

Employee Safety Handbook

ISSUED JANUARY 2007

Name _____

Department _____

Supervisor _____

Location _____

Personal Contact # _____

In Case of Emergency Contact _____

nationalgrid

IMPORTANT PHONE NUMBERS AND PERSONNEL INFORMATION

<i>Name</i>	<i>Department</i>	<i>Phone</i>

<i>Notes</i>

Employee
Safety Handbook

A Safe Way of Working

OUR COMMITMENT TO SAFETY AND OCCUPATIONAL HEALTH

OUR VISION

To safeguard each other and those who work with us by operating an injury free and healthy workplace and to protect the safety of the public.

OUR BELIEF

- Safety is paramount.
- All unsafe acts, work related injuries and illnesses are preventable.
- We should safeguard the public in everything we do.

OUR APPROACH

- Know that we did everything possible to prevent unacceptable risks to our colleagues and the public.
- Take personal responsibility for our health and safety and that of others and ensure line managers are accountable for the health and safety of their team.
- Create a culture where we always constructively challenge unsafe behaviors wherever observed.
- Learn lessons quickly and find solutions that prevent colleagues or the public being injured in the future.
- Stop work and ask for assistance if we think our safety or that of our colleagues or the public is at risk.
- Encourage and support employees to improve safety outside the workplace.
- Require our contractors to operate to the same high standards as we do and encourage them to share our vision and belief.
- Build on the commitment of everyone to make continuous improvements necessary to achieve our vision.

Our Safety and Occupational Health policy sets out the steps we are taking to achieve our vision including our approach to training and reporting.

INTRODUCTION/PREFACE

This Employee Safety Handbook contains the safety rules of the Company for the benefit and protection of employees, customers, and the public alike. This revision supersedes all previous rules or safety manuals. The Company's commitment to requiring safe work practices for contractors is outlined in the National Grid Safety and Health Procedure entitled "Contractor Safety Requirements", which will provide an equivalent or greater margin of safety to these rules.

This handbook provides the minimum acceptable safety and health standards which meet or exceed the current regulatory requirements as prescribed by standard setting organizations, such as the Occupational Safety and Health Administration.

Each business group within the Company issues specific, detailed procedures for implementing safety compliance. The business groups shall ensure that their written procedures meet or exceed the requirements of this handbook.

All Company personnel affected by these rules will be furnished a copy of this handbook and afforded the opportunity to familiarize themselves with it and/or afforded the opportunity to access the contents electronically. It is the responsibility of each employee to adhere strictly to these rules and to consider them a necessary tool for safe job performance. The Company recognizes the right of employees to refuse to perform any work that may compromise their safety and the safety of others.

It is our sincere belief that strict adherence to and willing cooperation with the spirit of these rules will reduce the number of accidental injuries and the possibility of loss of life.

Table of Contents

GLOSSARY	11
----------------	----

SECTION 1: GENERAL RULES FOR ALL EMPLOYEES	21
--	----

1.0	Purpose
1.1	Introduction and Responsibilities
1.2	Public Safety
1.3	Incidents Resulting in Employee Injury
1.4	Motor Vehicle Incidents
1.5	Property Damage Incidents
1.6	Near Miss Incidents
1.7	Hazardous Conditions
1.8	Asbestos
1.9	Batteries – Station and Storage
1.10	Bloodborne Pathogens
1.11	Compressed Air/Compressed Gas
1.12	Concrete and Masonry Construction
1.13	Confined Space Entry
1.14	Drinking Water
1.15	Electrical Safety-Related Work Practices
1.16	Excavations
1.17	Exits
1.18	Eyewash/Drench Showers
1.19	Fall Protection
1.20	Fall Protection Railings
1.21	Fire Protection
1.22	First Aid/CPR
1.23	Hazard Communication
1.24	Housekeeping
1.25	Job Briefs
1.26	Ladders
1.27	Lasers
1.28	Lockout/Tagout
1.29	Material Handling
1.30	Office – General
1.31	Personal Protective Equipment
1.32	Scaffolds
1.33	Spray Painting Operations
1.34	Tools
1.35	Water Safety
1.36	Welding, Cutting, and Heating

- 1.37 Welding in Confined Spaces
- 1.38 Work Zone Traffic Protection

SECTION 2: GENERAL RULES FOR ALL ELECTRICAL EMPLOYEES69

- 2.1 Aerial Buckets
- 2.2 Backfeed
- 2.3 Capacitors
- 2.4 Current Transformers
- 2.5 Enclosed Spaces
- 2.6 Fall Protection
- 2.7 Grounding of Cranes and Mobile Equipment in the Vicinity of Energized Conductors
- 2.8 Live Line Tools
- 2.9 Material Handling and Storage
- 2.10 Personal Protective Grounds
- 2.11 Rubber Gloves, Sleeves, and Blankets
- 2.12 Series Street Lighting
- 2.13 Structures
- 2.14 Testing and Test Facilities
- 2.15 Tools and Equipment
- 2.16 Training
- 2.17 Work Area Identification
- 2.18 Working On or Near Energized/Electrical Equipment

Tables

- 2A Minimum Working Approach Distances For Vehicular and Mechanical Equipment
- 2B DC Minimum Clearance From Live Parts
- 2C Minimum Approach Distances
- 2D Live Line Work Minimum Approach Distance With Overvoltage Factor Phase-to-Ground Exposure

SECTION 3: OVERHEAD LINES101

- 3.1 Aerial Spacer Cable
- 3.2 Applying and Removing Proper Coverup
- 3.3 Climbing Equipment and Climbing
- 3.4 Fall Protection
- 3.5 Live Line Tools for Hot Stick Work
- 3.6 Line Installation and Removal

SECTION 4: UNDERGROUND LINES109

- 4.1 Construction and Maintenance of Underground Structures and Conduit Lines
- 4.2 De-energized Cable or Equipment
- 4.3 Energized Cable or Equipment
- 4.4 Pulling Cable
- 4.5 Raising or Lowering Materials Into Manholes or Vaults
- 4.6 Risk Assessments
- 4.7 Underground Electrical Installations

