

DRTING INFORMATION	Incident Date			September 10, 2024
	Loc	Location		Langford, BC
	Reg	Regulated industry sector		Electrical - Low voltage electrical system (30V to 1000V)
	Impact	Injury	Qty injuries	4
			Injury description	One (1) contracted labourer experienced electrical burns to face, hands and other skin surfaces and vision impairment. Three (3) other store workers responding to the incident reported minor smoke inhalation.
			Injury rating	Major
		Damage	Damage description	There was a temporary partial power loss during overnight hours when normal restocking and maintenance activities were occurring at a large retail business. Damage to a lighting fixture with arcing and sparks and smoke. A secondary abnormal arc fault caused electrical arcing damage to an electrical panel, relays and conductors in a restricted electrical room.
SUPP(		-	Damage rating	Major
	Inc	iden	t rating	Major
	Incident overview		t overview	During overnight electrical work at a large retail store to upgrade the store lighting from fluorescent to LED fixtures ( <u>Image 1</u> ) an electrical short occurred that tripped an overload, de-energizing a circuit. While attempting to correct the situation, another contracted labourer that was being supervised by an unqualified individual who was in a role as the worker's supervising electrician, attempted to repair in the energized electrical panel and caused an abnormal arcing fault, causing a flash which resulted in damage to the equipment and injuring the worker.
INVESTIGATION CONCLUSIONS	Site, system and components		stem and ients	Abnormal Arc Fault When the flow of electrical current deviates from its intended path to ground or another electrical phase it produces an arc fault. When an arc fault occurs, the light and heat produced is referred to as an abnormal arc fault. The severity of the abnormal arc fault is dependent on the available voltage and current as well as the time it takes to clear the fault. An abnormal arc fault can produce temperatures in excess of 35,000°F (19,400°C) and vaporize metal conductors and equipment blasting molten metal and plasma outward with great force which can cause damage and injury. The store lighting system consisted of 347/600V lighting fixtures which were supplied and controlled from the lighting distribution panel in the main electrical room. The main electrical room was locked to prevent unauthorized entry and was intended to be accessed by authorized personnel only. Warnings posted above the door stated it was a "High Voltage Area" ( <u>Image 2</u> ).



**Lockout** (<u>Image 3</u>) is defined in the Canadian standard CSA Z460-20 "Control of Hazardous Energy - Lockout and Other Methods" as the "placement of a lockout device on an energy-isolating device in accordance with an established procedure." A lockout device is "a mechanical means of locking that uses an individually keyed lock to secure an energy-isolating device in a position that prevents energization of a machine, equipment, or a process." Each worker is required to place a lock on the equipment being de-energized to ensure the equipment is not re-energized while workers are still performing their duties.

**De-energization** is a process that is used to disconnect and isolate a system from a source of energy to prevent the release of that energy. By de-energizing the system, the risk that the system could inadvertently, accidentally, or unintentionally cause harm to a person through the release of hazardous energy is eliminated. Section 2 of the CSA electrical code (2-304) requires that equipment be de-energized before work commences. The safety provisions protecting live equipment from accidental contact such as cabinets, covers, enclosures, guards, or barriers shall not be removed exposing live parts unless the task to be performed is not possible while de-energized.

#### Personal protective equipment

When work must be carried out on energized electrical equipment, the persons performing the work must be trained to understand the specific hazards and use the appropriate personal protective equipment "Personal protective equipment" (PPE) to protect against shock and abnormal arc fault. PPE for the purposes of this section of the regulation is personal protective equipment that is appropriate for the hazard present while working on energized electrical equipment. This includes flame-resistant clothing, head protection, safety glasses, dielectric footwear, gloves, and face shields. It is the responsibility of the employer to ensure proper written safe work procedures are in place to deal with all aspects of low voltage live equipment work, including protection from electric shock and arc flash. <u>IB-EL 2013-01 REVISION 2</u>.

#### Installation

Installation and/or replacement of electrical light fixtures is regulated work that must only be done by a person with a certificate of qualification in the trade of electrician from a recognized training credential or under the direct on-site supervision of such person. The work must be done under a valid electrical installation permit. The intent of the permit is to provide permission for the work after verification by the regulator that the individual has the qualifications necessary for the scope of work indicated. A licensed contractor must not permit regulated work to be undertaken by persons under the control, contracted or employed by the licensed contractor if they are not authorized to do so.

