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| Revision No. 5 | 05/2006 | Page 1 of 4 |
| Kennecott Utah Copper Corporation Safety and Health Standards | | Standard No.: 15.1 Electrical Safety |

15.1.1 **INTRODUCTION**

15.1.1.1 This standard is intended to provide guidelines regarding electrical competency requirements, safe electrical work procedures, and access to electrical "controlled areas". This standard applies to all electrical work above 110 volts DC or 50 volts AC.

15.1.2 **DEFINITIONS**

15.1.2.1 "Competent person" means a person having the knowledge and abilities that fully qualify him / her to perform the duty to which he / she is assigned and who because of training and experience is capable of identifying hazardous or dangerous conditions and of training other employees to identify such conditions.

15.1.2.2 An "authorized person" means a person approved or assigned by plant management to perform a specific duty or to be at a specific location.

15.1.3 **REQUIREMENTS**

15.1.3.1 All electrical installation work shall be conducted by competent personnel in accordance with governing regulation, code, design criteria and safe work procedures.

15.1.3.2 There shall be demonstrated job and equipment-specific electrical competency standards and safe work procedures for all electrical work, i.e. construction, decommissioning and demolition of electrical equipment. The competency standards shall specify the frequency for re-certification, which shall be no less than every two years and address job and equipment-specific safe work procedures.

15.1.3.3 There shall be an arc flash protection program in place to determine incident energies and define the appropriate PPE and associated procedures to mitigate the hazard.

15.1.3.4 Electrical safety devices such as earth leakage and overload protection shall be installed on all final distribution circuits and the settings established by qualified personnel.

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| References: | | | | | |
| MSHA 30 CFR Subpart K. | | | | | |
| OSHA 29 CFR Subpart S. | | | | | |
| National Electric Safety Code - ANSI C2 | | | | | |
| National Electrical Code – NFPA 70 | | | | | |
| KUCC Safety and Health Standards 16.4 Cranes and Hoists | | | | | |
| KUCC Safety and Health Standard 16.10 – Electrical Grounding | | | | | |
| KUCC Safety and Health Standard 16.12 – Lockout / Tagout (Isolation) | | | | | |
| KUCC Safety and Health Standard 14.1 – Contract of Service, Repair and Construction Work | | | | | |
| Rio Tinto Safety Standard C2 – Electrical Safety | | | | | |
| Rio Tinto Electrical Standards Guideline Document | | | | | |
| Signatures | | | | | |
| Original signed by: Frank Klobchar | 05/09/06 | Original signed by: Scott Lawson | 06/21/06 | Original signed by: Bill Champion | 06/22/06 |
| Standards Committee Chairman | Date | VP and GM Engineering and Technical Services | Date | President, KUCC | Date |

- 15.1.3.5 Electrical equipment, grounding continuity and electrical safety devices shall be inspected and / or tested on a suitable schedule and the findings recorded. (See KUC Safety and Health Standard 16.10)
- 15.1.3.6 There must be a system for removing electrical equipment unfit or unsafe for purpose. Each plant shall establish a system for removing unfit or unsafe electrical equipment.
- 15.1.3.7 There must be a system for maintaining an up-to-date set of single line diagrams. The diagrams will show: system fault calculations; equipment details; electrical protection discrimination curves; and cable ratings. Pertinent revisions shall be properly engineered, approved and logged. (See Exhibit 15.1.1) Ongoing updates to distribution panel schedules, fault calculations, equipment details, protection discrimination curves and cable ratings must also be engineered, approved and logged.
- 15.1.3.8 Equipment shall be isolated in accordance with KUC Safety and Health Standard 16.12. All energized electrical work will require a safe work procedure and, with the exception of voltage testing and where no tools are used, will require an Energized Electrical Work Permit.
- 15.1.3.9 Access to an electrical cabinet or other enclosure with exposed energized terminals in excess of 1,000 volts is prohibited.
- 15.1.3.10 There shall be an assessment of overhead power lines and a system in place to mitigate the hazards associated with working in close proximity, and to prevent contact by personnel or equipment. (See Safety and Health Standard 16.4, Exhibit 16.4.2 Close Proximity Permit)
- 15.1.3.11 The following policies and procedures apply to all electrical / motor control rooms containing switches, motor starters, breakers, fuses and their accessories, located near the point of entrance of supply conductors to a "building or other structure" or an otherwise defined as a "controlled area", and intended to constitute the main point of control.
- Electrical panels, enclosures, control centers, substations and equipment shall be appropriately guarded, labeled, and made inaccessible (except for emergency shut off mechanisms) to unauthorized personnel. Areas containing such equipment are "controlled areas".
 - Access to "controlled areas" shall be restricted to competent or authorized personnel only. Access, will be controlled by locked doors or other appropriate means. Where it is necessary for untrained personnel (e.g. visitors) to enter controlled areas there shall be a system for communicating the hazards and for escorting them with appropriately trained personnel. Contractors must have a permit to work in controlled areas. (See KUC Safety and Health Standard 14.1)
 - Suitable "Danger" signs shall be posted at the entrance to all major electrical installations. Metal-enclosed switchgear, unit substations, transformers, pull boxes, connection boxes, and other similar associated equipment shall be marked with appropriate "Caution" signs. Principal power switches shall be labeled to show which units they control. The labeling shall be legible, durable and distinctive.
 - All electrical rooms shall be kept clean and orderly. All doors, inspection and cover plates on electrical equipment shall be kept in place at all times except during testing, installation or repairs.
 - All personnel doors will be equipped with panic hardware and swing outward to allow rapid egress in the event of an emergency.
 - Electrical rooms shall not be used as shop facilities, storage areas or lunchrooms. All electrical rooms will be posted as "NO SMOKING" areas. Combustible materials shall not be stored in any electrical room nor shall they be stored or allowed to accumulate within 25 feet of an electrical substation. All engineering documentation must be properly stored in racks or storage files.

- Insulated platforms, insulating mats, or other electrically non-conductive material shall be kept in place at all switchboards and power-control switches where a shock hazard exists.
- Adequate illumination shall be provided for all working spaces around electrical equipment. The lighting fixtures shall be so arranged that persons changing lamps or making repairs on the lighting system will not be endangered by live parts or other equipment.
- Working space around electrical equipment shall be provided in accordance with the National Electrical Code. Where there is access to exposed energized parts, measures such as de-energization or the use of insulated gloves or blankets shall be used in accordance with safe work procedures.

15.1.4 **RESPONSIBILITIES**

15.1.4.1 The electrical group is responsible for the upkeep, equipment integrity, maintenance and housekeeping of all electrical equipment and installations inside the electrical room.

15.1.5 **TRAINING**

15.1.5.1 Employees and contractors exposed to electrical hazards shall receive electrical hazard training at the commencement of their employment and thereafter on an annual basis. The training shall address the equipment and conditions specific to the work area of the personnel and be documented.

15.1.5.2 All personnel performing electrical installation work shall be re-certified no less than every two years as defined in the plant electrical competency standards in 15.1.3.2.

Exhibit 15.1.1

| Log of Engineering Revisions | | | | Plant: _____ Discipline: _____ | | Page 1 of _____ | |
|------------------------------|-----------------------------|----------|------|--|---|-----------------|--|
| Item No. | Drawing/ PLC ID # (a) | Rev. No. | Date | Description | APPROVALS | | |
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| 10 | | | | Procedure for updating Programmable Logic Controller (PLC) software: Diskette label must show Rev. number(s), same Rev. # as shown in this log. | (a) Shaded areas reserved for related PLC revision (b) Supervisor / Plant Engineer (c) Plant Engineer's supervisor (next level in organization) | | |