SECTION 5: SUBSTATIONS115

- 5.1 Access To/Entering
- 5.2 Digging
- 5.3 Elevated Areas
- 5.4 Fences
- 5.5 General Work
- 5.6 Grounding of Vehicles
- 5.7 Guarding of Energized Parts to Protect Employees
- 5.8 Indoor Substations
- 5.9 Power Transformers and Circuit Breakers
- 5.10 Testing in Substations

SECTION 6: METERING SERVICES AND COMMUNICATION125

- 6.1 General
- 6.2 Customer Premises (Work On)
- 6.3 Microwave Facilities
- 6.4 Fiber Optics
- 6.5 Antenna and Radio Work

SECTION 7: GENERAL RULES FOR GAS EMPLOYEES129

- 7.1 General
- 7.2 Bonding
- 7.3 Digging/Probing in the Vicinity of Underground Electric Facilities
- 7.4 Electric Clearances
- 7.5 Gas Leak Investigation
- 7.6 Live Gas Operations
- 7.7 Making Connections to Gas Lines
- 7.8 Purging Gas Mains and Services
- 7.9 Static Electricity Precautions

SECTION 8: LINE CLEARANCE TREE TRIMMING137

- 8.1 General Precautions
- 8.2 Chain Saws/Chippers
- 8.3 Climbing
- 8.4 Climbing Lines
- 8.5 Felling Trees
- 8.6 Personal Protective Equipment
- 8.7 Spraying
- 8.8 Working in Proximity to Energized Conductors

SECTION 9: MOTOR VEHICLES AND MECHANICAL/HYDRAULIC EQUIPMENT143

- 9.1 General
- 9.2 Inspections
- 9.3 Refueling
- 9.4 Aerial Devices
- 9.5 Digger/Derricks and Cranes
- 9.6 Trailers and Load Securement
- 9.7 Bulldozers, Tractors, and Backhoes
- 9.8 Forklifts
- 9.9 Trencher Operation
- 9.10 Winch Operation
- 9.11 Non-Insulated Manlifts
- 9.12 Crane Operation
- 9.13 Vehicle Jump Starting

Tables

- 9A Wheel Chock Utilization

SECTION 10: CHARTS AND VISUAL AIDS153

- 10.1 Basic Knots and Hitches
- 10.2 Basic Rigging Practices
- 10.3 Eye Protection – Welders
- 10.4 Hand Signals for Crane Operations
- 10.5 Hand Signals for Overhead and Gantry Cranes

- 10.6 Shackles – Working Loads
- 10.7 Sling Angles and Loading
- 10.8 Slings – Nylon and Polyester
- 10.9 Slings – Working Loads
- 10.10 Ropes – Properties
- 10.11 Ropes – Working Strength
- 10.12 Wire Rope Connections
- 10.13 Wire Rope/U-Bolt Clips
- 10.14 Excavations

APPENDIX A: NY Minimum Approach Distance Table175

APPENDIX B: Policy and Procedure Cross-Reference177

APPENDIX C: Hazard Assessment Worksheet189

APPENDIX D: Safety Observers191

APPENDIX E: Clearance and Control Procedure, NG-USA EOP G014

Glossary

Aerial basket equipment Any type of equipment that uses hydraulically operated booms to lift or raise aerial baskets or buckets in which employees work.

Affected employee An employee whose job includes activities such as erecting, installing, constructing, repairing, adjusting, inspecting, operating, or maintaining the equipment or process.

Arc flash analysis A calculation of the incident energy, measured in calories/centimeters², to which an employee could be exposed in the event of a fault, explosion, arc, or flash involving electrical equipment.

Attendant A qualified employee assigned to remain immediately outside the entrance to an enclosed or other space to render assistance as needed to employees inside the space.

Authorized Person A person designated by a Departmental Manager, or their designee, who has successfully been tested and has demonstrated proficiency and understanding of EOP G014, the Clearance and Control rules. Exception: A person who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of an Authorized Person is considered to be an authorized person in the performance of those duties.

Authorized Person List A formal document developed and maintained semiannually by National Grid management listing all individuals designated as an Authorized Person.

Automatic circuit recloser A self-controlled device for interrupting and reclosing an alternating current circuit with a predetermined sequence of opening and reclosing followed by resetting, hold-closed, or lockout operation.

Barricade A physical obstruction (such as tapes, cones, or A-frame type wood or metal structures) intended to warn of a hazard and to limit access to the area.

Barrier A physical obstruction that is intended to prevent:

- contact with energized lines or equipment, or
- unauthorized access to a work area.

Bond The electrical interconnection of conductive parts designed to maintain a common electrical potential.

Bus A conductor, or a group of conductors, that serves as a common connection for two or more circuits.

Bushing An insulating structure that can be mounted on a barrier (conducting or otherwise) for the purposes of insulating the conductor from the barrier and conducting current from one side of the barrier to the other.

Cable A conductor with insulation; or a stranded conductor with or without insulation and other coverings (single-conductor cable); or a combination of conductors insulated from one another (multiple-conductor cable).

Cable sheath A conductive protective covering applied to cables. A cable sheath may consist of multiple layers of which one or more is conductive.

Circuit A conductor or system of conductors through which an electric current is intended to flow.

Clearance (for work) Permission to an Authorized Person to perform specified work within a zone of protection.

Clearance (from hazard) Separation from energized lines or equipment.

Clearance Person The person holding the Clearance.

Code Blue An emergency rescue system that uses company radios to alert National Grid employees that a worker is stricken and automatic vehicle locators to show the exact geographic spot where ambulances and/or other assistance will be sent.

Conductor A material (usually in the form of a wire, cable, or bus bar) suitable for carrying an electric current.

Confined space A space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit.
- Is not designed for continuous occupancy.

Controllership Permission given and documented by the System Operator to only an Authorized Person or to the De-centralized Location(s) to assume all the duties and responsibilities of the System Operator.

Covered conductor A conductor covered with a dielectric that has: no rated insulating strength, or a rated insulating strength less than the voltage of the circuit in which the conductor is used.

Crew Chief New York term for the head union employee in an overhead lines work crew.

Crew Leader New England term for the head union employee in an overhead lines work crew.

Current-carrying part A conducting part intended to be connected in an electric circuit to a source of voltage. Non-current-carrying parts are those not intended to be connected in an electric circuit to a source of voltage.

