OSHA ET&D Partnership

Data Task Team Report to Steering Committee

OSHA 300 Log Analysis for Calendar Year 2023

October 2024

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Data Task Team

Executive Summary

The Data Task Team (DTT) presents the analysis report for 2023 of the Partner OSHA data. The mission of the Data Task Team has remained the same, data collection and analysis as a means to establish causes of serious injuries and fatalities for electrical work in the industry. In 2018 the Data Team was charged with analyzing the SIFs reported by the Partner companies. Identifying commonalities and trends in substance and operations that result in Serious Injuries and/or Fatalities (SIF) will greatly increase the ability of the Partners to achieve /exceed the established goals. Detailed descriptions of fatality and other SIF incidents are key in the Team's ability to perform accurate analysis and to make recommendations that will contribute to the continual reduction in these events.

Since 2011, all the Partner companies have submitted their OSHA 300 data to the task team for analysis. The data is submitted, redacted, and compiled into an excel file. That data is then evaluated and analyzed to determine the most prevalent types of injuries and associated information (e.g., nature of injury, location, type of work being performed, cause, etc.). Additionally, incident related data from OSHA's Information System (OIS) was used in analysis.

Going forward, beginning with CY2023 report, submission of Partner 300 log data for analysis and the data from OIS will be discontinued, and as stated above, the focus will be on Partner SIF data.

Take Aways and Opportunities:

- The Data Team has seen a flattening of rate data over the last few years. See Baseline Data TCIR graphs in Appendix C.
- Reviewing the 41 Serious Injury and Fatality (SIF) cases 13 did have an applicable Partnership Best Practice.
- Based on new and upcoming technics to classify events using the SCL Model/High Energy wheel, we see an opportunity to enhance the Job Briefing Best Practice.
- PSIF Definition for Partnership
- Annual follow-up to previous year's recommendations.
- Follow up with last year's discussion/take aways.

Serious Injury and Fatality (SIF)

The fundamental goal of this Partnership is to reduce the number of serious injuries and fatalities in the industry. Serious injury and fatality (SIF) events are a critical subset of an employer's OSHA recordable events. The information gained through analysis of SIF events will further aid in the identification of causal factors that result in serious injury or fatality.

When charged with focusing on the SIF events the Team agreed to use EEI's definition. EEI has a proposed new SIF definition for 2024 which the Partners agreed to use for the 2023 data submittal. #EEI_Definitions

Overview

1. 3 Fatalities
2. Applicable Best Practices
    - 13 events
    - Related to insulate and isolate
3. Fractures are the highest with 18 cases.
4. Burns are the Second Highest with 8 cases.
5. Electrical contacts 3 events.

With the new SIF Criteria, the Partners have reported 41 SIF events for 2023. Three of the forty-one events resulted in employee fatalities. Two fatal events were associated with an Administrative Controls Best Practice. While reviewing all SIF events, the Partners identified 13 cases with applicable Best Practices. The majority of these 13 applicable Best Practices revolved around insolate and isolate best practices. #Best_Practice_definitions

Fractured bones that resulted in surgery to repair with hardware were the highest number of SIF Events at 18 around 44% of the cases. Most of the fractures occurred to employees on the ground being struck by objects.

Electrical contacts and Arc Flashes were reported in thirteen events. Two of these events resulted in Fatalities while the other events resulted in burns. All thirteen were identified as violating a Best Practice. Table 6 #BP_Electric_Flash_table

Fatalities:

A primary Partnership goal is the reduction of fatalities. The Partners' data indicated that there were three fatal incidents in 2023. The 2023 fatalities descriptions are listed below.

- Electrical Contact**:** While making up load side of switch a flash/contact occurred
- Electrical Contact: Electrical contact while installing cutout switch

- Crushing: EE was involved in an excavator tip over and was crushed. Operating 35G mini excavator.

Of the three fatal events, two were associated with an Administrative Controls Best Practice: Administrative Controls & Information Transfer. The crushing event was confirmed to have no applicable Best Practice.

The average number of Fatal events (2016-2023) is 4.13, annually. Within the last 3 years, the Partners average 2.6 Fatal events for Electrical contacts account for most of the fatal events, 18 out of 33. The Partners reported two fatalities due to Electrical Contacts in 2023.
#Table_10_Fatality_Yearly_comparison

SIF Analysis

The Partners agreed to utilize the updated EEI Serious Injury Fatality descriptions for the 2023 data classification. This significantly decreased the number of SIF events, providing the opportunity to focus on the most serious events.

The Partners identified 41 SIF events. Three events were fatalities, discussed above. The Data Team reviewed the Serious Injuries. Analysis of SIF events shows that most injuries are related to fractured bones and burns. These SIF injury classifications account for 63% of the SIF events.
#Table_10_Fatality_Yearly_comparison

It is **recommended** that the Partners continue to report contributing and causal factors for applicable Best Practices and follow the same process for all Serious Injury/Fatal events. The Data Team anticipates that use of the new online collection portal, currently in development, will support better data quality and consistency. The online collection portal will feature a submittal form with required and conditional fields, including fields for Best Practice information.

The Partnership 2023 data collected and identified the applicable Best Practice for SIF events. List of Partner Best Practices in Appendix B. The data collected currently does not provide enough information for complete analysis of the use of the current Best Practices.

Applicable Best Practices

Of the 41 SIF Events, 13 were identified with an applicable Best Practice. Of the 13 applicable Best Practices, 7 were attributed to an insulate & isolate Best Practice, 54%. #BP_I_and_I

Of the 28 SIF events without an applicable Best Practice– 12 struck by, 4 caught between and 4 fall from elevation.

Bone Fracture Events

The Partners reported 18 events where a fractured bone occurred that are classified as a SIF. The change in classification identifies fracture where surgery was required with the implementation of hardware. Of these 18 events, eleven involved struck by. Of the eleven, six involved handling of poles. #SIF_fractures_20_23_general_activity

Electrical Contact and Arc Flashes

Thirteen events occurred due to Arc Flashes or Electrical Contacts. Two of these events resulted in employee fatalities. In the remaining eleven cases, the employees received burns which resulted in ten with days away from work and one placed on restricted duty.

Appendix A – EEI SIF Definitions

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Occupational Safety & Health Committee
Serious Injury and Fatality (SIF) Criteria
Proposed Changes

Power by Association

What is a SIF?
SIF was developed to be a metric that better defines serious injuries and fatalities. It includes work-related fatalities, life-threatening injuries, life-altering injuries, or the SIF criteria described below.

DEFINITIONS

Work-Related: If the injury is OSHA recordable, it should be considered work-related.

Life-Threatening: A physical injury that if not immediately addressed is likely to lead to the death of the affected individual and will usually require the intervention and/or external emergency response personnel to provide life-sustaining support.

Life-Altering: A physical injury that results in permanent loss of use of an internal organ, body function, or body part.

Serious Injury Incidence Rate (SIIR): The SIIR is calculated using the formula (# cases x 200,000/hours worked). The calculation of the SIIR uses the same hours worked number as the calculation of the Recordable Incidence Rate.

Identifying and Classifying Serious Injuries
When the work-related requirement has been met, compare the employee injury to the Serious Injury Criteria listed below to determine if the injury is deemed "Serious." (Each case should be counted only once. In cases with multiple injuries, assign the case to the category representing the most severe injury.)

SIF CRITERIA

1. **Fatalities**

2. **Amputations (involving bone) excludes distal phalanx.** Excludes distal phalanx unless thumb, index or great toe.

   Frequently Asked Questions

   Q. *If the amputation of a distal phalanx includes more than one finger that is not a thumb or index finger, would this be considered a SIF?*

   A. No, the multiple amputation of distal phalanges would not count as a SIF unless it included the thumb or index finger. On the foot, it would not count unless it included the great toe.

