

**OCCUPATIONAL SAFETY  
AND HEALTH STANDARDS BOARD**

2520 Venture Oaks Way, Suite 350  
Sacramento, CA 95833  
(916) 274-5721  
FAX (916) 274-5743  
[www.dir.ca.gov/oshsb](http://www.dir.ca.gov/oshsb)

**TITLE 8. CALIFORNIA CODE OF REGULATIONS**

Article 1. Definitions, Section 2300

Article 3. Work Procedures, Sections 2320.2, 2320.7, and 2320.8; and New Section 2320.11

Article 4. Requirements for Electrical Installations, Section 2340.17  
of the Low-Voltage Electrical Safety Orders

Article 1. Definitions, Section 2700

Article 23. Transformers, Section 2874

Article 29. Capacitors, Sections 2887 and 2893

Article 36. Work Procedures and Operating Procedures, Sections 2940, 2940.1, 2940.2,  
2940.5, 2940.6, 2940.7, and 2940.8; New Sections 2940.11, 2940.12, 2940.13,  
2940.14, 2940.15, and 2940.16; Sections 2941, 2941.1, and 2943;  
New Section 2943.1; Section 2944; and New Section 2944.1,

New Appendix A, Appendix C, New Appendix D, and New Appendix E

Article 37. Provisions for Preventing Accidents Due to  
Proximity to Overhead Lines, Section 2946

Article 38. Line Clearance Tree Trimming Operations, Section 2951  
of the High-Voltage Electrical Safety Orders

Article 7. Miscellaneous Safe Practices, Sections 3314

Article 10. Personal Safety Devices and Safeguards, Section 3389

Article 12. Tree Work, Maintenance or Removal, Sections 3422 and 3425;  
and New Section 3428

Article 108. Confined Spaces, Section 5156  
of the General Industry Safety Orders

Article 1. Telecommunications, Section 8617  
of the Telecommunications Safety Orders

**Electric Power Generation, Transmission, and Distribution;**  
**Electrical Protective Equipment: Final Rule**

(Published **January 27, 2017**)

NOTICE IS HEREBY GIVEN that the Occupational Safety and Health Standards Board (Board) proposes to adopt, amend or repeal the foregoing provisions of Title 8 of the California Code of Regulations in the manner described in the Informative Digest, below.

## **PUBLIC HEARING**

The Board will hold a public hearing starting at 10:00 a.m. on **March 16, 2017** in the **Auditorium** of the **State Resources Building, 1416 9<sup>th</sup> Street, Sacramento, California**. At this public hearing, any person may present statements or arguments orally or in writing relevant to the proposed action described in the Informative Digest.

## **WRITTEN COMMENT PERIOD**

In addition to written or oral comments submitted at the public hearing, written comments may also be submitted to the Board's office. The written comment period commences on **January 27, 2017** and closes at 5:00 p.m. on **March 16, 2017**. Comments received after that deadline will not be considered by the Board unless the Board announces an extension of time in which to submit written comments. Written comments can be submitted as follows:

By mail to Sarah Money, Occupational Safety and Health Standards Board, 2520 Venture Oaks Way, Suite 350, Sacramento, CA 95833; or

By fax at (916) 274-5743; or

By e-mail sent to [oshsb@dir.ca.gov](mailto:oshsb@dir.ca.gov).

## **AUTHORITY AND REFERENCE**

Labor Code Section 142.3 establishes the Board as the only agency in the State authorized to adopt occupational safety and health standards. In addition, Labor Code Section 142.3 requires the adoption of occupational and health standards that are at least as effective as federal occupational safety and health standards.

## **INFORMATIVE DIGEST OF PROPOSED ACTION/ POLICY STATEMENT OVERVIEW**

On April 11, 2014, Federal OSHA issued a Final Rule relating to Electric Power Generation, Transmission, and Distribution and Electrical Protective Equipment with updated and new provisions that affect the General Industry Safety Orders, the Low-Voltage Electrical Safety Orders, and the High-Voltage Electrical Safety Orders. The main purpose of this rulemaking is to update the California Electrical Safety Orders to be at least as effective as the federal standards.

Federal OSHA last issued rules for the construction of transmission and distribution installations in 1972. Those provisions are out-of-date and inconsistent with the more recently promulgated general industry standards covering the operation and maintenance of electric power generation, transmission, and distribution lines and equipment. Federal OSHA revised the construction standards to make them more consistent with the general industry standards. They also revised some provisions to both construction and general industry requirements. The final rules for general industry and construction include new or revised provisions on host employers and

contractors, training, job briefings, fall protection, insulation and working position of employees working on or near live parts, minimum approach distances, protection from electric arcs, deenergizing transmission and distribution lines and equipment, protective grounding, operating mechanical equipment near overhead power lines, and working in manholes and vaults. Federal OSHA also updated the standard for the design of electrical protective equipment replacing the incorporation of out-of-date consensus standards with a set of performance-oriented requirements that are consistent with the latest revisions of the relevant consensus standards. This proposal also includes new requirements for the safe use and care of electrical protective equipment.

This proposal is substantially similar to the federal standard since it was the Federal Final Rule that prompted this rulemaking. 29 CFR 1910.269 and 1926 Subpart V apply exclusively to electric power generation, transmission and distribution industries in the general industry and construction industry. The California Electrical Safety Orders apply to the operation, installation, removal, use and maintenance of electrical equipment and tools, with the operating or intended operation voltage as the delineating criterion, not the type of industry. Provisions for electrical installations operating or intended to operate on systems of 600 volts or less are governed by the Low-Voltage Electrical Safety Orders and installations above 600 volts are governed by the High-Voltage Electrical Safety Orders.

Due to the difference in organization, federal standards are proposed for adoption into Title 8 under the Low-Voltage Electrical Safety Orders, High-Voltage Electrical Safety Orders, and General Industry Safety Orders. Federal rules regarding host employers are being amended to be consistent with California's multi-employer standard. The proposed changes in the General Industry Safety Orders relate to equipment used for line-clearance tree trimming. The changes in Article 12, Tree Work, Maintenance and Removal of the General Industry Safety Orders will affect tree trimming operations outside line-clearance tree trimming.

The Board evaluated the proposed regulations pursuant to Government Code section 11346.5(a)(3)(D) and has determined that the regulations are not inconsistent or incompatible with existing state regulations. This proposal is part of a system of occupational safety and health regulations. The consistency and compatibility of that system's component regulations is provided by such things as: (1) the requirement of the federal government and the Labor Code to the effect that the State regulations be at least as effective as their federal counterparts, and (2) the requirement that all state occupational safety and health rulemaking be channeled through a single entity (the Standards Board).

### **Anticipated Benefits**

Federal OSHA expects the final rule to result in an increased degree of safety for the affected employees; thereby, reducing the numbers of accidents, fatalities, and injuries associated with the relevant tasks and reducing the severity of certain injuries, such as burns or injuries that employees could sustain as a result of an arrested fall that may still occur during the performance of some of the affected work procedures.

The specific changes are as follows:

## **Section 2300. Definitions.**

This section contains definitions in the Low Voltage Electrical Safety Orders. The addition of the following definitions adds clarity to the regulations since these definitions are used in the body of the safety orders:

- Barricade. This term is used in Section 2320.2(a)(7).
- Cable Sheath. This term is used in Article 49. Flexible Cords and Cables.
- Circuit. This term is used in many sections of the Electrical Safety Orders.
- Competent Supervision. This term is proposed to replace the term “responsible supervision” used in Section 2320.2. Energized Equipment or Systems. The definition of competent supervision provides more clarity than the term responsible supervision.
- Current-Carrying Part. This term is added to be commensurate with the federal standard. The term non-current carrying part is used in Sections 2320.11 and 2940.11.
- Minimum Approach Distance. This term is used in Section 2320.2.
- Qualified Electrical Worker. This term is used in the definition of “minimum approach distance”.
- Qualified Line Clearance Tree Trimmer. This term is used in Section 2320.2.
- Qualified Tree Worker. This term is used in Sections 2320.2 and 3420(b).

## **Section 2320.2. Energized Equipment or Systems.**

This standard sets forth requirements for practices, personal protective equipment, and procedures for working on energized equipment.

The following are the proposed changes:

- Subsection (a)(1) replaces the term “responsible” supervision with “competent” supervision. The intent of this proposal is to require that energized work be supervised by a person fully knowledgeable of and trained in the hazards inherent in the work, with authority to control the actions of those being supervised.
- Subsection (a)(3)(A) updates the edition of the consensus standards for rubber insulating gloves and sleeves. These standards are proposed to be incorporated by reference. They are equivalent to the federal standards and are consistent with the proposed updates in Appendix C of the High-Voltage Electrical Safety Orders.

- Subsection (a)(8) adds a NOTE to refer the reader to additional requirements that apply to arc flash protection for the power generation, transmission, and distribution industries.
- New subsection (b), entitled “Making Connections”, adds language similar to the federal standard. This provision spells out a specific sequence for making wiring connections so that the electrical source is the first one removed and the last one connected.

An EXCEPTION is added to subsection (b) which differs from the federal standard. The EXCEPTION allows the employers to deviate from the prescribed sequence for making wiring connections provided that the wires are secured by mechanical means.

The wiring sequence prescribed in the federal standard is not the method preferred by some power companies when wiring phase to phase relay system. It is sometimes necessary to deviate from the wiring sequence detailed in subsection (b) when using dissimilar metals, dissimilar conductor type (solid or stranded), and different types of metal conductors. Electric utilities need to be able to create “box loops” in low-voltage circuits for purposes of re-routing the feed points within that same circuit and they also need to be able to create system parallels on high-voltage circuits; thereby, combining two systems from different electrical sources.

- Existing subsection (b) is proposed to be renumbered to subsection (c).
- New subsection (d) is added which prescribes a minimum approach distance for energized unguarded parts in order to prevent employees from suffering an electrical shock or being electrocuted due to accidental contact with an energized part. This provision was added in order to provide protection equivalent to the federal standard, which contains approach distances for voltages less than 600 volts. For voltages from 301 to 600 volts, qualified electrical workers are required to maintain 1 foot and 1 inch distance from an unguarded energized conductive object. A NOTE is added to refer the reader to Section 2940.2 of the High-Voltage Electrical Safety Orders for minimum approach distances at higher voltages. Subsections (d)(1) and (d)(2) allow the employee to approach closer than the minimum approach distance provided that the employee is insulated or guarded from the energized part.

### **Section 2320.7. Safety Precautions.**

This section provides general safety precautions when performing electrical work. The following are the proposed changes:

- New subsection (d) is added to require employees not to wear any conductive articles such as jewelry, watches or keychains. This requirement would prevent employees from inadvertently conducting electricity to themselves via conductive articles, which may lead to an electrical shock or electrocution.
- Existing subsection (d) is proposed to be renumbered to subsection (e). It is more appropriate to group all the provisions relating to conductive objects together.

### **Section 2320.8. Fall Protection.**

This section contains the provisions with regards to fall protection. This section is revised to be consistent with the federal standard and the proposal in Section 2940.6(b).

The proposal removes the existing EXCEPTION for point to point travel by a qualified person. A new subsection (a)(1) is added which requires qualified employees when climbing and changing locations to utilize fall protection equipment, unless the employer can demonstrate that it is infeasible or creates a greater hazard as specified in the proposed new EXCEPTION. This provision's intent is to lower the risk to falls.

### **New Section 2320.11. Protection From Flames and Electric Arcs.**

The proposal creates a new section that contains provisions for personal protective equipment from electric arcs and flames. An electric arc is an unwanted power discharge between conductors. This discharge could create intense heat, high temperature gasses, fire, and/or explosion. The proposed standard provides a level of body protection from the intense heat or fire caused by an electric arc. Section 2940.11 is the corresponding section in the High-Voltage Safety Orders.

The proposal adds the following:

- The scope of the new proposed section is limited to employees who work in the electrical power generation, transmission and distribution industry. OSHA has determined that electric power generation, transmission, and distribution workers face a significant risk of injury from burns due to electric arcs.
- New subsection (a) requires the employer to perform a hazard assessment, the outcome of which is an important criterion in determining the selection of personal protective equipment. Proposed subsection (a)(1) requires the employer to identify employees who have an occupational exposure to flames and electric arcs. Proposed subsection (a)(2) then requires the employer to estimate the incident heat energy of the job task.

NOTE 1 to subsection (a)(2) provides guidance on estimating the available heat energy. Appendix D details the different methods for estimating the incident heat energy.

NOTE 2 to subsection (a)(2) clarifies that estimating the incident heat energy for every task is not required so long as the employer makes reasonable assumptions.

- New subsection (b) specifies how to select the suitable apparel for protection from flames and arcs based on the hazard assessment performed in subsection (a). There are different levels of arc flash personal protective equipment and the type that shall be worn by the employee is dependent on the estimated incident heat energy. The subsection also prohibits the employer from selecting clothing that could melt onto skin or could ignite and continue to burn when exposed to flames or the heat energy estimated in subsection (a)(2). Subsections (b)(2)(A) through (E) are exceptions to the protective equipment

covering the entire body. Subsection (b)(3) are the dates specifying when the various section of the standard become effective in order to provide sufficient time for employers to perform the assessment and purchase the protective clothing or equipment.

- New subsection (c) contains personal protective requirement relating to installing and removing fuses. The type of personal protective equipment is dependent on the voltage and type of fuse. Employees could be injured by the arc blast or by particles blown by the blast in their eyes. According to OSHA, when an expulsion fuse operates on a fault or overload, the arc from the fault current erodes the tube of the fuse holder, producing gas that blasts the arc out through the fuse tube vent or vents, and with it any loose material in the way.
- New subsection (d) clarifies that the requirements of this section also apply when working in proximity to covered (non-insulated) conductors because for non-insulated conductors, the covering is for weather protection only. Since these conductors are covered, but not insulated, arc protection is still needed.
- New subsection (e) specifies that non-current metal parts are to be treated as energized until the employer verifies that it is grounded. Grounding provides a safe path for electricity to travel in case of a fault.
- New subsection (f) requires that the devices used for opening and closing circuits under load are properly rated. This proposal is to prevent the heat buildup around the current path.

### **Section 2340.17. Guarding of Energized Parts.**

This section pertains to guarding of energized parts to prevent accidental or inadvertent contact and restricts access to energized parts.

The following are the proposed changes:

- New subsection (d) ensures that guarding required in subsection (a) is maintained. This means that for a guard to be effective, the guard must stay on. If the guard breaks or corrodes, it needs to be replaced.
- New subsection (e) requires that when a guard is temporarily removed that a barrier around the work area be installed in order to prevent unauthorized access to energized equipment.

