

# MAPP

## CONSTRUCTION

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<b>ELETRICAL SAFETY</b>	
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06/10/13	1	Reformat	A. Holland
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**1. POLICY**

- 1.1. Work activities involving electrical hazards shall be conducted safely. This policy covers minimum performance standards applicable to all MAPP employees and locations. Local practices requiring more detailed or stringent rules or local, state or other federal requirements regarding this subject can and should be added as an addendum to this procedure as applicable.
- 1.2. A job briefing should be held before starting each job and include all employees involved. The briefing should cover hazards associated with the job, work procedures involved, special precautions, energy source controls, and PPE requirements.
- 1.3. Hazard Analysis should contain event severity, frequency, probability and avoidance to determine the level of safe practices employed.

**2. SCOPE**

- 2.1. Applies to all MAPP project sites, offices, personnel, and personnel working on MAPP projects.

**3. DEFINITIONS**

<b>Approved</b>	Acceptable to the authorities
<b>Authorized Person</b>	A person approved or assigned by MAPP Construction to perform a specific duty or duties or to be at a specific location or locations at the jobsite.
<b>Cabinet</b>	An enclosure designed either for surface or flush mounting
<b>Competent Person</b>	One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.
<b>Conductor (bare)</b>	A conductor encased within material of composition and thickness that is recognized as electrical insulation.
<b>Defect</b>	Any characteristic or condition that tends to weaken or reduce the strength of the tool, object, or structure of which it is a part.
<b>Disconnect</b>	A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.
<b>Enclosed</b>	Surrounded by a case, housing, fence or walls which shall prevent persons from accidentally contacting energized parts.

<b>Enclosure</b>	the case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts, or to protect the equipment from physical damage.
<b>Exposed(as applied to live parts)</b>	Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts not suitably guarded, isolated, or insulated
<b>Guarded</b>	Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach to a point of danger or contact by persons or objects.
<b>Isolated</b>	Not readily accessible to persons unless special means for access are used.
<b>Labeled</b>	Equipment or materials to which has been attached a label, symbol or other identifying mark of a qualified testing laboratory which indicates compliance with appropriate standards or performance in a specified manner.
<b>NEC</b>	Stands for National Electric Code.
<b>Qualified</b>	Persons who are capable of working safely on equipment and are familiar with electrical properties, the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools.
<b>Receptacle</b>	A contact device installed at the outlet for the connection of a single attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is a single device containing two or more receptacles.

## 4. REQUIREMENTS

### 4.1. General

- 4.1.1. Feasible engineering and administrative controls shall be applied to mitigate or minimize the risk of injury and illness from exposure to electrical hazards. Where such hazards still exist after application of these controls, local controls shall apply and personal protective equipment shall be utilized. Such addenda shall comply with NFPA 70E. (SEE: SEC 19 for further detail on PPE inspection requirements.)
- 4.1.2. When test instruments are used for the testing for the absence of voltage on conductors or circuit parts operating at 50 volts or more, the operation of the test instrument shall be verified before and after an absence of voltage test is performed.
- 4.1.3. Test instruments, equipment, and their accessories shall meet the requirements of ANSI/ISA-61010-1-Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use -Part 1 General Requirements, for rating and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000 Volts and below.
- 4.1.4. No MAPP employee shall perform work on live electrical circuits. Subcontractors that engage in live work are required to provide applicable safe work procedures, PPE, and equipment to be reviewed and approved by the MAPP Project Team, and client if applicable, prior to any such work. The subcontractors work plan must exceed at minimum MAPP's **Energized Electrical Work Plan Sample (HSE12-002), client specific requirements, OSHA 1910.269, and NFPA 70E.**
- 4.1.5. Unqualified persons shall not be permitted to enter spaces that are required to be accessible to qualified employees only, unless the electric conductors and equipment involved are in an electrically safe work condition
- 4.1.6. In existing installations, no changes in circuit protection shall be made to increase the load in excess of the load rating of the circuit wiring.
- 4.1.7. Worn or frayed electric cords or cables shall be removed from work areas for repair or disposal. Plugs equipped with a grounding prong must have the prong in place. Damaged plugs must be repaired. Repairing cords shall be limited to shortening only by an authorized person, in compliance with OSHA regulations.
- 4.1.8. Working spaces, walkways, and similar locations must be kept clear of cords to eliminate hazards.
- 4.1.9. Extension cords shall not be fastened with staples or hung with nails.
- 4.1.10. Control equipment, utilization equipment, and busways approved for use in dry

locations only shall be protected against damage from the weather during building construction.