Dead Isolated, tagged, tested de-energized and grounded.

De-energized The absence of normal operating voltages associated with the operation of the system or control circuits.

Designated employee (or designated person) An employee (or person) who is designated by the Company to perform specific duties under the terms of this section and who is knowledgeable in the construction and operation of the equipment and the hazards involved.

Electric supply lines See **Lines, Electric Supply**.

Enclosed space A working space, such as a manhole, vault, tunnel, or shaft, that:

- has a limited means of egress or entry.
- is designed for periodic employee entry under normal operating conditions.
- under normal conditions does not contain a hazardous atmosphere, but may contain a hazardous atmosphere under abnormal conditions.

Spaces that are enclosed but not designed for employee entry under normal operating conditions are not considered to be enclosed spaces for the purposes of this section. Similarly, spaces that are enclosed and that are expected to contain a hazardous atmosphere are not considered to be enclosed spaces for the purposes of this section.

Energized (alive, live) Electrically connected to a source of potential difference, or electrically charged so as to have a potential significantly different from that of earth in the vicinity.

Energy Electrical voltage, mechanical motion, flow of liquids or gases, etc.

Energy isolating device A physical device that prevents the transmission or release of energy, including, but not limited to, the following: a manually operated electrical circuit breaker, a disconnect switch, a manually operated switch, a slide gate, a slip blind, a line valve, blocks, and any similar device with a visible indication of the position of the device. Push buttons, selector switches, and other control-circuit-type devices are not energy isolating devices.

Energy source Any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, or other energy source that could cause injury to personnel.

Enhanced fall protection system A work-positioning system used on wood pole structures which arrests a fall when adjusted and used properly.

Equipment (electrical) A general term for material, fittings, devices, appliances, fixtures, apparatus, and other items used as part of, or in connection with, an electrical installation.

Exposed Not isolated or guarded.

Flash ensemble A flash hood and flash jacket worn over flame retardant clothing.

Grounded Intentionally connected to earth through a ground connection.

Grounds

- Mechanical – Switching devices permanently installed in substations that are not to be used for personal protection except in Gas Insulated Substations (GIS), HVDC terminals, or network applications.
- Personal/Bracket/Equipotential Grounds – Portable conductors whose installation is directed by the Clearance Person and applied for the protection of workers.

Guarantee A Guarantee is a formal statement given to an inter-connected utility that specified apparatus has been de-energized and that certain device(s) are tagged in the Protective Position and will remain so until the Guarantee is released by the recipient.

Guarded Covered, fenced, enclosed, or otherwise protected, by means of suitable covers or casings, barrier rails or screens, mats, or platforms, designed to minimize

the possibility, under normal conditions, of dangerous approach or accidental contact by persons or objects. Wires that are insulated, but not otherwise protected, are not considered as guarded.

Hazardous atmosphere An atmosphere presenting a potential for death, disablement, injury, or acute illness from one or more of the following causes:

1. A concentration of flammable gas, vapor, or mist in excess of 10 percent of its lower explosive limit (LEL).
2. A concentration of airborne combustible dust that obscures vision at a distance of 5 feet or less.
3. An oxygen concentration less than 19.5 percent or greater than 23.5 percent.
4. A concentration of any substance listed in Subpart Z Air Contaminants 29CFR1900.1000 that exceeds the listed permissible exposure limit (PEL).
5. A concentration of a substance above the numerical limit in the Material Safety Data Sheet provided by the manufacturer.
6. Any other condition immediately dangerous to life or health.

Higher Authority An Authorized Person at the same or higher level of Management above the Clearance Person who is holding the Clearance and is knowledgeable in the work to be performed.

High-power tests Tests in which fault currents, load currents, magnetizing currents, and line-dropping currents are used to test equipment, either at the equipment's rated voltage or at lower voltages.

High-voltage tests Tests in which voltages of approximately 1000 volts are used as a practical minimum, and tests in which the voltage source has sufficient energy to cause injury.

Hot Stick An insulated stick stored in a controlled environment (i.e., a trailer or equivalent) used to perform work on energized voltages at 15 kV.

Hot Work Any activity which can create sparks sufficient enough to ignite surrounding materials.

Immediately dangerous to life or health (IDLH) Any condition that: poses an immediate threat to life; or is likely to result in acute or immediate severe health effects.

Incident Analysis A formal procedure for describing a safety event, near miss, or hazardous condition; identifying contributing factors and root causes; drawing conclusions about lessons to be learned; and formulating an improvement plan to prevent a recurrence or correct the hazard.

Insulated Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current.

Insulation (cable) That which is relied upon to insulate the conductor from other conductors or conducting parts or from ground.

Isolated Disconnected from all sources of electrical supply by open switches, disconnectors, jumpers, taps, or other means and absent from nominal voltages.

Limits Open devices that define a zone of protection, also known as protective points.

Lines, Electric supply The conductors and their supporting or containing structures that are used for public or private signal or communication service: telephone, telegraph, railroad signal, data, clock, fire, police alarm, cable television, and other systems conforming with this definition. Conductors used to transmit electric energy and their necessary supporting or containing structures.

Line truck A truck used to transport personnel, tools, and material for electric supply line work.

Live gas Live gas is defined as “escaping gas which cannot be controlled by valves, stoppers, etc., and is of sufficient volume to cause damage by fire, explosion or asphyxiation”.

Live Line Tool An insulated stick for use on energized equipment, usually carried on vehicles, or stored in buildings or control houses for everyday use. Tools such as shotgun sticks, switch sticks, telescopic sticks, etc., are live line tools. Live line tools must be used with rubber gloves. (See hot stick tools)

M.A.D. Acronym for minimum approach distance.

Manhole A subsurface enclosure:

- that personnel may enter, and
- that is used for the purpose of installing, operating, and maintaining submersible equipment or cable.

Manhole steps A series of steps individually attached to or set into the walls of a manhole structure.

Minimum Approach Distance The closest point of approach to energized lines or equipment by a qualified employee, or by any other conductive object, without the use of insulating gloves, sleeves or portable protection devices, shall be in accordance with the Minimum Approach Distance table.