### **Section 2700. Definitions.**

This section is the beginning of the High-Voltage Safety Orders and it lists the definitions of the various terms. The proposed definitions provide clarity, as these definitions are used in subsequent regulatory text.

The proposal adds or amends the following definitions for clarity:

- Affected employee. This term is used in Section 2940.13.
- Authorized Employee or Person. This term is used in Section 2940.13
- Barricade. This existing term is revised such that in order for the physical obstruction to be considered a barricade, it has to be set-up in a manner that demonstrates its purpose.
- Barrier. The existing term is being amended to state that a physical obstruction that prevents unauthorized access to a work area is also considered as a barrier. This term is used in Sections 2940.7, 2940.16, 2943, 2943.1, 2944, and 2945.
- Bond. This term is used in relation to grounding.
- Current Carrying Part. This term is used in various sections of the low and high voltage safety orders.
- Electric Supply Equipment. The term “supply” is used in various sections of the Electrical Safety Orders.
- Electric Utility. This term is used in Sections 2300 and 2320.9.
- Enclosed Space. This term defines the scope of Section 2943.1. A NOTE is also added to the definition to further clarify the terms “enclosed spaces” vs. “permit spaces”.
- Energy Isolating Device. This term is used in Section 2940.13.
- Energy Source. This term is used in Section 2940.13.
- Entry. This term is used in Section 2943.1.
- High-Power Tests. This term is used in Section 2940.16.
- High-Voltage Tests. This term is used in Section 2940.16.
- Line Clearance Tree Trimming Operations. This existing term removes “cleaning” and replaces it with “clearing” and removes the 10 feet (305 cm) criteria and replaces it within the vicinity of. Tree-trimming operations include trimming operations farther than 10 feet depending on the voltage. A NOTE is also added to refer the reader to the sections that specify the minimum approach distances.
- Minimum Approach Distance. This term is used in safety orders. See Sections 1612.1, 2940.2, and 2940.7.

- Qualified Person. This existing term is revised to add in parenthesis, qualified employee.
- Statistical Sparkover Voltage. This term is used in Appendix A of Article 36 of the High-Voltage Electrical Safety Orders.
- Statistical Withstand Voltage. This term is used in Appendix A of Article 36 of the High-Voltage Electrical Safety Orders.
- Switching Device. This existing term is revised to clarify that it is a manual switch unless specified.
- System Operator. This term is used in Sections 2940.13 and 2940.14.
- Vault. This existing term is revised to clarify that the vault can be located above ground.
- Vented Vault. This term is used in proposed new Section 2943.1.
- Work-Positioning Device System. This term adds examples of work locations where it is used, commensurate with the federal standard term called “work-positioning equipment”.

#### **Section 2874. General.**

This section contains general requirements pertaining to transformers. In a series streetlighting circuit, the lamps are connected in series, and the same current flows in each lamp. This current is supplied by a constant-current transformer, which provides a constant current at a variable voltage from a source of constant voltage and variable current. Like the current transformer, the constant current source attempts to supply current even when the secondary circuit is open. The resultant open-circuit voltage can be very high and hazardous to employees. For this reason, the proposal requires that either the street lighting transformer be de-energized or the circuit be bridged to avoid an open-circuit condition. The proposal adds new subsections (f) and (g) to be equivalent to the federal standard.

- New subsection (f) is proposed which requires the transformer to be de-energized prior to performing work and if that is not possible, it requires the employer to bridge the circuit.
- New subsection (g) is proposed which specifies requirements when working on streetlights. Subsection (g)(1) provides a cross-reference to other standards that must be followed. Subsection (g)(2) requires that that transformer be de-energized and isolated from the supply or bridge the loop to avoid an open-circuit condition.

#### **Section 2887. General.**

This section defines the scope of the article regarding capacitors. The proposal is to expand the scope to include any type of work performed by employees on capacitors or on lines connected

to capacitors. The expansion of the scope is to ensure consistency with subsequent proposed changes in Section 2893.

A non-substantive change is proposed to remove an outdated reference to Title 24 for this section.

### **Section 2893. Means for Discharge.**

This section pertains to work practices and methods for discharging capacitors to de-energize them prior to performing work. Capacitors are an electronic means of storing electricity, similar in concept to a battery.

The following are the proposed changes:

- The title of the section is revised to “Disconnecting Capacitors and Means for Discharge” to better describe the contents of the section.
- Existing subsection (a) requires that the employer disconnect the capacitor from the source of energy and short circuit it. The existing standard also requires that means for discharge shall be provided to reduce residual discharge to 50 volts within 5 minutes. The proposed change requires that the employee wait the 5 minutes before applying the short circuit. Short circuiting is a precaution to prevent the capacitor from being reenergized and it also relieves the capacitor of its charge.
- Existing subsection (c) requires that capacitors not be worked on until after they have been short circuited and grounded. The internal discharge device shall not be used as a substitute for externally short circuiting and grounding capacitors. The proposed revision requires that lines connected to capacitors be short circuited before it can be treated as de-energized. This proposal will ensure that the capacitor is isolated from the sources of energy.
- New subsection (d) is proposed to require that before employees handle capacitors, the employer must short circuit each unit in series-parallel capacitor banks between all terminals and the capacitor case or its rack and, if the cases of capacitors are on ungrounded substation racks, the employer must bond the racks to ground. This procedure will ensure discharge of the capacitors because individual capacitors may retain its charge otherwise.

### **Section 2940. General Provisions.**

This section provides general provisions pertaining to work and operating procedures.

The proposed changes are as follow:

- Re-numbered subsection (b)(1) requires the employer to train employees on how to inspect safety devices. The training would provide employees with the knowledge to identify if the safety device needs to be replaced or repaired.
- New subsection (b)(2) requires the employer to train the employee on work practices detailed in this section. The training would inform employees on how to protect themselves from electrical hazards.
- New subsection (b)(3) requires the employer to ensure that the employee has demonstrated proficiency in the work practices. Working with electricity is hazardous, so it is important to verify the employees' proficiency.
- New subsection (e). Information Transfer. A new subsection (e) is proposed to improve communication among different employers at the site, thereby, improving employee's safety from hazardous conditions through better communication between the employer and the employee.

New subsections (e)(1)(A) through (G) list the different topics the employers are required to communicate to each other before beginning work. Construction sites are typically multi-employer sites. Other sites may be a dual employer site. It is important when there is more than one employer at the same site that they communicate to each other to help ensure a safe workplace. The activities of one contractor may affect the other contractor. One employer may be aware of a hazard that is unknown to the other employer; as such a hazard may not have been disclosed. Therefore, communication between employers facilitates consistent safe practices.

New subsection (e)(2) requires employers to instruct their respective employees about the hazardous conditions that were required to be discussed by employers in accordance with subsection(e)(1).

- New subsection (f)(1) requires employers to determine the existing characteristics and conditions of the electrical installations prior to doing work. Subsections (f)(1)(A) through (H) are the characteristics and conditions of the electrical installation that need to be determined as specified in subsection (e)(1)(A).
- New subsection (g) requires that employees remove conductive articles such as key chains, rings, and watches to reduce the risk of electrical shock or electrocution from accidental contact with energized parts.

### **Section 2940.1. Voltage Determination.**

This section pertains to the requirement to determine voltage prior to working on or near energized parts. Voltage is one of the key considerations for determining how to perform the work and for selecting the appropriate personal protective equipment for the job.

The following are the proposed changes:

- The title of the section is revised to add “and Energized Equipment or Systems” for clarity.
- New subsection (a) is proposed to require that all electrical equipment or energized parts be treated as energized until tested or proven de-energized. Treating equipment as de-energized when it is not energized can have serious or deadly consequence.
- Existing subsection (a) is renumbered to subsection (b).
- New subsection (c) requires the use of personal protective equipment when testing or determining voltage.

### **Section 2940.2. Clearances.**

This section provides the minimum approach distances (MAD) developed for performing live work that can only be done by qualified electrical workers. Breaching the MAD without proper protection is equivalent to contacting live wire. Clearances for non-qualified employees are found in Section 2946.

Qualified electrical workers are required to maintain these minimum approach distances to protect them from electrocution. The two main factors that affect the prescribed distances are voltage and transient overvoltage. Transient over-voltages are power spikes that are caused by lightning strikes, switching on and off of equipment and circuit breakers, power outages, short circuit, etc. Another factor to account for is altitude.

The following are the proposed changes:

- The title of the section is revised to “Minimum Approach Distances” to reflect the content of this section. This term is used by the industry.
- New subsection (a) requires employers to establish minimum approach distances using one of the three methods outlined in subsection (a)(1) and subsection (a)(2).

Subsection (a)(1), Method 1: The employer can use provisions in subsection (a)(1) by using a formula for AC systems described in Table 2940.2-1. For DC systems, use Table 2940.2-6. In order to use the tables, the employer shall determine the maximum transient overvoltage of their system through an engineering analysis. A lower per unit maximum transient overvoltage would result in a shorter minimum approach distances and a higher per unit maximum transient overvoltage would result in a longer minimum approach distance. Table 2940.2-2 contains the electrical component of the minimum approach distance that is needed in the calculation detailed in Table 2940.2-1. The information regarding the electrical component is found in Appendix A.

Subsection (a)(2), Method 2: Absent engineering analysis to determine the maximum transient overvoltage, the employer shall use a table with pre-calculated minimum approach distances, Table 2940.2-3 and Table 2940.2-4 for AC systems and the last row

of Table 2940.2-6 for DC systems. For DC systems, the last row in Table 2940.2-6, which has the highest per unit transient overvoltage, is used for determining the minimum approach distance.

It is proposed to include a new NOTE to subsection (a)(2). For AC systems, the per unit transient overvoltage used to calculate distances in Table 2940.2-3 and Table 2940.2-4 is found in Table 2940.2-5. Figures in Table 2940.2-5 are the highest per unit transient overvoltage in the table of clearances found in IEEE Std 516-2009.

Subsection (a)(3), Method 3: Until a specified date, the employer may utilize the minimum approach distance specified in Table 6 or Tables 10 to 13 of Appendix A. California is relying on the memorandum released by U.S. Department of Labor, Occupational Safety and Health Administration, dated January 20, 2016, regarding the delay of enforcement of the minimum approach distances contained in 29 CFR 1910.269 and 29 CFR Part 1926. In this memorandum, Federal OSHA will accept compliance with the minimum approach distances in Table 6 or Tables 10 to 13 as compliance with 29 CFR 1910.269(l)(3)(i) and 29 CFR 1926.960(c)(1)(i).

- The provisions of existing subsection (c) are relocated to new subsection (a)(2)(A) to provide a more logical order of regulations. This subsection deals with altitude correction factors that must be taken into account when determining minimum approach distances in subsection (a). It is proposed to remove the references to Tables 2940.2-1 through 2940.2-3 in existing subsection (c) as these tables are no longer applicable. Also, it is proposed to specify Table 2940.2-7 instead of Table 2940.2-4 to reflect the renumbered tables.
- The provisions of existing subsection (a) are relocated to new subsection (b). Subsection (b) requires the employees not to approach the employer's established minimum approach distance in subsection (a) unless certain control measures are taken, such as insulated tools, personal protective equipment, etc. The proposal removes references to the old minimum approach distances that are outdated due to the new federal requirements. The language included in subsection (b)(1) clarifies that the employee has to have sufficient control of the insulated part in order to not expose the non-insulated part of the employee's body.
- It is proposed to include the heading "Type of Insulation: to new subsection (c).

New subsection (c)(1) requires that if the employee uses gloves as insulation, the employee shall also use rubber insulating sleeves except when all exposed energized parts are insulated or if installing insulation from a location wherein the employee does not expose his or her upper arm to contact other energized parts.

New subsection (c)(2) requires that the employee put on and take off rubber insulating gloves and sleeves from a safe distance to prevent accidental contact or breaching of the minimum approach distance when donning on and off insulating gloves and sleeves.

- The provisions of existing subsection (b) is relocated to new subsection (d)(1). It is proposed to include the heading “Working Position” to subsection (d). It is proposed to remove the word “clear” and replace it with the word “approach” to read “minimum approach distances” to provide consistent terminology.
- It is proposed to remove Table 2940.2-1: Alternating Current Minimum Approach Distance and NOTES 1 and 2 and replace this table with new Table 2940.2-1: AC Live-Work Minimum Approach Distance to reflect the changes in subsection (a).
- It is proposed to remove Table 2940.2-2: AC-Live Line Work Minimum Approach Distance With Overvoltage Factor Phase to Ground Exposure and NOTES 1 and 2 and replace this table with new Table 2940.2-2: Electrical Component Of The Minimum Approach Distance (D; In Meters) At 5.1 to 72.5 KV to reflect the changes in subsection (a).
- It is proposed to remove Table 2940.2-3: DC Live Line Work Minimum Approach Distance With Overvoltage Factor and NOTES 1 and 2 and replace this table with new Table 2940.2-3: Alternative Minimum Approach Distances (In Meters Or Feet For Voltages Of 72.5 KV And Less to reflect the changes in subsection (a). It is proposed to relocate the information in existing Table 2940.2-3 to new Table 2940.2-6 with revisions that include the minimum approach distances in meters and feet. This proposal group information together relating to AC minimum approach distances.
- It is proposed to add new Table 2940.2-4: Alternate Minimum Approach Distances For Voltages Of More Than 72.5 KV to reflect the changes in subsection (a)(2).
- It is proposed to add new Table 2940.2-5: Assumed Maximum Per-Unit Transient Overvoltage to reflect the changes in subsection (a).
- It is proposed to add new Table 2940.2-6: DC Live-Line Minimum Approach Distance With Overvoltage Factor. New Table 2940.2-6 contains the information from existing Table 2940.2-3 with revisions that include the minimum approach distances in meters and feet. This proposal groups information together relating to AC minimum approach distances.
- It is proposed to relocate existing Table 2940.2-4 to new Table 2940.2-7 for organization purposes. It is proposed to include a column to show the altitudes in both meters and feet.

### **Section 2940.5. Work Over or Near Water.**

This section requires that employees working near or over water be provided with suitable protection.

The following are the proposed changes:

- Subsection (a) adds a cross-reference to Section 3389 to clarify what is deemed as suitable protection when working near or over water.
- New subsection (b) is proposed which requires that safe access over streams or other waters of body be provided. This proposal is to ensure the safety of employees by protecting employees from slipping or being swept out or drowned in bodies of water.