#### A Field Service Representative

(FSR) is an individual who is certified to make declarations that the work described in an electrical installation or operating permit complies with the Safety Standards Act and Electrical Safety Regulation.

The FSR's duties outlined in the Safety Standard General Regulation include:

- Ensuring that the regulated work complies with all requirements under the Act.
- Ensuring that the persons performing regulated work under a permit have the qualifications that are appropriate for that type of work.



		<b>Project, contractors and sub-contractors</b> A large retail store chain initiated a re-lamping project to upgrade the lighting in several of their store's locations, upgrading from fluorescent tube fixtures to more energy efficient LED light fixtures. The fixtures required an upgrade to accommodate the new style of lamp.
		The work began at the incident location without the required electrical permit and variance applications for the site.
		The project was contracted out to a national re-lamping service company, who was hired by the store's head-office procurement to be responsible for the relamping projects in the retailers' locations across Canada. That re-lamping company sub- contracted some of the Western Canadian work, including the incident location, to an Alberta based electrical contractor. That Alberta based electrical contractor, who was a certified electrician registered in British Columbia, then sub-contracted out that work to on-site labour. This certified electrician was acting as the Field Safety Representative (FSR) for the incident site and was responsible for overseeing the electrical work and project safety.
		The regulated electrical work in the store was being performed during overnight shifts by five (5) workers who did not hold any valid electrical certificates of qualification for electrical work in the province and were not under the direct supervision on the site of a person authorized do so.
	Failure scenario(s)	When several of the five (5) individuals were working on the night of the incident, one (1) caused an initial fault while performing overhead relamping tasks on energized (347V) lighting equipment in main retail area which is referred to as the first of two (2) incidents.
		Two (2) incidents occurred the morning of September 10 <sup>th</sup> , 2024
		The initial incident occurred at approximately 1:00 AM while three (3) of the contracted labourers were in different areas of the store. They can be seen on CCTV footage standing on scissor lifts, doing live light fixture replacements overhead. The 347-volt electrical lighting circuits were not de-energized and locked off before the work began that evening.
		While changing one of the fixtures, an energized conductor contacted bonded material resulting in an active fault condition within the fixture housing. The fault in a fixture activated an overcurrent protection device in a lighting contactor panel in the main electrical room. During this fault condition the branch circuit over current devices for several lighting branch circuits were activated causing a partial blackout in the store (Image 4).
		Following the initial fault, one (1) of the workers reached out to a night-manager of the store. One of the workers later described the manager as being motivated to have the lighting restored which was perceived as pressure by the labourers.
		That manager did understand fully what was happening regarding the blackout and staff described feeling frustrated as communication between staff and labourers was difficult as a result of language barriers.
		An attempt was then made by the worker using their phone translation application to communicate what seemed to be an urgent need to access the main electrical room.



The manager believed this person to be a qualified individual and escorted them to gain access to the locked electrical room to complete repairs. After providing the worker access, the manager left the area to resume normal duties.

Approximately five (5) hours after the initial fault incident, the individual in the role of onsite electrical supervisor arrived. The exact time is unknown. It is noted by several witnesses he was not present until shortly before the second

(2<sup>nd</sup>) incident in the morning. This supervisor was seen with a different worker in the electrical room who was not the original worker who was given access by the manager. The original person had at some point exited the building and was not seen again.

This different worker was also unqualified and the most junior worker of the crew. He was seen in the electrical room working with many tools (<u>Image 7</u>, <u>Image 8</u>, and <u>Image 9</u>) attempting electrical panel repair in front of his supervisor. He used these tools to work inside an open energized electrical panel for the lighting circuits.

While working inside this energized electrical distribution equipment using conductive tools and without any appropriate personal protective equipment (PPE), a connection was made between an active 347V circuit and the bonded housing of the distribution equipment resulting in abnormal short circuit fault condition causing a thermal flash and injuring the worker (Image 5, Image 6, and Image 7).