Near In the statement “working on or near,” the word “near” refers to the potential to encroach minimum approach distance.

Non-Reclose Assurance A formal statement from the System Operator to an Authorized Person to perform work on, or near, designated energized lines or apparatus after all its reclosing devices, including SCADA/EMS, are disabled and tagged.

Person in Charge of the Work A qualified person responsible for the work to be performed.

Personal Red Tagging (PRT) Permission given by the System Operator to an Authorized Person to assume the duties and responsibilities with respect to the switching, tagging, testing, grounding, and restoring specific sections of the electrical system as defined by the System Operator.

Protective Position The tagged position of a mechanical or electrical device with a visible air gap that prohibits the energizing or the re-energization of a specific work area. Exceptions to a visible air gap: Oil Fused Cutout, Vacuum switches, network protectors, network Transformer Oil Disconnects (TOD), and other devices approved for this application.

Qualified Gas Employee An employee knowledgeable in Gas Operations and qualified in accordance with the Operator Qualification Program at the applicable level of progression.

Qualified Employee A person knowledgeable in the construction and operation of electric power generation, transmission, substation, and/or distribution apparatus involved along with the associated hazards in specific duties pertaining to electric operations.

Reaching Distance The distance that an employee's hand or any other body part and the end of any uninsulated tool being handled can reach while working, using a normal range of movement required by the work (for example, not stretching, leaning, or reaching in excess of what is required by work).

Re-Issue The issuance of a surrendered Clearance from the System Operator to a Clearance Person.

Release of Clearance The act in which a Clearance Person(s) reports to the System Operator that their grounds have been removed (if applicable), all workers and equipment are in the clear, and the status or condition of the line or apparatus they were working on.

Risk Assessment A formal evaluation of; the immediate and potential hazards associated with a task or an environment, the severity and likelihood of injuries from the hazards, and ways to effectively mitigate the hazards.

Rubber A generic term that includes elastomers and elastomer compounds, regardless of origin.

Rubber Blanket A protective device designed to cover energized equipment and contain energy resulting from an unexpected fault or malfunction.

Rubber Mat A protective device designed to be placed on the ground or on a floor and act as an insulating barrier between a worker (or a vehicle) and the earth.

Sign-On Method permitting an Authorized Person to work independently on an existing Clearance with the same zone of protection.

Sectionalizer (overhead) A device designed to protect the feeder from an outage. It is a pole-mounted device attached to overhead lines that is sensitive to interruptions of current flow in the overhead wires. The sectionalizer will turn the power off, when current flow exceeds prescribed limits, until reset manually. Only those customers located beyond the sectionalizer will experience an outage.

Step bolt A bolt or rung attached at intervals along a structural member and used for hand and foot placement during climbing or standing.

Surrender Permission from the System Operator to the Clearance Person to be relieved of further work and responsibility in connection with the Clearance. It differs from Release of Clearance in that it definitely implies that the work is unfinished, that tags cannot be removed, that the circuit may still be grounded, and the circuit or

System Operator An Authorized Person, who directs, controls, monitors, and operates the electric system and its associated apparatus.

Switch A device for opening and closing or for changing the connection of a circuit. In this section, a switch is understood to be manually operable, unless otherwise stated.

TOA Transmission Outage Application, or the formal application for requesting outages or for other work on lines or apparatus through the System Operator.

Transfer A process to re-assign a Clearance or NRA from one Authorized Person to another through the System Operator.

Vault An enclosure, above or below ground, that personnel may enter and that is used for the purpose of installing, operating, or maintaining equipment or cable.

Vented vault A vault that has provision for air changes using exhaust flue stacks and low level air intakes that operate on differentials of pressure and temperature. The venting system prevents the development of a hazardous atmosphere.

Voltage The effective (rms) potential difference between any two conductors, or between a conductor and ground. Voltages are expressed in nominal values unless otherwise indicated.

Voltage, Nominal The nominal voltage of a system or circuit is the value assigned to a system or circuit of a given voltage class for the purpose of convenient designation. The operating voltage of the system may vary above or below this value.

Voltage Testing Testing when applied voltages result in voltages greater than 50 volts. This includes but not limited to Fault Finder, Power Factor, Insulation Resistance measurements, TTR, Hi-Pot, or System Voltages, etc. Appropriate minimum approach distances shall be maintained within the area under test.

Zone of Protection An area defined by opened protective points which isolate all known energy sources. This area is created by isolating, de-energizing and tagging every protective point of isolation from all forms of external sources of energy that could create a hazard for workers.

Section 1

GENERAL RULES FOR ALL EMPLOYEES

- 1.0 This section covers the general rules that apply to all National Grid employees. The Employee Safety Handbook serves as one of many resources available to employees to assist them in working safely.

1.1 INTRODUCTION AND RESPONSIBILITIES

- 1.1.0 Except where superseded by union agreements, these rules apply to all company employees.

- 1.1.1 This Safety Handbook is intended solely for use by National Grid employees.

Each National Grid employee has the responsibility to:

- a. Work safely; understand applicable company rules, policies, and procedures;
- b. Follow and enforce the rules of this handbook and to assist other employees to understand and comply with it, and;
- c. Refuse to perform any work that may compromise his or her safety, or the safety of others.

- 1.1.2 A qualified employee refers to a National Grid employee who has received training at a level appropriate to his or her assigned task. The type of work performed will determine the required level of proficiency. The term “trained and qualified” shall mean an employee who has the appropriate level of training and proficiency to safely perform their assigned task. For electrical operations, the term “qualified person” has a specific meaning and requirements. Please refer to the Glossary for guidance.

- 1.1.3 Regulatory Compliance

- a. National Grid incorporates Occupational Safety and Health Administration (OSHA) and other applicable regulations into its rules, policies, and procedures.

- b. Achieving compliance relies on both the Company and the employee.
- c. National Grid provides the resources necessary to ensure that each employee is adequately trained, qualified, and equipped to safely perform assigned duties.
- d. Employees must accept responsibility for their own safety.
- e. By following this Employee Safety Handbook, and its associated procedures, employees comply with these regulations.