### **Section 2940.6. Tools and Protective Equipment.**

This section pertains to tools and protective equipment used by qualified electrical workers when performing work.

The following are the proposed changes:

- Subsection (a)(1) adds the requirement that the personal protective equipment shall meet the marking, inspection, performance, and testing as shown in Appendix C, which is a list of consensus standards that are incorporated as reference. This proposal will make the state standard equivalent to the new federal standard. Appendix C is proposed to be changed by updating the editions of the consensus standards consistent with the editions Federal OSHA derived in their final rule.
- Subsection (a)(4) requires testing and retesting of insulating gloves, sleeves, and blankets be in accordance with ASTM standards. Updating the editions of these standards is consistent with the federal standard and the proposed changes in Appendix C.
- A new subsection (a)(11) is proposed which requires insulating equipment that has been repaired to be retested. The testing is to verify that the repaired equipment has the same insulating properties as it was designed; therefore, ensures that it provides the expected level of protection.
- A new subsection (a)(12) is proposed which requires that the employer certifies that the equipment has been tested to meet the performance requirements of the consensus standards listed in Appendix C.
- Subsection (b) is revised to remove the existing EXCEPTION for point to point travel by a qualified person and to add new subsection (b)(1) which would require qualified employees when climbing and changing locations to utilize fall protection equipment, unless the employer can demonstrate that it is infeasible or creates a greater hazard as specified in the proposed new EXCEPTION. This proposal will minimize the employee's risk to falls.
- New subsection (c)(2) is proposed which requires that linemen who are exposed to the hazards from flames or electric arc utilize fall protection equipment that provide flame and arc protection. The fall arrest equipment must meet ASTM F887-12<sup>E1</sup>, which is incorporated by reference. This proposal will provide a level of protection from falls and severe burns due to an arc flash or electric arc.

- Existing subsection (c)(2) is proposed to be renumbered to subsection (c)(3) and existing subsection (c)(3) is proposed to be renumbered to subsection (c)(4).
- Subsection (c)(4) is proposed to be deleted. The specification on the materials that make up safety straps is addressed in existing subsection (c)(1) and proposed new subsection (c)(2) of Section 2940.6; therefore, this provision is not necessary.
- The title of subsection (d) is revised to “Portable Ladders and Platforms” to reflect the content of the subsection. The existing standard allows the use of conductive ladders. The proposed amendment will clarify that conductive ladders can only be used in specialized high voltage work where non-conductive ladders would present a greater hazard.
- A new subsection (d)(4) is proposed which cross references portable ladder use contained in Section 3276.
- New subsection (d)(5) is proposed which requires that portable platforms and ladders which are used must be able to support 2.5 times maximum intended load in the configuration it is used. This is a measure of the ladder’s ability to support the load.
- New subsection (d)(6) is proposed which requires that the user of the portable ladder or platform not overload the ladder or platform beyond its working load. This proposal will prevent the portable ladder or platform from collapsing or failing and causing an accident.
- Subsection (e)(2) includes the heading “Daily Inspection” for consistency and clarity. The requirement to wipe the tools clean is relocated to new subsection (e)(2)(A). The proposed text clarifies that the type of defect or contamination that is of concern is one that could affect the insulation quality or mechanical integrity. A NOTE to subsection (e)(2) provides the name of consensus standard for further information as to examples of defects that could affect the insulating qualities and mechanical properties of the live line tools.
- New subsection (e)(3) is proposed which requires the removal of all live-line tools every 2 years for examination, cleaning, repair, and testing.
- New subsections (e)(3)(A) and (e)(3)(B) require the removal of all live-line tools every 2 years for examination and cleaning, and if found defective, to be repaired or removed from service. New subsection (e)(3)(C) pertains to biennial testing. All live-line tools that have been repaired or refinished are required to be tested regardless of composition. A new EXCEPTION is included regarding the testing of live-line tools that are solid or foam filled that have passed examination and do not require repair. Testing is to verify that the insulation qualities of these tools are maintained to protect employees from electrical hazards associated with live-work.

- New subsections (e)(3)(D) and (e)(3)(E) are proposed which detail testing specifications. These provisions ensure that the type of testing is standardized across the industry. Testing will verify the effectiveness of the insulating properties of the tool.
- A NOTE to subsection (e) is proposed to be added to provide the reader reference material relating to examining, cleaning, repairing and in-service testing of live-line tools.
- The heading of subsection (g) is proposed to be revised to “Handtools and Pneumatic Tools” for consistency and clarity. Subsection (g)(1) contains provisions for hydraulic tools. The proposed revisions to subsection (g)(1) add that valves, pipes, filters, and fittings shall also have adequate strength for normal operating pressure, not just the non-conductive hose. This proposal will ensure that the valves, pipes, filters, and fittings are part of the line that carries hydraulic fluid have adequate strength to prevent bursting or loss in pressure.
- A new subsection (g)(1)(A) is proposed which requires that if there is a potential for the hydraulic system to contact exposed live part, the hydraulic system should be properly insulated taking into the consideration of the voltage of the energized parts. This proposal is to ensure that the hydraulic system’s insulation is not overlooked. Employees use equipment with hydraulic systems to access overhead lines and their safety relies on the insulation properties of their equipment.
- A new subsection (g)(1)(B) is proposed which requires that the employee does not block the hydraulic pressure using any part of their body. The pressure of the hydraulic fluid may be high enough that the employee can inject hydraulic fluid inside their body.
- A new subsection (g)(4) is proposed which requires that cord and plug equipment be grounded. This proposal is to protect employees from an electrical shock in event of an electrical fault. An EXCEPTION to grounding requirements is proposed to be added to not require grounding if the introduction of a ground into the work environment would increase the hazard to an employee.
- A new subsection (h) is proposed which requires that portable and vehicle mounted generators be grounded to protect the employee from an electrical shock in an event of an electrical fault.
- Existing subsection (h) is re-designated as subsection (i). Existing subsection (i) is re-designated as subsection (j). Existing subsection (j) is re-designated as subsection (k).
- A new NOTE to subsection (k) is included directing readers to new Section 2940.11. New Section 2940.11 covers apparel requirements for employees that work in the power generation, transmission, and distribution industry.

### **Section 2940.7. Mechanical Equipment.**

This section applies to mechanical equipment that could contact overheard power lines.

The following are the proposed changes:

- Existing subsection (a)(3) requires that the type of hydraulic fluid used for insulated parts of the mechanical equipment be the kind that provides insulation. The proposal clarifies that the insulating properties of the hydraulic fluid has to provide insulation for the voltage involved in the work.
- The existing reference to Section 2940.2(b) Table 2940.2 is revised to Section 2940.2, the minimum approach distances. It is proposed to include an EXCEPTION to subsection (b)(6) to allow the insulated portion of the aerial lift operated by a qualified employee to come closer to the minimum approach distance with the requirement that the distance between the energized part and the uninsulated portion of the aerial lift complies with the minimum approach distances. This EXCEPTION is allowed because the insulated portion is designed to provide the employee the needed protection.
- A new subsection (c)(2) is proposed which specifies that work on overhead power lines already requires qualified electrical workers. This proposal would require a designated qualified employee to observe the operations to ensure that the mechanical equipment does not violate the minimum approach distance, unless the employer can establish that the operator can accurately maintain its distance from energized part. This provision would prevent encroachment beyond the minimum approach distance, which can result in an electrical arc, fire, explosion and injury to workers.
- A new subsection (c)(3) is proposed that includes the different control measures that shall be in place to protect employees from the electrical hazard just in case the mechanical equipment contacts the line. New subsection (c)(3) lists the control measures that must be followed unless the employer can demonstrate that the measures they use can protect each employee should there be contact to the line.
- A new NOTE is included to subsection (c)(3) which refers the reader to Appendix E that contains information on hazardous step and touch potentials and methods of protecting employees from hazards resulting from such potentials.
- Existing subsection (c)(2) is renumbered to new subsection (c)(4). It is proposed to correct the cross reference to the minimum approach distances to Section 2940.2.
- Existing subsection (c)(3) is renumbered to new subsection (c)(5).
- A new subsection (c)(6) is proposed to specify that the setting, moving, and removing of poles involves the use of mechanical equipment presents a hazard of accidental contact to the overhead power lines, which can lead to an energized pole. The proposal requires that the employee wears appropriate personal protective equipment or require the utilization of insulated devices and require that the uninsulated parts of employee do not contact the pole to prevent electrical shock or electrocution in case the pole becomes accidentally energized.

**Section 2940.8. Material Handling.**

This section applies to handling and storage of materials for construction or maintenance electrical installations. Examples of materials handled are wooden poles, conducting wires, tower members, etc.

The following are the proposed changes:

- Existing subsection (c) is proposed to correct the reference from Table 1 to Table 2. The proposal to change the reference to Table 2 requires that materials stored near power lines adhere to clearances from energized lines to boom-type lifting or hoisting equipment. This proposal effectively changes the clearance from 6 to 10 feet for voltages from 600 to 50,000 volts. The reference to Table 2 provides equivalent protection to the federal standard and provides a greater clearance distance to prevent accidental contact to the electrical power lines. In addition, the references to Section 2944(c)(3) and Section 2944(c)(4) are proposed to be revised to Section 2944(g)(3) and Section 2944(g)(4), respectively, to be consistent with the proposed relocation of the provisions in Section 2944.
- A new subsection (g) is proposed to require holes dug for placing poles to be guarded or attended to. This proposal will prevent employees from accidentally tripping or falling.

#### **New Section 2940.11. Protection From Flames and Electric Arcs.**

The proposal creates a new section called “Protection From Flames and Electric Arcs”. The scope will be limited to employees who work in the electrical power generation, transmission, and distribution industry. OSHA has determined that electric power generation, transmission, and distribution workers face a significant risk of injury from burns due to electric arcs.

The proposed new section contains provisions for personal protective equipment from electric arc and flames. An electric arc is an unwanted power discharge between two conductors. This discharge could create intense heat, heated gasses, fire, and/or explosion. The proposal will help ensure that employees are provided with the appropriate eye, face, and body protection.

The proposal adds the following:

- New subsection (a) entitled “Hazard Assessment”. New subsection (a)(1) requires the employer to perform a hazard assessment to identify employees who have an occupational exposure to the hazards from flames or electric arc. New subsection (a)(2) requires that the employer make a reasonable estimate of the incident heat energy to which the employee would be exposed to. The assessment will determine the selection of the personal protective equipment that would provide a level of protection from burns.

New NOTE 1 to subsection (a)(2) provides guidance on estimating the available heat energy. Appendix D details the different methods for estimating the incident heat energy.

New NOTE 2 to subsection (a)(2) clarifies that estimating the incident energy for every task is not required so long as the employer makes reasonable assumptions.

- New subsection (b) entitled “Selection and Prohibited Clothing”. New subsection (b) specifies how to select the personal protective clothing based on the hazard assessment performed in subsection (a). There are different levels of arc flash personal protective equipment and the type that shall be worn by the employee is dependent on the estimated incident heat energy. This subsection also prohibits the employer from selecting clothing that could melt onto skin or could ignite and continue to burn when exposed to flames or the heat energy estimated in subsection (a)(2). New subsections (b)(1)(A) through (b)(1)(C) pertain to flame-resistant clothing. New subsections (b)(2)(A) through (b)(2)(E) are exceptions to the protective equipment covering the entire body. New subsection (b)(3) contains the dates specifying when the various section of the standard become effective. This proposal will provide employers enough time to perform the assessment and purchase the protective clothing or equipment.
- New subsection (c) contains personal protective requirement relating to installing and removing fuses. The type of personal protective equipment is dependent on the voltage and type of fuse. According to Federal OSHA, when an expulsion fuse operates on a fault or overload, the arc from the fault current erodes the tube of the fuse holder, producing gas that blasts the arc out through the fuse tube vent or vents, and with it any loose material in the way. The flying debris could injure the employee’s eyes.
- New subsection (d) clarifies that the requirements in this section also applies when working in proximity to covered (non-insulated) conductors. The covering for this type of conductor is for weather protection, not insulation. Therefore, the electrical hazard is such as if it was bare wire; therefore, needs to be handled accordingly to prevent electrical burns, shock, fault or other serious injury.
- New subsection (e) specifies how non-current metal parts are to be treated as energized until the employer verifies that it is grounded. Treating it as energized means that employees are required to adhere to the protective work procedures for working on energized parts. Making the false assumption that a part is de-energized without verification, can have serious or deadly consequences.
- New subsection (f) requires that the devices used for opening and closing circuits under load are properly rated. This proposal will prevent the build-up of heat and cause fire or explosion.

**New Section 2940.12. Making Connections.**

A new section is proposed using language similar to the federal standard. This provision spells out a specific sequence in making wiring connections so that the electrical source is the first one removed and the last one connected.

An EXCEPTION is proposed to be added to subsection (a), which differs from the federal standard. The EXCEPTION allows employers to deviate from the prescribed sequence of making connections provided that the wires are secured by mechanical means. The sequence of method prescribed in the federal standard is not the preferred method by some power companies

when wiring phase to phase relay system. The sequence of making connections may deviate from subsection (a) when conductors are dissimilar in type (solid versus stranded), metal, or size. In addition, electrical utilities deviate from the wiring order when they need to create “box loops” in high-voltage circuits for purposes of re-routing the feed points within that same circuit and create system parallels on high-voltage circuits; thereby, combining two systems from different electrical sources.

### **New Section 2940.13. Hazardous Energy Control Procedures.**

The proposal creates a new section for hazardous energy control procedures for the power generation including related equipment for communication or metering. Facilities that are not an integral part of, or inextricably commingled with power generation process or equipment are covered under Section 3314.

Hazardous energy control procedures ensure that conductors, equipment, or machinery are de-energized and remain de-energized to prevent unexpected energization, start-up or movement that could seriously harm the employee while the employee is performing work.

The proposal is similar to the federal standards with changes in the order and formatting. The new federal standards address procedures relating to system operation, the hazard of re-accumulation of energy, and also contain the circumstances that will trigger retraining. These provisions are not in Section 3314.