### **Communication and supervision**

The workers were unable to effectively communicate directly with the Field Safety Representative in Alberta or the retail store managers and staff on the site because of language barriers. All workers with the exception of the individual in the role of onsite electrical supervisor on behalf of the FSR, did not speak any English.

The evening of the initial fault, the individual in the role of onsite electrical supervisor, who had presented themselves as a red seal electrician from Ontario, was not on site. This individual was witnessed throughout the project being able to communicate in English, as well as with the workers in their languages and was the only person to appear to effectively communicate between all people involved.

The night and morning of the incident, all three (3) of the workers who were seen on the CCTV footage working had no documented electrical experience or qualifications. They were left on their own to perform regulated electrical work and were given access to the high-voltage electrical room for repairs when the initial fault at 1:00 AM took place.

A previously unmentioned individual who was never on site was referred to by the FSR as the interpreter for the site crew and when interviewed identified himself as a previous owner of the same electrical contractor (FSR) that had been hired by the relamping company. The interpreter was regularly messaging with the onsite supervisor but had no direct contact with the workers. He communicated and edited paperwork and passed it to the off-site FSR. The interpreter stated they were responsible for passing on documentation but had a limited understanding of the scope of work, even though they were the previous owner of this electrical company.



#### **Bulletins, Acts and Regulations**

- Regulated work The replacement of complete light fixtures assemblies or upgrading of existing assemblies to LED fixtures is regulated work that needs to be done by a qualified person under an appropriate installation permit (<u>Bulletin-General Rules</u>).
- Qualifications/certifications Regulated electrical work can only be done by a person authorized to do so under the <u>Electrical Safety Regulation</u> (the Regulation)
  - Working live Electrical work may only be carried out in a deenergized state, unless it can be demonstrated that the task to be performed is not feasible in a de-energized state. See Bulletin <u>IB-EL</u> <u>2013-01</u>.
- LED Retrofit Kits Information Bulletin IB-EL 2017-01 states "A variance must be associated with either an operating permit or a contractor installation permit when upgrading luminaires for energy efficiency or converting them to the light emitting diode (LED) type." See <u>Retrofit Bulletin</u>.

#### Definitions

Based upon part 1, section 4 of the Regulation, an individual must not perform regulated work in respect of electrical equipment unless the individual meets at least one of the following criteria:

- (a) holds appropriate industry training credentials in respect of electrical work.
- (b) has successfully completed electrical training recognized by a provincial safety manager under *the Safety Standards Act.*
- (c) is employed by an organization that utilizes electrical training programs that are approved by a provincial safety manager under the *Safety Standards Act* and the individual:
  - (i) has successfully completed the relevant training, and
  - (ii) does not perform regulated work for any person other than the individual's employer who provided the training.
- (d) is the manufacturer's technical representative, or
- (e) is supervised by an individual who:
  - (i) is specifically authorized under the *Safety Standards Act* to perform that type of electrical work, and
  - (ii) supervises the individual on site and provides guidance and assistance to the individual as the electrical work is performed.

#### Field Safety Representative (FSR) as per Canadian Electrical Code 2-304

- An Electrical Field Safety Representative (FSR) is a person who is certified to make declarations that the work described in an electrical installation or <u>operating permit</u> complies with the <u>Safety Standards</u> <u>Act</u> and <u>Electrical Safety Regulation</u>. An FSR can make these declarations on behalf of a contractor as occurred in this case where the contractor initially hired was a nation-wide company hired by the procurement division of a large retailer.
- The national electrical contractor who was located out of province, was subcontracted by the national company to organize and oversee activities. As the responsible FSR, he was required to be on-site/or to ensure work performed is being done by qualified personnel in a safe manner.



