OREGON State FACE Program
Fatality Assessment & Control Evaluation
Oregon Institute of Occupational Health Sciences • Oregon Health & Science University
3222 SW Research Dr. L606 • Portland, OR 97239 • 503-494-2281

REPORT#: 2021OR01 **REPORT DATE:** May 23, 2023

Heavy Equipment Operator and Rancher Crushed by Excavator—Oregon

INCIDENT HIGHLIGHTS

DATE:
Mar. 12, 2021

TIME:
8:45 a.m.

VICTIM:
57-year-old white heavy equipment operator; 47-year-old white rancher

INDUSTRY/NAICS CODE:
Construction/238910 and Farming/111940

EMPLOYER:
Heavy equipment and farming/ranching

SAFETY & TRAINING:
The heavy equipment operator was considered experienced, no formal training.

SCENE:
Hay Ranch

LOCATION:
Oregon

EVENT TYPE:
Caught in or between

SUMMARY

On March 12th, 2021, a 57-year-old heavy equipment operator and 47-year-old rancher were run over by an excavator; they died from their injuries immediately. Another individual was able to stop the excavator without getting injured. At the time of the incident, the heavy equipment operator was standing on the tracks when the pilot control stop bar was accidentally released, allowing the machine to start moving. He fell in between the tracks. When the rancher saw him fall, he ran to the machine to pull him to safety but was also run over by the machine. The operator's lunchbox had been left resting on the travel control levers causing the machine to activate when the pilot control stop bar was accidentally released. READ THE FULL REPORT> (p.4)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Older equipment does not have the most current safety features.
- Inadequate training on the equipment and hazards of operation.
- Failure to read and/or understand and follow the manufacturer's manual and posted warnings for equipment operation.

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RECOMMENDATIONS

To help prevent similar occurrences, Oregon FACE investigators concluded that employers should:

- Replace older equipment with newer equipment that has enhanced safety features.
- Train employees on the potential risk of not shutting off equipment when exiting the operator's seat.
- Ensure that employees follow the manufacturer's safety instructions.LEARN MORE> (p.8)

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Oregon Fatality Assessment and Control Evaluation Program

The Oregon Fatality Assessment and Control Evaluation (OR-FACE) Program is a project of the Oregon Institute of Occupational Health Sciences at Oregon Health & Science University (OHSU). OR-FACE is supported by a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH) (grant #U60OH008472) through the Occupational Public Health Program (OPHP) of the Public Health Division of the Oregon Health Authority. OR–FACE reports are for information, research, or occupational injury control only. Safety and health practices may have changed since the investigation was conducted and the report was completed. Persons needing regulatory compliance information should consult the appropriate regulatory agency.

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OR-FACE supports the prioritization of safety interventions using a hierarchy of safety controls, where top priorities are hazard elimination or substitution, followed by engineering controls, administrative controls (including training and work practices), and personal protective equipment.

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INTRODUCTION

At 8:45 am on March 12th, 2021, a 57-year-old heavy equipment operator and 47-year-old ranch manager were killed when a 54,000-pound tracked excavator ran over them. On March 15th, 2021, an OR-OSHA compliance officer conducted an investigation of the fatality and reviewed the circumstances of the incident. On March 16th, 2021, the Oregon Occupational Safety and Health Division (OR-OSHA) notified the Oregon Fatality Assessment and Control Evaluation (OR FACE) investigators of the incident. The Oregon FACE investigators reviewed the OSHA written investigation and spoke with the OSHA investigator. Primary evidence photographs of the incident site were reviewed, as well as witness statements taken by OR-OSHA and the local sheriff. An Oregon FACE investigator also spoke with and visited excavator manufacturers and their staff representing six different equipment manufacturing companies to determine if new engineering controls were available and could be retrofitted into existing equipment.