The proposal adds the following:

- New subsection (a), entitled “Application”, defines the application of new Section 2940.14. The new NOTE to new subsection (a) is added to clarify electrical installations that are not an integral part of, or inextricably commingled with, power generation process or equipment are covered under Section 3314. For example, utilization circuits in electric power generation plants are not an integral part of a generating installation.
- A new subsection (b) is entitled “General”. New subsection (b)(1) requires that the employer establishes energy control procedures, training, and periodic inspection to ensure that conductors, equipment, or machinery are de-energized and remain de-energized to prevent unexpected energization, start up or movement that could harm the employee while the employee is performing work.
- New subsection (b)(2) lists the energy control requirements. The preferred system of ensuring that de-energized equipment is a lockout system. However, tagging is allowed provided that it achieves equivalent means of safety to the lockout system. For example, removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle to reduce the likelihood of inadvertent energizing. It also contains a provision to make equipment lockable if it is replaced or renovated.

- New subsection (c), entitled “Hazardous Energy Control Procedures”, lists the requirements that need to be included in the written hazardous energy control procedures. These elements are essential in achieving the purpose of the section, which is to ensure that the equipment to be worked on is de-energized and remains de-energized until the intended time when it is safe to be reenergized.
- New subsection (d), entitled “Protective Materials and Hardware”, contains provisions regarding materials and hardware used to implement the hazardous energy control such as locks, tags, chains, wedges, etc. These devices are to prevent tampering of the controls after it is de-energized and to provide the authorized employee control over the energy state of the equipment.
- New subsection (e), entitled “Energy Isolation”, requires that only authorized employees are permitted to de-energize the equipment and to place locks and tags. Authorized employees are trained and knowledgeable of the equipment and the hazardous energy control procedures. An employee that is not authorized may improperly de-energize, lockout, and reenergize the equipment and this may cause serious injuries.
- New subsection (f), entitled “Notification” provides a notification requirement to ensure that employees who work or use the equipment are notified prior to locking out the equipment. This proposal improves communication and makes the employee who may be affected by the locking out of the equipment aware of what is happening.

A new NOTE to subsection (f) is proposed that also references subsection (i), which requires that the second notification take place before the equipment is re-energized. This new NOTE is to inform the reader of the notifications requirements.

- New subsection (g), entitled “Lockout/Tagout Application”, contains procedures about the application of the lock and/or tag. This proposal prescribes the procedural steps for which the authorized employee(s) must adhere to ensure that the equipment is properly de-energized and locked out prior to performing work. The procedures include notification, shutting off the machine using established procedures, placement of locks and other isolating devices by the authorized employee, relieving of stored or residual energy, and means to prevent accumulation of energy.
- New subsection (h), entitled “Test”, requires the equipment be tested to verify that it is indeed isolated and de-energized. This verification is to ensure that the employee is not making the incorrect assumption that the equipment is de-energized when it is not. The wrong assumption can lead to serious injuries.
- New subsection (i), entitled “Release From Lockout/Tagout”, contains the procedures that must be followed prior to releasing the lock and or tag and reenergizing the equipment. This proposal is to ensure that the equipment is re-energized in an orderly fashion.

- New subsection (j), entitled “Additional Requirements”, contains additional requirements regarding removing the lock/tag to test the functionality of what was repaired or adjusted. Often times when an employee services equipment, the employee has to test the functionality of it to ensure that it is working as intended.
- New subsection (k), entitled “Group Lockout or Tagout”, contains provisions relating to a group of employees performing servicing or maintenance on equipment. Some machines, equipment, or systems are such that it takes a group of employees to work on them. This proposal ensures that everyone working on that equipment is protected.
- New subsection (l), entitled “Shift or Personnel Changes”, contains procedures to account for shift and personnel changes. Work may last longer than a shift. This proposal outlines the procedures for the transfer of lockout and tagout devices for shift and personnel changes.
- New subsection (m), entitled “Outside Servicing Personnel”, contains procedures to account for outside employees working on equipment such as subcontractors. This provision is to ensure that all employees working on the equipment know what set of procedures they need to follow in order to perform their work safely.
- New subsection (n), entitled “System Operator”, contains procedures to isolate energy that is under the control of a system operator in a central location. Under this proposal, the system operator has complete control over hazardous energy sources that endanger employees maintaining or servicing machinery or equipment associated with an electric power generation installation. Other employees do not have access to the energy control devices and cannot operate them to reenergize machinery or equipment being serviced.

This proposal includes procedures for the placement and removal of lockout or tagout devices by the system operator. The employer is required to utilize procedures that will provide equivalent protection as a personal lockout.

The procedures also requires the employer to identify the authorized employee being protected by the lockout or tagout device, to transfer responsibility for lockout and tagout devices, and to ensure that an employee requesting the removal or transfer of a lockout or tagout device is the authorized employee responsible for it.

It is important for any lockout or tagging system to protect every employee servicing or maintaining machinery or equipment. To achieve this goal, the lockout or tagging procedures must ensure that no lock or tag protecting an employee is removed without the knowledge and participation of the employee it is protecting. Even though the energy control devices are under the exclusive control of the system operator, the locked out or tagged out devices must not be operated until the employee they are protecting personally authorizes it.

When a lockout or tagout device is to be removed or when responsibility for the device is to be transferred to another employee, the lockout or tagout procedures must take steps to

identify the employee requesting removal or transfer. Signed orders, for example, could be used, and the signatures on the orders could be checked against the original lockout or tagout request. Password systems, master lock systems, and receipt systems could also be used to identify the authorized employee responsible for the lockout or tagout device. The procedures must also make provisions for transferring lockout or tagout from one employee to another, such as may be needed during shift changes. The procedures must also ensure that the system operator does not remove any lockout or tagout device without the specific authorization of the employee it is protecting, except as permitted in emergencies. Procedures shall prohibit supervisors (or other employees) from releasing lockout or tagout devices while they are protecting authorized employees, and recognize only central control systems that provide protection equivalent to that provided by personal lockout or tagout devices.

- New subsection (o), entitled “Periodic Inspections”, requires periodic inspections to evaluate the effectiveness of the energy control program. Verification of the effectiveness of the program would provide an opportunity for the employer to identify the areas that need improvement.
- New subsection (p), entitled “Training”, contains provisions regarding training on the hazardous energy control procedures. This provision teaches employees who are affected by the energy control procedures the importance of following the established procedures for their protection.

#### **New Section 2940.14. Deenergizing Lines and Equipment for Employee Protection.**

The proposal creates a new section that pertains to de-energizing, electrical distribution, and transmission lines. The procedures in this section are required to be followed before transmission and distribution lines are considered de-energized. Working on transmission and distribution lines, as if it were de-energized, when it is not, will cause serious and fatal injuries.

Transmission and distribution systems are different from other energy systems found in the general industry or in the electric utility industry. The hazardous energy control methods for these systems are necessarily different from the methods covered under the general industry standard on the control of hazardous energy sources. Electric utilities install transmission and distribution lines and equipment outdoors; consequently, these lines and equipment are subject to re-energization by means other than normal energy sources. Additionally, some de-energized transmission and distribution lines are subject to re-energization by induced voltage from nearby energized conductors or by contact with other energized sources of electrical energy. Another difference is that energy control devices often are remote from the worksite and are frequently under the centralized control of a system operator.

When work is to be performed that requires the removing or de-energizing hazardous energy from all or a portion of an operating system, a work request is submitted to the operating authority “system operator” that has exclusive control of all or portions of the system. The operating authority determines which operations to be performed and documents the sequence of operations to be performed. This procedure ensures that all the switches, isolation points, and

valves are properly identified and de-energized before working on the overhead electrical lines. The federal standard also requires the grounding of lines as part of the de-energization process.

The proposal adds the following:

- New Section 2940.14, entitled “Deenergizing Lines and Equipment for Employee Protection”.
- New subsection (a) outlines the application. Employers are to designate where a power generation ends and where transmission installation begins for the purpose of selecting which section applies to their operations. Employers shall de-energize circuits on the generation side of the demarcation point in accordance with new Section 2940.13 and the remaining circuits in the substation in accordance with new Section 2940.14.
- New subsection (b), entitled “General”, outlines the participants in de-energizing lines: system operator, systems without an operator, single crew, multiple crews, and disconnecting means accessible to the general public.

New subsection (b)(1), system operator and new subsection (b)(2), systems without a system operator. Some systems are under the direction of a central system operator who controls all switching operations. Other systems (mostly distribution installations) are not under any centralized control. Electric utilities energize and de-energize these systems in the field without the direct intervention of a system operator.

Whether or not there is a system operator, it requires the employers to designate one employee in the crew as being in charge of the clearance requirements. However, if there is no system operator, new subsection (b)(2) requires that the designated employee perform the functions that would otherwise apply to a system operator.

New subsection (b)(3) is entitled “Single crew”. Work performed by a single crew of employees requires that the means of disconnection of the lines and equipment are accessible and visible to, and under the sole control of, the employee in charge of the clearance. A single crew is exempt from those relating to: new subsection (c)(1) which requests the system operator to de-energize the lines and equipment, new subsection (c)(3) regarding automatic and remote control of the lines, and new subsection (c)(5) regarding the requirements for tags.

New subsection (b)(4), entitled “Multiple crews”, specifies that if two or more crews are working on the same lines or equipment, then the crews can choose to follow either subsection (b)(4)(A) or subsection (b)(4)(B). Under new subsection (b)(4)(A), work performed by multiple crews on the same lines requires coordination of their activities through a single employee in charge of clearance for all the crews and the entire section regarding de-energizing lines and equipment applies. Multiple crews under new subsection (b)(4)(B) can also comply independently with this section and if there is no system operator, each crew needs to coordinate de-energizing and re-energizing the lines or equipment with the other crews and have separate tags.

New subsection (b)(5) requires that if there is a disconnecting means accessible to public, it shall be rendered inoperable. This proposal is necessary to prevent the public from tampering with the controls and causing an accident by energizing or de-energizing lines or equipment while work is being performed by employee(s).

- New subsection (c), entitled “Deenergizing Lines and Equipment”, contains specific procedures for de-energizing lines and equipment. Work practices contained in subsections (c)(1) through (c)(7) are required for effective de-energization of the transmission and distribution lines. Adherence to these procedures are necessary to prevent damage or destruction of equipment, injuries or loss of life.

New subsection (c)(1), entitled “Request to deenergize”, requires the employee designated in subsection (b) to be in charge of the clearance to make a request to the system operator. This is the person in charge and is responsible for the clearances. New subsection (c)(2), entitled “Open disconnecting means”, requires that all sources of energy that supply the line to be de energized are open. New subsection(c)(3), entitled “Automatically and remotely controlled switches”, requires automatically and remotely controlled switches disable the automatic feature unless the design does not allow disabling of that feature. New subsection (c)(4), entitled “Network protectors”, allows the employer not to use a tag under certain conditions as listed in subsections (c)(4)(A) through (c)(4)(C). New subsection (c)(5), entitled “Tags”, new subsection (c)(6), entitled “Test for energized condition”, and new subsection (c)(7) entitled “Install grounds”, require tagging of disconnecting means, testing to ensure its energized condition, and installing grounds. New subsection (c)(8) states that subsections (c)(1) through (c)(7) shall be followed in order for the line or equipment to be considered as de-energized.

- New subsection (d), entitled “Transfer Clearance”, contains rules for transferring clearances. Clearances are given by the system operator to the person in charge, authorizing work to proceed. The provisions in new subsection (d) are necessary to account for circumstances wherein the person in charge may have to leave and another employee is to relieve the person in charge and be designated as the new person in charge.
- New subsection (e), entitled “Releasing Clearances”, contains procedures that shall be followed before releasing clearance to the system operator to reenergize the lines.
- New subsection (f), entitled “Person Releasing Clearance,” restricts who can release the clearance.
- New subsection (g), entitled “Removal of Tags”, restricts who can remove the tag.
- New subsection (h), “Reenergizing Lines and Equipment”, prohibits the reenergizing lines until all protective grounds have been removed, all crews of the lines and equipment release their clearance, all employees are clear of the lines and equipment, and all protective tags are removed from point of connection.

## **New Section 2940.15. Grounding For the Protection of Employees.**

The proposal creates a new section that details the grounding procedures to protect employees. Transmission and distributions lines are required to be de-energized in accordance with proposed new Section 2940.14 and then grounded in accordance with proposed new Section 2940.15 before lines are considered as de-energized. Grounding protects employees by preventing unintended current flow to travel through electrical lines while employees are working.

The creation of new Section 2940.15 necessitates that grounding requirements in existing Section 2941 relating to overhead lines, existing Section 2943 relating to underground lines, and existing Section 2944 relating to substations and switchyards be consolidated and relocated to new Section 2940.15.

The proposal adds the following:

- New subsection (a), entitled “Application,” limits the application of the Section to transmission and distribution lines.
- New subsection (b), entitled “General”, contains condition that must be met before an employee can work on transmissions and distribution lines. For the line or equipment to be considered as deenergized, it requires that lines or equipment be deenergized and grounded in accordance with Section 2940.14 and Section 2940.15. However if the employer can demonstrate that installation of a ground is impracticable or would create a greater hazard, the employer is required to ensure that the following conditions are met: (1) lines and equipment are deenergized in accordance with Section 2940.14; (2) there is no possibility of contact with another energy source; and (3) no hazard of induced voltage. Contact with another line and induced voltage would reenergize the lines.
- New subsection (c), entitled “Testing”, requires testing of the line to verify that the line is deenergized before installing grounds on lines and equipment. Failing to verify that the line is deenergized prior to installing grounds is dangerous because if the line was energized, the employee would suffer from electrical shock, burns, or electrocution.
- New subsection (d) requires installation of guards and barriers to prevent contact with another exposed energized conductor and equipment. This provision was relocated from existing Sections 2943(g)(1)(D) and 2944(h)(1)(D) since this provision applies to work procedures relating to grounding. New subsection (b) requires that there is no possibility of contact with energy source before it can be considered as deenergized. Guarding or placing barriers to prevent contact with energized lines is one of the ways to achieve that purpose.
- New subsection (e), entitled “Equipotential Zone”, requires that grounds be placed and arranged in a manner that prevents employee exposure to differences in electric potential. Employees exposed to different electric potentials can result in serious electrical burns, shock, and electrocution.

A new NOTE to subsection (e) refers the reader to Appendix E, which contains guidelines for establishing an equipotential zone.

