OREGON State FACE Program
Fatality Assessment & Control Evaluation

Oregon Institute of Occupational Health Sciences • Oregon Health & Science University
3181 SW Sam Jackson Park Rd. L606 • Portland, OR 97239 • 503-494-3940

REPORT#: 2018OR40 **REPORT DATE:** Oct. 30, 2020

Newly hired lighting technician electrocuted while working night shift—Oregon

INCIDENT HIGHLIGHTS

DATE:
September 26, 2018

TIME:
Approx. 3:30 AM

VICTIM:
28-year old male, employed 3 weeks

INDUSTRY/NAICS CODE:
Construction, Electrical Contractors and Other Wiring/238210

EMPLOYER:
Staffing agency

SAFETY & TRAINING:
No records of safety training. PPE not provided by employer.

SCENE:
Retail store chain

LOCATION:
Oregon

EVENT TYPE:
Electrocution

SUMMARY

A 28-year-old lighting technician was electrocuted while replacing overhead light fixtures in a commercial building. The job foreman thought the lights were on a 208/120V single-phase panel, but they were on an energized 480/277V 3-phase panel. At 3:30am, co-workers found the lighting technician slumped over the scaffold. The foreman performed CPR and Emergency Medical Services were called. The worker could not be resuscitated and was pronounced dead at the scene. READ THE FULL REPORT> (p.3)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- A trained competent person was not at the job site, and workers continued to work in the same hazardous conditions, even after the fatal incident.
- Employees were exposed to wiring work on an energized circuit.
- Inadequate training on workplace hazards associated with electrical wiring, especially for new employees.
- Employer not licensed to work in Oregon; did not assess safety procedures or licensing status of an acquired company, whose staff was performing the work.
- Lack of appropriate PPE for the task.
- LEARN MORE> (p.9)

RECOMMENDATIONS

To help prevent similar occurrences, employers should:

- Competent person should be at job site to identify/mitigate safety hazards, and to stop work/secure scene when an injury occurs.
- De-energize circuits and use lockout/tagout procedures before work.
- Employers should provide written procedures and training to ensure employees are able to safely perform potentially hazardous tasks.
- All contractors and subcontractors should ensure compliance with license requirements in states where they conduct business. Especially, worker safety responsibilities should be explicitly clear between contractors, staffing agencies and/or host employers.
- Employers should provide all appropriate PPE needed for the task. LEARN MORE> (p.10)

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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

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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SUMMARY

On September 26, 2018, a male contract worker, employed 3 weeks with a staffing agency, was electrocuted while working on an energized lighting fixture during a night shift (7pm to 7am). A crew of subcontracted lighting technicians were replacing lights at a large retail store chain while the lighting circuits were energized. Workplace hazards at the stores were not identified. It was assumed that all stores were on the 120V single-phase circuits and previously retrofitted with luminaire (i.e., "quick") disconnects. Before work began in the store where the incident occurred, the foreman located what he thought was the lighting electrical panel, which was a 208/120V single-phase panel, but this panel was for accent lighting only. The main store lighting was in an uninspected panel and was a 480/277V 3-phase panel. At the time of the incident, the decedent was working on a fixture without a quick disconnect. About 3:30am, co-workers noticed the decedent was slumped over the scaffold and not moving. CPR was initiated and co-workers called 911. The decedent was declared dead at the scene by EMS. A Police Officer on scene notified Oregon OSHA (OR-OSHA) and instructed the crew not to disturb the incident scene prior to OR-OSHA investigation. After the decedent was removed and law enforcement left, the foreman and remaining crew continued to work, completing the disconnect installation the decedent was working on, exposing themselves to similar, and potentially fatal, hazards. Photographs and witness statements were taken by the OR-OSHA Safety Compliance Officer (SCO). The Oregon Fatality Assessment and Control Evaluation (OR-FACE) investigated this workplace fatality by reviewing the OR-OSHA investigation files, and corresponding with the OR-OSHA SCO.

INTRODUCTION

The decedent had been employed with a staffing agency for approximately 3 weeks, which, according to co-workers, was the extent of his experience in the electrical trade. The prime contractor had won a bid to replace fluorescent light fixtures with LED light fixtures in all 30+ Oregon stores of a national retail chain. The prime contractor then hired a staffing agency to contract lighting technicians to do the work. The decedent and the rest of the 6-person lighting technician crew had completed lighting fixture replacement in 11 stores in the 3 weeks prior to the incident. Because the decedent did not have any prior electrical experience, this 3-week period served as his on-the-job training. The technical manager, a journeyman electrician, who resided in California, did not inspect any stores in Oregon. Some of the lighting systems in the stores had previously been retrofitted with quick disconnect circuits required by National Electrical Code (NEC) Article 410.130(G)(1) that states "for existing installed fluorescent luminaires without disconnecting means, a disconnecting means must be added when a ballast (a regulator for current) is replaced" (NEC, 2011). This is so that maintenance workers can replace fluorescent bulbs without having to turn off the circuit breaker to the lighting system. In the store where the incident occurred, about 60% of the light fixtures were not retrofitted with the quick disconnects.

EMPLOYER

The prime contractor was a commercial lighting maintenance contracting firm based in Ohio that had been in business 25+ years and had approximately 14 employees. The business model of the prime contractor was to bid on energy efficient lighting retrofit jobs, then subcontract the work. The prime contractor was hired by the store chain to replace fluorescent lights with LED light fixtures in all 30+ Oregon stores. The prime contractor then subcontracted the work

with a staffing agency based in Michigan that provides contracted mechanical automation engineering/design and manufacturing labor. The prime contractor's business was dissolved in 2019.