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3. **Head trauma that results in a traumatic brain injury (TBI), intracranial bleeding or loss of consciousness for greater than 30 minutes.**

Intracranial can include any bleeding within the confines of the skull and things that are outside of the brain tissue like an epidural bleed.

4. **Injury or trauma to vital organs to include brain, spinal cord, heart, lungs, kidneys, liver, spleen, large and small intestine, and stomach.**

Frequently Asked Questions

1. *When should a case of organ damage be classified as serious?*

A. Injuries and occupational illnesses resulting from acute exposures should be classified as serious if objective medical evidence indicates significant or sustained (beyond initial event, acute treatment and testing) organ damage, or progressive changes in organ function or anatomy. This criterion does not include injury from long term or repetitive exposures.

Only cases that involve relatively short-term events should be included in the serious metric, even if the result is an illness. Illnesses that develop from exposure over long periods of time (years) are not to be captured in this metric (example, fibrosis of the lung from asbestos exposure).

Q. *Is a hernia considered a serious case?*

A. A hernia by itself would not be classified as a severe case. However, if the hernia causes damage to an internal organ such as a strangulated colon, it would be classified as a severe case.

5. **Bone fractures requiring surgery for repair (pins, rods, screw, plates, wires, etc.) Excludes fingers and toes.**

Bone fracture that requires open reduction and internal fixation (ORIF) or other immediate surgical intervention.

Bone fracture of the fingers and toes that require ORIF is excluded.

Any injury to the spine that results in permanent neurological impairment and/or a sensory or motor deficit that does not resolve within the expected/normal recovery time.

Frequently Asked Questions

Q. *Are all fractures of the fingers and toes that result in a permanent loss of mobility excluded?*

A. All fractures of the fingers and toes are excluded.

6. Acute traumatic herniated disc with neurologic deficit – sensory or motor	
7. 2nd degree burn (10% body surface); 3rd degree burn (5% of body surface) or 3rd degree burn requiring skin graft.	Burns resulting from ***electrical contact*** or ***chemical exposure*** should be classified respectively under criterion #12 or #14.
8. Eye injuries resulting in permanent vision loss or change in vision.	Frequently Asked Questions **Q.** *Does a corneal abrasion constitute eye damage injury?* **A.** No. Corneal abrasions and/or scratches due to foreign bodies are considered minor and usually heal quickly.
9. High pressure injection injuries requiring surgical debridement and irrigation.	This could include injuries resulting from injection of hazardous materials such as hydraulic fluid or hydrogen fluoride.
10. Heat Stroke	Must meet medical diagnosis of heat stroke.
11. Dislocation of the hip, elbow or knee.	Does not include dislocation of the patella (kneecap). Count only cases that required the manipulation or repositioning of the joint back into place under the direction of a treating doctor.
12. Electrical contact injuries.	Injuries resulting in or requiring one of the following procedures: ▪ Surgical repair, skin grafting or amputation ▪ Permanent contracture of a joint or loss of function ▪ Cardiac Dysrhythmia ***If there is a burn resulting from an electrical contact, please classify here using the burn criterion - #7.***
13. Vascular trauma requiring surgery	
14. Acute chemical or radiological exposure resulting in injury to vital organs to include brain, spinal cord, heart, lungs, kidneys, liver, spleen, large and small intestine, and stomach.	***If there is a burn resulting from a chemical or radiological exposure, please classify here using the burn criterion - #7.***

15. Other injuries

The "Other injuries" category should only be selected to report injuries not identified in the existing categories. The injury must meet the life-threatening or life-altering definition.

Injuries listed in this document are intended to capture life-threatening and life-altering injuries. We recognize that there is variability in recovery from injury by individuals. Injuries that do not generally result in life-altering outcomes have been omitted.

When applying this classification to life-altering injuries not listed, please select only if an employee is unable to engage in prior level of work functional ability. A description box is provided to briefly describe the nature of the injury.

Appendix B – Best Practices

#Return_overview

#1 Administrative Controls & Information Transfer

PRACTICE STATEMENT: To eliminate injuries to personnel from improper job planning and risk assessment.

PRACTICE DESCRIPTION: Identify protection methods and risk mitigation techniques based on information obtained through information transfer and jobsite analysis. The information obtained through this process shall be provided to the employee in charge to supplement the field crew's job briefing.

A. Pre-planning to begin at the pre-bid meeting.
B. Preliminary job site analysis.
C. The Contractor shall request information from the Host Employer so that the Contractor may be able to conduct adequate risk assessments prior to beginning and during operations. As a minimum this information shall include:
   - Nominal voltage of lines & equipment
   - Maximum switching transient voltage (TOV)
   - Presence of induced voltage
   - Presence of protective grounds and grounding conductors
   - Location of circuits and equipment, including electric supply lines, communication lines, and fire protective signaling circuits
   - The condition of protective grounds and equipment grounding conductors
   - The condition of structures, poles, and/or other facilities.
   - Environmental conditions related to safety.
   - Other known system information related to safety, requested by the contractor such as incident energy, MAD distance, AR clothing.
D. Knowledge of any change in the original work task and any other conditions or characteristics that may affect the safety of the workers.
E. Line work on conductors or equipment shall be performed when they are de-energized, or a portion is de-energized and grounded when possible.
F. Information that is required of the contractor to be communicated to the host:

   - The contract employer shall advise the host employer of any unique hazardous conditions presented by the contract employer's work.
   - The contract employer shall advise the host employer of any unanticipated hazardous conditions found during the contract employer's work that the host employer did not provide.

G. Examples of Host Employer Communication may include work orders, job prints, bid documents, and/or one-line diagrams. The contractor shall document communication (as stated in item "C" above) from the host employer.

BENEFITS:

- Eliminate injuries resulting from improper planning by ensuring key job hazards are identified and controlled.

REFERENCES:
National Electric Safety Code (NESC, ANSI C2 – Part 4)
OSHA 29 CFR §1926.950 (c)
OSHA 29 CFR 1910.269 (a)(3)

#2 Job Briefings

PRACTICE STATEMENT: To provide a uniform method to conduct and document a task-oriented job briefing and the review of critical mitigation information.

PRACTICE DESCRIPTION: The employee in charge shall discuss the tasks to be performed. The briefing shall be documented and include an explanation of how the tasks shall be achieved, hazards expected to be encountered, and steps to be taken to eliminate or control the hazards.

The documented Job Briefing shall identify each of the following:

A. Tasks to be performed.
B. Any Critical Steps for the task
C. How the crew shall complete the tasks with "Positive Control": the key steps that must be done correctly to ensure the planned outcome of the task
D. Existing worksite conditions or characteristics, including any information provided by the host employer.
E. Specific roles and responsibilities for each employee for completing the tasks.
F. Existing and predictable hazards
G. Which situations require heightened awareness, e.g., Qualified Observer, Spotter, Confined Space Attendant, etc.
H. Hazard/Risk mitigation
I. The required protective methods (where applicable) to be used, which include but are not limited to the following:
    - Insulation
    - Isolation
    - Grounding
    - Equal Potential Zone
J. Personal Protective Equipment (PPE) required.
K. Emergency response information

Task specific job briefings shall be held:

- at the start of the work shift,
- at the location of the tasks,
- whenever tasks, key steps, or scope of work changes,
- hazards differ from the original briefing,
- as additional personnel arrive at the job site, and

- after extended work pauses (work breaks, weather delay, etc.).

The briefing form shall have a provision for each employee to sign to verify they have participated in the briefing. Each ET&D Partnership company's management shall establish a review process to ensure that the documented task briefing process is effective.

Debrief

At the end of the workday or prior to work beginning the following day, employees shall convene to debrief. Debriefing discussions may include successful or unsuccessful work methods, special site conditions to be considered, accomplishments and/or accolades, or goals moving forward. All debriefing discussions shall be noted on the task briefing form and lessons learned considered for all future work.