- New subsection (f), entitled “Protective Grounding Equipment”, outlines specific grounding equipment requirements. The requirements in this subsection are the combination of federal standard and current California standards. The proposed new standard necessitates the reorganization of existing standards related to grounding from Sections 2941, 2943, and 2944.
  - New subsection (f)(1) is relocated from existing Sections 2941(h)(1), 2943(g)(1)(A), and 2944(h)(1)(A), which requires conductors or equipment to be grounded be clearly identified and isolated from all sources of voltage.
  - New subsection (f)(2) is relocated from existing Sections 2941(h)(10), 2943(g)(1)(G), and 2944(h)(1)(I) and is also a federal requirement, which requires that the protective ground be capable of the maximum anticipated fault current.
  - New subsection (f)(3) is relocated from existing Sections 2941(h)(10), 2943(g)(1)(G), and 2944(h)(1)(I) and is also a federal requirement, which requires that the grounding devices shall have a minimum conductance of No. 2 AWG copper.
  - New subsection (f)(4) is from the new federal standard 29 CFR 1910.269(n)(4)(iii) and 29 CFR 1926.962(d)(2), which requires the ground have an impedance low enough that they do not delay the operation of the protective device in case of accidental re-energization.
  - New subsection (f)(5) is relocated from existing Sections 2941(h)(7), 2943(g)(1)(G), and 2944(h)(1)(G), which is a requirement to have a minimum of one ground on conductors or equipment being worked on.
  - New subsection (f)(6) is relocated from existing Sections 2941(h)(8), 2943(g)(1)(H), and 2944(h)(1)(H), which requires that the ground be visible to at least one member of the crew unless the grounding device is only accessible only to authorized persons.
  - A new NOTE to subsection (f) refers the reader to an American Society for Testing and Materials standard, which contains the guidelines for protective grounding equipment and to the Institute of Electrical Engineers’ standard, which contains the guidelines for selecting and installing protective grounding equipment.
- New subsection (g), entitled “Connecting and Removing Grounds”, contains the order of connecting and removal of grounds. This specific order of connecting and disconnection will help ensure a continuous path to ground in case of an electrical fault.

- New subsection (h), entitled “Additional Precautions”, requires that when an employee works on a location remote from the cable terminal, the cable is not grounded if there is a possibility of hazardous transfer of potential energy should a fault occur.
- New subsection (i), entitled “Removal of Grounds for Test”, allows the removals of grounds for tests provided that certain control measures that essentially treat the equipment as energized.

### **New Section 2940.16. Testing and Test Facilities.**

High-power testing involves sources of fault current, load current, magnetizing current, or line dropping current for testing, either at the rated voltage of the equipment under test or at lower voltages. Examples of typical special tests in which employees use either high-voltage sources or high-power sources as part of operation, maintenance, and construction of electric power transmission and distribution systems include cable-fault locating, large capacitive load tests, high current fault-closure tests, insulation-resistance and leakage tests, direct-current proof tests, and other tests requiring direct connection to power lines.

The proposal creates a new section with provisions identical to the federal standard to protect the health of the employees working in this industry.

The proposal adds the following:

- New subsection (a), entitled “Application”, defines the application of the standard. It excludes routine inspection and maintenance-type measurements made by qualified employees. The EXCEPTION to subsection (a) states that routine inspection and maintenance measurements are not part of the scope of this section provided that the hazards related to the use of intrinsic high-voltage or high-power sources requires only normal precautions.
- New subsection (b), entitled “General Requirements”, requires the employer to establish and then train employees on the work practices that must be followed at temporary and permanent test areas.
- New subsection (c), entitled “Safeguarding of Test Areas”, requires the employer to control access to the test equipment and permanent and temporary test areas. This proposal is to prevent accidental contact and unauthorized use or entry of test equipment or test area.
- New subsection (d), entitled “Grounding Practices”. New subsections (d)(1) through (d)(6) contain grounding practices, procedures of installation of grounds, isolation of ground returns, equipment grounding conductors, grounding after tests, and grounding of test vehicles.

A new NOTE for subsection (d)(3)(B) refers the reader to Appendix E for information on measure that the employers can take to protect from hazardous step and touch potentials.

- New subsection (e), entitled “Control and Measuring Circuits”. New subsections (e)(1) through (e)(4) contain work procedures relating to control wiring and measuring circuits, instruments, routing of temporary wires, and test observer.
- New subsection (f) is entitled “Safety Check”. New subsections (f)(1) and (f)(2) require employers to adopt safety practices that provide for a safety check of temporary and field test areas before employees begin a series of test. This proposal lists the conditions that must be verified prior to the test.

### **Section 2941. Work on or in Proximity to Overhead High Voltage Lines.**

This section pertains to work and operating procedures when working on overhead voltage lines. The proposal is to relocate grounding requirements from this section and relocate them to new Sections 2940.14 and 2940.15. The proposal also adds new requirements to be at least as effective as the federal standards.

The following are the proposed changes:

- Subsection (f)(1) adds a cross reference to Section 2940.6, which requires that insulating gloves meet an updated consensus standard. The provision requiring that the rubber insulating gloves meet ASTM D120-95 is proposed to be deleted because the language is duplicative information listed in Appendix C as referenced in Section 2940.6.
- Subsection (h) pertains to grounding de-energized conductors and equipment. The requirements of this subsection will be deleted and relocated to either Section 2940.14 relating to deenergizing transmission and distribution lines or Section 2940.15 relating to grounding for the protection of employees.

The proposed relocations are:

- Delete subsection (h)(1). The requirement to isolate and identify conductors or equipment to be grounded will be addressed in proposed new Section 2940.15(f)(1) which contains protective grounding requirements.
- Delete subsection (h)(2). The work procedure to ensure that the system operator is notified prior to grounding deenergized equipment or conductors will be addressed in proposed new Section 2940.14(c).
- Delete subsection (h)(3). The work practices of multiple crews working on the same deenergized lines or equipment will be addressed in new Section 2940.14(c)(4).
- Delete subsection (h)(4). The requirement to test lines and equipment before grounding them will be addressed in new Section 2940.14(c)(5) and new Section 2940.15(c).

- Delete subsection (h)(5). The requirement to install grounds will be addressed in new Section 2940.14(c)(7) and new Section 2940.15(b).
- Delete subsection (h)(6). The criteria for suitable grounding will be addressed in new Section 2940.15(f) and the order of connection will be addressed in new Section 2940.15(g)(1).
- Delete subsection (h)(7). The requirement as to where the ground should be located is relocated to new Section 2940.15(f)(5).
- Delete subsection (h)(8). The requirement regarding the visibility of the ground is relocated to Section 2940.15(g)(6).
- Delete subsection (h)(9). The removal for grounds for test will be addressed in new Section 2940.15(i).
- Delete subsection (h)(10). The provision for minimum size of wire will be addressed in new Section 2940.15(f)(3).
- Delete subsection (h)(11). The work practice to allow temporary removal of ground for testing will be addressed in new Section 2940.15(e).
- Deletes subsection (h)(12). The work practices that shall be followed prior to releasing the clearance will be addressed in new Section 2940.14(e) and (h).
- Existing subsection (i) relates to stringing and removing conductors.
  - Subsection (i)(1)(J)3 restricts the type of work that can be performed directly under the conductor or pulling line. The proposed amendment states that the employee is permitted to be under the conductor while the pulling line is in motion only to guide a stringing sock or board over or through the stringing sheave. Stringing sock or board means a device which is used to pull multiple line conductors simultaneously by one pulling line. Stringing sheave means a sheave which is used to redirect the travel of a line conductor during its installation or removal. The sheave is mounted on a string block attached to a supporting (pole, tower) structure.
  - New subsection (i)(1)(L)4 empowers the employee to determine when it is safe to operate the pulling rig and operate it only when the employee feels it is safe to do so.
  - A editorial revision is proposed in subsection (i)(2)(A) to revise the existing reference to the following provisions (B through I) to read (B through J) to reflect the proposed revisions to this proposal.

- New subsection (i)(2)(D) requires that the temporary grounds shall be located and arranged in a manner that would not create hazardous electric potential. A new NOTE to subsection (i)(2)(D) refers the reader to Appendix E, which contains guidelines for protecting employees from hazardous electric potential differences.
- Existing subsection (i)(2)(D) is renumbered to subsection (i)(2)(E) and therefore, subsequent existing subsections are renumbered.

### **Section 2941.1. Metal Tower Construction.**

This section contains work procedures to be followed when performing construction work for a metal tower.

The following are the proposed changes:

- Editorial revisions are proposed to existing subsection (d) to correct grammar.
- Existing subsection (d)(2) states that no one should be positioned under the tower which is in the process of erection or assembly. Subsection (d)(2) is revised to add that no one should be positioned under a tower or structure when it is in the process of erection or assembly. The addition of the word “structure” is to clarify that employees are to clear away from overhead hazards in whatever form it is in order to prevent injury from falling objects.
- Existing subsection (d)(3) is revised to direct the reader to the appropriate Section 2940.2 that addresses minimum approach distances. The existing reference to Section 2940.2(b), Table 2940.2 is deleted as this reference is no longer applicable.
- Existing subsection (e)(2) is revised to be consistent with the federal standard, which allows the employer not to use tag lines if the employer can demonstrate that the use of tag lines would create a greater hazard.

### **Section 2943. Work on or in Proximity to Underground High-Voltage Cables, Conductors or Equipment.**

This section contains work and operating procedures when entry into the manhole, vault, or similar structures is required to perform work. The proposal is to relocate deenergizing procedures and grounding requirements from this section to the appropriate proposed new Sections 2940.13, 2940.14, or 2940.15 as detailed below. The proposal also adds new requirements to be at least as effective as federal standard.

The following are the proposed changes:

- Existing subsection (b)(1) requires the employer to comply with the confined space requirements of Article 108 of the General Industry Safety Orders. It is proposed to

revise subsection (b)(1) to require the employer to determine if entry would be under the new enclosed space standard or if the space is a permit required confined space. Entry into permit confined space is covered in Section 5157 of the General Industry Safety Order or Article 37 of the Construction Safety Orders. By definition, an enclosed space does not have hazardous atmosphere; therefore, allows the employee to enter the space with less requirements than the permit required confined space in Section 5157 or Article 37 of the Construction Safety Orders.

- New subsection (b)(2) requires the employer to provide a safe means of access for vaults or manholes greater than 4 feet in depth. This new subsection also prohibits employees from stepping on cables or hangers. Stepping on cables or hangers could damage, displace, or disconnect conductive wires and this may lead to an electrical fault that could cause electrical shock, electrocution, fire, and or explosion.
- Existing subsection (b)(2) is renumbered to new subsection (b)(3).
- New subsection (b)(4), entitled “Attendants for manholes and vaults”, requires an attendant with first aid training to be available on the surface or immediately available in the vicinity of the vault entrance to render emergency assistance while work is being performed in a manhole or vault containing energized electric equipment.
- New subsection (b)(5) allows the attendant to enter the manhole or vault briefly to provide nonemergency assistance if entry procedures that are being followed are under Section 2943.1. This proposal is consistent with new Section 2943.1.
- New subsection (b)(6) allows an employee working alone to enter an enclosed space for the purpose of inspection, housekeeping, taking readings, or similar work. An employee working alone may enter, for brief periods of time, a manhole or vault where energized cables or equipment are in service, if the employer can demonstrate that the employee will be protected from all electrical hazards.
- New subsection (b)(7), entitled “Communications”, requires that the employer ensures that the employees working in manholes, vaults or similar locations have reliable communication.
- New subsection (b)(8), entitled “Hoisting equipment”, requires that the hoisting equipment be capable of supporting the load. When a load is hoisted, the material is suspended. This provision is to prevent the load from falling uncontrollably due to a break or malfunction because the hoisting equipment does not have sufficient rated load capacity to lift and move the load.
- New subsection (b)(9), entitled “Clear the area of employees”, consists of a work procedure to make sure that the area underneath the opening is clear before materials are lowered inside. This proposal will prevent employee(s) from being injured by materials being lowered.

- Existing subsection (b)(3) is renumbered to new subsection (b)(10) to relocate the requirements regarding the automatic circuit recloser in order to group the provisions pertaining to equipment together.
- Existing subsection (b)(4) is renumbered to new subsection (b)(11) to relocate the requirements regarding the automatic circuit recloser to group the provisions pertaining to equipment together.
- New subsection (b)(12), entitled “Sheath continuity”, requires that when employees work on the buried cable, the outer metallic sheath be continuous and if it is damaged, it is to be treated as if it is energized. The metallic sheath provides a fault return path. The bonding protects and employee against electric shock from a difference in potential. Treating the wire as energized is an alternative to grounding.
- New subsection (d) is entitled “Duct Rods”. To install cables into the underground ducts, or conduits that will contain them, employees use a series of short jointed rods, or a long flexible rod, inserted into the ducts. The insertion of these rods into the ducts is known as “rodding.” Employees use the rods to thread the cable-pulling rope through the conduit. After withdrawing the rods and inserting the cable-pulling ropes, employees then can pull the cables through the conduit by mechanical means. This proposal requires the employees to install the duct rods in the direction presenting the least hazard to employees to make sure that a rod does not contact live parts at the far end of the duct line being rodded, which would be in a different manhole or vault. This proposal also requires the employer to station an employee at the remote or far end of the rodding operation to ensure that employees maintain the required minimum approach distances. Violating the minimum approach distance can cause an electrical shock.
- New subsection (e), entitled “Multiple Cables”, requires that when multiple wires are present, the employer shall identify the cable to be worked on unless it is obvious by appearance. It also requires the employer to protect the other cables from damage. This proposal is to ensure that the employees are working on the right cable and that the other cables are not accidentally damaged.
- New subsection (f), entitled “Moving Cables”, requires that the employees inspect the cable to be moved for abnormalities. The inspection would make the employee aware of possible damage to the cable or hazard and handle it accordingly. A new EXCEPTION to subsection (f) is added that would permit work that could cause a fault, provided that the employee be protected from possible effects of failure using shields or other devices capable of containing the adverse effect of the fault, which will provide protection to the employee.
- New subsection (g), entitled “Protection Against Faults”, requires the employer to deenergize the cables if it has abnormalities that could lead to a fault in subsection (g)(1). A list of abnormalities is contained in subsection (g)(1)(A).