The Michigan-based staffing agency (employer) has been in business for approximately 30 years. The staffing agency recently acquired (5 months before incident) a small electrical contracting company based in California that was owned by a journeyman electrician. This journeyman electrician was hired to be the technical manager of the staffing agency's new electrical contracting division and had 35+ years of experience as an electrician, and approximately 30+ years as a journeyman. In the staffing agency's employee handbook, the technical manager is listed as a "job site supervisor." The acquired company had applied for and received a Construction Contractors Board license to operate in Oregon in 2015, but the license was not valid at the time of the incident. The staffing agency had been working in Oregon since September 10, 2018, but was not licensed by the Construction Contractors Board to operate in Oregon at the time of the incident, did not have a valid Workers Compensation insurance policy, and was not licensed by the Electrical and Elevator Board with the Oregon Building Codes Division.

Two employees of the acquired company, with 10+ years of lighting technician experience each, were promoted to lead lighting technicians with the staffing agency (employer). Another employee of the acquired company with several years of experience was promoted to site foreman. All three were working in the store where the incident occurred. The employer hired lighting technicians based on a referral from the technical manager on a contract basis. Lighting technicians were paid directly by the employer. The lead lighting technicians and foreman had never met any representative of the employer. The foreman said he received an employee handbook from the employer that had been written for the mechanical/manufacturing divisions, not the newly formed electrical division. The foreman had never met the decedent prior to the job in Oregon and had no prior knowledge of the decedent's work experience.

WRITTEN SAFETY PROGRAMS and TRAINING

The employer had written policies on workplace safety for the mechanical and manufacturing divisions, but did not develop workplace safety policies for the newly formed electrical division, and did not assess the workplace safety policies of the newly acquired electrical contracting company that became the newly formed electrical division. The employer had a written policy on de-energizing manufacturing equipment and installing lockout/tagout (LOTO) devices during machine repair and maintenance, but the recently acquired company had no written policy for de-energizing lighting circuits or for installing LOTO devices on electrical systems. Lighting technicians were not trained in LOTO procedures and were not provided LOTO devices to lockout an electrical system. Lighting technicians were not evaluated for workplace safety knowledge or practice, nor did they receive safety training or direction from either the employer or the technical manager. Thus, employees were not aware of any company policies, or dangers of working on energized circuits. The employer and the technical manager of the newly formed electrical division were unable to produce any documentation of workplace safety training for any lighting technician. This included a lack of documentation of any assessment or training provided to the decedent during his tenure with the employer.

WORKER INFORMATION

The decedent was a 28-year old male contractor who resided in Wisconsin. He had worked for the employer for 3

weeks and had no previous electrical trade experience. Information regarding the decedent's work history prior to being hired by the staffing agency was not available. During interviews with the OR-OSHA SCO, co-workers said the decedent did not have prior electrical trade experience.

INCIDENT SCENE

The incident site was a large retail store, approximately 60,000 square feet, with a mezzanine floor for utility chases, electrical panels and HVAC. The store had approximately 500 fluorescent lighting fixtures, all of which were contracted for replacement with LED fixtures. The employer scheduled the crew to work in the store when it was closed, from 7pm to 7am, until all the fluorescent lighting in the store had been replaced with LED lighting. The employer did not install or use secondary (i.e., portable) light fixtures and relied on the store lighting for job site illumination.

WEATHER

The incident took place indoors. There were no electrical storms that day. Weather is believed to not have been a factor in this incident (Weather Underground, 2018).

INVESTIGATION

On September 25, 2018, at approximately 7pm, a 6-man lighting technician crew arrived at the store where the incident occurred. The employer's competent person[1] resided out of state and did not visit any of the stores in Oregon prior to the crew beginning work. He assumed all the stores had similar lighting on 120V single-phase circuits, and that all had already been retrofitted with quick disconnects (*See image 1*).

A. B C. D.

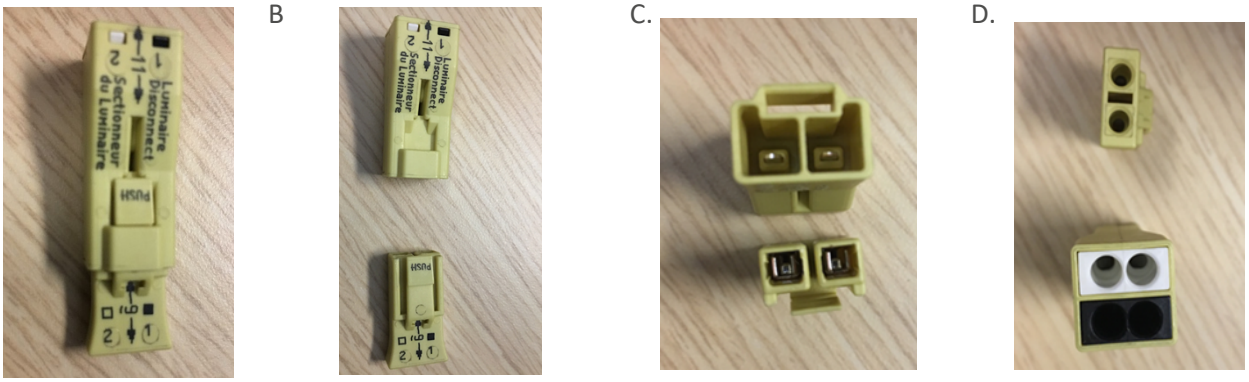

Image 1. Luminaire (i.e., "quick") disconnect in different orientations. A. connected. B. Pulled apart. C. Looking inside at terminal connection points. D. Looking end-on, at wire feed points.