1.1.4 Changes to the Employee Safety Handbook

This Employee Safety Handbook is a living document. These rules, and their associated procedures, will be revised as necessary by Safety and Health Services to comply with applicable regulations, and to include feedback from both Union and Management Stakeholders.

1.1.5 Employee Training

- a. Continuous training and re-training is integral to premier work performance and employee safety. Training occurs in many different venues: classroom, on-the-job, and self-directed. It is the responsibility of each employee to understand their assigned duties and to participate in all offered training. It is the responsibility of National Grid to provide the appropriate level and frequency of employee training.

b. Required Retraining

Employees who have not performed a task within the last 12 months will be retrained on that task before performing it. This required retraining format can be either classroom; on-the-job; job safety briefing, or; whatever format is the most appropriate.

c. Additional Training and Retraining

Employees will receive additional training (or retraining) under any of the following conditions:

- 1. The supervisor or annual inspection indicates that the employee is not complying with the relevant safety-related work practices;

- 2. New technology, new types of equipment, or changes in procedures require new work practices;
- 3. The employee will use safety-related work practices not normally used during his or her regular job duties.

d. Documentation of Training

Training will be documented when the employee successfully completes the training. Training records will be retained for the duration of the employee's employment.

1.1.6 Employee Licenses and Certifications

Certain work activities may require that the employee maintains a license and/or certification. Where appropriate, National Grid shall provide the resources and training necessary to maintain the license and/or certification. The employee shall be responsible for maintaining the required license and/or certification.

1.2 PUBLIC SAFETY

- 1.2.0 Each employee shall report promptly to his or her supervisor, or to the proper Company office, any abnormal condition observed, such as:

- a. Wires down
- b. Broken poles
- c. Odor of gas

- 1.2.1 If an emergency condition exists, the employee shall so state and stand by to warn persons in the vicinity until Company personnel or qualified emergency personnel arrive.

1.3 INCIDENTS RESULTING IN EMPLOYEE INJURY

- 1.3.0 Call the appropriate local emergency medical services (911) or Code Blue, if needed.

- 1.3.1 If trained, render first aid treatment to the injured.

- 1.3.2 Report every injury to your supervisor as soon as practical but no later than the end of the work day or shift. Supervision will then report the incident via the **One Call Safety System: 1-866-322-5594**.
- 1.3.3 The person in charge of the job shall obtain the following pertinent facts about the incident from the employee or witnesses:
- What happened?
 - Who and how many people were injured?
 - What treatment was administered?
 - What was the nature and seriousness of the injury?
 - Where did the incident occur?
 - When did the incident occur (date, time of day)?
 - Were there any witnesses?
- Safety and Health Services shall determine if an incident analysis, or other follow-up, will be required.

1.4 INCIDENTS - MOTOR VEHICLE

- 1.4.0 Call the appropriate local emergency medical services (911) or Code Blue, if needed.
- 1.4.1 If trained, render first aid treatment to the injured.
- 1.4.2 Place warning devices if your vehicle remains on the highway.
- 1.4.3 Notify your supervisor as soon as practical after the incident occurs.
- 1.4.4 Complete the appropriate state form. Notify Safety and Health Services according to established procedures.

1.5 INCIDENTS - PROPERTY DAMAGE

- 1.5.0 Property damage incidents shall be reported to supervision.
- 1.5.1 When supervision receives a report of property damage with the potential for injury, supervision will contact the Safety and Health Services immediately.
- 1.5.2 The appropriate risk management department shall be notified if public property is involved.

- 1.5.3 These incidents shall be investigated to determine the causes and hazards. Hazards identified shall be eliminated or guarded.
- 1.5.4 Incident analyses with lessons to be learned shall be communicated to prevent recurrences.

1.6 INCIDENTS – NEAR MISS

- 1.6.0 A “Near Miss” is an incident which had the potential, under different circumstances, to result in an injury.
- 1.6.1 Employees who are involved in a near miss incident should report the incident to their supervisor.

1.7 HAZARDOUS CONDITIONS (NO INJURY, NO PROPERTY DAMAGE)

- 1.7.0 Potentially hazardous conditions and equipment shall be reported to the appropriate management personnel or department to ensure corrective action is taken.
- 1.7.1 A “Significant Hazard” is a condition that requires others to take action to rectify and requires further investigation as to how the situation came to occur.
- 1.7.2 An “Other Hazard” is a condition that can be rectified immediately by the person who identified the hazard.

An employee who has a safety concern that cannot be addressed locally can submit it through the Safety Concern Sheet. A copy of this can be obtained from the employee's supervisor or from the Safety and Health Services Infonet site, under the “Safety and Health Forms” section.

1.8 ASBESTOS

- 1.8.0 Employees who handle asbestos-containing materials shall be trained to the appropriate level with applicable Company policies and procedures.

1.9 BATTERIES - STATION AND STORAGE

- 1.9.0 Electrolyte solutions shall not be placed in metal containers or stirred with metal objects.

- 1.9.1 Smoking and open flames shall be kept a minimum of 25 feet away from battery rooms or installations.
- 1.9.2 Battery leads shall not be connected or disconnected from the battery terminal during charging or discharging operations unless properly jumpered, and the employee is using proper personal protective equipment.
- 1.9.3 Ensure that tools and equipment do not cause a short between terminals and bus work.
- 1.9.4 When employees install or maintain storage batteries, they should be cautious and when necessary should use non-conductive tools.
- 1.9.5 When employees move a battery or work with acid solution, they shall wear chemical-resistant gloves, aprons, safety glasses with side shields, and face protection.
- 1.9.6 Acid burns shall be flushed immediately with water or a neutralizing solution, and if severe, treatment shall be obtained by a doctor.
- 1.9.7 Eyewash stations with a 15-minute flush capability shall be readily available (within 25 feet) when employees perform battery maintenance and/or battery testing.
- 1.9.8 Access to emergency eyewash and shower stations shall be clear at all times.

1.10 BLOODBORNE PATHOGENS

- 1.10.0 Personal regulated waste, such as insulin needles, shall be placed into puncture-proof, sealed containers and disposed of at proper disposal locations.
- 1.10.1 Biohazard face shields, glasses, and protective gloves designed to prevent bloodborne pathogen exposure shall be used when rendering first aid.
- 1.10.2 All potential exposure incidents shall be immediately reported to supervision and to the local health office, nurse practitioner, occupational health nurse, or safety specialist.

