

Injury prevention – tools and techniques

Carri Casteel, PhD

Todd Schoonover, PhD, CIH, CSP

WestON Meeting
September 14, 2018

Session Outline

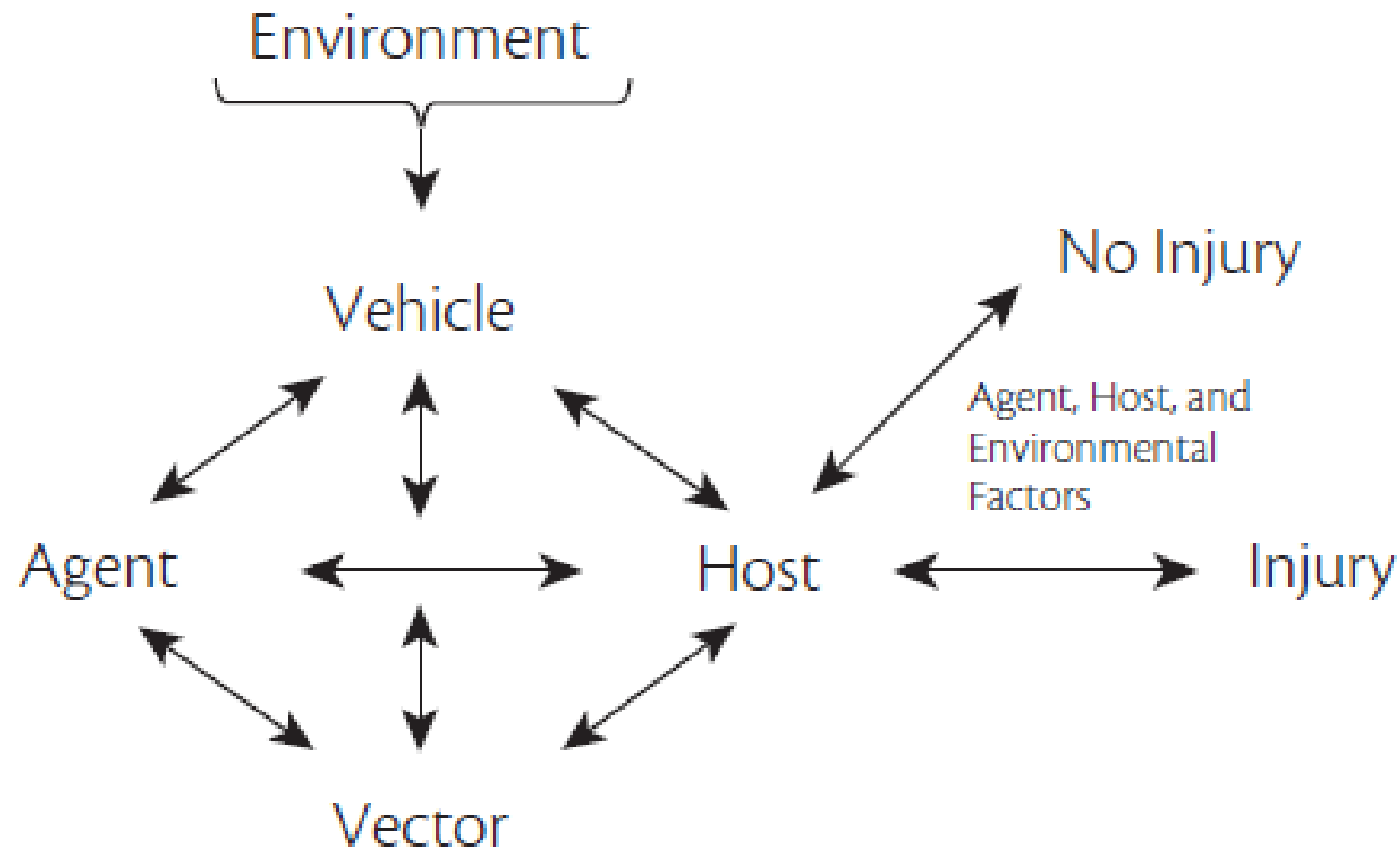
- Approaches to Occupational Injury Prevention
- Case Investigation from WA FACE
 - Identifying Contributing Factors
 - Haddon Matrix Group Exercise
 - Recommendations for Prevention
- Tips for Conducting Investigations

Approaches to Occupational Injury Prevention

- Epidemiologic Principles
- Injury Prevention Principles
- Public Health Principles

Causal Model for Injuries: Epidemiologic Triad

Injuries behave like infectious diseases.