The foreman of the lighting technician crew located what he thought was the main lighting panel, a 208/120V single-

[1] A *competent person* is defined as someone who "is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measure to eliminate" the hazards (CFR 29 1926.32(f) adopted into OAR 437-003 by reference).

phase panel (*See images 2 and 3*). However, the 208/120V panel was for accent lighting only.

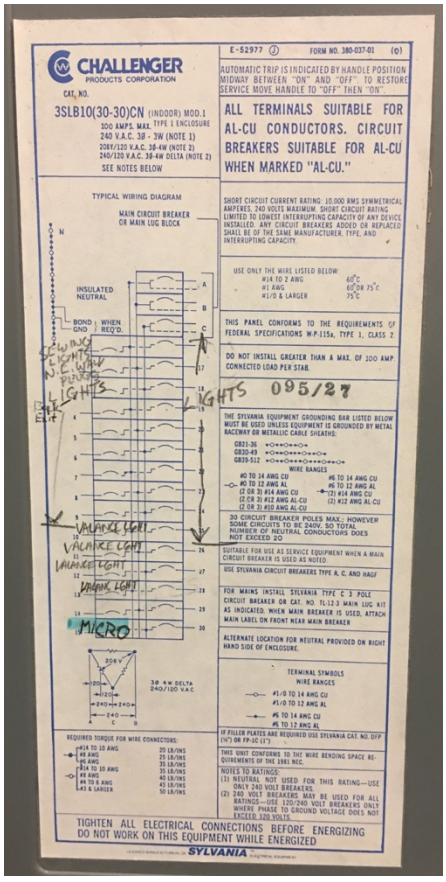

Image 2. Information sticker on outside of 208/120V single-phase electrical panel box. Note some circuits are labeled "lights". These are for the accent lighting in the store.

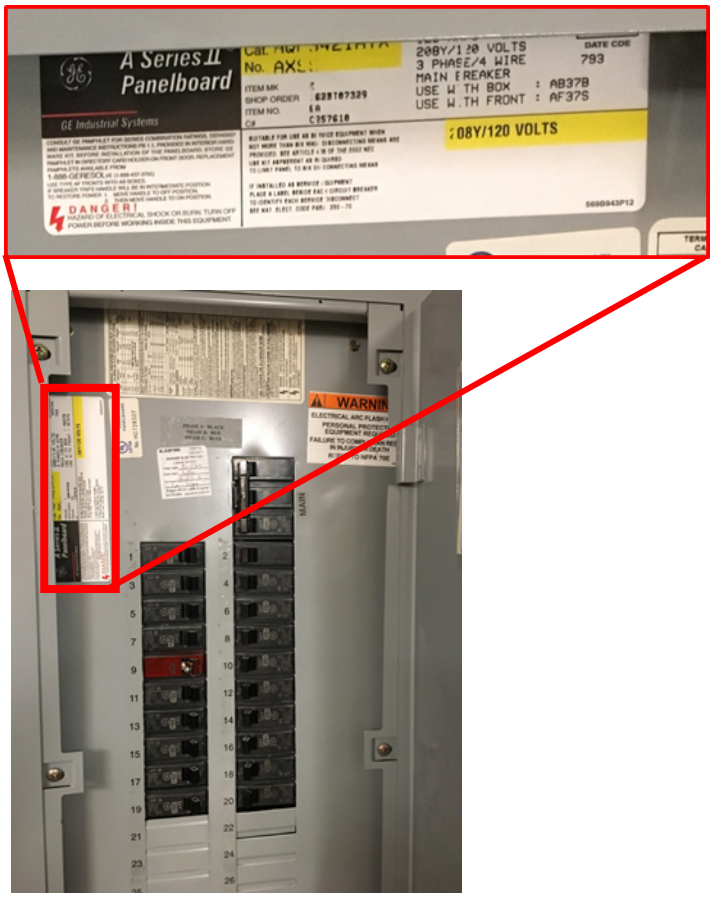

Image 3. 208/120V electrical panel controlling accent lighting and store outlets, with close-up of information sticker on inside of the breaker panel box. Note this is a 3-phase panel.

The main store lighting circuits were in another panel, on a 480/277V 200A 3-phase panel (*See images 4 and 5*). There was also an automated lighting system on third (emergency) circuit panel. The automated lighting system powered store lighting at night and in the event of a power failure. This panel had an override switch that, when pushed, would turn on the store lights for approximately 40 minutes. During the work, the foreman designated one of the crew members to stay on the ground and supply other crew members on the scaffolds and scissor lifts with materials for the light fixture replacement. The person on the ground was also designated to regularly go up to the mezzanine level and push the emergency circuit panel override button to turn the store lighting back on. Lighting technicians worked in different sections of the store and were not necessarily working near one another.