EMPLOYERS

The heavy equipment operator was employed by a small company hired to build an access road across a small creek and prepare the site for the construction of a new horse barn. The operator was the only employee of the company at the job site. The deceased heavy equipment operator had been employed by the company for the past 32 years. The employer was a holding company that provided heavy equipment to operators, sold farm equipment, helped with various farming activities, and provided other related services. At the time of the incident, the holding company had a total of 40 employees. Six of these employees, including the deceased, were heavy equipment operators. The deceased was the only holding company employee on site at the time of the incident.

The ranch manager was the sole proprietor of a specialty ranch management contracting company. He had been hired as an independent contractor by the ranch property owner.

WRITTEN SAFETY PROGRAMS and TRAINING

At the time of the incident, according to OR-OSHA, the holding company employer did not have a comprehensive safety and health plan and there was no evidence of a formal worker training program or process. The employer's policy was to start new employees working with smaller equipment and let them operate it in a safe area until they were proficient. Employees could then work their way up to larger equipment. More experienced operators provided the training to newer operators. When asked about requiring employees to read the safety manual, the employer replied it was provided in the equipment and he stated, "I don't require employees to read the manual" and "the manuals are in the equipment."

There was no information regarding the ranch manager's safety or training programs as he was the sole proprietor (deceased) and was working as an independent contractor for the property owner. There were no notes provided from his spouse who worked with him as an office manager at the same location. A comment from the witness was that he always worked safely.

WORKER INFORMATION

The 57-year-old male heavy equipment operator had worked for the same employer since 1989 according to his obituary (32 years). Prior to this he had farm work experience during high school, and it is believed he also had heavy equipment experience during this time. He graduated high school and went to work full-time operating equipment. At the time of the incident, the decedent had 35 years of experience.

The 47-year-old ranch manager grew up on a dairy farm as described by his obituary. After high school he attended Utah State University where he studied Agriculture. He worked on farms and ranches throughout his adult career and had approximately 29 years of experience in this type of work.

EQUIPMENT

The holding company employer owned the John Deere 225D LC excavator. Based on the serial number, it was manufactured in 2010. The investigation found controls operated as designed, i.e., there were no malfunctions identified that would have contributed to the fatality. However, there was an approximately 20-pound lunch box wedged between the front window and the directional control levers. The weight of the lunch box depressed the lever causing the machine to travel when the pilot control stop bar was released. How or why this occurred was not determined. A third person used the pilot control stop bar to stop the movement. The pilot control stop bar or shut off lever is located near the cab exit and shuts off the hydraulic pressure to all control valves. When the lever is in the up or locked position the machine will not move even if the controls are accidentally depressed. However, when the pilot control stop bar was unintentionally moved to the down or unlocked position, the travel controls were able to be activated. The excavator traveled approximately 25 feet before being stopped.

