Purpose

The purpose of this program is to establish and implement written procedures for compliance to inform personnel of the potential exposure to electrical hazards in operations and to provide guidelines for to use when dealing with those operations.

Dee Cramer, Inc. must ensure that all electrical equipment shall be installed and guarded so that adequate provision is made for the safety of persons and property and for the protection of the electrical equipment from mechanical or other injury to which it is liable to be exposed.

Scope

This program is applicable to all employees. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers Dee Cramer, Inc. employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Key Responsibilities

Managers and Supervisors

- For ensuring to implement and enforce the electrical safety program and to ensure that workers must be informed of the potential electrical hazards before being permitted to do work in proximity to energized electrical conductors or equipment.
- To ensure all electrical installations, equipment, apparatus and appliances shall be in conformity with the requirements of the local, provincial and national regulatory codes.
- To ensure only approved electrical equipment is used by workers and that the electrical equipment is:
    - Approved for the intended use and location of the electrical equipment;
    - Maintained in proper working condition and capable of safe operation; and
    - Tested in accordance with the manufacturer’s recommendations

Employees

- Following the requirements in the electrical safety program.

Procedure

During COMPANY work there are times when overhead or buried lines may be present. Dee Cramer, Inc. staff will use hazard identification and assessment methods to document hazards and corrective actions needed to eliminate employee exposure to potential electrical hazards.

Qualifications of Electrical Workers

Electrical work may only be performed by competent/qualified workers. No worker shall connect, maintain, or modify electrical equipment or installations unless the worker is an certified electrician. A worker who does not meet the requirements may insert an attachment plug cap on the cord of electrical equipment or an electrical tool into, or remove it from, a convenience receptacle.

Dee Cramer, Inc. shall ensure that the qualified electrician performing electrical work de energizes, isolates and locks out and connects to ground electrical equipment on which work is to be done in a lawfully required manner, removes any potential stored power and does not re-energize the equipment until the work has been completed and all persons in the immediate vicinity are in a safe location.

PPE and Tools

Personal protective equipment must be worn for protection from electrical shock and/or arc flash. A worker shall use mats, shields or other protective devices or equipment, including personal protective equipment, adequate to protect the worker from electrical shock and burn.

Only non-conductive tools and equipment may be used while performing electrical work. Tools and other equipment that are capable of conducting electricity and endangering the safety of any worker shall not be used in such proximity to any live electrical installation or equipment that they might make electrical contact with the live conductor.

Safe Work Practices to Prevent Electric Shock

Safe work practices shall be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts when work is performed near or on equipment or circuits which are or may be energized. Additional practices include:

- Only nonconductive hardhats are allowed for use where there is a potential for injury from electric shock or burns due to contact with energized parts.
- Work shall not be done on an energized electrical conductor or equipment that has a voltage of more than 750 volts unless 2 or more authorized personnel are present while the work is being performed.
- COMPANY must ensure that the path to ground from circuits, equipment, or conductor enclosures shall be permanent and continuous, shall have ample ampacity to conduct safely and currents liable to be imposed on it, and shall have impedance sufficiently low to limit the voltage above ground and to facilitate the operation of the over current devices in the circuit.
- Equipment with defective electrical components is immediately removed from service. Defective electrical equipment and tools that may pose a hazard shall be immediately disconnected, removed from service and tagged as being defective.
- COMPANY shall ensure that all operating electrical equipment is kept in safe and proper working condition. Electrical equipment maintained for emergency service will be periodically inspected and tested by qualified personnel as necessary to ensure its fitness for service.
- Infrequently used electrical equipment maintained for future service shall be thoroughly inspected by qualified personnel before use in order to determine its fitness for service.
- All wire joints or connections are to be fitted with an approved cap or other approved cover, enclosed in an approved box or where the wire joints or connections are not permanently installed be protected from damage by another approved means and all dead, abandoned or disused electrical conductors or equipment are removed from the work area or disconnected and secured to prevent inadvertent energization.

- Only CSA approved electrical equipment and devices used in electrical installations within the jurisdiction of the local regulatory requirements shall be approved and shall be of a kind or type and rating approved for the specific purpose for which it is to be employed.