<ul> <li>Requirement to De-Energize <ul> <li>Clause 2-304 of the Canadian Electrical Code (CEC) requires that equipment be de-energized prior to commencing work unless it is unfeasible to do so.</li> <li>Information Bulletin IB-EL 2013-01 states that inconvenience or additional cost is not considered acceptable grounds for removing or bypassing the protective safety provisions of electrical equipment.</li> </ul> </li> </ul>
<ul> <li>Lockout is defined in the Canadian standard CSA Z460-20</li> <li>"Control of Hazardous Energy - Lockout and Other Methods" as the "placement of a lockout device on an energy-isolating device in accordance with an established procedure." A lockout device is "a mechanical means of locking that uses an individually keyed lock to secure an energy-isolating device in a position that prevents energization of a machine, equipment, or a process".</li> </ul>



	Roles and Responsibilities
Facts and evidence	<ul> <li>Large Retailer Procurement – Hired National Relamping Contractor to renew lighting fixtures nationally.</li> <li>National Relamping Company – Hired a National Electrical Contractor and Field Safety Representative to ensure safety and provide services for relamping project at the Large Retailer Stores.</li> <li>National Electrical Contractor – Was a certified electrician based in Alberta hired as (FSR) Field Safety Representative for jobs in Western Canada.</li> <li>Interpreter - The National Electrical Contractor hired an Interpreter due to language barriers of labourers and individual in the role of onsite electrical supervisor to communicate while the work was being done on site. The interpreter was necessary to communicate instructions and perform quality checks on documents sent between labourers and the FSR. However, this interpreter stated he did not communicate with any labourers, only the supervisor.</li> <li>Supervisor - Individual responsible for supervising the site work including regulated electrical work. Had a history of working for FSR on sites in Alberta and BC with different labour crews acquired for different projects. He was given responsibility to organize labour and manage work on site on behalf of the FSR/National Electrical Contractor, communicating through the interpreter and directly with the FSR. The FSR was under the understanding that the Supervisor held an electrical qualification.</li> <li>Labourers - Multiple Labourers/Injured Party-Performing regulated work at the site at times with no supervision.</li> </ul>
	There were multiple written or verbal agreements between the parties' project
	contractors including the interpreter.
	<ul> <li>Contracts between the store procurement and the national relamping company which specified requirements to log in and out. This was not monitored or consistently or accurately filled out.</li> </ul>
	<ul> <li>Contract stated all regulations and codes must be followed.</li> <li>Contract stated requirement to work deepergized when required</li> </ul>
	Prework Shift Reports to Field Safety Representative (FSR) – From labourers on site
	The electrical contractor/FSR stated they had hired an electrician to supervise workers for multiple projects including the project where the incident occurred.
	Showed lack of accuracy and oversite in daily tracking attendance and identification of who was physically onsite, when individuals came and left, and what tasks they were allowed to perform.
	Witnesses identified that certain individuals were seen coming and going from the store without signing in and out. Sign in sheets provided supplementary evidence that no supervisor or FSR was on site during the hours of relamping that night before and after the first incident, however witnesses stated the labourer's supervisor arrived at some point in the morning the day of, before the second electrical incident



where they were seen in the room when the injury occurred. There was no daily report provided from FSR for that day. Field Safety Representative (FSR)- Qualifications **FSR –** Provided multiple certifications included BC certification, which requires responsibility to ensure safety and work being done by code and regulation. Worker #1 Referred to as the labourer's onsite supervisor-Provided a (copy) of an Ontario registered Electrical Construction and Maintenance Certification card as proof of qualifications and competency. Upon review of validation with Skilled Trades Ontario the individuals name was not in their database and the ID on the card was fraudulent. It was not a document issued by Skilled Trades Ontario to that individual. The ID had a date of validity until April 21-2025. Workers #2, #3, #4, and #5 - No relevant electrical certification provided, or apprenticeship documentation submitted proving any sort of proof of gualification from the FSR outside of three (3) workers that had a fall protection and elevating work platform operation card. **FSR Written Report** The supervising worker was utilizing an inexperienced worker to assist in troubleshooting a short circuit fault caused by work in a different area of the store. A relay cabinet was opened without proper lockout procedures or proper PPE being used with exposed live circuits. **FSR Statements** The FSR stated the following in an interview after the incident: The FSR was located in Alberta for the duration of the project and did not • attend the site personally. The FSR applied for the permit for the electrical work after the incident • occurred. It was a common practice to pull permits after the work had begun. The Supervisor held an electrical qualification from Ontario and the FSR had a scan of the certificate. The Supervisor had worked for the FSR as a site supervisor on multiple occasions in the past. Store Managers Store Managers stated labourers could not communicate verbally on site. The manager stated that light dimming happened nightly as part of normal store practices. It's unclear whether the labourers understood this or if they believed that fixtures were being selectively de-energized for work. In a 347-volt circuit, the lights

#### Supervisor's Written Statement

This individual noted the following regarding the events leading up to the incident:

being switched off does not completely deenergize the circuits to the lights.