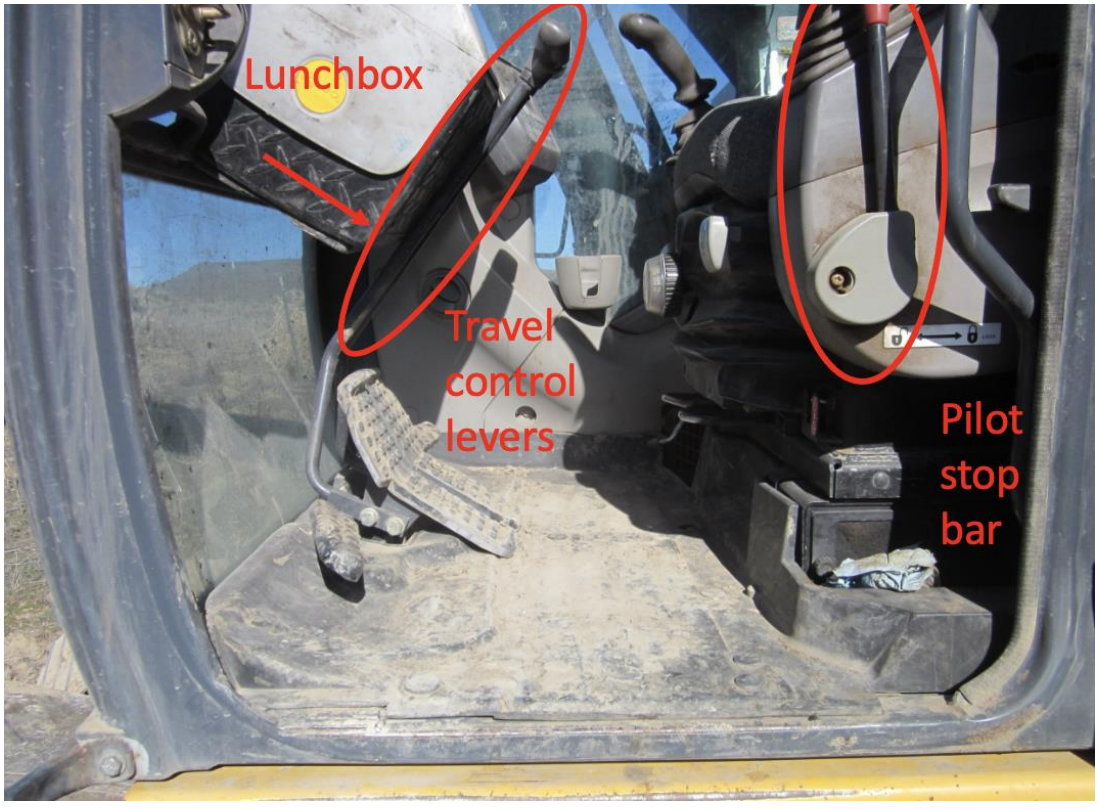

Photo 1. Operator's lunchbox wedged behind the control levers as found after the incident. Note the travel control levers have been moved toward the seat by the weight of the box. (*Photo courtesy of OR-OSHA.*)

INCIDENT SCENE

The equipment operator was using the excavator to build a road across a small creek and prepare the site for a new horse barn. The employee operating the excavator was outside of the cab with the engine running and was seen walking back from the bucket by the witness, who had arrived with the ranch manager. The bucket was in the air, approximately 1 foot above grade. The operator had rotated the cab approximately 30 degrees toward the right track as shown in Photo 2 below. The operator climbed on the track and started to reach into or get back into the excavator, when the ranch manager approached him. The operator stood on the track while they talked. The equipment operator had stored his lunchbox on the control levers, but with the pilot control stop bar still engaged, the machine remained stationary. After the conversation with the equipment operator, the ranch manager started to walk back toward the witness. The excavator suddenly started moving in reverse with the equipment operator still standing on the track. The operator's employer speculated that as his employee re-entered the cab, possibly to turn the excavator off, his coat hooked on the pilot control stop bar shifting it and allowing the machine to move. This is just one possible scenario that could have caused the pilot control stop part to be moved into the unlocked position.

The equipment operator lost his balance and fell toward the center of the machine, ending up under the track on the opposite side of the cab door. During the OSHA investigation it was noted that the machine moved approximately 25-feet in a matter of seconds. The excavator had two travel speed control modes, slow (turtle) and fast (rabbit). It was noted by the responders that first arrived on the scene, that the excavator had been left in rabbit, or fast travel mode.

The second decedent, the ranch manager, saw the equipment operator fall and rushed back to the excavator to get between the tracks to pull the operator free from the tracks. He was also caught underneath the same track, and both were crushed by the weight of the machine. The witness was looking in the other direction at the new horse barn at the time of the initial events. When he saw what had happened, he ran over to stop the excavator. He was able to reach the pilot control stop bar and raise it back up in the locked position, stopping the movement. He was unable to retrieve either person as they were underneath the track. The excavator had to be jacked up to removed the deceased.