- 1.10.3 All employees who perform medical care or who clean-up blood as part of their assigned duties shall participate in annual blood-borne pathogens training.

1.11 COMPRESSED AIR/COMPRESSED GAS

General

- 1.11.0 Compressed air/gas used for cleaning purposes shall not exceed 30 pounds per square inch. Appropriate personal protective equipment shall be used.
- 1.11.1 Safety chains or equivalent, except threaded fittings, shall be used on compressed air hose connections.
- 1.11.2 Kinking lines is prohibited.
- 1.11.3 Under no circumstances shall compressed gas be used to clean clothing.
- 1.11.4 Blowing compressed gas at yourself or anyone else is prohibited.
- 1.11.5 Cylinders shall be transported in a cart. Rolling or dragging cylinders is prohibited.
- 1.11.6 Whenever possible, transport cylinders in an upright position or in a rack that meets DOT specifications. Ropes shall not be used to secure cylinders.
- 1.11.7 Identify empty and full cylinders, and store them separately.

Compressed Gas Cylinders

- 1.11.8 Inside buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location. Cylinders should be stored in specific assigned places away from elevators, stairs, or gangways. Assigned storage spaces shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards not designed for the application.
- 1.11.9 Acetylene cylinders shall only be stored and used in a vertical, valve-end-up position.

- 1.11.10 Under no conditions shall acetylene be generated, piped (except in approved cylinder manifolds), or used at a pressure in excess of 15 psig. The use of liquid acetylene is prohibited.
- 1.11.11 Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease) a minimum distance of 20 feet or by a noncombustible barrier at least five feet high with a fire-resistance rating of 30 minutes.
- 1.11.12 Compressed gas cylinders shall be handled as if full. Keep the cylinders upright and properly secured. Upright position shall be determined by the construction and required use of the cylinder.
- 1.11.13 Valve protection caps, where cylinder is designed to accept a cap, shall always be in place, hand-tight, except when cylinders are in use or connected for use.
- Exception: welding and cutting apparatus and propane and nitrogen test bottles without screw caps must have all regulators removed with plugs installed or covered with an approved protective device before transporting in a vehicle.
- 1.11.14 Gas cylinders shall be stored in a place where they will not be subject to excessive temperature.
- 1.11.15 Never let oil or grease come in contact with oxygen valves or regulators.
- 1.11.16 All propane tanks used shall have a guard around the valve. A propane tank shall not be used in an excavation, manhole, confined space, or enclosed space. The length of hose shall be long enough to keep the tank out of the work space. Exceptions may be coordinated with authorization from the Safety and Health Department.
- 1.11.17 Oxygen/Fuel Gas Cylinders set-up on welding carts or assembled together with regulators, hoses, and torches are considered available for use. Available for use means that the welding unit was used in the last 24 hours and/or will be used in the next 24 hours. The welding set-up shall be disassembled, regulator and hoses removed, cylinders separated, and protective caps secured in place (as required for cylinders considered in storage) when the definition of available for use has not been met.

1.12 CONCRETE AND MASONRY CONSTRUCTION

- 1.12.0 All protruding reinforced steel onto and into which employees could fall shall be guarded to help reduce the hazard of impalement or injury.
- 1.12.1 Do not work underneath concrete buckets or any other suspended loads or hazards.

1.13 CONFINED SPACE ENTRY, PERMIT-REQUIRED

Preparation

- 1.13.0 A job brief shall be conducted prior to entry. A hazard evaluation shall be completed for all entries to confined spaces. The form is required to be filled out.
- All other employees entering a confined space shall verify atmospheric monitoring previously completed by reviewing the evaluation form.
- 1.13.1 Atmospheric monitoring shall be conducted by a trained and qualified employee prior to entry. Continuous monitoring shall be in use any time an employee is in a confined space and must exit the space immediately if the meter alarms. The multi-gas meters or equivalent shall be in good working condition and have a current calibration date.
- 1.13.2 Guard rails or barricades shall be used to prevent falling into the space when a hazard exists.

Entering

- 1.13.3 A permit space requires the employee to be connected (tethered) to the rescue device unless doing so creates an additional hazard; this additional hazard must be verified by a supervisor, crew leader/chief, or foreman on-site.
- A reclassified confined space requires a separate hazard evaluation to determine non-entry rescue requirements.
- 1.13.4 An attendant who is trained in first aid and cardiopulmonary resuscitation is required for entry to be made into a permitted confined space. Adequate communications shall be established.

Power Ventilation Requirements

- 1.13.4 Continuous power ventilation is required when employees are performing work using solvents or open flame, or if potential atmospheric hazards exist. Continuous monitoring is required when controlling a hazard. The intake air hose shall be located in clean air location, away from vehicle exhaust, etc.

1.14 DRINKING WATER

- 1.14.0 Drinking water dispensers shall be designed, constructed, serviced, and used to ensure sanitary conditions; shall be capable of being closed; and shall have a tap.

1.15 ELECTRICAL SAFETY-RELATED WORK PRACTICES

- 1.15.0 Unqualified persons and mechanical equipment must be at least 10 feet away from overhead power lines and/or exposed energized equipment. If the voltage exceeds 50,000 (50 kV), the clearance distance shall be increased by four inches for each additional 10,000 volts.
- 1.15.1 Employees must use ground-fault circuit interrupters (GFCIs) for portable tools or when using non-double-insulated tools. For temporary power supplies on a construction site, GFCI's are required at all times.
- 1.15.2 Lamps for general illumination must be protected from breakage (by using a bulb guard or similar protection), and metal shell sockets must be grounded.
- 1.15.3 Portable lighting used in wet or conductive locations must be operated at no more than 50 volts or must be protected by GFCI's or low-voltage isolation transformers.
- 1.15.4 Extension cords shall be of the three wire type and shall be protected from accidental damage. Extension cords and flexible cords shall be designed for hard or extra hard usage. Extension cords are not to be used as a substitute for permanent wiring.
- 1.15.5 All cord and plug connected equipment used shall be either double-insulated or contain an equipment grounding conductor.