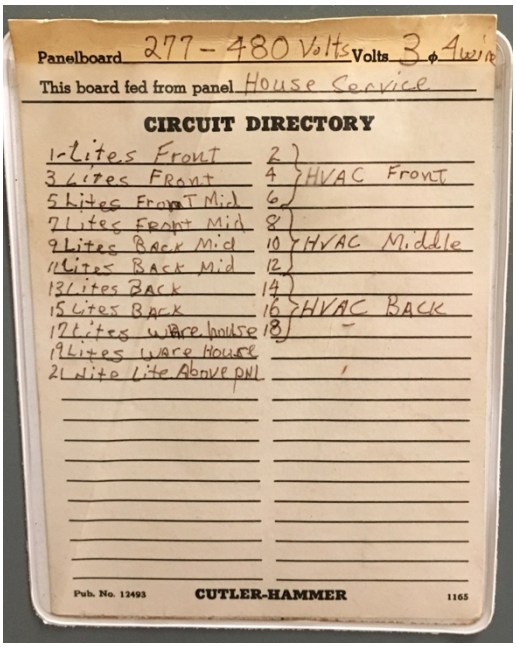

Image 4. Information sticker on outside of 480/277V 200A 3-phase electrical panel box. This panel contains the main store lighting circuits.

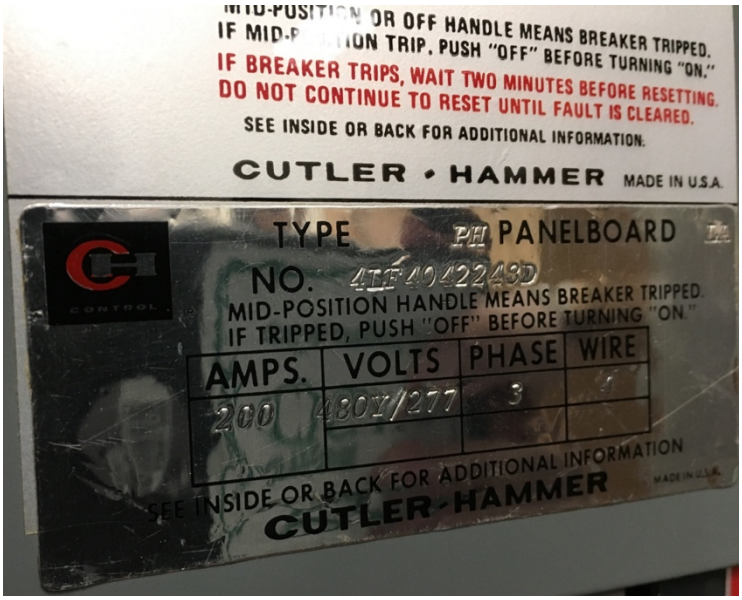

Image 5. Close-up of sticker on inside of 480/277V 200A 3-phase electrical panel box.

After work began, the crew discovered that about 60% of the store light fixtures did not have quick disconnects. During the OR-OSHA investigation, the technical manager said there was an unwritten policy to de-energize the circuit and for the lead technician to handle quick disconnect installation. However, employees stated they were expected to install quick disconnects on live circuits and were trained how to do so. During the OR-OSHA investigation, one crew member told the OR-OSHA Safety Compliance Officer (SCO) that if only one wire is cut and exposed at a time, there shouldn't be a problem with electric shock. The same crew member also stated that he didn't wear gloves while installing quick disconnects, although he did purchase insulated pliers and wore work boots. The only personal protective equipment (PPE) provided to him by the employer was a hard hat. Any additional PPE in use was purchased by employees. The appropriate PPE for working with live circuits includes untreated natural fiber long-sleeve shirt and pants, eye protection, insulated hand and foot protection, insulated tools rated to the voltage, and an electrically rated hard hat.

The energized lights were suspended from the ceiling with metal braided wire. Signage, also suspended with metal braided wire from the ceiling, was in the direct path of where employees were working with energized wires, while standing on metal scaffolds or scissor lifts. Employees reported moving signs to the side of their scaffold or scissor lift to work on some light fixtures. This was the case for the decedent while working on the light fixture where he was electrocuted (See images 6 and 7).

On the night of the incident, the decedent was hit across the nose by a sign suspended from the ceiling, which caused a

small laceration. The decedent told his foreman he just needed first aid and felt fine to return to work. The decedent was working on a fixture without a quick disconnect when the incident occurred. It is suspected he was in the process of installing the disconnect when he was electrocuted. He was not wearing gloves.

Image 6. Light fixtures and signage suspended from the roof by metal braided wire. Scaffold location recreates where decedent was working at the time of the incident. Writing on signs obscured for report.

Image 7. Different angle of light fixtures and signage suspended from the roof by metal braided wire. Scaffold location recreates where decedent was working at the time of the incident.

At approximately 3:30am, co-workers noticed the decedent was slumped over the scaffold and not moving. The foreman climbed up the decedent's scaffold and checked for a pulse. When he did not find a pulse, he initiated CPR, while other co-workers called 911. First on scene was Emergency Medical Services (EMS), followed by the local police. The decedent was lowered to the floor by co-workers, but could not be revived by EMS, who declared the decedent dead at the scene and removed the body. The Police Officer on scene took pictures, interviewed the remaining crew, and notified OR-OSHA within 2 hours of the incident. The Officer instructed the crew not to disturb the incident scene prior to OR-OSHA investigation. However, after the Officer left, the crew continued to work. One of the lead technicians completed the quick disconnect installation on which the decedent had been working, and the crew removed the scaffold and tools the decedent had been using. The foreman told the OR-OSHA SCO this was done so that the store could open for normal business hours.