Electrical Fire Safety

- Dee Cramer, Inc. shall ensure that electrical installations shall be made so that the probability of spread of fire through fire stopped partitions, floors, hollow spaces, firewalls or fire partitions, vertical shafts, or ventilating or air-conditioning duct is reduced to a minimum. Where a fire separation is pierced by a raceway or cable, any openings around the raceway or cable shall be properly closed or sealed in compliance with the National Building Code of Canada.
- Dee Cramer, Inc. shall ensure that a fire extinguisher approved for Class C fires is readily available to workers working on or near energized high voltage electrical equipment.
- Dee Cramer, Inc. will ensure that in locations where explosive or flammable materials or gases are present, special precautions shall be observed including that repairs or alterations shall not be made on any live equipment and fits or seals in enclosures shall be maintained in their original safe condition.

Signage, Markings and Warnings

Warning techniques will be used to protect employees from injury by electrical equipment. These include:

- Safety signs or tags will be used when necessary to warn employees about electrical hazards.
- Electrical equipment such as switchboards, panel boards, industrial control panels, meter socket enclosures and motor control centres that are installed in other than dwelling units and are likely to require examination, adjustment, servicing or maintenance while energized shall be field marked to warn persons of potential electric shock and arc flash hazards. The markings shall be located so that it is clearly visible to persons before examination, adjustment, servicing, or maintenance of the equipment.
- Barricades, along with safety signs or tags, will be used where necessary to prevent or limit employee access to work areas exposing employees to exposed energized equipment. The barricades should not be conductive if the potential for electrical contact exists.
- Where signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant must be stationed to warn and protect employees.
- Electrical control panels have their covers permanently marked: DANGER" "HIGH VOLTAGE" and must have an approved rubber mat in front of the panel.
- Notices reading "DANGER" "HIGH VOLTAGE" shall be placed in prominent positions in proximity to energized electrical equipment, operating at over 750 volts, which may be accessible to workers.
- Access to electrical control rooms and enclosures is restricted. The entrance to a room or similar enclosure containing exposed live electrical parts shall have a conspicuous sign, warning of the danger, and forbidding entry by unauthorized persons.
- All electrical panel switches must be legibly marked to indicate what they control. The markings must be durable to withstand the service environment.
- For electrical powered equipment in the shop: air compressors, fans, etc., controls must also be labelled unless the location of the switch makes it obvious what the control switch operates.

Working With and/or Near Exposed Energized and De-Energized Parts

The following applies to work on exposed energized and de-energized parts and/or near enough to them to expose the employee to any electrical hazard they present.

Lockout/Tagout

Lockout Tagout is used before performing electrical work. The power supply to electrical installations, equipment, or conductors shall be disconnected, locked out of service, and tagged before any work is done, and while it is being done, on or near live exposed parts of the installations, equipment, or conductors. Lockout Tagout requirements do not apply if it is not practical to disconnect electrical installations, equipment, or conductors from the power supply before working on, or near, live exposed parts of the installations, equipment, or conductors. The worker shall use rubber gloves, mats, shields, and other protective equipment and procedures adequate to ensure protection from electrical shock and burns while performing the work on live exposed parts.

See Dee Cramer, Inc. Lockout/Tagout Program.

Dee Cramer, Inc. facilities will have the necessary equipment to Lockout and Tagout breakers.

If more than one worker is involved in Lockout/Tagout the worker who disconnected and locked out the power supply will communicate the purpose and status of the disconnecting and locking out.

If a tag is used as a means of communication, the tag:

- Shall be made of non-conducting material;
- Shall be secured to prevent its inadvertent removal;
- Shall be placed in a conspicuous location;
- Shall state the reason the switch is disconnected and locked out;
- Shall show the name of the worker who disconnected and locked out the switch; and
- Shall show the date on which the switch was disconnected and locked out.