- 4.1.11. Metal raceways, cable armor, boxes, cable sheathing, cabinets, elbows, couplings, fittings, supports, and support hardware shall be of materials appropriate for the environment in which they are to be installed.
- 4.1.12. Electrical switches shall be labeled to indicate the system, equipment, service, or tool they control. This includes switch boxes, cabinets, motor control cabinets, stationary equipment, control panels, and other such switches or disconnects.
- 4.1.13. In work areas where the exact location of underground electric power lines is unknown, employees using jackhammers, bars, or other hand tools that may contact a line shall be provided with insulated protective gloves. Gloves must be rated to (or exceed) the voltage for which they may be exposed. The gloves shall be inspected before use and replaced as per the manufacturer's specifications.
- 4.1.14. Wiring components and equipment in hazardous environments shall be maintained in a condition consistent with NEC requirements (i.e. no loose or missing screws, gaskets, threaded connections, seals, or other impairments to a tight condition).
- 4.1.15. Equipment, wiring methods, and installations of electrical equipment in hazardous (classified) locations must be designated as "intrinsically safe" or be approved for the classification location.
- 4.1.16. MAPP Project Manager shall advise the host employer of:
  - 4.1.16.1. Any unique hazards presented by the contract employer's work,
  - 4.1.16.2. Any unanticipated hazards found during the contract employer's work that the host employer did not mention, and
  - 4.1.16.3. The measures the contractor took to correct any hazards reported by the host employer to prevent such hazards from recurring in the future.

## **5. WORKING ON OR NEAR ENERGIZED ELECTRICAL PARTS AND SYSTEMS**

- 5.1. Every effort shall be made to preclude work on energized electrical parts. When this is not possible, the requirements of this section shall apply.
- 5.2. Potential contact with live energized parts includes work performed on exposed live parts (involving either direct contact or contact by means of tools or materials) or near enough to them for employees to be exposed to any hazard they present.

- 5.3. Only qualified persons shall work on electrical equipment that has not been deenergized. **NO MAPP EMPLOYEE SHALL WORK ON ENERGIZED ELECTRICAL SYSTEMS OR PARTS.**
- 5.4. All energized or potentially energized parts shall be Locked and Tagged Out prior to work being performed at all times when possible. For specific lockout tagout requirements, see **HSE28-001 Lockout Tagout Policy.**
- 5.5. Subcontractors that engage in energized electrical work are required to provide applicable safe work procedures, PPE, and equipment to be reviewed and approved by the MAPP Project Team, and client if applicable, prior to any such work. The subcontractors work plan must exceed at minimum MAPP's **Energized Electrical Work Plan Sample (HSE12-002), client specific requirements, OSHA 1910.269, and NFPA 70E.**
- 5.6. If the exposed live parts are not de-energized (i.e., for reasons of increased or additional hazards or infeasibility), other safety-related work practices shall be used to protect employees who may be exposed to the electrical hazards involved. Such work practices shall protect employees against contact with energized circuit parts directly with any part of their body or indirectly through some other conductive object.
- 5.7. The work practices that are used shall be suitable for the conditions under which the work is to be performed and for the voltage level of the exposed electric conductors or circuit parts.
- 5.8. If work is to be performed near overhead lines, the lines shall be deenergized and grounded, or other protective measures shall be provided before work is started. If the lines are to be deenergized, arrangements shall be made with the person or organization that operates or controls the electric circuits involved to deenergize and ground them. Verification and test should be performed by the responsible party with observation by the MAPP project team prior to beginning any work.
- 5.9. If protective measures, such as guarding, isolating, or insulating are provided for power lines, these precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.
- 5.10. Employees shall not enter spaces containing electrical hazards unless illumination is provided that enables the employees to perform the work safely. Where lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform any task within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists.