Photo 2. Rotated position of the excavator cab at the time of incident (*Photo courtesy of OR-OSHA.*)

WEATHER

The weather on the day of the incident was clear and cold, with little to no winds (less than 5 mph) and the temperature was approximately 34^{0}F based on the nearest National Oceanic and Atmospheric Administration (NOAA) government weather station (Boise, ID, about 35 miles away) [Weather Underground 2023]. Weather is not believed to have been a contributing factor in this incident.

INVESTIGATION

The holding company equipment operator arrived at work on March 12th, 2021, at approximately 8:30 am. He had worked on this particular job site prior to this day. He began work that day on the road being built to cross the creek using the excavator. The incident occurred approximately 15 minutes into his shift. The ranch manager arrived with another person (incident witness) in a side-by-side quad at approximately 8:45 am. The ranch manager approached the equipment operator who had walked from the excavator bucket back to the track and had climbed onto the track while they had a conversation.

A quote in the Malheur Enterprise online article listing incident investigation findings from the sheriff and OR-OSHA (12/17/2021) attributed the following statement to a fellow excavator company employee: the deceased heavy equipment operator is "…an outstanding operator and has always been very safe while operating the excavator." He

added, the decedent "always had his lunch box in the excavator with him". The cab of the excavator is small so anytime the deceased, "exits the machine he places his lunchbox up against the front window and it also rests against the lever of the machine."

The operator left the cab with the bucket raised approximately one foot above grade, despite the manufacturer's instructions to lower the tool to the ground before exiting the cab. The employer did not require employees to comply with these instructions. As shown in Photo 3 below, the prominent warning sticker from inside of the excavator cab lists this safety instruction. Other safety instructions are included the equipment manual.