Guarding

- Work shall not be done in or around an area or structure in proximity to energized electrical conductors or equipment which are normally isolated by position or elevation, unless the electrical connections, conductors or equipment are provided with cabinets or guards which will effectively prevent contact by a worker, or by equipment being used or handled.
- Bare live parts shall be guarded against accidental contact by means of approved cabinets or other forms of approved enclosures except where local codes exempts and cabinets or guards shall meet the specifications of an authority acceptable to regulatory authorities.
- All switches, receptacles, luminaries and junction boxes shall be fitted with a cover that is approved for the intended use and location of the cover.

Egress

- Dee Cramer, Inc. shall ensure that passageways and working space around electrical equipment shall not be used for storage and shall be kept clear of obstruction and be arranged to give authorized persons ready access to all parts requiring attention.

- A minimum working space of 1 meter with secure footing shall be provided and maintained about electrical equipment such as switchboards, panel boards, control panels, and motor control centres that are enclosed in metal, except that working space is not required behind such equipment where there are no renewable parts such as fuses or switches on the back and where all connections are accessible form locations other than the back.
- Each room containing electrical equipment and each working space around equipment shall have suitable means of egress (walk areas, corridors, doors, etc.), which shall be kept clear of all obstructions.
- Access to electrical equipment must be kept free of obstruction and allow easy access to all parts which may require maintenance.
- Special care will be taken to ensure hazardous or flammable material must not be stored or placed close to or in dangerous proximity to any electrical equipment.
- For outdoor installations, arc producing electrical equipment shall not be installed within 1 meter from the discharge of a combustible gas relief device or vent.

Hazardous Locations

Hazardous locations will be classified as listed below:

- Class I: Locations in which flammable gases or vapours are or may be present in the air in quantities sufficient to produce explosive gas atmospheres.
- Class II: Locations in which there is a presence of combustible dusts or electrically conductive dusts.
- Class III: Locations in which there is a presence of easily ignitable fibres but in which such fibres are not likely to be in quantities sufficient to produce ignitable mixtures.

Where ever reasonably practicable no electrical equipment or devices shall be used or installed within hazardous locations unless the equipment is essential to the process being carried on therein.

Dee Cramer will ensure the use or installation of electrical devices be essential within a hazardous location, only electrical equipment rated and approved for use by local regulatory code with the specific gas, vapour, mist or dust hazard which may be present within the hazardous location shall be used.

Service equipment, panel boards, switchboards, and similar electrical equipment shall, where practicable, be located in rooms or sections of the building in which hazardous conditions do not exist.

Electrical equipment shall be adequately ventilated to prevent the development around electrical equipment of ambient air temperatures in excess of those normally permissible for such equipment.

Adequate illumination shall be provided to allow for safe operation and maintenance of electrical equipment. Employees may not enter spaces containing exposed energized parts unless illumination is provided that enables the employees to work safely.

Use of Portable Electric Equipment

- Portable equipment must not be handled in any way that would cause damage. Electrical cords cannot be used for raising or lowering equipment or be fastened by staples or otherwise hung in a manner which could cause damage to the outer insulation.

- Portable electrical equipment used outdoors or in damp locations is equipped with ground fault circuit interrupters (GFCI). When used outdoors or in wet locations, portable electrical tools shall be protected by a ground fault circuit interrupter installed at the receptacle or on the circuit at the panel.
- Extension cords and cords on equipment must be visually inspected before use or at the beginning of each shift to determine if the damage (loose parts, deformed or missing pins, damage to the outer cover or insulation, or pinched/crushed outer jacket) exists. A visual inspection is not required if equipment/cords remain connected and are not exposed to damage. All defective or damaged cords and equipment must be removed from service immediately until repaired and tested if they might expose an employee to injury.
- Cord-connected electrical equipment and tools must be adequately grounded. Cord-connected electrical equipment and tools shall have a casing that is adequately grounded. This does not apply to cord-connected electrical equipment or tools that are adequately double-insulated and whose insulated casing shows no evidence of cracks or defects, and/or a portable electrical generator in which the equipment is not exposed to an external electric power source if the casings of portable electrical tools connected to the generator are bonded to a non-current-carrying part of the generator).
- Only equipment and codes approved for use in wet locations may be used on job locations covered with water or conductive liquids or where employees are likely to contact conductive liquids.
- Employee's hands must be dry when plugging or unplugging energized equipment. Also, if energized plugs or receptacles are wet or could otherwise provide a conducting path, only insulating protective equipment may be used for handling the connection devices.
- When a portable luminaire is used, COMPANY shall ensure that the electrical extension cord and fittings are approved for the intended use and location of the extension cord and fittings and are properly maintained and the electrical extension cord is not used to supply power to any equipment other than the portable luminaire unless the cord meets the proper requirements.