**6. OVERHEAD ELECTRICAL LINES**

- 6.1. While conducting site activities near overhead lines, field personnel need to be aware of the location of the lines so as not to use conductive equipment (e.g., metal equipment to include: drill rigs; hand auger extensions; geoprobe units; excavators, etc.) in close proximity to power lines.
- 6.2. OSHA 29 CFR 1926.550 requires that any vehicle or mechanical equipment (i.e., drill rigs) capable of having parts of its structure elevated near energized overhead lines shall be operated so that a clearance distance of at least 10 feet is maintained.
- 6.3. Higher voltages require greater clearance distances. Contact the electrical utility company to verify line voltage. If the voltage is higher than 50kV, the clearance shall be increased 4 in. for every 10kV over that voltage.
- 6.4. Under any of the following conditions, OSHA allows the required clearance to be reduced.
  - 6.4.1. If a vehicle is in transit with its structure lowered, the clearance shall be reduced to 4ft. If the voltage is higher than 50kV, the clearance shall be increased 4 in for every 10kV over that voltage.
- 6.5. When an unqualified person is working in an elevated position near overhead lines, or working on the ground in the vicinity of overhead lines, the location shall be such that the person and the longest conductive object he or she may contact cannot come closer to any unguarded, energized overhead line than the clearance distances indicated in Table 1-1.

<b>Table 1-1</b>	
<b>Voltage</b>	<b>Required Clearance</b>
0-50 kV	10 feet
50-200 kV	15 feet
200-350 kV	20 feet
350-500 kV	25 feet
500-750 kV	35 feet
750-1000 kV	45 feet

- 6.6. For voltages normally encountered with overhead power lines, objects which do not have an insulating rating for the voltage involved shall be considered to be conductive.
- 6.7. When a qualified person is working in the vicinity of overhead lines, the employees companies safety policy shall be enforced.

**7. ILLUMINATION**

- 7.1. Employees shall not enter spaces containing exposed energized parts, unless illumination is provided that enables the employees to perform the work safely. Where

lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform tasks near exposed energized parts. Employees shall not reach blindly into areas which may contain energized parts.

## **8. PORTABLE LADDERS**

- 8.1. Portable ladders shall have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized parts.

## **9. CONDUCTIVE APPAREL**

- 9.1. Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) shall not be worn if they might contact exposed energized parts.

## **10. HOUSEKEEPING DUTIES**

- 10.1. Where live parts present an electrical contact hazard, employees shall not perform housekeeping duties at such close distances to the parts that there is a possibility of contact, unless adequate safeguards (such as insulating equipment or barriers) are provided.
- 10.2. Electrically conductive cleaning materials (including conductive solids such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions) shall not be used in proximity to energized parts unless procedures are followed which will prevent electrical contact.

## **11. GROUNDING, GFCIS AND ASSURED GROUNDING PROCEDURES**

- 11.1. Equipment, tools and cord sets shall be provided and utilized so as to protect employees from electrical shock and to prevent fire.

## **12. EQUIPMENT AND TOOLS**

- 12.1. Note: Portable equipment which is "double insulated" and endorsed by a nationally recognized testing facility need not have a grounding conductor, but is subject to the inspection requirements of this section. Tools and equipment subject to inspection and testing include:

12.1.1. Portable Electrical Tools such as grinders, drills and stapling guns

12.1.2. Stationary tools such as table saws, drill presses, and jig saws

12.1.3. Portable electrical extension cords

12.1.4. Portable and Temporary lighting systems and cords

- 12.1.4.1. Receptacles shall be of the grounding type and their contacts shall be grounded by connection to the equipment grounding conductor of the circuit

supplying that receptacle in accordance with the NEC.