- The proposal includes a new EXCEPTION to subsection (g)(1) that would allow employees to work in a manhole with energized cable with abnormalities provided that the employee uses a shield or other devices that could contain adverse effects of a fault which will provide protection to the employee.
- New subsection (g)(2), entitled “Work-related faults”, pertains to performing work that could cause a fault. Employees are required to deenergize the cable, but when there is no feasible alternative, the employee shall use shields or other devices that is capable of containing the effects of a fault.
- The proposed new informational NOTES to subsection (g)(2) are from a settlement agreement with Edison and Federal OSHA. A question was posed as to how the safety orders apply to the operation of removing arc-proofing tape or similar material from a cable? How does the provision apply to chipping or slicing duct work, concrete, asphalt, or similar material away from an energized cable. Federal OSHA responded that it considered work described in the NOTE 1. to subsection (g)(2) and in the NOTE 2. to subsection (g)(2) as work that does not present a reasonable possibility of a fault occurring.
- The proposal includes a new EXCEPTION to subsection (g)(2) that would allow employees to work in a manhole with energized cable with abnormalities provided that the employee uses a shield or other devices that could contain adverse effects of a fault which will provide protection to the employee. An example of work that could lead to a fault is removing asbestos covering on a cable or using a power tool to break concrete encasing a cable. This type of work can damage the cable and create an internal fault. The energy released by the fault could injure not only the employee performing the work, but any other employees nearby. An example of a protective measure is a ballistic blanket wrapped around a defective splice that can protect against injury from the effects of a fault in the splice. The energy that could be released in case of a fault is known, and the energy absorbing capability of a shield or other device can be obtained from the manufacturer or can be calculated. As long as the energy absorbing capability of the shield or other device exceeds the available fault energy, employees will be protected. The proposal would require employees to be protected, regardless of the type of device used and how it is applied.
- Existing subsection (d) is renumbered to new subsection (h), which is about working on conductors or equipment energized at 7,500 volts or less. Subsection (h)(3) includes a cross reference to new Section 2940.11 for arc flash personal protective equipment. The work in subsection (h) is energized work, which presents an occupational exposure to flames and arc flash.
- Existing subsection (e) is renumbered to new subsection (i), which is about working on conductors or equipment energized in excess of 7500 volts. Subsection (i)(1) includes references to Sections 2940.6 regarding tools and protective equipment and new Section 2940.11 regarding arc flash protection.

- Existing subsection (f) is renumbered to new subsection (j), which is about working on de-energized equipment. New subsection (j)(1) adds cross references to the sections that detail how equipment or lines are to be de-energized. The subsequent existing subsections are renumbered to reflect this proposal.
- Existing subsection (g) is renumbered to new subsection (k), which relates to ground de-energized equipment.
  - Re-numbered subsection (k)(1) replaces the existing references to subsections (d) and (e) to specify subsections (h) and (i), respectively, as a result of this proposal. In addition, this subsection cross references new Section 2940.14. Denergizing Lines and Equipment for Employee Protection and Section 2940.15. Grounding For the Protection of Employees. The existing provisions of subsection (g) are proposed to be deleted and relocated to either Section 2940.14, relating to de-energizing transmission and distribution lines or Section 2940.15, relating to grounding for the protection of employees.
  - Existing subsection (g)(1)(A) is proposed to be deleted because a new Section 2940.15 is created and the provision to identify the cables or equipment to be grounded is relocated to new Section 2940.15(f)(1).
  - Existing subsection (g)(1)(B) is proposed to be deleted because notifications to a system operator is addressed in new Section 2940.14(b)(1) and (c) and new Section 2940.15(b).
  - Existing subsection (g)(1)(C) is proposed to be deleted because the test requirement to make sure that conductors are deenergized is relocated to new Section 2940.14(c)(6) and new Section 2940.15(c).
  - Existing subsection (g)(1)(D) is proposed to be deleted because the provisions for guarding exposed energized conductor is relocated to new Section 2940.15(d).
  - Existing subsection (g)(1)(E) is proposed to be deleted because the requirement to apply grounds is to be addressed in new Section 2940.14(c)(7) and new Section 2940.15(b).
  - Existing subsection (g)(1)(F) is proposed to be deleted because the criteria for protective grounds is relocated to new Section 2940.15(f).
  - Existing subsection (g)(1)(G) is proposed to be deleted because the requirement as to where the ground is to be located will be addressed in new Section 2940.15(f)(5).
  - Existing subsection (g)(1)(H) is proposed to be deleted because the visibility of the ground will be addressed in new Section 2940.15(f)(6).

- Existing subsection (g)(1)(I) is proposed to be deleted because the size requirement of the wire will be addressed in new Section 2940.15(f)(2) and (f)(3).
- Existing subsection (g)(1)(J) is proposed to be deleted because work procedures regarding multiple crews will be addressed in new Section 2940.14(b)(4).
- Existing subsection (g)(1)(J)(2) is proposed to be deleted because the release of clearances will be addressed in new Section 2940.14(e).
- Existing subsection (g)(1)(J)(3) is proposed to be deleted because the requirement for reenergizing the lines and equipment will be addressed in new Section 2940.14(h).

### **New Section 2943.1. Enclosed Spaces.**

This proposal adds a new section which will contain requirements for entering an enclosed space. Enclosed spaces are a type of confined space location, but one where a hazardous atmosphere is not expected under normal conditions. Confined space is defined as space that is large enough and so configured that an employee can bodily enter it; has limited or restricted means for entry and exit; and is not designed for continuous employee occupancy. Electrical utility operations will no longer have to adhere to Section 5158, but will now be required to follow the provisions contained in proposed new Section 2943.1.

For routine entry to a confined space without a hazardous atmosphere, the employer has the option of entering a confined space using the requirements of Section 2943.1. If entry to the space must be through a permit required confined space, then the entry can be under Section 5157 for work covered in the General Industry Safety Orders or Article 37 of the Construction Safety Orders for construction work.

The requirements proposed to be added are essentially verbatim to the federal standard. These control measures are to address the potential hazards in the enclosed space in order to prevent permanent injury or loss of life.

The proposal adds the following:

- The definition of “enclosed space”. Normally, a definition is not in the body of the regulation, but in this instance, the definition of enclosed space defines the scope of the standard.
- New subsection (a), entitled “General”, provides additional details regarding the scope of the standard. The scope makes it clear that it does not apply to vented vaults if the ventilation system is operating to protect employees prior to entering the space.

This subsection also provides a cross reference provision in Section 2943, which is about working on or in proximity to underground high-voltage cables, conductors, or equipment. If adhering to those requirements does not eliminate other hazards that could endanger the life of the entrant or interfere with the ability to egress the space, then the

space shall be considered a permit required space. Article 37 of the Construction Safety Orders covers permit required spaces for construction and Section 5157 addresses permit required confined spaces in the general industry.

A new “NOTE” to subsection (a) is proposed that provides information that entries into enclosed spaces conducted as specified by the permit space requirements of Article 37 of the Construction Safety Orders or Section 5157 of the General Industry Safety Orders are considered as complying with this section.

- New subsection (b), entitled “Safe Work Practices”, requires the employer to develop, implement, and provide to employees a written safe work practices for entry into, work in, and rescue. In multi-employer worksites, the work practices need to be coordinated. Subsections (b)(1), (b)(2), and (b)(3) are safe work practice requirements from Section 5158(c)(1).
- New subsection (c), entitled “training”, requires the employer to train employees who are entering or assisting (attendant) the entrants of the space.
- New subsection (d), entitled “Attendants”, requires an attendant to be outside the enclosed space if a traffic hazard exists. This proposal also allows the attendant to perform other tasks so long as the attendant is not distracted from his primary task of monitoring the employees in the enclosed space.

A new “NOTE” to subsection (d) is proposed to refer the reader to Section 2943(b)(4) that when work is being performed in manholes or vaults containing energized equipment, an attendant is required outside the vault or manhole.

- New subsection (e), entitled “Rescue Equipment”, requires that employers provide rescue equipment to ensure the safe rescue of employees.
- New subsection (f), entitled “Evaluating Potential Hazards”, requires the employer to determine if there is an atmospheric or temperature difference between the outside space and the enclosed space prior to removing the cover. The temperature and atmospheric difference is an indication that there is atmospheric and/or fire or explosion hazard. Underground cables become frayed from aging, corrosive chemicals, overload, or rats biting them. These cables carry high voltage. Electrical wires heat up the paper, lead and rubber insulation. The insulation can smolder and catch on fire, releasing gases. The pressure from the gas builds up inside the manhole. The electrical wires arc like a bolt of lightning and ignite the gases, causing a powerful explosion.

A “NOTE” to subsection (f) is proposed to explain one of the ways to determine if the entrance cover can be safely removed.

- New subsection (g), entitled “Removing Covers”, requires guarding by a railing, temporary cover, or other barrier designed to prevent accidental fall through the opening to protect the public at the top of the manhole and employees at the bottom from objects falling or entering the space.

- New subsection (h), entitled “Hazardous Atmosphere”, prohibits employees from entering an enclosed space with a hazardous atmosphere unless they comply with entry requirements in Section 5157 of the General Industry Safety Orders or Article 37 of the Construction Safety Orders for construction.

A new NOTE to subsection (h) is proposed to refer the reader to additional requirements regarding attendants in Section 2943(b).

- New subsection (i), entitled “Calibration of Test Instruments”, requires that instrument used to monitor atmosphere are properly calibrated and within an acceptable level of accuracy.
- New subsection (j), entitled “Testing”, contains equipment requirements, documentation of the testing and procedures for testing the air for oxygen deficiency and flammable gases and vapors. The results of the air testing is a determining factor whether work is to proceed as permit required confined space under Section 5157 for general industry or Article 37 of the Construction Safety Orders or under Section 2943.1 for enclosed space. This evaluation is necessary to ensure that proper control measures are taken to proceed with the work safely.

New subsection (j)(1) requires that interconnected spaces are blinded off and that each space is tested. New subsection (j)(2) states that if the result of the testing does not reveal air contamination then work may proceed, but the periodic testing of the space is required for the detection of dangerous air contamination, oxygen enrichment or deficiency in case one develops and if dangerous air contamination, oxygen enrichment or deficiency develops, then the employer is required to treat the space as permit-required confined space and must follow either Article 37 of the Construction Safety Orders or Section 5157 of the General Industry Safety Orders. Subsections (j)(1) and (j)(2) are provisions from Section 5158(d)(4) and (d)(5), respectively.

- New subsection (k), entitled “Ventilation and Monitoring”, requires ventilation and monitoring if dangerous air contamination is detected.
- New subsection (l), entitled “Specific Ventilation Requirements,” requires that if continuous forced air ventilation is used, it shall be started and be in operation long enough to provide a safe atmosphere.
- New subsection (m), entitled “Air Supply”, requires that the air supply for the continuous forced air ventilation is from a clean source so as to not introduce other air contaminants into the space.
- New subsection (n) requires that there will be no source of ignition introduced into the enclosed space until appropriate provisions of this section is followed. Work that introduces a source of ignition could deplete oxygen and introduce air contaminants. This provision is from Section 5158(d)(8).

- New subsection (o), entitled “Open Flames”, contains specific monitoring requirements for open flames. It also requires that the employer provide sufficient air flow in and out of the enclosed space if the type of work consumes oxygen, for example, welding, torches, and salamander heaters.
- New subsection (p) requires ease of access and egress to the extent possible. Conditions in the enclosed space may necessitate emergency entrance or exit to the enclosed space. This provision is from Section 5158 (d)(10).
- New subsection (q) requires that if an enclosed space does not have ready exit out of the space and it is equipped with an automatic fire suppression system that may employ toxic gases or oxygen-displacing gases in an event of the fire, then the fire suppression system shall be deactivated. If it is not practical or safe to deactivate, then entry to the space shall be in accordance with Article 37 of the Construction Safety Orders or Section 5157 of the General Industry Safety Orders for permit required confined space.

Fire suppression system may introduce toxic gases at levels above the permissible exposure limit or immediately dangerous to life and health (IDLH) or it may displace oxygen to levels that it would be considered oxygen deficient. In these situations where it cannot be deactivated, the employee shall be provided with the appropriate respirator and be able to exit the space as quickly as possible. The provisions regarding respiratory protection shall be provided and entry shall be in accordance with Section 5157 and Article 37 of the Construction Safety Orders. If or when the fire suppression system creates a hazardous atmosphere, then it is no longer under the scope and definition of an enclosed space and the control measures required by the permit entry are necessary to ensure the protection of the employees’ health and safety.

**Section 2944. Work on or in Proximity to Conductors and Equipment Located in High-Voltage Stations, or Switchyards.**

This section applies to high-voltage work on or in proximity to conductors and equipment located in high-voltage stations or switchyards.

The following are the proposed changes:

- Existing subsection (b) requirements regarding circuit labeling are relocated to new subsection (d).
- New subsection (b) requirements are relocated from existing subsection (k) and a new requirement is proposed to require that conductive fences around substations be grounded. This new subsection also requires substation fences to be isolated and grounded when expanded or removed, to protect employees from hazardous electric potential. This proposal also corrects the cross reference to Section 2812.1, as the original reference to Section 2812 in existing subsection (k) has been repealed.

- Existing subsection (c) regarding work near energized equipment and facilities is relocated to new subsection (g).
- New subsection (c) is added which details rules regarding entrance to an attended substation. For added security, the entrant shall report his/her presence to the substation attendant. The entrant shall be informed of any special conditions that may affect safety. New subsection (c) requires a briefing regarding the location of energized equipment and the limits of any de-energized work area. This proposal informs the employee of the hazards in the workplace.
- New subsection (d) regarding circuit labeling is relocated from existing subsection (b).
- Existing subsection (d) regarding mechanical equipment is relocated to new subsection (h).
- Existing subsection (e) regarding working on conductors or equipment energized at 7,500 volts or less is relocated to new subsection (i).
- New subsection (e) is added which requires that when an employee inserts or removes draw-out type circuit breakers that the breaker is in the open position. The open position is the off position. New subsection (e) also requires the employer to make the circuit inoperable if the design of the equipment permits. This proposal provides safety by design.
- New subsection (f) is added which cross references provisions for guarding of energized parts.
- New subsection (g) regarding work near energized equipment and facilities is relocated from existing subsection (c).
- New subsection (h) regarding mechanical equipment is relocated from existing subsection (d). In addition, the cross reference to the minimum approach distance is corrected to refer the reader to the appropriate section.
- New subsection (i) regarding working on conductors or equipment at 7, 500 volts or less is relocated from existing subsection (e).
- New subsection (j) regarding working on conductors or equipment energized in excess of 7, 5000 volts is relocated from existing subsection (f).
- New subsection (k) regarding working on de-energized conductors or equipment is relocated from existing subsection (g).
- Existing subsection (h) is renumbered to subsection (l), which pertains to grounding of de-energized conductors or equipment. In addition, a cross reference for de-energizing and grounding is added. The creations of Section 2940.14. Deenergizing Lines and

Equipment for Employee Protection and Section 2940.15. Grounding for the Protection of Employees necessitate the relocation of the provisions as detailed below:

- Existing subsection (h)(1)(A) is proposed to be deleted because the requirement to identify conductors to be grounded is proposed to be relocated to new Section 2940.15(f)(1).
- Existing subsection (h)(1)(B) is proposed to be deleted because notifications to system operators is proposed to be relocated to new Sections 2940.14(b)(1) and 2940.15(b).
- Existing subsection (h)(1)(C) is proposed to be deleted because of the requirement to verify if the equipment or conductor is de-energized is addressed in new Sections 2940.14 (c)(6) and 2940.15(c).
- Existing subsection (h)(1)(D) is proposed to be deleted because the requirement to guard or install barriers to prevent contact with exposed energized conductors or equipment is proposed to be relocated to new Section 2940.15(d).
- Existing subsection (h)(1)(E) is proposed to be deleted because the requirement to provide protective grounding is addressed in proposed Sections 2940.14(c)(7) and 2940.15(b).
- Existing subsection (h)(1)(F) is proposed to be deleted because the criteria for suitable grounding is addressed in new Section 2940.15(f).
- Existing subsection (h)(1)(G) is proposed to be deleted because the requirement regarding the location of a protective ground is proposed to be relocated to new Section 2940.15(f)(5).
- Existing subsection (h)(1)(H) is proposed to be deleted because the requirement regarding the visibility of the ground is proposed to be relocated to new Section 2940.15(f)(6).
- Existing subsection (h)(1)(I) is proposed to be deleted because the conductance requirement for grounding devices is addressed in new Section 2940.15(f)(2) and (f)(3).
- Existing subsection (h)(1)(J) is proposed to be deleted because work procedures regarding multiple crews is proposed to be relocated to new Section 2940.14(b)(4).
- Existing subsection (h)(2) is proposed to be deleted because procedures regarding the release of clearances is addressed in proposed new Section 2940.14(e) and (g).