The OR-OSHA SCO arrived on site at 8:10am September 26, 2018. The technical manager of the electrical division of the staffing agency arrived at the store from out-of-state later that day to take part in the investigation. Some of the crew had left the store where the incident occurred and had started work at another store location. During the investigation, the technical manager discovered the main store lighting was on a 480/277V 3-phase panel, and that 3 of the 11 stores already completed were also on 480/277V 3-phase panels. The employer and the foreman did not identify or recognize this potentially fatal hazard at these prior locations. The technical manager told the OR-OSHA SCO that no one should work on an energized 480/277V 3-phase panel, indicating he understood the hazard of doing so. The technical manager stated he was not surprised the foreman did not locate the correct electrical panel as he probably did not know what he was looking for. These comments by the technical manager suggest that supervision and training was inadequate for the foreman and his crew.

In a request for training records by the OR-OSHA SCO, the employer provided an employee handbook, which contained a section entitled "Control of Hazardous Energy/Lockout Program," dated January 1, 2018. The foreman said he received the employee handbook when the employer acquired the company for which he had been working. The employee handbook also contained a section on PPE that required a quality/safety administrator to train and authorize employees on when and how to use PPE. The Employee Handbook did not specify PPE for working with electrical circuits, although it did specify that employee-owned PPE was not allowed.

The site foreman said he never received training on control of hazardous energy, LOTO, or PPE from the employer, and was never instructed to apply the policies of the Control of Hazardous Energy/Lockout Program. No other training documents were provided for any of the employees on site, including the decedent.

The employer produced a copy of the contract between the employer (i.e., subcontractor) and prime contractor, which specified the subcontractor would carry liability insurance and be responsible for all licenses and permits necessary for the contracted work. The contract also specified the subcontractor would provide all supplies, labor and tools, and indemnified the prime contractor from any injuries or death of any persons as a result of the contracted work. The employer registered as a business with the Oregon Secretary of State Corporate Division on August 22, 2018, but did not have a valid Construction Contractor's Board license to work in Oregon. The employer was not licensed by the Electrical and Elevator Board of the Oregon Building Code Division, and did not have a valid Workers Compensation insurance policy required to employ workers in Oregon. The OR-OSHA SCO's investigation resulted in a citation and fine for employer for violating Oregon workplace safety standards.

CAUSE OF DEATH

According to the Medical Examiner, the cause of death was cardiac arrhythmia due to electrocution. The Medical Examiner also reported thermal burns consistent with electrical burns on both hands of the decedent.

CONTRIBUTING FACTORS

The unrecognized hazards or inadequately controlled exposures that contributed to this incident include:

- Competent person was not present to identify/ mitigate hazards, stop work when injury occurred, or secure scene.
- Employees exposed to wires on an energized circuit.
- Inadequate training on electrical hazards, especially for new employees.
- Employer was not licensed to work in Oregon.
- Failure of employer to assess safety policies and licenses of acquired company at time of acquisition.
- Employer did not require or provide appropriate PPE for the task.

Occupational injuries and fatalities are typically the result of one or more immediate contributing factors or key events that are part of a larger context or sequence of events. While the direct cause of death was exposure to an electric current that resulted in cardiac arrhythmia and subsequent death, there were several indirect or upstream contributing factors that led to the employee being exposed to the fatal hazard. These include not having a competent person at the job site to supervise the work and identify and mitigate workplace hazards; the employer failing to protect workers from exposure to live wires; inadequate written safety policies and enforcement of existing LOTO policies; insufficient training for the foreman and crewmembers to identify and control workplace hazards; employer's failure to provide appropriate PPE for the task; failure of the employer to follow Oregon state licensing requirements; and failure of the employer (as the acquiring company) to assess the acquired company's safety policies and CCB license status to operate in the state of Oregon. In addition, interviews with employees during the OR-OSHA investigation indicate the employer's representative (the technical manager) expected employees to install quick disconnects on energized circuits. Thus, there were several root causes that converged and ultimately led to the decedent's exposure to a fatal hazard. Many of these were administrative and organizational factors.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: **A competent person should be at the job site to identify and mitigate workplace hazards.**

Discussion: OSHA's General Safety and Health provision for the construction industry requires employers to designate a competent person to provide regular inspections of job sites, materials and equipment (29 CFR 1926.20(b)(2) and OAR 437-001-0760(7)(a)). The competent person has an obligation to examine workplace conditions and ensure hazards are identified and mitigated. The competent person should have the knowledge and expertise of the work that needs to be done, how to recognize hazards and avoid unsafe conditions, as well as have the authority to stop or modify work practices in order to mitigate potential exposures to a hazard. This means the competent person must visit the job site at least once, and ideally stay at the job site while work is being performed. The competent person also documents findings of workplace inspections, develops written procedures to work safely, and provides employee training on the identification of workplace hazards and safe work practices. In workplaces where workers are potentially exposed to hazardous energy, the competent person should be able to identify the voltage and amps of the circuits to which workers will be exposed, have LOTO devices on hand, be able to de-energize and lock out the circuit, and be authorized to select the appropriate PPE for the work performed. The competent person has the authority to stop work if an injury

occurs and secure the scene to prevent further injuries if the exposure to the hazard persists. The incident scene should be undisturbed prior to the arrival of the OR-OSHA Safety Compliance Officer.