BENEFITS:

- Provides essential job safety planning guidelines and lists key elements.
- Incorporates use of a specific hazard identification process in the job planning process that will provide for enhanced controls for risks.
- The process and required documentation encourage inclusion and participation of job team members in the specific task hazard identification and mitigation associated with the overall job.
- Provides a process (Debrief) to review lessons learned from each work shift.

DEFINITIONS:

Positive Control is the idea that one is aware of and in control of actions/steps and the outcomes of the actions/steps. A person/work crew maintains positive control when the outcome of all action/steps is intended and expected.

Critical Step is any action that will trigger immediate irreversible harm if that step or preceding actions are performed improperly or omitted.

Task for the purposes of this Best Practice is the sub-elements of a job. The processes necessary to complete the job.

Step for the purposes of this Best Practice is the sub-element of a task. The detailed processes necessary to complete a task.

#3 PRE-USE INSPECTION OF INSULATING PROTECTIVE EQUIPMENT AND INSULATING PERSONAL PROTECTIVE EQUIPMENT

PRACTICE STATEMENT: Protocols related to the effective inspection of insulating protective equipment (IPE) and insulating personal protective equipment (IPPE)**.**

PRACTICE DESCRIPTION: All IPE (rubber/plastic) and IPPE shall be inspected by a qualified employee prior to each use and immediately following any incident that can reasonably be suspected of causing damage.
Pre-use inspection must, at minimum, cover the following:

- All IPE/IPPE shall be inspected for any damage, wear or contamination that would compromise its ability to insulate the linemen from different potentials. If upon inspection, IPE/IPPE is found to be defective, the equipment shall be identified and removed from service.

- Applicable service dates and voltage rating shall be observed.

- Insulating rubber gloves shall be given an air test along with an inspection completed by the qualified user.

- Insulating rubber sleeves shall be inspected by the qualified user.

BENEFITS:

- Ensures insulating protective equipment can be used to protect at the rated voltage.
- Provides uniform inspection guidelines for in-service inspection of insulating protective equipment.

DEFINITIONS:

- Insulating Personal Protective Equipment (IPPE): Insulating rubber Gloves and Sleeves.
- Insulating Protective Equipment (IPE): Insulating rubber blankets, rubber line hose, rubber hoods, plastic covers, etc.

REFERENCES:

ASTM F478 Standard Specification for In-Service Care of Insulating Line Hose and Covers
ASTM F479 Standard Specification for In-Service Care of Insulating Blankets
ASTM F496 Standard Specification for In-Service Care of Insulating Gloves and Sleeves
ASTM F1236 Standard Guide for Visual Inspection of Electrical Protective Rubber

Products
OSHA 29 CFR 1910.137
OSHA 29 CFR 1926.97
National Electric Safety Code (NESC, ANSI C2 – Part 4)

#4 Qualified Observer

PRACTICE STATEMENT: A Qualified Observer shall be designated to provide timely

warning while working on or within the minimum approach, including extended reach, of energized conductors or equipment (systems at and above 600V).

PRACTICE DESCRIPTION: A member of the crew shall be identified to act as a Qualified Observer to ensure clearances are maintained, PPE, and effective cover-up is installed.

A. A Qualified Observer shall be designated to provide timely warning while working:
   - On or within the minimum approach including extended reach, of energized conductors or equipment (systems at and above 600V).
   - When using mechanical mobile equipment near energized conductors.
   - When moving energized conductors.

B. A Qualified Observer is defined as an electrically qualified worker that can identify all hazards present to the crew working energized conductors. The Qualified Observer shall be capable of:
   a. Distinguishing exposed live parts.
   b. Identify nominal voltages.
   c. Determine minimum approach distances.
   d. Knowing safe work practices for working on, or near, energized lines and equipment.
   e. Recognize electrical hazards to which workers will be exposed and skills and techniques to control those hazards.
   f. Rendering immediate assistance in case of an accident,

C. The Qualified Observer shall not perform other duties and all work shall stop if the Qualified Observer can no longer perform observer duties.

DEFINITIONS

The term "effective cover up" is used to describe the installation of phase-to- phase rated insulating protective cover on energized conductors and/or equipment of different potentials when the lineman is within reaching distance or in areas extended by handling conductive objects.

The term "extended reach" is used to describe being within five feet of energized conductors and/or equipment or having a conductive object within five feet of energized conductors and/or equipment.

BENEFITS:

- Eliminate unintentional contact with energized components while working on, or near lines and equipment.
- Eliminate injuries from unrecognized hazards or changes in conditions.
- Clarify duties and provide guidance as to when observers are necessary.

- Provides guidance on observer qualifications.

#5 I&I TECHNIQUES FOR THE RUBBER GLOVE METHOD

PRACTICE STATEMENT: The effective use of Isolate and Insulate equipment and procedures to provide the necessary level of safety when qualified line workers are working on energized lines & equipment.

The employer must ensure that any employee who performs energized line work is qualified through training and experience to perform the work assigned.

PRACTICE DESCRIPTION: Properly performed Insulate and Isolate (I&I) techniques used in conjunction with the necessary Insulating Personal Protective Equipment (IPPE) allows a qualified line worker to safely work on and around energized equipment and conductors.

1. Only qualified line workers shall be permitted to encroach M.A.D. using this Best Practice.

2. When working from an aerial lift the 'Cradle to Cradle' Best Practice shall be observed.

3. Before getting into a position where the qualified line worker can reach into, extend any conductive object into, or extend any other part of the body into the M.A.D., properly rated IPE/IPPE shall be used to insulate/isolate energized conductors and/or other conductive parts at a different potential.

4. For URD equipment the criteria for the 'Lock to Lock' Best Practice shall be observed.

5. Properly rated IPE shall be installed in the order of 'nearest first' and removed in the reverse order.

    - Energized or de-energized part(s) may have to be temporarily covered in order to install IPE on all parts necessary to insulate/isolate the part that is to be worked on.

    - The part to be worked shall only be uncovered after all IPE has been installed in the work zone that will allow no contact with conductors or equipment at a different potential.

    - IPE shall be installed/removed in such a manner so that the worker is not exposed to contact from energized conductors or second points of contact.

    - The line worker shall **NEVER** turn their back on exposed energized conductors or second points of contact within M.A.D.

BENEFITS:

- Eliminate contact injuries.
- Eliminate electric arc flash injuries.

- Safely working on energized circuits and maintaining the reliability of the electrical system.

Definitions:

Effective cover-up is used to describe the installation of phase-to-phase rated insulating protective cover on energized conductors and/or equipment of different potentials when the lineman is within reaching distance or in areas extended by handling conductive objects.

Extended reach is used to describe being within five feet of energized conductors and/or equipment or having a conductive object within five feet of energized conductors and/or equipment.

Insulated: (1) The use of IPE to protect the line worker while gloving energized lines/equipment.

Insulating Personal Protective Equipment (IPPE): Rubber Gloves and Sleeves.

Insulating Protective Equipment (IPE): rubber blankets, rubber line hose, rubber hoods, plastic covers, etc.

Isolate: (A) Physically separated, electrically and mechanically, from all sources of electrical energy. Such separation may not eliminate the effects of induction. (B) Not readily accessible to persons unless special means of access are used.

Minimum Approach Distance (M.A.D.): The distances set forth in 29 CFR 1910.269. This distance is measured from the end of the line worker's reach or from the end of any conductive object being handled by the line worker.

Second points of contact: Accidental/inadvertent contact made with any conductive object within your extended reach that could have a difference of potential and would allow current to pass through the body.