Agent of Injury = Energy

- Mechanical
 - Injuries associated with penetrating or non-penetrating blows to the body (e.g., motor vehicle crash, fall)
- Thermal
- Chemical
- Electrical
- Asphyxiation
 - Injuries associated with the absence of energy elements (e.g., drowning, hypothermia)

Injury Definition

Damage to the body, usually sudden, resulting from exposure to a transfer of energy or from the sudden absence of energy elements

Epidemiologic Triad: Example

A clerk is working a late-night shift in a small, independently-owned convenience store in a high crime neighborhood. A person comes into the store, shops, and brings snacks and a case of beer to the cash counter. As the clerk rings up the merchandise, the person pulls out a gun and demands all the money from the register. The clerk complies, and the robber leaves with \$300 cash. The clerk then chases after the robber, and the robber shoots him.



- Host
- Agent (Energy)
- Vehicle, Vector
- Environment- Physical, Social




Epidemiologic Triad: Example

A young woman was working at a local restaurant when a large pot of oil spilled on her left arm, jawline, ear, neck, chest, stomach and back. None of her coworkers called 911; everyone was afraid, and no one knew what to do. She ran cold water over the burned areas and took some ibuprofen, unsure of whether or not to go to the hospital. She went home, and shortly thereafter went to the ER. She suffered mostly second-and third- degree burns on 15% of her body.



- Host
- Agent (Energy)
- Vehicle, Vector
- Environment- Physical, Social

Injury Phases

- Pre-injury phase  Primary Prevention
 - Period prior to energy transfer
- Injury phase  Secondary Prevention
 - Period in which energy is transferred to host
- Post-injury phase:  Tertiary Prevention
 - Period of recovery and rehabilitation

Haddon Matrix

	Host (victim)	Agent (energy) Vector (animate) Vehicle (inanimate)	Physical Environments	Social Environments
Pre-event				
Event				
Post-event				

A 19-Year-Old Landscape Laborer Dies When Entangled in Auger after Entering the Hopper of a Bark Blower Truck



Investigation: # 15WA02901

Release Date: October 20, 2017

SHARP Report: 52-41-2017

www.lni.wa.gov/Safety/Research/Face/Files/YoungWorkerBarkBlowerTruckAuger.pdf

A 19-year-old landscape laborer died after entering the hopper of a bark blower truck and becoming entangled in its rotating auger system. He was employed by a company that supplies commercial and residential bark, mulch, and other landscaping materials. It was his second day on the job. He had no prior experience in the landscaping industry.



Bark blower truck at the incident site. The victim was working inside the cargo hopper near the rear of the truck. The delivery hose can be seen extending from the rear of the truck.

On the day of the incident, the victim, along with a supervisor and another laborer were delivering a load of bark mulch to a residence. The bark blower truck consisted of a truck-mounted pneumatic blower system powered by a diesel engine.



Rear of the bark blower truck with the hopper access ladder and hose assemblies.

A conveyor belt was located on the hopper floor that moved material toward the auger system. The system consisted of a stir rod, to break up the material, and two diagonal augers that would drive the material down into a rotating feeder located on the hopper floor.



The empty cargo hopper of the bark blower truck. The material conveyor belt and feeder mechanism can be seen on the hopper bed.



The auger system used to deliver bulk material into the feeder mechanism located on the cargo hopper bed. The auger system is located on the rear interior of the bark blower truck.

Bulk material was loaded into the hopper and an operator would use a remote control to engaged the system's power. When the material entered the feeder it would be caught up in the air flow created and blown out the discharge hose.



Remote control used by the crew leader to operate the blower system.

The bark blower truck being used that day had pressure sensors that would shut down the conveyor belt when the auger system experienced too much pressure from bulk material in the hopper. However, the sensors were broken. Meanwhile the auger continued to force material into the feeder and out the delivery hose. When this happened, the bulk material would bridge over the conveyor belt, forming a tunnel. When tunneling occurred, material would not flow into the feeder and workers were unable to blow the material through the hose onto a site.



Pressure control switches on bark blower truck that were not operative and for which employer could not find replacements.

It had become accepted company practice to have workers inside the hopper standing on bulk material using a pitchfork to move material into the blower system. They would work 1 to 5 feet from the rotating unguarded auger system.