The employer did not ensure a competent person was at the job site. The technical manager, who was the employer's representative, was the only person qualified to be the competent person at the job site where the incident occurred. The site foremen and lead technicians at the job site were not qualified to be the competent person because they did not have the knowledge to identify hazards, as evidenced by the foreman assessing the wrong lighting panel, and did not have the authority to take prompt corrective measure to eliminate the exposure to an electrical hazard, as evidenced by the expectation of the employer's representative (technical manager) that employees work on live circuits. After the decedent's body was removed, the technical lead allowed the work crew to continue to work, even though the hazard that caused the fatality was still present, which could have led to a similar injury.

Recommendation #2: **Employers should ensure live circuits are de-energized, especially when employees are working with bare wires to install luminaire disconnects, and ensure employees use appropriate lockout-tagout devices on de-energized circuits.**

Discussion: Electricity has two components, voltage and amperage. Using water in a pipe as an analogy, if amperage is the volume of water in the pipe, voltage is the water pressure. Higher voltages produce higher currents. According to the National Institute for Occupational Safety and Health (NIOSH), a current above 10 milliamperes (10 mA) can cause a person to lose muscle control to the point where "a person is no longer able to release a tool, wire, or other object. At 30 mA, the loss of muscle control can lead to respiratory paralysis, which has occurred in an exposure of less than 50V." (NIOSH, 2009, p. 6). Cardiac arrhythmia occurs at 75mA, heart paralysis occurs at 4A, thermal burns to tissue occur at 5A, and probable death at 10A (NIOSH, 2009). Also, the path of the electrical current through the body affects the severity of the injury. Hand or arm contact with a live circuit while a person is grounded will cause the current to pass across the chest, causing injury to the heart and lungs (NIOSH, 2009).

Under federal OSHA's General Requirements Electrical Safety in construction, employers are required to ensure electrical energy is turned off before working on or near an electrical circuit, and to post and maintain proper warning signs where such a circuit exists (29 CFR 1926.416(a)(3)). OSHA requires that "before work begins, the employer shall ascertain by inquiry or direct observation, or by instruments, whether any part of an energized electric power circuit, exposed or concealed, is so located that the performance of the work may bring any person, tool, or machine into physical or electrical contact with the electric power circuit." The employer must also advise employees of the location of such circuits, the hazards involved, and the protective measures to be taken. The rule states that "no employer shall permit an employee to work in such proximity to any part of an electric power circuit that the employee could contact … in the course of work, unless the employee is protected against electric shock by deenergizing the circuit and grounding it or by guarding it effectively by insulation or other means." (29 CFR 1926.416(a) adopted into OAR 437-003 by reference). A de-energized circuit is defined by federal OSHA as "free from any electrical connection to a source of potential difference and from electrical charge; not having a potential different from that of the earth" (29 CFR 1910.399). Without specialized training to do so, employers must prevent workers from repairing or performing

maintenance on energized circuits. Circuits should be de-energized, locked out so the circuit is inoperable, and tagged so that others in the workplace know who locked out the circuit.

Under OSHA's General Safety and Health Provisions for the construction industry, no contractor or subcontractor should require an employee to work under hazardous working conditions, if not properly trained and equipped to do so (29 CFR 1926.20(a)). When working with electrical systems, employees should assume the circuit is live until it has been de-energized and locked out. As an extra precaution, employers should ensure employees use electrical testing equipment before starting work on a circuit. In addition, employers are responsible to train each employee in the recognition and avoidance of unsafe conditions, and the be knowledgeable of applicable regulations to control or eliminate any exposure to any hazards that could cause illness or injury (29 CFR 1926.21(b)(2)). Employees should also know and understand their right to speak up about workplace hazards without fear of retaliation.

In 2018, 160 U.S. workers were killed due to exposure to electricity, including the decedent (BLS, 2020). The decedent thought he was working with a 208/120V circuit: that would have been enough current to cause death, given the evidence of thermal burns on his hands, although the energy in the circuit he was working on was actually greater.

Recommendation #3: **Employers should provide training, including written procedures, to employees performing the work and ensure employees understand the risks associated with exposure to the hazards involved.**

Discussion: The employer should ensure employees have adequate training on the hazards associated with each task they perform at work, and keep records of such training up to date. Training must be provided by a competent person, who can instruct employees how to recognize, and ways to prevent exposure to workplace hazards.

The General Safety and Health provisions for the construction industry of both federal OSHA (29 CFR 1926.20(f)(2)) and Oregon OSHA (OAR 437-003-0920) also require employers to provide training to employees on "hazards and related matters [and] the employer must train each affected employee in the manner required by the standard."

When engaging in electrical work, employers should ensure employees are trained in accordance with the requirements for specialized licenses. Employers should also ensure employees are qualified to perform the work they have been assigned. The General Safety and Health provisions for the construction industry of both federal OSHA (29 CFR 1926.20(b)(4)) and Oregon OSHA (OAR 437-003-0920) require that general contractors and subcontractors "ensure that only employees qualified by training and experience operate equipment and machinery."

An employer is required to retain employee training records for Lockout/Tagout, use of PPE, hazard communication, process safety management involving certain quantities of hazardous materials, working with asbestos, emergency action plans, working in a confined space, bloodborne pathogens, respiratory protection, electrical safety, and powered industrial trucks. Both federal OSHA and Oregon OSHA recommend maintaining an employee's training records while the employee is employed with the employer.