REFERENCES:

- **NJATC –** Effective Cover Up; interactive training.
- **NECA** – Safety Risk Management for the Electrical T&D Line Construction
- **IBEW –** Ten States Safety Manual
- **OSHA –** 1910.269, 1926.950; subpart V
- **ASTM** – F 968-93
- **ET&D Partnership** – Existing Best Practices
- **WISHA-296-45** – Electrical Workers
- **IEEE 100 –** The Authoritative Dictionary of IEEE Standards Terms (seventh edition)

#6 CRADLE-TO-CRADLE USE OF INSULATING RUBBER GLOVES AND SLEEVES

PRACTICE STATEMENT: Protocols related to effective use of insulating rubber gloves and sleeves**.**

PRACTICE DESCRIPTION:

A. When employees are working on energized circuits or equipment using the rubber glove method, insulating rubber gloves and sleeves rated for the exposure of the highest nominal voltage shall be worn cradle-to-cradle when working from an aerial platform.

   - Exception-Insulating rubber sleeves are not required when employees are working circuits with a potential of 600 volts or less if there is no upper arm exposure and the worker will not encroach the 5-foot primary zone.

B. Electrical class rating of the insulating rubber sleeves shall meet or exceed the electrical class rating of the insulating rubber gloves when working on primary conductors.

C. Company policies shall apply when the above conditions cannot be met. Alternative work methods ensuring worker safety shall be identified, communicated to all affected workers, implemented, and documented as part of the Job Briefing process.

BENEFITS:

- Provides specific use requirements that are proven methods for reducing electrical contact injuries and fatalities.
- Provides uniform use guidelines that can be applied industry wide.

DEFINITIONS

Effective Cover Up is used to describe the installation of phase-to- phase rated insulating protective cover on energized conductors and/or equipment of different potentials when the lineman is within reaching distance or in areas extended by handling conductive objects.

Extended Reach is used to describe being within five feet of energized conductors and/or equipment or having a conductive object within five feet of energized conductors and/or equipment.

#7 Lock-To-Lock Use of Insulating Rubber Gloves and Sleeves

PRACTICE STATEMENT: Protocols related to effective use of insulating rubber gloves and sleeves**.**

PRACTICE DESCRIPTION:

- When employees are working on energized circuits or equipment, rubber protective-insulating gloves and sleeves rated for the exposure of the highest nominal voltage shall be worn "lock to lock" when employees are working on underground electrical equipment. This includes when the employee manipulates the enclosure's door.

- A complete, thorough inspection and hazard assessment must be conducted prior to any action involving manipulation of the locking mechanism being performed. This hazard assessment could include the following based on geographical location: Visible damage, hinge condition, foundation (stability and general condition), rust, site conditions (landscaping), noise in the enclosure, oil present in and around enclosure, wildlife concerns (bees, snakes, etc.)

    - If no physical, sensory, or environmental condition is present during the hazard assessment that would necessitate the use of gloves and sleeves to unlock the lock, gloves and sleeves may be omitted for unlocking. Gloves and sleeves are required for lock removal without exception.

- Rubber gloves and sleeves shall be worn when working on or within the extended reach of the conductor or piece of equipment.

- The electrical class rating of the insulating rubber sleeves shall meet or exceed the electrical class rating of the insulating rubber gloves.

BENEFITS:

- Provides specific use requirements that are proven methods for reducing electrical contact injuries and fatalities.
- Provides uniform use guidelines that can be applied industry wide.

DEFINITIONS

Lock-to-Lock is used to describe the utilization of rubber gloves and sleeves, when required, prior to the time the pad mounted equipment is unlocked until work is complete, and the pad mounted equipment is relocked.

Extended Reach is used to describe being within five feet of energized conductors and/or equipment or having a conductive object within five feet of energized conductors and/or equipment.

#8 I&I TECHNIQUES FOR THE LIVE LINE TOOL METHOD ON DISTRIBUTION

PRACTICE STATEMENT: The effective use of Isolate and Insulate equipment and procedures to provide the necessary level of safety when performing Live Line Tool work on energized lines & equipment.

The employer must ensure that any employee who performs energized line work is qualified (See 29 CFR 1910.269 and 29 CFR 1926.950) through training and experience to perform the work assigned.

PRACTICE DESCRIPTION: Properly performed Insulate and Isolate (I&I) techniques used in conjunction with the necessary insulating live line tools allows qualified personnel to safely work on and around energized equipment and conductors.

I&I Definitions:

1. **Insulated**: (1) The use of Insulated Protective Equipment (IPE) to protect the line worker while working on or within 5 feet (including extended reach) of energized lines/equipment.

2. **Insulating Personal Protective Equipment (IPPE)**: Rubber Gloves and Sleeves.

3. **Insulating Protective Equipment (IPE)**: rubber blankets, rubber line hose, rubber hoods, plastic covers, etc.

4. **Isolate**: (A) Physically separated, electrically and mechanically, from all sources of electrical energy. Such separation may not eliminate the effects of induction. (B) Not readily accessible to persons unless special means of access are used.

5. **Minimum Approach Distance (M.A.D.)**: The distances set forth in 29 CFR 1910.269. This distance is measured from the end of the line worker's reach or from the end of any conductive object being handled by the line worker.

6. **Second points of contact:** Accidental/inadvertent contact made with any conductive object within your extended reach that could have a difference of potential and would allow current to pass through the body.

I&I Best Practice: Energized Primary Live Line Tool Method

1. Only workers who are qualified shall be permitted to work within M.A.D. using this best practice.

2. When working from an aerial lift/structure the 'IPPE for the Live Line Tool Method on Distribution Lines' Best Practice shall be observed. Any time an employee's unprotected hands and/or arms are positioned within the MAD of exposed energized lines or equipment, appropriately rated rubber gloves and sleeves shall be worn, or effective cover shall be applied.

3. Before getting into a position where the qualified line worker can reach into, extend any conductive object into, or extend any other part of the body into the M.A.D., approved and tested IPE/IPPE for the voltage to be worked shall be used to insulate/isolate energized conductors and/or other conductive parts at a different potential.

4. For URD equipment the criteria for the 'Lock to Lock' Best Practice shall be observed.

5. Approved IPE shall be installed in the order of 'nearest first' and removed in the reverse order.

    a. Energized or de-energized part(s) may have to be temporarily covered in order to install IPE on all parts necessary to insulate/isolate the part that is to be worked on.

    b. The part to be worked shall only be uncovered after all IPE has been installed in the work zone that will allow no contact with conductors or equipment at a different potential.

    c. IPE shall be installed/removed in such a manner so that the worker is not exposed to contact from energized conductors or second points of contact.

    d. The line worker shall **NEVER** turn their back on exposed energized conductors or second points of contact within M.A.D.

BENEFITS:

- Eliminate contact injuries.
- Eliminate electric arc flash injuries.
- Safely working on energized circuits and maintaining the reliability of the electrical system.

REFERENCES:

- **NJATC –** Effective Cover Up; interactive training.
- **NECA** – Safety Risk Management for the Electrical T&D Line Construction
- **IBEW –** Ten States Safety Manual
- **OSHA –** 1910.269, 1926.950; subpart V
- **ASTM** – F 968-93
- **ET&D Partnership** – Existing Best Practices
- **WISHA-296-45** – Electrical Workers
- **IEEE 100 –** The Authoritative Dictionary of IEEE Standards Terms (seventh edition)

<u>#9 Safety at Heights – Fall Protection when Performing Aerial Work</u>

PRACTICE STATEMENT: Fall Protection Equipment (FPE) shall be used above 4 feet when ascending, while in the working position, when changing positions, descending, and/or performing rescue operations.

PRACTICE DESCRIPTION: Fall hazards associated with aerial work shall be assessed and fall hazard mitigation plans developed. Fall Protection Device shall be "engaged" ground-to-ground.

A. Climbers shall be competent in the application of all necessary fall protection methods used for the fall hazard mitigation of the tasks that will be performed.