- 1.15.6 Worn or frayed electrical cords or cables shall not be used. Extension cords shall not be fastened with staples, hung from nails, or suspended by wire.
- 1.15.7 Flexible cords shall be connected to devices and fittings so that strain relief is provided which will prevent pull from being directly transmitted to joints or terminal screws.
- 1.15.8 Employees may not work closer to live parts of electrical circuits than their qualifications allow unless they protect themselves by de-energizing, testing de-energized, and grounding the parts.
- 1.15.9 Equipment or circuits that are de-energized shall be rendered inoperative and shall have tags and/or locks attached at all points where the equipment or circuits could be energized.
- 1.15.10 Until the exact location of underground power circuits is known, employees using jackhammers, bars, shovels or similar tools are required to wear the appropriate rubber gloves, FR clothing and EH rated safety shoes or overboots. The person in charge shall contact Dig-Safe or Dig Safely to verify that no utilities are present in the area to be excavated.
- 1.15.11 When it is necessary to break through underground conduit, ducts, concrete envelopes, etc., housing energized conductors or conductors that may become energized, special care shall be taken if pneumatic tools are to be used. The pneumatic tools shall be properly and adequately grounded. Appropriate rubber gloves with protectors, as a minimum, shall be worn, along with EH-rated footwear and flame retardant clothing. Suitable approved protective guards shall be used to protect exposed conductors in the work area.

1.16 EXCAVATIONS

Preparation

- 1.16.0 Before any excavation is begun, the appropriate Dig Safe organization shall be contacted. At sites not controlled by Dig Safe/Dig Safely, the appropriate underground facilities locator shall be contacted.
- 1.16.1 A warning system shall be used when mobile equipment is operated next to an excavation. Examples: stop logs, barricades, hand signals.

- 1.16.2 All excavated areas shall be barricaded or attended.
- 1.16.3 Prior to employee entry, excavated material shall be placed at least two feet from the edge of the excavations, or protected by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.
- 1.16.4 Where employees are required to enter excavations, consider all soils Type C or perform a visual and manual soil test. The excavation log is required to be completed if any of these apply:
- a. There is a protective system in place.
 - b. There is a failure of the protective system.
 - c. Compliance audits have been performed at the work site.
 - d. Injuries or near misses associated with a protective system have occurred.
- 1.16.5 Near gas stations, landfills, and hazardous waste sites greater than four feet in depth, excavations shall be tested for hazardous atmospheres if there are indications that a potential hazardous atmosphere may exist.
- 1.16.6 Walkways shall be provided where employees or equipment cross over excavations. When excavations are greater than six feet deep, guard rails shall be used on walkways where employees cross over if a fall hazard exists.
- Entry
- 1.16.7 If a hazardous atmosphere or chemicals are identified, employees shall not enter until a safe work plan (Health and Safety Plan) is established.
- 1.16.8 No employee shall be permitted to enter an excavated area (greater than or equal to 5 feet in depth or determined to be hazardous by the Competent Person) unless shoring and/or other safeguards that may be necessary for the protection of the employee are provided.

- 1.16.9 All excavations require a daily inspection (or more often, if conditions change) by a designated competent person who is trained to recognize hazards, perform soil analyses, and take corrective actions. A competent person shall be present at the worksite while people are in the excavation.
- 1.16.10 An employee shall never be more than 25 feet from a ladder or other safe means of egress if an excavation is greater than four feet.
- 1.16.11 Where any employee in an excavation is exposed to the hazard of falling or sliding material from any bank or side, adequate piling and bracing shall be provided against the bank or side to eliminate such hazard regardless of depth.
- 1.16.12 No employee shall be permitted to work where the employee might be struck or endangered by an excavating machine or by material dislodged by machinery or falling from machinery.

For additional information, see Section 10.14, Charts and Visual Aids

1.17 EXITS

- 1.17.0 Exits and the way of approach and travel from exits shall be maintained so that they are unobstructed and are accessible at all times.

1.18 EYEWASH/DRENCH SHOWERS

- 1.18.0 Suitable facilities for quick drenching or flushing of the eyes and body shall be provided if there is a possibility that an employee might be exposed to injurious, corrosive materials. Portable and 'hard piped' units shall be inspected monthly.
- 1.18.1 Eyewash stations with a 15-minute flush capability shall be readily available (no more than 10 seconds to reach) of injurious, corrosive materials.

1.19 FALL PROTECTION

General

- 1.19.0 OSHA requires fall arrest systems to be worn at different heights depending on the type of work you're doing. The following requirements have been established:
- Each employee on a walking/working surface with an unprotected side or edge which is **(4) four feet** or more above a lower level shall be protected from falling by use of guardrail systems, safety net systems, or personal fall arrest systems.
 - Employees working more than **(4) four feet** above the ground on poles, towers, or similar structures shall be protected with fall arrest equipment, work positioning equipment, or travel restricting equipment.
 - When personal fall arrest systems are used, systems shall be rigged such that an employee can neither fall more than **(6) six feet** nor contact any lower level.
 - Positioning devices shall be rigged such that an employee can not free fall more than two feet.
- 1.19.1 All climbers shall be fully protected with fall arrest equipment at all times when climbing to, and working from, the work position.
- Ladder climbing is excluded.
 - Arborist exception found in Section 8.3.
- 1.19.2 Fall protection equipment shall be used when employees are exposed to falls from **heights at or above (4) four feet** unless the work is to be performed from an approved ladder. If work from an extension ladder requires the use of two hands to be free, employees shall use a work positioning belt and safety strap properly attached to the secured ladder.
- 1.19.3 All fall protection equipment shall be inspected before use.
- 1.19.4 Any equipment that has been subjected to a fall in actual field use will be inspected by the manufacturer before being reused.