- 12.2. **Visual inspections** Visual inspection of tools and equipment are required prior to each use and shall include:

12.2.1. General condition

12.2.2. Plugs and caps, and presence of ground prong

12.2.3. Electrical cord sets

12.2.4. External defects, and missing parts

- 12.3. Defective tools shall be tagged, taken out of service and placed in a secured location until they are repaired or destroyed.

- 12.4. **Removal from service** Any equipment failing any test shall be taken out of service, shall be tagged with a "Danger, Do Not Use" tag, secured and repaired or destroyed.

### 13. GROUND FAULT CIRCUIT INTERRUPTERS (GFCI'S)

- 13.1. Ground Fault Circuit Interrupters (GFCI's) shall be used on receptacles  $\geq 15$  amps up to and including 30 amps for tool and equipment used in construction applications and potentially wet environments (either indoors or outdoors). Receptacles of temporary wiring systems and portable generators shall be protected with a GFCI.

- 13.2. The minimum requirements relative to the use of Ground Fault Circuit Interrupters are:

13.2.1. Prior to use, and periodically thereafter, verify that the GFCI is in good working order. Periodically re-test the GFCI to ensure continued effectiveness.

13.2.2. Remove from service any GFCI that has insufficient load capacity, is damaged or is ineffective for any reason. Affix a "Danger, Do Not Use" tag and store the GFCI in a secure location until it can be replaced or repaired. Destroy and discard any GFCI that cannot be repaired or reused.

13.2.3. Train employees in the provisions of this section as related to safe use of GFCIs. This training should include:

13.2.3.1. Double insulated tools

- 13.2.3.2. Defective cords and plugs
- 13.2.3.3. Heavy moisture, and wet conditions
- 13.2.3.4. Operation, selection, and use of GFCI's

#### **14. TEMPORARY WIRING**

- 14.1. This section applies to temporary electrical power and lighting wiring methods that may be of a class less than would be required for a permanent installation.
- 14.2. Temporary wiring shall be removed immediately upon completion of work and when the purpose for which the wiring was installed no longer applies.
- 14.3. **General requirements for temporary wiring**
  - 14.3.1. Feeders shall originate in a distribution center. The conductors shall be run as multiconductor cord or cable assemblies or within raceways.
  - 14.3.2. Branch circuits shall originate in a power outlet or panel board. Conductors shall be run as multi-conductor cord or cable assemblies or open conductors, or shall be run in raceways. Conductors shall be protected by over current devices at their ampacity.
  - 14.3.3. Receptacles shall be of the grounding type. Unless installed in a complete metallic raceway, each branch circuit shall contain a separate equipment-grounding conductor, and receptacles shall be connected to the grounding system. Receptacles shall not be connected to the same ungrounded conductor of multi-wire circuits that supply temporary lighting.
  - 14.3.4. Disconnecting switches or plug connectors shall be installed to permit the disconnection of ungrounded conductors of each temporary circuit.
  - 14.3.5. Lamps for general illumination shall be protected from accidental contact or breakage. Metal-case sockets shall be grounded.
  - 14.3.6. The temporary wiring cords shall not be used to suspend temporary lights unless cords and lights are designed for this means of suspension. Temporary lighting shall be properly supported.
  - 14.3.7. Portable electric lighting used in wet and/or other conductive locations, as for example, drums, tanks, and vessels, shall be operated at 12 volts or less. However, 120-volt lights may be used if protected by a ground-fault circuit interrupter.