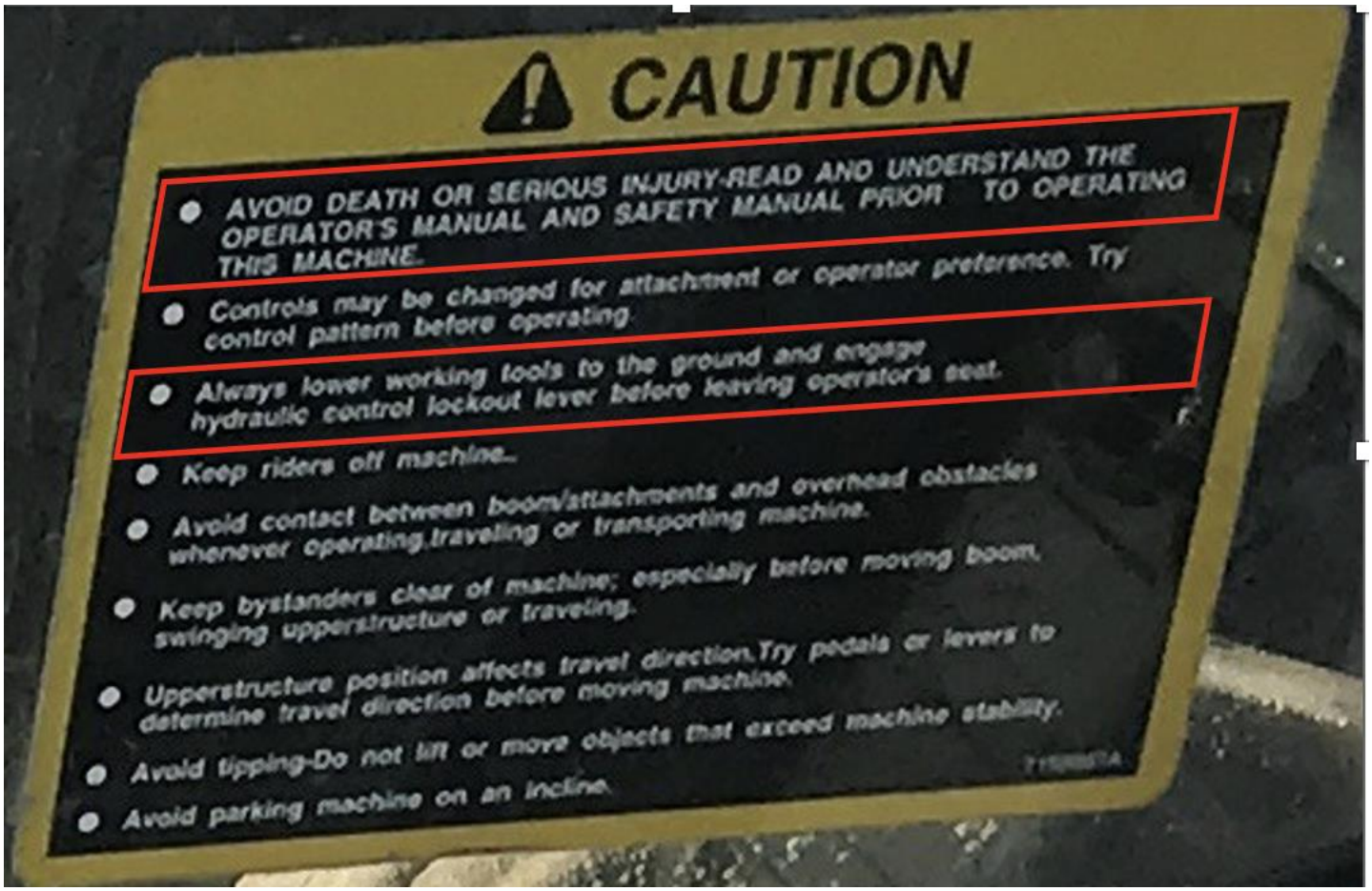

Photo 3. Window sticker with warnings to ensure safe operation (Photo courtesy of OR-OSHA).

CAUSE OF DEATH

At approximately 9:00 am, the local sheriff was contacted regarding the incident and emergency responders were dispatched to the site arriving approximately 50 minutes later. According to the Medical Examiner report, the cause of death was crushing injuries for both decedents. Both were pronounced dead at the scene.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. Oregon FACE investigators identified the following unrecognized hazards as key contributing factors in this incident:

- *Equipment was older and did not have updated safety features of newer equipment models.*
- *A lack of formal safety training for equipment operators, including a review of the equipment manual.*
- *Deviation from manufacturer's safety manual instructions and decal inside the cab*
  "Always lower working tools to the ground and engage pilot control locking lever before leaving operators seat"
- *Manufacturer's instructions for safe equipment operations were not followed (shutting off equipment, lowering tools to ground prior to exiting cab, no loose items in the cab).*
- *Inadequate assessment of the hazards prior to emergency response. While there is the need to act quickly in an emergency situation, responders must also stop to assess the risks in order to protect their own safety first.*

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should replace older equipment with newer equipment that has advanced safety features.

We start our recommendations with the prevention through design changes and equipment engineering controls that could have prevented this fatality. Based on discussions with various equipment manufacturers, there are several equipment safety features that could have prevented these fatalities. When feasible, equipment owners should consider replacing their equipment with newer models that have additional safety features. One equipment manufacturer currently has equipment that includes a seat sensor that automatically locks out hydraulic systems (stops movement) when body weight is removed from the seat. Another equipment manufacturer has a pilot control lever built as part of a hinged section that must be rotated up and out of the way in order to enter and exit the cab. While up, the hydraulics are locked out. An additional equipment manufacturer has added an emergency shut-off switch that's easily accessible from the ground in addition to a large pilot control lever. The employer mentioned during the OSHA interview that he thought the equipment manufacturer "should add a pressure sensor to the seat…to disengage the throttle. Several other equipment manufacturers already offer this safety feature on equipment.

Recommendation #2: Employers should provide formal safety training, including a review of the equipment manual.