B. The following information must be considered and addressed on the job briefing form when planning aerial work:

    - Identify tasks to be performed while working aloft.
    - Client/Owner Fall Protection policies, procedures, and hazard analysis documentation as applicable.
    - Identify suitable anchorage points that are going to be used for the task to be performed.
    - Employers shall address rescue considerations and develop appropriate procedures that will allow successful performance of a given rescue technique for varied field conditions.
    - Determine/Identify necessary FPE and/or Work Positioning Equipment (WPE).
    - Determine climber qualification in the use of FPE and/or WPE.

C. FPE/WPE shall be inspected and used in accordance with the manufacturer's instructions and guidelines.

D. Company policies shall apply when the conditions of this Best Practice cannot be met. Alternative work methods ensuring climber safety shall be identified, communicated to all affected climbers, implemented, and documented as part of the job briefing process.

E. Climbers shall be trained and competent in the care, use, and inspection of the equipment used to conform to this Best Practice. Climbers must be trained in the selection and safe use of the equipment/system. Training shall only be conducted by qualified trainers.

F. Visual inspections shall be performed prior to, and during climbing, to ensure that the structure is inacceptable condition for the safe execution of the tasks to be performed.

G. This Best Practice applies to all climbers including those that perform rescue. Rescue application should be predetermined as early as possible, but no later than during the pre-job briefing, based on rescue needs such as timeliness and consideration given to the characteristics of the structure that rescue is being performed on.

BENEFITS: To eliminate injuries and fatalities associated with falls while performing work aloft.

REFERENCE:

ANSI Z359.2 – 2007

CSA Z259.14-01

29 CFR 1910.66 App C

29 CFR 1926.500 – 503

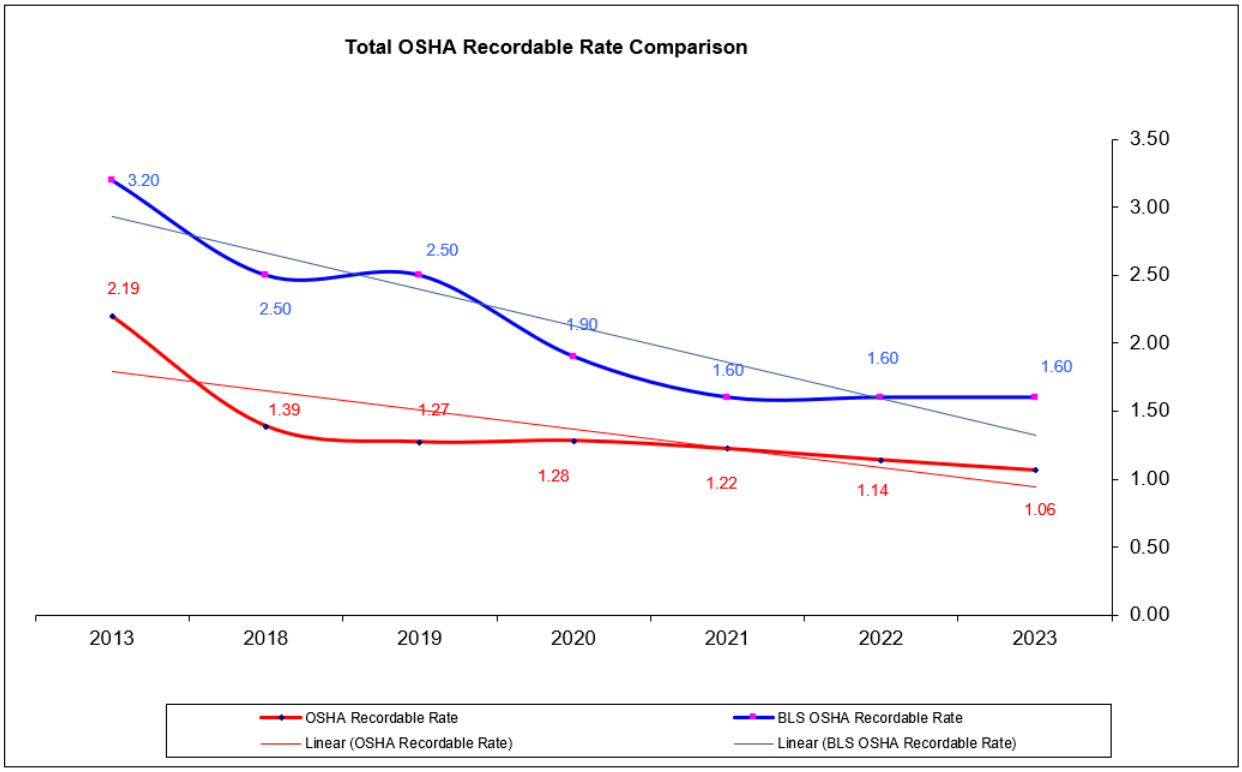
BLM 1292-1

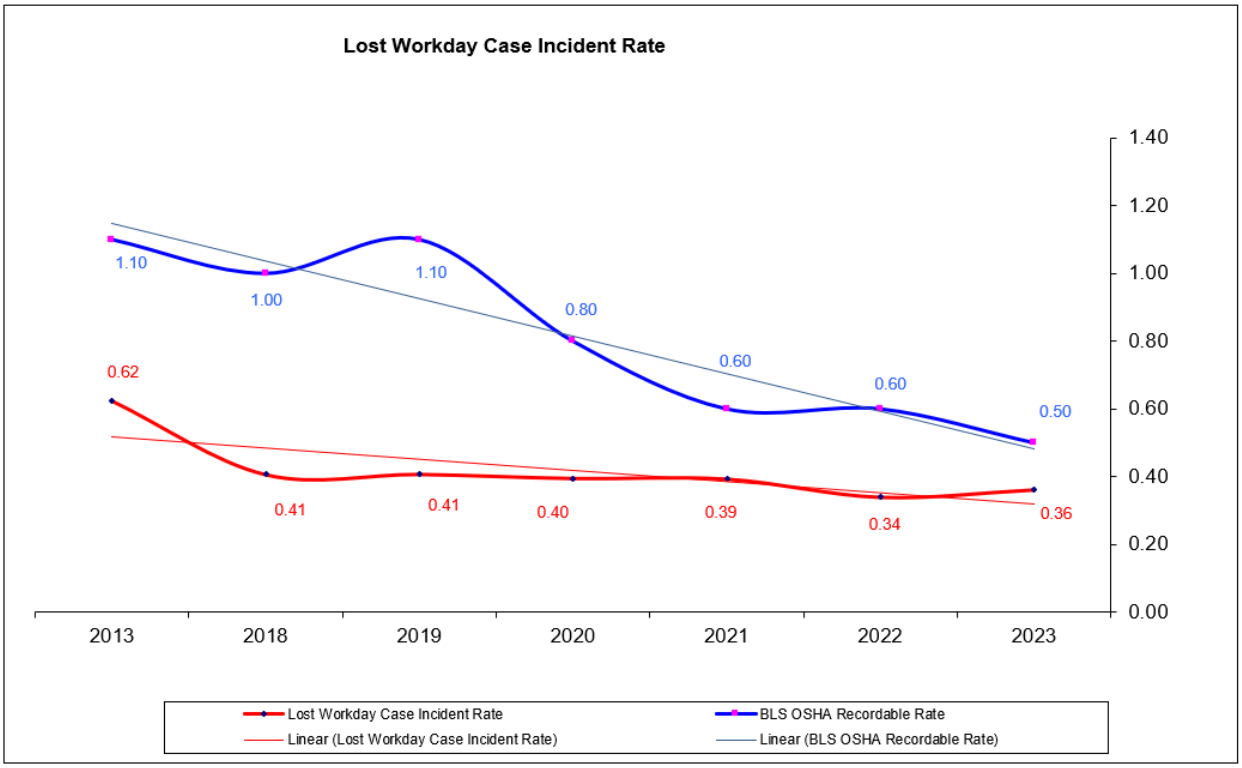
Best practices utilized by OSP members for lattice structures.