"When turning lights on after retrofitting a batch of fixtures, the branch circuit breaker did not trip from a fault. instead, the main breaker was



	tripped, and when reset - roughly 1/3rd of the place energized. Further troubleshooting revealed that breakers in the breaker panel remained on, and uncovered heat damage on insulation of multiple cables in relay cabinet during the troubleshooting of the panel an arc was created." <b>Daily Store Site Reports</b>
	Some daily sign in logs show lack of accuracy and minimal or no signing in and out by the contractors.
	Store Witness Interviews x5
	<ul> <li>Multiple staff responded to incident.</li> <li>Multiple staff had minor respiratory complaints from smoke inhalation.</li> <li>Multiple staff interacted or tried to communicate with injured party and other workers before and during incidents but struggled with language barriers.</li> <li>Multiple staff documented messy work which was unusual compared to previous projects.</li> <li>Staff witnessed the electrical individual in the role of onsite supervisor was not on site at the time of initial fault.</li> <li>Night managers stated the worker involved in initial fault at 01:33 when breaker blew was not the worker involved in subsequent major incident with injuries at 08:00 am in the electrical room.</li> <li>Night managers assumed all electrical workers were vetted and qualified when they let them access the electrical room to fix the fault that occurred at 01:33. Lamps came ½ on after worker flipped multiple breakers in the electrical room at 01:46 am.</li> </ul>
	CCTV Video Surveillance
	<ul> <li>The lighting in the store typically switches off at 00:14 am and 00:25 am for power conservation but the lights operated steadily and consistently throughout store during the night when the re-lamping work was taking place.</li> <li>Video captures a partial black out during the initial fault while the worker was working live (lamps illuminated). One (1) of the three (3) actively occupied lifts are observed with the labourers working simultaneously around store replacing lamps overhead until the incident occurred at 01:33 am. During incident footage, sparks are observed at the area of the store where the fault occurs, and image shows sparks and lighting outage. (Image #10).</li> </ul>
Causes and contributing factors	<ul> <li>The incident was caused by electrical work being performed without proper deenergization of the system.</li> <li>Contributing factors to the incident include: <ul> <li>Regulated electrical work being conducted by unqualified individuals and without any direct supervision or direction by a qualified person.</li> <li>Language barriers and ineffective communication contributed to a misunderstanding of safe work practices and hazards associated with the work being performed.</li> <li>A worker with a fraudulent electrical certification led to the electrical subcontractor allowing the individual to oversee the regulated electrical work</li> </ul> </li> </ul>



being performed at the site, possibly without the individual having proper knowledge of how to complete the work correctly and safely or understanding the hazards associated with the work.

• There was minimal verification or follow-up by the National Relamping Contractor, or the large retailer, to ensure the contractual obligations for safety, and certification of workers physically performing the work were met.



Image 1 – (Left) Old florescent lamps. (Right) New LED lamps being installed.





Image 2 - High Voltage electrical room.





Image 3 – Lock out example from individual in the role of onsite supervisor on September 3<sup>rd</sup>, 2024.





Image 4 – Partial blackout. During incident footage, sparks are observed at the area of the store where the fault occurs, and image shows sparks and lighting outage.





Image 5 – Smoke residue on panel after second incident.





Image 6 - Damage inside panel door. Close up of tool marks at location of incident.





Image 7 - Dent from drill tool where incident was initiated.





Image 8 - Marks on tool used to attempt a repair by unqualified worker/injured person.

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Image 9 - Tools on floor after incident. These were used by unqualified worker/injured person to attempt a repair while individual in the role of onsite supervisor watched.





Image 10 – During the incident, CCTV footage show sparks appear at the area of the store where labourer is working on a scissor-lift. When the fault occurs the circle shows sparks above the worker who is working overhead on a lift and the arrow points to the lighting outage occurring.