Working Under Overhead Lines & Clearance Distances

The lines shall be deenergized and grounded or other protective measures shall be provided before work is started.

When Dee Cramer, Inc. personnel are working in an elevated position near overhead lines or have equipment elevated, the person and the longest conductive object he/she may contact cannot come closer to any unguarded, energized overhead line than specified below:

- For voltages to ground 50kV or below – minimum 10 ft. Clearance
- For voltages to ground over 50kV – minimum 10 ft. clearance plus 4 inches for every 10kV over 50kV.

NOTE: For voltages encountered with overhead power lines, objects which do not have an insulating rating for the voltage involved are considered conductive.

Any vehicle or mechanical equipment capable of having structure parts elevated near energized overhead line of 50kV or less must be operated so that a clearance of 10 ft. is maintained. If the voltage is greater than 50kV, the clearance must be increased 4 inches for every 10kV. The following conditions may warrant these clearance requirements:

- If the vehicle is in transit with its structure lowered, the clearance from 50kV or less overhead lines may be reduced to 4 feet. If the voltage is greater than 50kV, the clearance must be increased 4 inches for every 10kV.

If adequately rated insulating barriers are installed to prevent contact with the lines and are not part of or an attachment to the vehicles or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

Emergency Procedures

The following emergency procedures shall be required as training to be completed and are to be followed if a person comes in contact with exposed energized electrical equipment and that contact may affect his or her safety or health:

When Closing Contacts at Electrical Control Panels

- If personnel must touch anything on an electrical control panel, first check it with a voltage tester (contact or non-contact). If not available, tap it with the back of your hand. (Prevents hand from grabbing)
- Before operating switches or breakers ensure all protective panels are closed and properly fastened.
- To disconnect the electrical power from the equipment, always shut the control switch off first, before shutting the main switch off.
- To connect the electrical power, always ensure all control switches are off before engaging the master switch.
- When operating the control or master switch, never stand in front of the electrical panel. Always stand off to the side of the panel to operate the switch. Never look at the control panel. Should the panel explode, your eyes or body must not be in a direct line with the explosion.

Contact with Normal Electrical Current

- Don't touch the victim unless the power is off.
- Unplug the equipment or turn the power off at the main control area.
- If you can't turn off the power, use a dry wooden board or broom handle to separate the victim from the power source.
- Call for emergency medical assistance.
- If the victim is not breathing, perform mouth-to-mouth resuscitation, if trained.
- If the victim is conscious, keep them calm. Lay them on their back. Elevate their feet. Cover them with a blanket.

Contact with High Voltage Line

- Don't try to separate the victim from the power source.
- Don't touch the victim unless you are absolutely certain the victim is not in contact with electrical wire.
- Call for emergency help and medical assistance.

Electrical Fire

- Unplug the burning or smoking appliance.
- Get everyone out at once.
- If the fire is small, use a CO2 or dry powder fire extinguisher. Never put water on an electrical fire.

- Call for emergency assistance or the fire department. Tell the dispatcher your name, address, and that you have an electrical fire.

Training Requirements for Unqualified Persons

All Dee Cramer, Inc. personnel shall be trained annually in the requirements of this program and general electrical safety safe work procedures. Specific elements include:

- Employees who face a risk of electric shock but who are not qualified persons shall be trained and familiar with electrically related safety practices.
- Employees shall be trained in safety related work practices that pertain to their respective job assignments.
- Training shall include clearance distances based on voltage (See Overhead Power Lines).
- Training shall also include emergency response for electrical contact.

All training must be documented and kept on file.