- 14.3.8. A mounted box (with a cover) shall be used wherever a change is made to a raceway system or a cable system that is metal clad or metal sheathed. Non-metallic wiring system joints below seven foot (7') shall have mounted boxes and be covered. Exposed temporary joints shall have the wire nuts or other mechanical devices taped with black (electrical) tape to prevent them from falling off. Temporary joints including the ground wire shall have a mechanical connection.
- 14.3.9. Flexible cords and cables shall be protected from damage. Sharp corners and projections shall be avoided. Flexible cords and cables may pass through doorways or other pinch points, if protection is provided to avoid damage. Cords and temporary wiring passing through walls shall be properly protected (e.g. sleeved).
- 14.3.10. Extension cord sets used with portable electric tools and appliances shall be of three-wire type and shall be designed for hard or extra-hard usage. Flexible cords used with temporary and portable lights shall be designed for hard or extra-hard usage. See the NEC, ANSI/NFPA 70, in Article 400, Table 400-4 that lists various types of flexible cords, some of which are noted as being designed for hard or extra-hard usage. Note: SEU, SER or other similar cables cannot be laid on the floor despite their rating.
- 14.3.11. For temporary wiring over 600 volts, nominal, fencing, barriers, or other effective means shall be provided to prevent access of other than authorized and qualified personnel.

## **15. CLEARANCES IN THE WORK PLACE**

- 15.1. Employees shall not be permitted to work in such proximity to any part of an electric power circuit that the employee could contact the electric power circuit in the course of work, unless the employee is protected against electric shock by deenergizing the circuit and grounding it (if appropriate) or by guarding it effectively by insulation or other means.
- 15.2. Responsible Subcontractor shall ascertain by inquiry, direct observation, or by instruments, whether any part of an energized electric power circuit, exposed or concealed, is so located that the performance of the work may bring any person, tool, or machine into physical or electrical contact with the electric power circuit. The Responsible Subcontractor shall post and maintain proper warning signs where such a circuit exists. The Responsible Subcontractor shall advise employees of the location of such lines, the hazards involved, and the protective measures to be taken.
- 15.3. Barriers or other means of guarding shall be provided to ensure that workspace

for electrical equipment will not be used as a passageway during periods when energized parts of electrical equipment are exposed.

- 15.4. Only qualified persons complete tasks such as testing, troubleshooting and voltage measuring within the limited approach boundary.

## **16. FUSES**

- 16.1. Installing or removing fuses shall be considered as work with live electrical energy and shall be covered in the hot work policy for the subcontractor.
- 16.2. Persons who perform work on high voltage fuses (over 600 volts) shall wear appropriate head, face, body flash suits, protective footwear and insulated gloves.
- 16.3. Insulating electrical gloves, sleeves, aprons, and other protective electrical clothing shall be tested for leaks and integrity prior to initial use and periodically. These tests shall meet the requirements of OSHA Standard 29 CFR 1910.137.
- 16.4. Protector gloves shall be worn over insulating gloves, except as defined in the above referenced standard.
- 16.5. Only manufacturer-qualified personnel shall inspect and make repairs to electrical insulating protective clothing.

## **17. PPE**

- 17.1. All insulating PPE must be inspected before each day's use and immediately following any incident that can reasonably be suspected of having caused damage. Insulating gloves shall be given an air test, along with the inspection.
- 17.2. Such tests include:
  - 17.2.1. Blankets-before first issue/every 12 months thereafter,
  - 17.2.2. Gloves-before first issue and every 6 months,
  - 17.2.3. Sleeves before first issue and every 12 months.
  - 17.2.4. Covers and Line hose shall be testing if insulating value is suspect

## **18. TRAINING**

- 18.1. All potentially exposed employees will be provided awareness training upon hire and annually thereafter of this program in order to be familiar with the potential hazards and proper safe work procedures to follow if exposed to electrical

hazards. NO MAPP employee shall work on energized electrical systems under any circumstances, as these tasks should only be performed by a qualified person.

18.2. Employees will be instructed on:

18.2.1.1. Distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment,

18.2.1.2. Determine the nominal voltage of exposed energized electrical conductors and circuit parts, the approach distances specified in Table 130.2 (Available upon request).

18.2.1.3. Decision making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.

18.3. Documentation shall be made when the employee demonstrates proficiency, be maintained for the duration of the employee's employment, and contain each employee's name and date of training. Forward all MAPP employee training records to Baton Rouge, LA corporate office for filing.

18.4. Re-training

18.4.1. When the employee is not complying with safety-related work practices or when workplace changes necessitate the use of safety-related work practices that are different from those that the employee would normally use?

18.4.2. Intervals not to exceed 3 years