In this incidence, there were several training insufficiencies. Oregon's Electrical Safety Law states that "no person shall make, supervise or direct the making of an electrical installation which does not meet minimum safety standards" (ORS 479.710). Oregon's Occupational Safety and Health (OSH) rules for all workplaces require employees to "see that workers are properly instructed and supervised in the safe operation of any machinery, tools, equipment, process, or practice that they are authorized to use or apply" (OAR 437-001-0760). In addition, Oregon's OSH rules require employers to take all reasonable means to require employees to work and act in a safe and healthful manner (OAR 437-001-0760(1)(b)(A)). The workplace must be inspected for potential hazards by a qualified person as often as needed (OAR 437-001-0760(7)(a)). Oregon's OSH rules define a *qualified person* as someone who is familiar with the construction and operation of the equipment and the hazards involved (CFR 29 1926.449, adopted into OAR Division 3 by reference). In this incidence, the qualified person was the technical manager, who was not present at the job site. The foreman was not a qualified person, as indicated by his inability to identify the circuit panels controlling the light fixtures, nor were the lighting technicians, including the decedent, qualified to install quick disconnects.

Employees were not trained in how to recognize and prevent exposure to hazardous energy. Contrary to safety training, the employees were trained how to install quick disconnect on live circuits. Oregon adopted General Requirements Electrical Safety in construction be reference, prohibiting employers from allowing employees to work on energized circuits without being protected from electric shock (20 CFR 1926.416). In addition, Oregon also adopted OSHA's standard requiring de-energized equipment or circuits be rendered inoperative with LOTO devices to prevent the equipment or circuit from being energized during repair, replacement, or maintenance (CFR 29 1926.417). The foreman and lead lighting technicians were not trained how to use LOTO devices by the employer, and were not provided with such devices. The employer did not provide any documentation that the decedent had received, reviewed, and understood the employee handbook, and did not have a new employee orientation program to raise awareness of hazards typically associated with the type of work for which the decedent was hired to perform.

Recommendation #4: **Ensure the contracted firms are licensed in the state where the work will be performed.**

Discussion: The stated purposes of Oregon's Electrical Safety Laws are to: 1) protect health and safety from electrically-caused shocks, fires and explosions; 2) assure the public that persons making electrical installations in this state are qualified by experience and training; and 3) assure that electrical installations meet minimum safety standards (ORS 479.520(1). State electrical license requirements set a baseline for health and safety of employees performing the work, and for the public, who will use and/or interact with the finished product or service once completed. Licensing should also establish a level playing field in the bidding process, as every contractor licensed in the state to perform electrical work has provided proof to the state Electrical and Elevator Board of the contractor's experience and competency to do the work safely. Licensed firms tend to be members of state or national trade associations, such as the National Electrical Contractors Association (NECA), the Independent Electrical Contractors (IEC), and/or belong to a local chapter of the International Brotherhood of Electrical Workers (IBEW). These associations provide safety training from apprenticeships through master electrician programs, and promote the principles of a positive safety culture among member firms. Licensed firms also carry the required Workers Compensation insurance policy. The investment in employee training, licensing and Workers Compensation insurance are costs that need to be recovered by providing

reasonable bids to contracts. In this incidence, it is not possible to know why the store chain decided to choose the prime contractor, or why the prime contractor chose the employer, but it can be assumed at least part of the decision was based on choosing the lowest bidder to maximize profit, which circumvented government and industry efforts to maintain a baseline workplace safety standard through electrical contractor licensing programs.

Neither the store chain nor the prime contractor ensured the subcontractor was licensed to work in Oregon. Oregon's Building Code (ORS 455.010-897) prohibits anyone from "engaging in, or procure or assist any other person to engage in any conduct or activity for which a … license or other formal authorization is required by any specialty code" which includes Oregon's Electrical Safety Law (ORS 479.510-945), administered by the Oregon Building Codes Division for the Electrical and Elevator Board (see details below). In addition, under the Licensing Requirements for Electrical Work, "No person or entity shall allow any individual to perform electrical work for which the individual is not properly registered or licensed." (OAR 918-282-0120).

Oregon's Employer Liability Law (ORS 654.305) can designate a prime contractor as an indirect employer if the prime contractor retains the right to control the manner or method in which a risk-producing activity is performed. In this particular case, there's no record that the prime contractor was considered an indirect employer, as the prime contractor relied on contractual language to indemnify their firm from liability. However, if the store chain or the prime contractor had insisted the subcontractor be licensed to work in Oregon, it is highly likely the employees would have received proper training in the control of hazardous energy, as well as appropriate PPE to prevent exposure.

Oregon's Electrical Safety Law prohibits electrical installations, including maintenance or repair of installed electrical products, such as quick disconnects, without a license (ORS 479.620(1)). The minimum type of license required for the work involved in this incident is a limited maintenance specialty contractors' license. (ORS 479.630(12)) A limited maintenance specialty contractor license to a person who qualifies under this subsection. A person licensed under this subsection is authorized to engage in the electrical work related to the repair, service, maintenance, installation or replacement of existing, built-in or permanently connected appliances, fluorescent ballasts or similar equipment and to employ individuals to engage in that work. However, the technical manager did not apply for this license and was never present at any job site in Oregon until after the incident. In addition, the foreman could have applied for the limited maintenance specialty contractor license (ORS 479.620(12)), which would have authorized him and his crew to work on existing light fixtures. This license requires proof of sufficient work experience, and to provide a list of individuals employed by the license holder to work under the license to Oregon Building Codes Division. In this incidence, the employer did not seek proper licensure to perform the work in Oregon, and did not ensure the workplace met minimum safety conditions.