The employer provided informal training for equipment operators, that included newer operators working with experienced operators. Newer operators started on smaller equipment and moved up to larger equipment over time. A formalized training program should include specific information on the operation of the equipment including the manufacturer's instructions, a review of the equipment manual, and training on employer specific equipment policies. This training should also include an operational evaluation of performance including regular and consistent use of safety features, especially when exiting and entering the cab. As with other equipment users (forklift, aerial lift, etc.), employers should confirm that safe operating practices are still being used annually and should include a formal recertification process every three years by having the operator review these practices and demonstrate proficiency. It is important that employers obtain and keep the operation and safety manuals from equipment manufacturers and require operators to review the manuals initially and periodically.

Recommendation #3: Employers should ensure that employees follow manufacturer's safety manual instructions, best practices, and warnings on the cab window sticker.

The equipment manufacturer specified that an operator should always lower the excavating bucket or other working tools to the ground and apply the pilot control locking lever when parking or leaving the machine. The machine should have also been turned off before leaving the cab. By following the manufacturer's instructions, the inadvertent activation of the machine that caused the fatality may have been prevented.

NIOSH published a study of excavator incidents that occurred between 1992 and 2000 (Document 2004-107). One conclusion they reached was that employers should "instruct operators to lower the boom to a safe position on the ground and turn off the machine before stepping off for any reason."

It is important that employers require operators to follow the manufacturer's instructions and requirements when operating the machine. Employers should provide initial training and education regarding how to safely operate equipment, especially as it relates to the possible consequences of ignoring this information. Employers should also monitor and observe to confirm that training has been understood and is being followed.

Best practices including no loose items in the cab should also be included in the training and employer requirements. Based on a quote in the investigation, at least one other employee knew the equipment operator placed his lunchbox on the travel levers when getting into the cab. Had this been identified and prohibited by the employer, the incident may have been prevented.

Recommendation #4: Employers should develop and enforce a clear policy stipulating that any items stored in the equipment cab must be properly secured.

Cab storage options are limited. The only storage option in this piece of equipment was a cup holder in the arm rest area. Loose equipment is a well-recognized hazard as it can interfere with the pedals and potentially move under or behind them. The employer could have been aware of the limited storage options on the equipment. Until the cab area could be modified to accommodate storage of additional items, or storage in other locations on the machine, employers should develop and enforce a clear policy stipulating nothing is permitted in the cab that cannot be properly secured.

Newer heavy equipment designs provide storage for a mobile phone, large drink containers and most provide hot/cold beverage storage compartments. Some provide jacket/hardhat hangers but despite most operators being in the cab for extended periods, few specifically address the need for a lunchbox or similar food and drink container storage in the cab or elsewhere on the excavator. Manufacturers need to continue to evolve their equipment designs in ways that meet workers' needs, including safer options for carrying lunch/snacks in the cab.

ADDITIONAL RESOURCES

CDC/NIOSH (2003). Preventing Injuries When Working with Hydraulic Excavators and Backhoe Loaders. NIOSH Publication No. 2004-107.

DISCLAIMER

Furthermore, Oregon FACE and NIOSH are not responsible for the content of these websites. All web addresses referenced in this document were accessible as of the publication date.

REFERENCES

Malheur Enterprise (2021, Dec 17). State report outlines details of tragic episode in Westfall that left two men dead. Malheur Enterprise.

Weather Underground (2022). The Weather Underground Family of Sites, Weather History for Boise, ID.

INVESTIGATOR INFORMATION

This investigation was conducted by Steve Eversmeyer, CIH, CSP, Contract Fatality Investigator/Outreach Specialist, OR-FACE Program. The report was reviewed and received input from Dr. David Hurtado, Director, OR-FACE Program, Jackie Boyd, OR-FACE Project Coordinator, and Rachel Madjlesi, OR-FACE Fatality Investigator, Dr. Barbara Hanley, and the OR-FACE Publications Review Panel including Dr. Ryan Olson and Gideon Potgieter.

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