- Existing subsection (h)(3) is proposed to be deleted because the requirement for re-energizing the lines and equipment is addressed in new Section 2940.14(h).
- New subsection (m) regarding access to insulators is relocated from existing subsection (i).
- New subsection (n) regarding the inspection of poles or elevated structures supporting overhead electrical lines or equipment is relocated from existing subsection (j).
- Existing subsection (k) regarding substation fences is relocated to new subsection (b), with revisions.

### **New Section 2944.1. Power Generation.**

The proposal adds a new section relating to power generation plants by adopting federal language. Federal OSHA promulgated specific work practices that apply to power generating plants. This proposal includes provisions pertaining to safety devices, work space, guarding of energized parts, equipment maintenance, and special equipment.

The proposal adds the following:

- New subsection (a) states that additional requirements and related work practices for power generation plants are covered in this section.

New subsection (a)(1) contains provisions to ensure that interlocks and safety devices work. This proposal will require the employer to inspect, maintain, and test safety devices to ensure that the interlock and safety devices function as intended.

New subsection (a)(2) contains requirements to check ground conditions before changing brushes while the generator is energized. A brush is a device which conducts current between stationary wires and moving parts. Field winding and exciters are operated in an ungrounded condition, meaning there is no voltage with respect to ground as long as there is no fault in the circuit. If the equipment has grounding devices, the protective devices are disconnected prior to changing the brush. This proposal ensures that there is no difference in electrical potential.

New subsection (a)(3) contains a requirement to maintain sufficient workspace. This proposal ensures that there is sufficient workspace for the employee working on the equipment.

New subsection (a)(4) provides a cross reference to the article that specifies guarding requirements of rooms and other spaces containing electrical equipment. This proposal informs the regulated public of the guarding requirements that applies to rooms and other spaces in the power generation industry.

New subsection (a)(5) provides a cross reference to the section pertaining to guarding of energized parts. This proposal requires that energized parts are guarded.

- New subsection (b), entitled “Water or Steam Spaces”, applies to work operations in water or steam spaces. Boilers are part of equipment necessary for steam power generation. New subsection (b)(1) requires inspection of the work conditions prior to permitting work and after work is completed. The employer has to assess if it is necessary to wear eye or face protection while cleaning. New subsection (b)(2) requires the employer to provide shielding from steam or water when the employees work near the end of water or steam tubes. This proposal is a protective measure against burns due to heated water or steam.
- New subsection (c), entitled “Chemical Cleaning of Boilers and Pressure Vessels”, contains requirements that apply to chemical cleaning of boilers and pressure vessels. New subsections (c)(1) and (c)(2) consist of requirements for chemically cleaning boilers. These new provisions require cordoning of areas while chemical cleaning is taking place. This proposal protects other employees from getting exposed to the chemicals used for cleaning. If the chemical used is flammable or combustible, signs to restrict entry and warn employees of the fire and explosion hazard shall be posted. Use of the flammable liquids may create a flammable atmosphere; therefore, ignition sources are prohibited to prevent the occurrence of fire and explosion. Since chemical cleaning of boilers can be potentially hazardous, it is necessary to limit the number of people in the area to the number of people necessary to perform the task safely.
- New subsection (d), entitled “Boilers” is proposed. New subsections (d)(1) and (d)(2) consist of requirements when performing repair work on boilers. These new provisions require the employer to address the hazard of possible falling objects like liners, insulation or other machine parts. These new provisions also require that the employee stand clear of the opening when opening the door to avoid being burned from heated gas.
- New subsection (e), entitled “Chlorine Systems”, contains requirements for chlorine systems. Chlorine systems are used for chlorination of cooling water for power generators. It is used as a biocide to prevent water fouling. Chlorine is highly corrosive and exposure to this chemical can have serious and fatal consequences. The proposed requirements are intended to limit the number of employees by restricting entry and posting signs. This proposal informs the employee of the presence of hazardous chemicals in the area. This new subsection requires that an emergency repair kit be available. This new subsection also requires the purging of chlorine prior to performing repairs on equipment. New subsection (e) also requires that the employer makes sure that chlorine is not mixed with other materials that would react with chlorine. This proposal ensures that employees are not harmed by exposure to chlorine.
- New subsection (f), entitled “Turbine Generators”, contains requirements to address the hazards associated with hydrogen as it relates to turbine generators. Turbine generators are typically cooled by air or hydrogen. New subsection (f)(1) is to prohibit sources of ignition as hydrogen is flammable; new subsection (f)(2) requires that the employer treat abnormal loss of hydrogen pressure as an emergency to be corrected immediately because an abnormal loss of hydrogen would mean a hydrogen leak; and new subsection (f)(3) requires that there is sufficient amount of inert gas to be available to purge

hydrogen from the largest generator. This proposal provides control measures to address the fire and explosion hazards of hydrogen.

- New subsection (g), entitled “Coal and Ash Handling”, contains provisions related to coal and ash handling in coal power plants.

New subsection (g)(1) requires only designated trained persons or employees operate railroad equipment. This proposal prevents untrained employees from operating railroad equipment.

New subsection (g)(2) requires warning employees before the locomotive crane is moved. This proposal provides the employees a chance to move away from a potentially dangerous location.

New subsection (g)(3) requires that the employees not use their feet to try to line up drawheads when switching or dumping cars. This proposal ensures that the employees’ feet are not injured.

New subsection (g)(4) requires that the drawhead and knuckle not be shifted when in motion. Drawhead is the body of the automatic coupler and the knuckle is the movable arm which connects the drawhead to form the coupling on cars and locomotives. This proposal prevents the employee from being physically caught in or crushed by moving parts of the equipment.

New subsection (g)(5) requires the railroad car to be stopped for unloading and secured so that it does not move. This proposal prevents employees from getting hit or run over.

New subsection (g)(6) requires that the employer have emergency means of stopping dump operations. This proposal provides a system to interrupt or stop the operation in case there is an incident where the employee is exposed to the hazard of the dumping operation, for example, in case an employee gets trapped or is found trapped.

New subsection (g)(7) requires the employer to provide employee training as listed in subsections (g)(8) to (g)(12), which are requirements related to conveyors.

New subsection (g)(8) prohibits riding a coal or ash handling conveyor at all times. Employees can only cross over the conveyor belts at walkways or when it is de-energized and locked out. This proposal will prevent slips and falls.

New subsection (g)(9) requires that the conveyor that could cause injury not be started until employees in the area are alerted by a signal or personnel that the conveyor is about to start. This proposal provides a means to warn the employee so that the employee can move out of harm’s way.

New subsection (g)(10) contains provisions for conveyors that automatically are controlled or are controlled at remote locations. This subsection discusses the different methods that can be used to warn employees that the conveyor is about to start. This

subsection requires that the conveyor be equipped with a device that audibly warns employees when the conveyor is about to start. A visual device can be substituted provided that the employer can demonstrate that equivalent protection is provided. This subsection also states that a warning sign can be substituted for an audible device if the employer can demonstrate that the system's function would be seriously delayed. Finally, warning signs may be provided in place of audible warning device for conveyor systems built before January 31, 1995, until the conveyor system is rebuilt. This proposal is to provide an effective means to warn employees of the movement of the conveyor so that the employee can move out of harm's way.

New subsection (g)(11) contains provisions to provide means for stopping remotely or automatically controlled conveyors that have operating stations that are not manned or are beyond voice and visual contact from drive areas, loading areas, transfer points, and other locations on the conveyor path not guarded by location, or position or guards. Such means include emergency stop buttons, pull cords, limit switches, or similar emergency stop devices. This proposal provides a means of stopping the movement of conveyors in case of an emergency.

New subsection (g)(11)(A) requires that the stop devices are easily identifiable in the immediate vicinity. This proposal is to ensure prompt access to the stop devices.

New subsection (g)(11)(B) requires that the emergency stop device acts directly on the control of the conveyor. This proposal ensures that the stopping mechanism does not depend on another part. It is the design requirement that affects the reliability of the stop device.

New subsection (g)(11)(C) requires that stop devices cannot be overridden from other locations. This proposal ensures the dependability of the stop devices.

New subsection (g)(12) eliminates sources of ignition in coal handling operations that could produce a combustible atmosphere. A NOTE is added to provide a cross reference to Section 5174 for combustible dusts. This proposal is to prevent fires and explosions.

New subsection (g)(13) prohibits work under coal bunkers, silos, or coal storage areas unless the employee is protected from all hazards created by shifting coal. This proposal will prevent the employee from being crushed by materials that can fall.

New subsection (g)(14) requires that the employee entering a bunker or silo wear a body harness with lifeline attached to a fixed support structure. This proposal will protect the employee from engulfment hazards.

- New subsection (h), entitled "Hydroplants and Equipment", requires employers to warn and to vacate employees working near the water gates, valves, intakes, forebays, flumes, or other locations where increase or decrease water flow may pose a significant hazard. This proposal removes the employee from a location where the employee can be swept by the water or drown.

### **New Appendix A. Working on Exposed Energized Parts.**

The heading “Appendix A” is in existing Title 8. The proposal adds new Appendix A, which contains information to explain the concepts, tables, and equations relating to minimum approach distances in Section 2940.2.

### **Appendix C. Protective Equipment.**

This proposal amends existing Appendix C to update the consensus standards to a newer edition and to add new consensus standards to be incorporated by reference. This proposal would render the California standards to be as effective as the corresponding federal standards.

### **New Appendix D. Protection From Flames and Electric Arcs.**

The proposal adds new Appendix D which provides information regarding the methods to estimate incident energy and to select the appropriate protective clothing to protect from flames and electric arcs.

### **New Appendix E. Protection from Hazardous Differences in Electrical Potential.**

The proposal adds new Appendix E which provides information regarding the work practices used in the industry in order to create an equipotential zone in accordance with new Section 2940.15.

### **Section 2946. Provisions for Preventing Accidents Due to Proximity to Overhead Lines.**

This section contains provisions to prevent accidental contact to energized lines. The proposal amends subsection (b)(4) to change the reference to the table of clearances for storage of materials from Table 1 to Table 2, which requires a minimum clearance of 10 feet for 600 to 50,000 volts, as opposed to Table 1, with a requirement of 6 feet. This proposal will render the California standard to be as effective as the federal standard 29 CFR 1926.958(b) regarding material storage near energized lines and equipment.

The heading of Table 2 is proposed to be revised to include the phrase “Material Storage and” prior to the existing heading “Boom-type lifting or hoisting equipment clearances required from energized overhead high-voltages lines” to reflect the change in subsection (b)(4).

### **Section 2951. Line Clearance Operations.**

This section applies to line clearance tree-trimming operations to keep leaves and branches away from energized lines.

The following are the proposed changes:

- It is proposed to include (Tree Trimming) to the title of Section 2951 to read “Line

Clearance (Tree Trimming) Operations. This proposal better describes the subject of this section.

- Existing subsection (a) adds a requirement to require the employer to determine the nominal voltage or the maximum voltage of the power line the employee will be exposed to. The voltage is a determining factor in establishing the minimum approach distance for the job, the selection of the personal protective equipment, and the work procedures to be followed.
- Existing subsection (b) is revised to correct the cross reference to minimum approach distances to reflect the changes in Section 2940.2.
- Existing subsection (d) is revised to add a requirement for the other person to be close enough so that employees can communicate to each other verbally. This proposal will improve communication and will enable employees to warn each other of an unsafe condition that may develop.
- New subsection (g) is added which requires that the ladder does not approach closer than the minimum approach distance. This proposal is to prevent an electrical shock or electrocution.
- New subsection (h) is entitled “Sprayers and Related Equipment”. New subsections (h)(1) and (h)(2) require the walking and working surfaces of spraying equipment to be slip resistant. This proposal also requires the employer to provide handrails on equipment if the employees have to stand while the equipment is in motion. Both new requirements are intended to prevent accidents due to slips and falls.
- New subsection (i), entitled “Rope”, specifies how rope is to be stored to allow it to dry and to prevent moisture retention. This proposal also requires that rope with impaired insulating properties not be used near exposed energized lines because a wet or damaged rope will conduct electricity, which can lead to an electrical shock or electrocution.

**Section 3314. The Control of Hazardous Energy for the Cleaning, Repairing, Servicing, Setting-Up, and Adjusting Operations of Prime Movers, Machinery and Equipment, Including Lockout/Tagout.**

Existing Section 3314 applies to the cleaning, repairing, servicing, setting-up, and adjusting of machines and equipment in which the unexpected energization or start-up of the machines or equipment, or release of stored energy could cause injury to employees.

The proposal is to add new subsections (a)(4) and (a)(5) to provide cross references to the proposed new sections in the High-Voltage Electrical Safety Orders, Sections 2940.13 and 2940.14, respectively. New Section 2940.13 refers to the energy control procedures for the power generation industry and new Section 2940.14 refers to procedures for de-energizing transmission and distribution lines and equipment.