If the store chain, prime contractor or employer would have confirmed the employer was licensed to conduct business in Oregon as an electrical contractor/subcontractor, the licensing requirements would have ensured greater worker safety training and general workplace safety knowledge of the crew, and likely would have prevented this workplace fatality.

All workers always have a right to a safe and healthy workplace. The prime contractor and the staffing agency (host employer) are joint employers of temporary workers and therefore, both are responsible for providing and maintaining a safe work environment for contracted workers. The prime contractor and the employer must work together to ensure that the Occupational Safety and Health Act of 1970 (the OSH Act) requirements are fully met. OSHA and the National Institute for Occupational Safety and Health (NIOSH) have published a guide entitled "Recommended Practices to Protect Temporary Workers"(OSHA-NIOSH, 2014, to address the numerous preventable deaths and disabling injuries of temporary workers each year This publication outlines the worker and workplace safety responsibilities of prime contractors and host employers, as well as listing resources for additional information.

Recommendation #5: **Employers should specify and provide all appropriate PPE needed for the task.**

Discussion: Employers are required to assess workplace hazards and select PPE appropriate for the work that employees will be doing (29 CFR 1910.132(d), and 29 CFR 1926.20(f)(1)). Oregon's OSH rules apply to **all** Oregon industries under OR-OSHA's jurisdiction and require the employer to: 1) conduct a workplace hazard assessment and put the findings from the assessment in writing; 2) select appropriate PPE for each respective hazard; 3) ensure employees receive training so they understand why PPE is required for the task and how to properly use it; 4) provide PPE at no cost to the employee; 5) require employees to use specified PPE; and 6) ensure the PPE fits the employee and adequately protects the employee from exposure to the hazard (OAR 437-002-0134(1). The four most relevant types of PPE to this incident are: The following PPE is required to protect employees from exposure to electric shock hazards and when working with lighting:

- Class A protective helmet when electric shock hazard could contact the head (OAR 437-003-0134(9)(b)(1).
- Insulated foot protection (OAR 437-003-0134(10)(a).
- Insulated tools rated at the voltage that may be imposed upon it (CFR 29 1910.137(b), adopted into OAR 437-002, General Occupational Safety and Health, by reference).
- Class 00 gloves when employees' hands are exposed to thermal burn hazards (OAR 437-003-0134(12)(a).

Eye protection is also required if exposure to hazardous optical radiation exists (OAR 437-003-0134(8)(a). The lack of a competent person at the job site meant that there was no one to identify the appropriate PPE for the work performed. In addition, the employer did not provide any PPE to employees other than a hard hat. Employees purchased their own PPE, which may not have been adequate to protect against the hazards of working with energized circuits. When employees provide their own PPE, employers are required to ensure its adequacy for the task. In this incidence, there was no record the employer took steps to ensure the PPE purchased by the employees was adequate for the tasked performed. The employer's Employee Handbook stated that employee owned PPE was not allowed.

ADDITIONAL RESOURCES

NIOSH Directory of Construction Resources. https://www.cdc.gov/niosh/construction/

Recommended Practices for Safety & Health Programs in Construction". OSHA Publication 3886, October 2016. https://www.osha.gov/Publications/OSHA3886.pdf.

OSHA Training Requirements in OSHA Standards. https://www.osha.gov/dte/training_policy.html.

OSHA Training and Reference Materials Library for Construction. https://www.osha.gov/training/library/materials

Oregon Institute of Occupational Health Sciences Resource Directory. https://apps.ohsu.edu/oregon-institute-occupational-health-sciences/resources/

Oregon Building Codes Division, Electrical and Elevator Board. https://www.oregon.gov/bcd/licensing/Pages/electrical-apply.aspx.

Independent Electrical Contractors of Oregon. https://iecoregon.org/.

The Center for Construction Research and Training (CPWR), Electronic Library of Construction Occupational Safety & Health (ELCOSH). http://www.elcosh.org/index.php

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Oregon Employer Liability Law, 2018. ORS 654.305 to 654.336. https://www.oregonlaws.org/ors/chapter/654.

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Oregon Administrative Rules, definition of "qualified person". OAR 437-003-0001-1926.449. Adapted by reference. https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.449.

Oregon Administrative Rules, protection of employees from hazardous energy. OAR 437-003-0001-1926.416. Adapted by reference. https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.416.

Oregon Administrative Rules, lockout and tagging of circuits. OAR 437-003-0001-1926.417. Adapted by reference. https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.417.

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FACE INVESTIGATION INFORMATION

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ACKNOWLEDGEMEMENT

The OR-FACE Program would like to acknowledge the staff of the Oregon Department of Consumer and Business Services, and Aaron Colmone, Oregon OSHA Senior Safety Compliance Officer, Portland Office, for providing assistance and information for this investigation. We would also like to acknowledge the Independent Electrical Contractors of Oregon, The National Electrical Contractors Association-IBEW Training Center, Portland Office, and the Oregon Electrical and Elevator Board for insight and guidance on recommendations to prevent future workplace fatalities under similar circumstances.