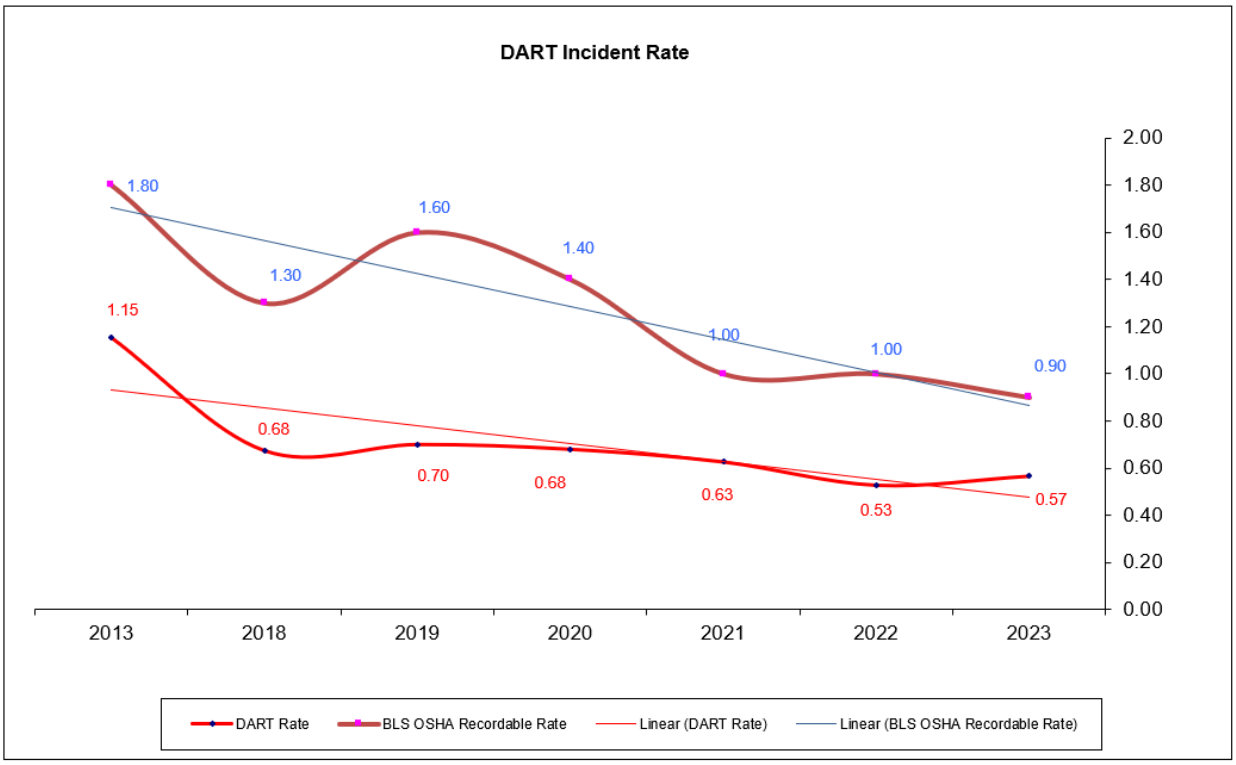
IEEE 1307 – IEEE Standard for Fall Protection for Utility

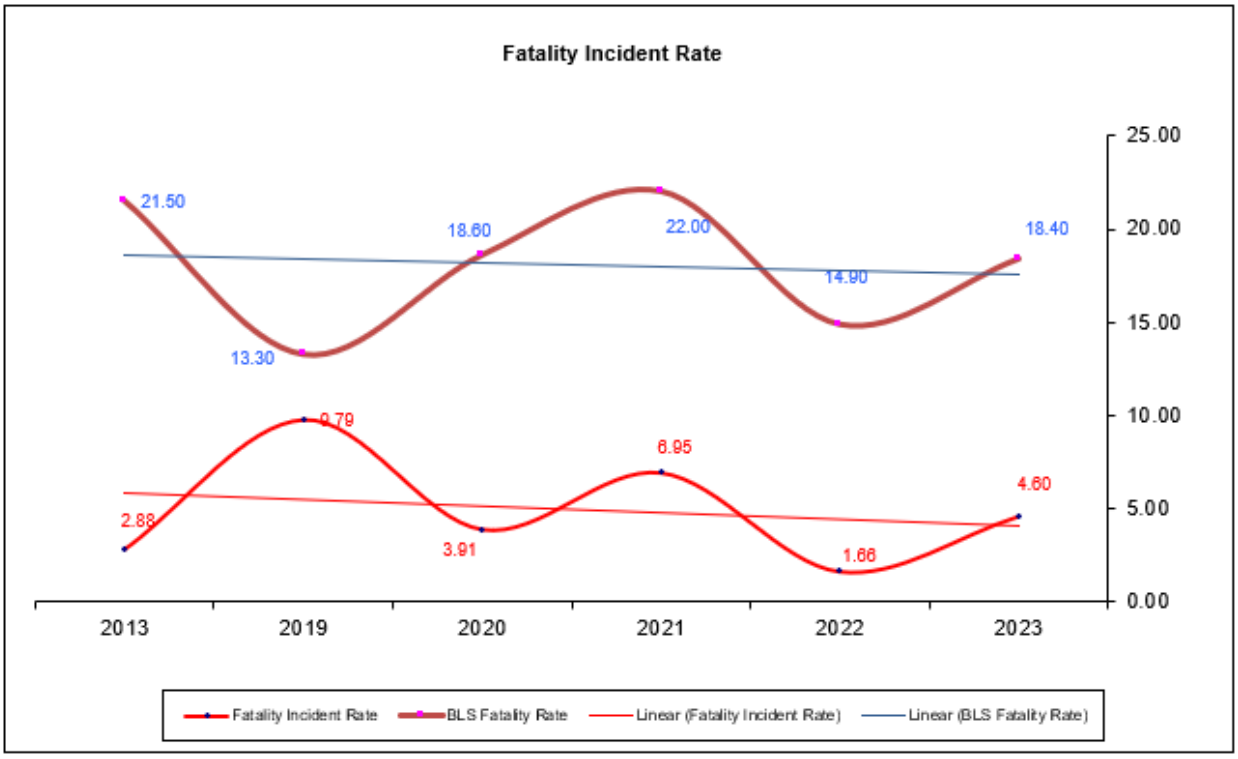
Work Example FHA attached.