A new NOTE to subsection (a)(4) is included to clarify to the employer that there is no need to have two separate energy control procedures. The requirements in Section 3314 are also included in proposed new Section 2940.13, with additional provisions, to address the possibility of re-accumulation of energy and system operator, which are unique to the power generation industry.

### **Section 3389. Life Rings and Personal Flotation Devices.**

Life ring and personal flotation devices are personal protective equipment found in hydroelectric power plants. The existing safety order requires that the flotation device is maintained in good condition, which implies that it needs to be inspected in order to be maintained.

The proposal clarifies that the life ring and personal floatation devices are to be inspected with sufficient frequency to ensure that there is no rot, mildew, water saturation, or any other condition that would render the flotation device unsuitable for use. This proposal is in the General Industry Safety Orders; therefore, this proposal affects other industries that use life rings and personal floatation device. This proposal ensures that the personal protective equipment used in hydroelectric power plants are safe to use.

### **Section 3422. Treework Saddles.**

This section pertains to treework saddles, work positioning lanyards, and climbing lines. The proposal adds a requirement that the ropes are to be coiled and piled or be suspended to allow air to circulate. This requirement will help prevent deterioration of the rope due to moisture. The addition of this provision into the General Industry Safety Orders affects all employees who use this equipment, not limited to line-clearance employees.

### **Section 3425. Portable Power Hand Tools.**

Existing Section 3425 pertains to portable power hand tools used for tree work, maintenance or removal. Subsection (a) consists of operation and maintenance requirements of power saws. Amendments to this general industry safety order affect general tree-trimming operations as well as line clearance tree trimming operations.

The following are the proposed changes:

- To relocate existing subsection (a)(2) to new subsection (a)(6) to group like provisions together.
- To add new subsection (a)(2), which requires that the saw be started on the ground or firmly supported. Starting the saw on the ground limits the unintended movement and provides better control of the saw when starting. The kickback of saws can be dangerous and can cause lacerations. The proposal provides an exception by allowing drop starting of chain saw outside of the aerial bucket lift, provided that the saw weighs less than 15 pounds and no personnel are located in the area below. This proposal will ensure the safety of all personnel.

- To add new subsection (a)(4) to ensure that other employees are out of harm's way prior to starting the saw.
- To add new subsection (a)(5) to prohibit carrying a saw up into the tree while it is running. Carrying the saw up the tree while the blade is rotating is dangerous.
- To renumber existing subsection (a)(4) to subsection (a)(7) with a revision to subsection (a)(7) to clarify that the chain saw is to be equipped with a clutch. The existing wording of subsection (a)(7) already implies that there is a clutch; therefore, this proposal provides clarity.
- To renumber existing subsection (a)(5) to subsection (a)(8), existing subsection (a)(6) to subsection (a)(9), existing subsection (a)(7) to subsection (a)(10), existing subsection (a)(8) to subsection (a)(11), and existing subsection (a)(9) to subsection (12) to group like provisions together.

### **New Section 3428. Stump Cutters.**

The proposal is to add provisions regarding stump cutters. Stump cutters may be used by line clearance tree trimming operations or anywhere a stump needs to be removed to install equipment. The point of operation of the stump cutter is the rotating blade with teeth.

New subsection (a) requires the stump cutters to be equipped with a guard or enclosures. New subsection (b) requires the operator and employees close by to wear personal protective equipment in accordance with Article 10 of the General Industry Safety Orders. The personal protective equipment would include, but not limited to, eye, face, and foot protection. The addition of this Section into the General Industry Safety Orders affects all employees who use this equipment, and is not limited to line-clearance employees. This proposal is necessary to prevent accidents from debris caused by the cutting motion.

### **Section 5156. Scope, Application and Definitions.**

This section pertains to the scope and application of confined space operations.

The following are the proposed changes:

- As a result of the proposed deletion of subsection (b)(2)(G), it is proposed to editorially revise the punctuation marks at the end of subsections (b)(2)(E) and (b)(2)(F) to be grammatically consistent with the listing of these subsections.
- Subsection (b)(2)(G) is proposed to be deleted in order to be consistent with proposed new Section 2943.1 regarding enclosed spaces. As a result of the proposed deletion of subsection (b)(2)(G), it is proposed to editorially revise the punctuation marks at the end of subsections (b)(2)(E) and (b)(2)(F) to be grammatically consistent with the listing of these subsections.

This proposal will clarify that electrical distribution and transmission work other than construction work are to comply with Section 2943.1 for enclosed space or Section 5157 for permit-required confined space.

- A new NOTE is included to direct the reader to the new enclosed space standard Section 2943.1, which applies to electric utility operations, both in the general industry and the construction industry.

### **Section 8617. Eye Protection.**

This section pertains to eye protection for telecommunication facilities.

- Subsection (a) is proposed to be revised to require that the employer ensure that no employee looks into an antenna that is connected to an energized source of microwave radiation in order to prevent eye injury to the employee.

### **DOCUMENTS INCORPORATED BY REFERENCE**

1. American Society for Testing and Materials International (ASTM) D120-09, Standard Specification for Rubber Insulating Gloves.
2. ASTM D178-01 (2010), Standard Specification for Rubber Insulating Matting.
3. ASTM D1048-12, Standard Specification for Rubber Insulating Blankets.
4. ASTM D1049-98 (2010), Standard Specification for Rubber Insulating Covers.
5. ASTM D1050-05 (2011), Standard Specification for Rubber Insulating Line Hose.
6. ASTM D1051-08, Standard Specification for Rubber Insulating Sleeves.
7. ASTM F696-06 (2011), Standard Specification for Leather Protectors for Rubber Insulating Gloves and Mittens.
8. ASTM F712-06 (2011), Standard Test Methods and Specifications for Electrically Insulating Plastic Guard Equipment for Protection of Workers.
9. ASTM F 1564-95 (Reapproved 2006), Standard Specification for Structure-Mounted Insulating Work Platforms for Electrical Workers.
10. ASTM F1236-96 (2012), Standard Guide for Visual Inspection of Electrical Protective Rubber Products.
11. ASTM F478-09, Standard Specification for In-Service Care of Insulating Line Hose and Covers.
12. ASTM F479-06 (2011), Standard Specification for In-Service Care of Insulating Blankets.
13. ASTM F496-08, Standard Specification for In-Service Care of Insulating Gloves and Sleeves.
14. ASTM F819-10, Standard Terminology Relating to Electrical Protective Equipment for Workers, which includes definitions of terms relating to the electrical protective equipment covered under this section.
15. ASTM F887-12<sup>E1</sup>, Standard Specifications for Personal Climbing Equipment.

These documents are too cumbersome or impractical to publish in Title 8 [or may include copyrighted items, (e.g., ANSI standards).] Therefore, it is proposed to incorporate the

documents by reference. Copies of these documents are available for review Monday through Friday from 8:00 a.m. to 4:30 p.m. at the Standards Board Office located at 2520 Venture Oaks Way, Suite 350, Sacramento, California.

### **DISCLOSURES REGARDING THE PROPOSED ACTION**

**Mandate on Local Agencies and School Districts:** None.

**Cost or Savings to State Agencies:**

Department of Water Resources will be affected by the rulemaking, but there will be no fiscal impact to the General Fund. DWR operates 8 power generating plants throughout the State. According to DWR, the proposed rule would affect approximately 680 employees and may need additional training, personal protective equipment, tools and materials. The 8 generating plants are part of the State Water Project which is funded through Water Supply Contracts with 29 local public agencies (Water Contractors), which provide for DWR to recover substantially all System costs.

**Cost to Any Local Government or School District Which Must be Reimbursed in Accordance with Government Code Sections 17500 through 17630:** None.

**Other Nondiscretionary Cost or Savings Imposed on Local Agencies:** None.

**Cost or Savings in Federal Funding to the State:** None.

**Cost Impacts on a Representative Private Person or Business:**

The types of businesses that will be affected by this rulemaking include electric power generation; electric power distribution; major publicly owned utilities; industrial power generators; ornamental shrub and tree services; water, sewer, and pipeline construction; power and communication transmission line construction; industrial non-building structure construction; all other heavy construction; structural steel erection contractors; and building equipment and other machine installation contractors.

<b>Industry</b>	<b>Total First Year Cost</b>	<b>Estimated California Cost (12% of the Federal Cost)</b>
Water, Sewer, and Pipeline Construction	\$1,153,078	\$138,369
Power and Communication Transmission Line Construction	\$28,451,085	\$3,414,130
Industrial Nonbuilding Structure Construction	\$1,121,731	\$134,608
All Other Heavy Construction	\$6,812,888	\$817,547
Electrical Contractors	\$21,012,253	\$2,521,470
Structural Steel Erection Contractors	\$334,562	\$40,147
Building Equipment and Other Machines	\$333,729	\$40,047
All other special trade contractors	\$1,022,182	\$122,662
Electrical Power Generation	\$12,939,866	\$1,552,784
Electrical Power Transmission, Control, and Distribution	\$28,853,013	\$3,462,362
Major Publicly Owned Utilities	\$4,100,296	\$492,036
Industrial Power Generators	\$5,108,161	\$612,979
Ornamental Shrub and Tree Services	\$2,536,461	\$304,375
<b>Total</b>	113,779,305	\$13,653,516

Federal cost estimates are derived from Federal Register, Vol. 79, No. 70, pages 20608 – 20609, (April 11, 2014). Federal OSHA estimates the annualized cost for compliance to be \$49,516,264 annually. The cost to California is estimated to be \$5,941,951.68.

**Statewide Adverse Economic Impact Directly Affecting Businesses and Individuals:  
Including the Ability of California Businesses to Compete:**

The Board has made an initial determination that this proposal will not result in a significant, statewide adverse economic impact directly affecting businesses/individuals, including the ability of California businesses to compete with businesses in other states. This rulemaking was prompted by the federal final rule which is nationally mandated regulations.

**Significant Affect on Housing Costs:** None.

## **DETERMINATION OF MANDATE**

The Occupational Safety and Health Standards Board has determined that the proposed standards do not impose a local mandate. There are no costs to any local government or school district which must be reimbursed in accordance with Government Code Sections 17500 through 17630.

## **SMALL BUSINESS DETERMINATION**

The Board has determined that the proposed amendments may affect small businesses. However, no economic impact is anticipated. The portion of the proposal that would affect small businesses concerns rules regarding tree trimming. The training requirement regarding the use of saws is minimal and the guards for stump cutters are included in the cost of purchasing the equipment.

## **RESULTS OF THE ECONOMIC IMPACT ASSESSMENT/ANALYSIS**

The proposed regulations will not have any effect on the creation or elimination of California jobs or the creation of new businesses or the elimination of existing California businesses or affect the expansion of existing California businesses. The proposed changes are nationally mandated minimum standards that all employers must abide by.

This proposal would provide safety equivalent to that provided by the federal standards. Since this rulemaking is a national requirement that every state must abide by, it will not create or eliminate jobs within the State of California, it will not create new businesses or eliminate existing businesses within the State of California, and it will not expand businesses currently doing business within the State of California.

## **BENEFITS OF THE PROPOSED ACTION**

The amendments to these regulations would provide safety equivalent to that provided by the federal standards. This proposal updates and creates new sections and subsections to protect employees from electrical hazards and other related hazards (falls, burns, chemicals, etc.) associated with performing work in the power generation, transmission, and distribution industries.

Federal OSHA estimated the annual monetized national benefits of fatalities prevented, injuries potentially prevented, and the total potential monetized benefits as \$179.2 million per year. Given that California is approximately 12% of the population, the estimated benefit would be approximately \$21.5 million per year.

Among the provisions in this proposal are the following:

- To improve communication between employers and employees.
- To update the procedures for de-energizing and grounding equipment and lines for electrical generation, transmission, and distribution.
- To update the procedures for confined spaces (enclosed spaces).
- To update the provisions for substations.

- To add provisions to power generation.
- To strengthen fall protection requirements.
- To add provisions for the protection of employees from electrical arcs and flames.
- To update the provisions for tools and personal protective equipment.

### **CONSIDERATION OF ALTERNATIVES**

In accordance with Government Code Section 11346.5(a)(13), the Board must determine that no reasonable alternative it considered to the regulations or that has otherwise been identified and brought to its attention would either be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action or would be more cost-effective to affected private persons and equally effective in implementing the statutory policy or other provision of law than the proposal described in this Notice.

The Board invites interested persons to present statements or arguments with respect to alternatives to the proposed regulations at the scheduled public hearing or during the written comment period.

### **CONTACT PERSONS**

Inquiries regarding this proposed regulatory action may be directed to Marley Hart (Executive Officer) and the back-up contact person is Michael Manieri (Principal Safety Engineer) at the Occupational Safety and Health Standards Board, 2520 Venture Oaks Way, Suite 350, Sacramento, CA 95833; (916) 274-5721.

### **AVAILABILITY OF STATEMENT OF REASONS, TEXT OF THE PROPOSED REGULATIONS AND RULEMAKING FILE**

The Board will have the entire rulemaking file available for inspection and copying throughout the rulemaking process at its office at the above address. As of the date this notice is published in the Notice Register, the rulemaking file consists of this notice, the proposed text of the regulations, the Initial Statement of Reasons, supporting documents, or other information upon which the rulemaking is based. Copies may be obtained by contacting Ms. Hart or Mr. Manieri at the address or telephone number listed above.

### **AVAILABILITY OF CHANGED OR MODIFIED TEXT**

After holding the hearing and considering all timely and relevant comments received, the Board may adopt the proposed regulations substantially as described in this notice. If the Board makes modifications which are sufficiently related to the originally proposed text, it will make the modified text (with the changes clearly indicated) available to the public at least 15 days before the Board adopts the regulations as revised. Please request copies of any modified regulations by contacting Ms. Hart or Mr. Manieri at the address or telephone number listed above. The Board will accept written comments on the modified regulations for at least 15 days after the date on which they are made available.

### **AVAILABILITY OF THE FINAL STATEMENT OF REASONS**

Upon its completion, copies of the Final Statement of Reasons may be obtained by contacting Ms. Hart or Mr. Manieri at the address or telephone number listed above or via the internet.

### **AVAILABILITY OF DOCUMENTS ON THE INTERNET**

The Board will have rulemaking documents available for inspection throughout the rulemaking process on its web site. Copies of the text of the regulations in an underline/strikeout format, the Notice of Proposed action and the Initial Statement of Reasons can be accessed through the Standards Board's website at <http://www.dir.ca.gov/oshsb>.