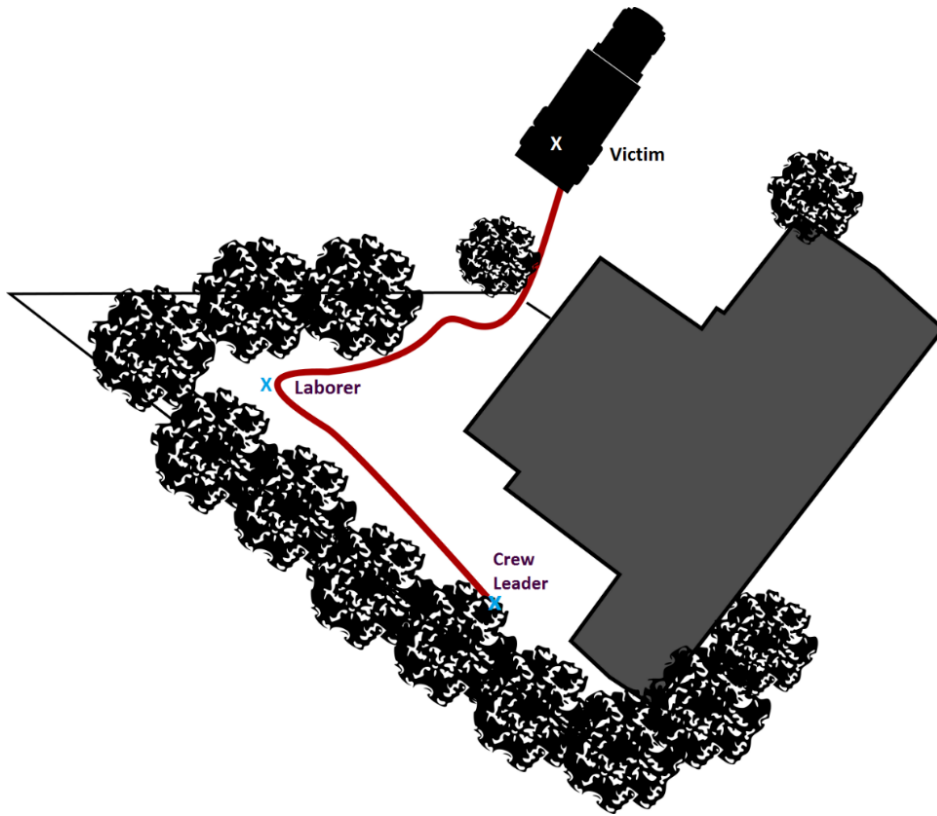


Pitchfork that the victim was using to move bark into the feeder.



Interior wall of the bark blower truck's hopper. Scratches on the rear of the wall near the auger system may have resulted from pitch forks used by employees to feed bark into the blower system while standing on the bark.

The supervisor and other laborer could not see the victim working in the truck's hopper as they were blowing bark onto the residence's yard. They heard a clunking noise coming from the truck and bark stopped flowing through the hose. The supervisor used the remote control to shut down power to the system. He then walked over to the truck and called the victim's name. When he received no answer, he instructed the laborer to call 911. Police and EMS arrived within minutes and found the victim entangled in the stir rod of the auger system.



Incident scene schematic showing approximate locations of blower truck and three employees at the residential delivery site [figure not to scale].



Residential yard where two employees were spreading bark while the victim was working in the hopper. The red circle indicates the blower truck's location.

Discussion

Occupational injuries and deaths are typically the culmination of many contributing factors, and understanding these factors can help us develop and implement prevention strategies.

What are some contributing factors in the death of this laborer?

Contributing Factors

- Employer's accident prevention program (APP) did not address bark blower truck operations and associated hazards, nor did it contain adequate instruction for employees.
- A safety and health training program providing adequate instruction for employees working on or around bark blower trucks was not developed and enforced.
- Permit-required confined spaces were not identified.
- Procedures for entering the permit-required space of the hoppers of bark blower trucks were not developed.
- Employees were not prevented from entering the hoppers of bark blower trucks while unguarded mechanical equipment was operating.
- New and inexperienced employees were not properly trained and supervised to avoid hazards.
- Lockout/tagout procedures were not used to control the blower system when employees were working in the bark blower hopper.
- Employees were not trained in lockout/tag out procedures.
- Blower system manufacturer's operating procedures were not followed.
- Maintenance of the blower system was not addressed.

How Could This Death Have Been Prevented?