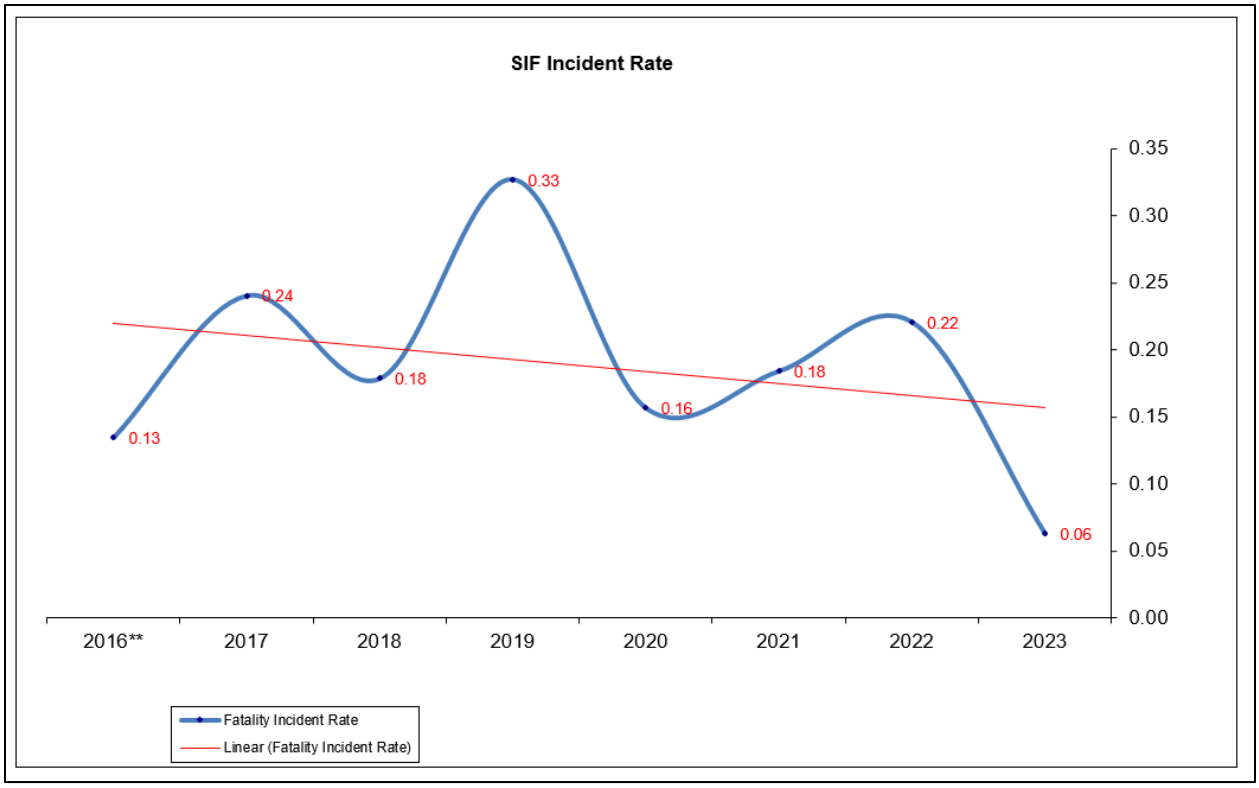
Appendix C – Baseline data Graph TCIR, LTIR, DART, Fatal






DART Incident Rate
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1.80
1.30
1.60
1.40
1.00
1.00
0.90
1.15
0.68
0.70
0.68
0.63
0.53
0.57
2013
2018
2019
2020
2021
2022
2023
DART Rate
BLS OSHA Recordable Rate
Linear (DART Rate)
Linear (BLS OSHA Recordable Rate)


Fatality Incident Rate
25.00
20.00
15.00
10.00
5.00
0.00
21.50
13.30
18.60
22.00
14.90
18.40
2.88
9.79
3.91
6.95
1.66
4.60
2013
2019
2020
2021
2022
2023
Fatality Incident Rate
BLS Fatality Rate
Linear (Fatality Incident Rate)
Linear (BLS Fatality Rate)



as of 31 Dec 2023	Man Hours Worked	SIF Incident Rate (see note below)	
		Number of SIF	Partnership SIF Incident Rate
2023 EEI SIF Def.**	130,457,865	41	**0.06**
2022	120,581,148	133	**0.22**
2021	115,110,130	106	**0.18**
2020	102,178,417	80	**0.16**
2019	102,115,211	167	**0.33**
2018	92,938,987	83	**0.18**
2017	84,030,858	101	**0.24**
2016	83,179,680	56	**0.13**
2015	69,395,665	n/a	
2014	64,492,853	n/a	
2013	69,561,958	n/a	
10 Year Combined	1,034,042,772	767	

as of 31 Dec 2023	OSHA Recordable Rate		Lost Workday Case Incident Rate		Restricted Workday Case Incident Rate		Other Recordable Incident Rate		DART Rate	Fatality Incident Rate (see note below)	
	Number of OSHA Recordable Injuries	OSHA Recordable Rate	Number of Lost Workday Cases	Lost Workday Case Incident Rate	Number of Restricted Workday Cases	Restricted Workday Case Incident Rate	Number of Other Recordable Cases	Other Recordable Incident Rate	LW & RW Case Incident Rate Combined	Number of fatalities	Partnership Fatility Incident Rate
2023 EEI SIF Def.**	694	1.06	236	0.36	134	0.21	321	0.49	0.57	3	**4.60**
2022	687	1.14	205	0.34	114	0.19	367	0.61	0.53	1	**1.66**
2021	697	1.22	221	0.39	137	0.23	335	0.60	0.63	4	**6.95**
2020	655	1.28	202	0.40	146	0.29	305	0.60	0.68	2	**3.91**
2019	650	1.27	208	0.41	150	0.29	287	0.56	0.70	5	**9.79**
2018	645	1.39	189	0.41	125	0.27	322	0.69	0.68	9	**19.37**
2017	646	1.54	174	0.41	156	0.37	308	0.73	0.79	8	**19.04**
2016	650	1.56	177	0.43	279	0.67	322	0.77	1.10	1	**2.40**
2015	657	1.89	200	0.58	144	0.42	309	0.89	0.99	7	**20.17**
2014	753	2.34	250	0.78	179	0.56	335	1.04	1.33	6	**18.61**
2013	763	2.19	217	0.62	184	0.53	350	1.01	1.15	1	**2.88**
10 Year Combined	7,497	1.45	2,279	0.44	1,748	0.34	3,561	0.69	0.78	47	

Appendix D – Tables, charts, graphs

Table 1 –2020 to 2023 SIF Event Classification

SIF Categories *Definition changed in 2023 see Appendix A	2020	2021	2022		2023
Fatality	2	4	1		3
Amputations	12	10	6		2
Concussions	2	5	0		0
Trauma to internal organ	2	1	0		3
Fractured bones	32	49	78		18
Tendon tear complete	12	8	9		N/A
Herniated disc	0	0	1		0
Internal stitches required	3	0	5		N/A
Burns	13	23	23		8
Eye loss of vision	0	0	0		0
Injections of Foreign Material	0	0	3		0
Severe Heat	2	2	2		2
Dislocation Major Joint	0	4	4		0
Other	0	0	1		1
**NEW – Electrical Contact Injuries	N/A	N/A	N/A		3
**NEW – Vascular Trauma	N/A	N/A	N/A		1
Grand Total	**80**	**106**	**133**		**41**

Table 2 –Best Practice – Electrical contacts and Arc Flashes

#Return_overview

Best Practice – Electrical contacts and Arc Flashes	2023
ADMINISTRATIVE CONTROLS & INFORMATION TRANSFER	2
CRADLE-TO-CRADLE USE OF INSULATING RUBBER GLOVES AND SLEEVES	1
I&I TECHNIQUES FOR THE LIVE LINE TOOL METHOD ON DISTRIBUTION	2
I&I TECHNIQUES FOR THE RUBBER GLOVE METHOD	1
JOB BRIEFINGS	2
LOCK-TO-LOCK USE OF INSULATING RUBBER GLOVES AND SLEEVES	3
QUALIFIED OBSERVER	2
Total	13

Table 3 – Fatality Yearly comparison

Injury Classification	2016	2017	2018	2019	2020	2021	2022	**2023**
Electric Contact	1	5	3	3	1	3	0	2
Struck By (*1)	0	0	1	0	1	0	0	0
Fall	0	2	1	2	0	0	0	0
Misc./Other (*2)	0	0	2	0	0	0	0	0
Caught Between (*1)	0	0	2	0	0	0	0	1
Motor Vehicle	0	1	0	0	0	1	1	0
Grand Total	1	8	9	5	2	4	1	3

***2018 – Helicopter Events**

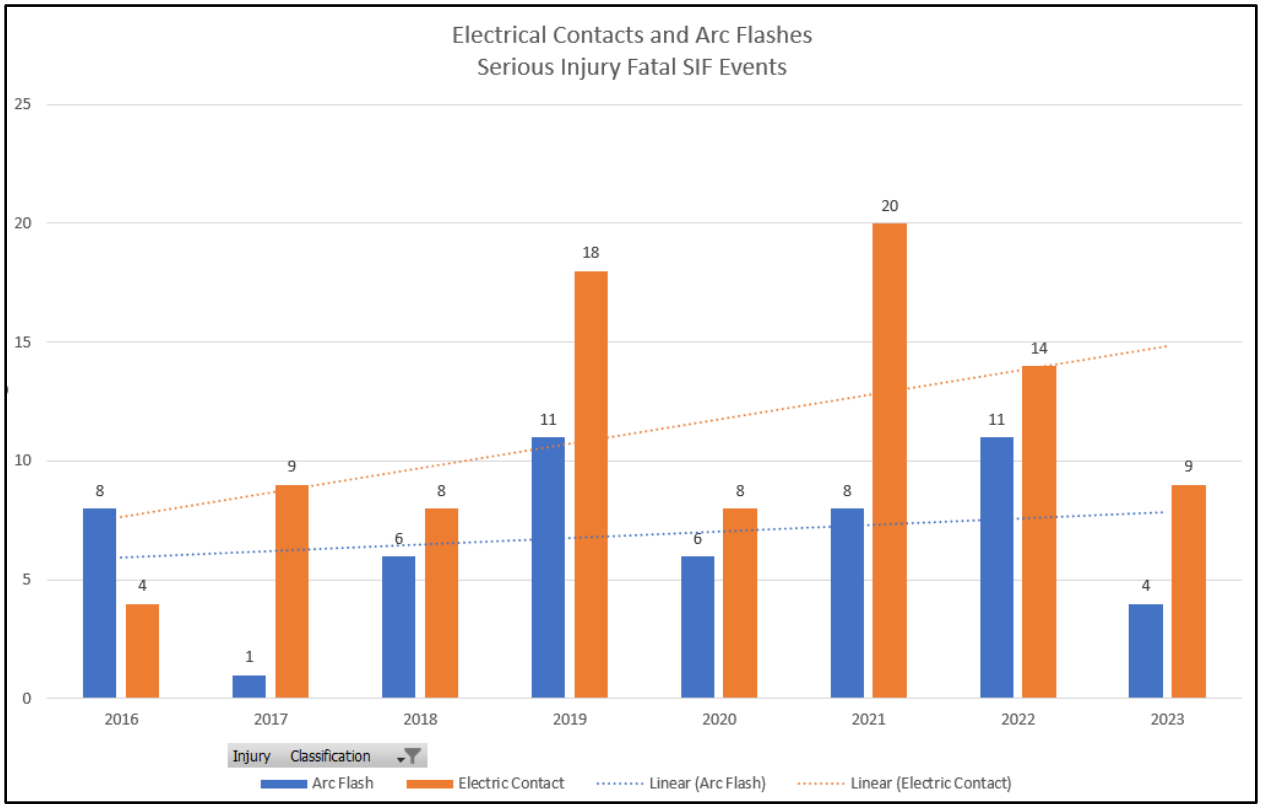


Figure 1 – Electrical Contact and Arc Flash

Table 4 – 2020 – 2023 SIF Fractures General Activity

#Bone_fracture

General Activity SIF Fractures	2020	2021	2022	2023
Standing	1	8	2	0
Operating Vehicle/Equipment	4	6	5	0
Materials Handling Mechanical	3	5	3	2
Driving/Passenger	0	5	6	0
Tools Manual	0	5	1	0
Materials Handling Manual	4	4	13	0
Walking	5	3	15	2
Conductors Installing/Removing	3	3	8	2
Equipment Assembly/Disassembly	4	2	5	0
On Equipment	1	2	6	2
Other	0	2	0	1
Pole/Tower/Structure -Assembly/Disassembly	4	1	5	4
Climbing	1	1	2	2
Access /Egress	1	1	3	0
Digging/Excavation Manual	0	1	0	0
Cutting/Welding/Grinding	0	0	1	0
Cutting Hand Tools	1	0	0	0
Aerial Work	0	0	3	2
Work Area Protection	0	0	0	1
Grand Total	**32**	**49**	**78**	**18**

Table 5 – SIF Fractures by Injury Classification

SIF Type	Injury Classification	2020	2021	2022	2023
05 Fractured bones	Caught Between	7	15	24	0
	Struck By	6	16	14	11
	Slip/Trip/Falls** (updated)	N/A	N/A	24	2
	Fall from Elevation** (updated)	N/A	N/A	1	4
	Slip/Trip** (updated)	6	1	N/A	N/A
	Fall** (updated)	10	10	N/A	N/A
	Motor Vehicle	1	7	4	1
	Cuts/Punctures	0	0	7	0
	Strains/Sprains	1	0	2	0
	Electric Contact	0	0	1	0
	Misc./Other	1	0	0	0
	Laceration	0	0	1	0
Grand Total		**32**	**49**	**78**	**18**

Table 6 – Best Practice Insolate and Isolate

Row Labels	Total BP
CRADLE-TO-CRADLE USE OF INSULATING RUBBER GLOVES AND SLEEVES	1
I&I TECHNIQUES FOR THE LIVE LINE TOOL METHOD ON DISTRIBUTION	2
I&I TECHNIQUES FOR THE RUBBER GLOVE METHOD	1
LOCK-TO-LOCK USE OF INSULATING RUBBER GLOVES AND SLEEVES	3
Grand Total	**7**

Table 7 – Lineman SIF Events

Lineman Injury Trends	2020	2021	2022	2023
Top work activity	Installing & Removing conductors	Installing & Removing conductors	Installing & Removing conductors	Aerial Work
SIF top 2 Injury types	Fractures and Burns	Fractures and Burns	Fractures and Burns	Fractures and Burns
SIF top 2 Injury types	Fractures 2 Times more frequent	Fractures 2 Times more frequent	Fractures 18 Burns 23	Fractures 6 Burns 6
0-3-month length of employment % of SIF	36%	13%	29%	6%
Work type - Distribution.	60.61%	69.23%	66%	65%
Work type - Transmission.	33.33%	28.85%	25%	35%
Work type - Substation	0.00%	1.92%	7%	0%
Work type - Other	6.06%	0.00%	2%	0%

Table 8 - Apprentice SIF Events

Apprentice Injury Trends	2020	2021	2022	2023
Top work activity	Installing & Removing conductors; equipment assembly /disassembly; access/egress; aerial	Pole/Tower/Structure Assembly/Disassembly; Materials Handling Manual; Standing; conductors installing/Removing; climbing	Walking	Pole/Tower/Structure Assembly/Disassembly; Materials Handling Mechanical

	work; climbing (equally)			
SIF top 2 Injury types	Fractures and Burns	Fatality & Amputations	Fracture	Fracture
Frequency 1 to 2 Year length of employment top	6-12 months (4)	1-2 Years (5)	1-2 Years (5) 1-3 Months (5)	2-5 year (3) 1-2 Year (3) 1-3 Month (3)
Work type - Distribution	35.71%	53.85%	69.57%	75%
Work type - Transmission	57.14%	38.46%	17.39%	25%
Work type - Substation	0.00%	7.69%	13.04%	0%
Work type - Other	7.14%	0.00%	0.00%	0%

Table 9 – SIF Events Lineman, Apprentice, Groundman by Employment Length

SIF Events by Specific Job Title - 2023			
Length of Employment (with company)	**Apprentice Lineman**	**Groundman/Laborer**	**Lineman**
Less than 1 month	0	0	3
1-3 month	3	0	3
3-6 month	1	0	2
6-12 month	2	0	0
1-2 year	3	0	2
2-5 year	3	1	6
5-10 year	0	0	1
10 + year	0	0	0
Grand Total	**12**	**1**	**17**