Use the Haddon Matrix to brainstorm interventions

	Host (victim)	Agent (energy) Vector (animate) Vehicle (inanimate)	Physical Environments	Social Environments
Pre-event				
Event				
Post-event				

WA FACE Recommendations

- Conduct a job hazard assessment (JHA) of machinery, processes, and tasks to identify potential hazards to which workers might be exposed.
- Develop, implement, and enforce:
 - A written accident prevention program (APP) that is effective in practice and that includes training on identified hazards, hazard recognition, and the avoidance of unsafe work conditions and practices specific to the worksite.
 - Written standard operating procedures (SOPs) that are specific to bark blower truck operations. Train and supervise employees in these procedures.
 - A comprehensive written hazardous energy control program including a lockout/tagout (LOTO) procedure and training for maintenance and servicing of bark blower trucks.
 - A comprehensive written program detailing procedures for safe entry into or work in permit-required confined spaces, such as bark blower truck hoppers.

WA FACE Recommendations (cont'd)

- Maintain machinery and equipment in safe operating condition. Remove malfunctioning machinery and equipment from service and repair or replace.
- Affix labels to equipment containing graphics providing hazard warnings and instructions for the safe use of equipment.
- Ensure that young workers and inexperienced workers are adequately trained and supervised to perform their work safely.

Conducting your own traumatic injury or fatality investigation

Resources

- Death certificate*
- Coroner or Medical Examiner's report*
- OSHA or other agency inspection report*
- Employer interview or documents
- Police report
- Witness interviews
- Media reports

*Essential

Conducting your own traumatic injury or fatality investigation

Strategies for gaining employer cooperation

- Introduce yourself briefly express your condolences.
- Relate you are not associated with OSHA or any other enforcement agency.
- Tell them your goal is to write a report and share information with those who can prevent similar incidents.
- Ask them to meet at their convenience and say it will take as little as an hour.

At this point, you usually get a 'yes' or 'no'. If they are undecided:

- Assure them the report will not assign blame or contain any names or identifiers.
- Offer to send them examples of similar investigation reports.
- Let them know they can choose to withdraw at any time.
- Invite them to review the report before publishing.

Conducting your own traumatic injury or fatality investigation

Available soon from NIOSH Division of Safety Research by request

STATE FACE PROJECT
HANDBOOK
Revised October 2017

Table of Contents
OBJECTIVE OF THE STATE FATALITY ASSESSMENT AND CONTROL EVALUATION (STATE FACE)
PROJECT
SCOPE OF THE PROJECT
DETERMINATION OF CASES ACCORDING TO THE SCOPE OF THE CENSUS OF FATAL
OCCUPATIONAL INJURIES (CFOI)
Criteria
Type of worker
Travel status
Type of incident
Type of worker activity
Location of incident
Other FACE Specific Criteria
INVESTIGATION – CONDUCTING THE FACE EVALUATION
PRE-INVESTIGATION PROCEDURES
OSHA or Other Reporting Agency Contact
Employer Contact
Contact with Other Agencies
Travel Arrangements
Basic Equipment to Have at Immediate Disposal
THE ROLE OF THE INVESTIGATOR AT THE INCIDENT SITE
CONDUCTING THE EMPLOYER INTERVIEW

Opening Conference
Closing Conference
PREPARING TO INTERVIEW THE WITNESS
THE FACE NARRATIVE REPORT
DSR RECOMMENDED FACE REPORT FORMAT
STATUS REPORT
REPORT WRITING PROBLEMS AND SOLUTIONS
APPENDICES
INVESTIGATION FORMS
GENERAL INVESTIGATION INFORMATION GUIDE
MACHINE INVESTIGATION INFORMATION GUIDE
FALL INVESTIGATION INFORMATION GUIDE
FOREIGN BORN WORKER INVESTIGATION INFORMATION GUIDE
NIOSH Fatality Assessment and Control Evaluation Team
Surveillance and Field Investigations Branch
STATE PROJECT CONTACTS LIST
California FACE Program
Kentucky FACE Program
Massachusetts FACE Program
Michigan FACE Program
New York FACE Program
Oregon FACE Program
Washington FACE Program
EXAMPLE LETTERS
COVER LETTER FOR REPORT TO BE SENT TO EMPLOYER
REQUEST TO OSHA FOR DRAFT REVIEW
REQUEST FOR POLICE REPORT
REQUEST FOR DEATH CERTIFICATE AND MEDICAL EXAMINER'S REPORT
REQUEST FOR EMS REPORT

Acknowledgements

- Christina Rappin, WA FACE Investigator
- Randy Clark, WA FACE Data Manager
- Heartland Center for Occupational Health and Safety,
University of Iowa

- Funded in part by a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH grant# 2U60OH008487)

Contact Information

Todd.Schoonover@Lni.wa.gov

360-902-5663

carri-casteel@uiowa.edu

319-384-4388