- 1.19.5 Single D ring body belts and "job made" lanyard pole straps are not acceptable for fall arrest.
- An arborist exception is located in Section 8.3.
- 1.19.6 If vertical lifelines are used, not more than one employee may be attached to any one life line. Locking type snap hooks shall be used for climbing and fall protection. Snap hooks may not be connected to web-type lanyards, or to each other. If such a connection is necessary, a carabiner shall be used as the intermediate member.
- 1.19.8 Guardrails with mid-rails are acceptable fall protection on open sided structures. See Section 1.20.
- 1.19.9 A full body harness, with shock absorbing lanyard, shall be worn when employees are working from aerial lifts and bucket trucks. An approved attachment point shall be used for the lanyard; the approved attachment point shall not be part of the fiberglass bucket. Fall protection is not required when employees access or exit an aerial bucket in the cradled position or work on the truck.
- 1.19.10 A worker may enter or exit an aerial lift (at heights above four feet) provided that fall protection such as guardrails or a fall arrest system is used while the worker moves between the lift and the working surface. Before any such transfer is made, the employee shall be properly tied off to an adequate support, the pole, or structure prior to and in the direction of the transfer.

1.20 FALL PROTECTION RAILINGS

- 1.20.0 A standard railing protecting floor openings, platforms, and scaffolds shall consist of top rail, intermediate rail, and posts. A vertical height of 42 inches nominal from the upper surface of the top rail to the floor, platform, runway, or ramp level is required.
- Guardrail systems shall have a top rail that is 42 inches above the walking/working surface and a mid-rail that is 21 inches above the walking/working surface, platform, runway, or ramp level is required.

b. A railing for open-sided floors, platforms, and runways, shall have a toeboard whenever there are open sides beneath which toeboards can be placed; persons can pass; there is moving machinery; or there is equipment with which falling materials could cause a hazard.

c. Wire ropes for top rails must be flagged at no more than six foot intervals with highly visible materials.

1.20.1 Railings shall be of such construction that the complete structure is capable of withstanding a load of at least 200 pounds in any direction on any point on the top rail.

1.20.2 Wire ropes for top rails must be flagged at no more than **(6) six foot intervals** with highly visible materials.

1.20.3 A stair railing shall be of construction similar to a standard railing, but the vertical height shall be no more than 34 inches nor less than 30 inches from the upper surface of the top rail to the surface of the tread in line with the face of the riser at the forward edge of the tread.

1.20.4 A standard toeboard shall be at least four inches in height and may be of any substantial material, either solid or open, with gaps in floors not to exceed one-quarter inch in greatest dimension.

1.20.5 Guardrails shall be installed along open-sided floors more than four feet above a lower level. Guardrails shall be installed along open pits, tanks, etc. Loading docks are excluded.

1.20.6 Every stairway and ladderway floor opening shall be guarded by standard railings with standard toeboards on all exposed sides except at the entrance. The entrance to ladderway openings shall be guarded to prevent a person from walking directly into the opening.

1.21 FIRE PROTECTION

1.21.0 Fire extinguishers shall be placed where they will be readily accessible to personnel.

1.21.1 All fire extinguishers shall be visually inspected monthly, and refilled, weighed, and hydrostatically tested in accordance with state and federal requirements.

1.21.2 Only fire fighting equipment (carbon dioxide, dry chemical, and halon) authorized for use on Class C fires (electrical fires) shall be used on electrical equipment.

a. Class A extinguishers shall be used for fires involving wood, paper, rubber, or cloth.

b. Class B extinguishers shall be used for fires involving flammable liquids, gases, oil, and grease.

c. Class C extinguishers shall be used for fires involving energized electrical equipment.

d. Class D extinguishers shall be used for fires involving flammable metals.

e. Class K extinguishers shall be used for kitchen fires.

1.21.3 Stations or installations provided with automatic gaseous (carbon dioxide or halon) fire protection equipment for habitable areas shall have an audible warning device timed to permit persons within the protected area to leave the area before the system is activated and the agent released.

1.21.4 Signs shall be placed inside and outside the protected area explaining the audible warning devices, their purpose, and the need for immediate evacuation. Such pre-discharge alarms shall sound a warning for at least 30 seconds prior to discharge.

1.21.5 When maintenance work is being performed in an area, so that false operation of detectors could be expected (e.g., torch work), or under conditions that would make it difficult to evacuate the area in the pre-discharge alarm period, the system shall be rendered non-automatic.

1.21.6 Carbon dioxide and halon systems protecting normally non-habitable enclosures (e.g., subfloor spaces, interior of electrical machinery, etc.) and not equipped with a pre-discharge alarm device shall be rendered non-automatic when work must be performed within such enclosures.

1.21.7 After the gas discharge in a room or enclosure, no one shall enter unless they are wearing self-contained breathing equipment, or until the room has been thoroughly ventilated. In the case of a

carbon dioxide discharge, the area shall be tested with an approved oxygen deficiency tester in accordance with approved station operating instructions for acceptable oxygen concentrations.

- 1.21.8 Smoking shall not be permitted in battery rooms, hydrogen areas, gasoline dispensing areas, or rooms so posted.
- 1.21.9 Local firefighters shall be requested to fight fires within an electric station or installation only under the supervision of a qualified and authorized Company employee.
- 1.21.10 No one shall remove a fire hose from a fixed fire station, except to connect a replacement section, or for a minimum time required for testing.
- 1.21.11 No one shall use an existing fire hose for any purpose other than for fire fighting. However, for emergency or other maintenance work, a fire hose may be used with the authorization of supervision so a replacement hose can be provided.

Flammable, Combustible, and Toxic Liquids

- 1.21.12 Adequate precautions shall be taken to prevent the ignition of flammable vapors. Sources of ignition include, but are not limited to, open flames, lightning, smoking, cutting and welding, hot surfaces, frictional heat, static, electrical and mechanical sparks, and spontaneous ignition, including heat-producing chemical reactions and radiant heat.
- 1.21.13 Flammable liquids shall not be dispensed into containers unless the nozzle and container remain in contact with each other. All containers shall be clearly labeled.
- 1.21.14 Flammable liquids shall not be dispensed into a container while it is placed inside a vehicle, vehicle trunk, or pick-up bed (with or without liner) or on any other surfaces other than the ground.

Hot Work Permit

- 1.21.15 Where sparks can pass through floor or wall openings, precautions must be taken to prevent contact with combustible materials on the floor below and a hot work permit is required.

- 1.21.16 Personnel conducting hot work shall comply with basic fire prevention and protection rules in accordance with the hot work permit provisions outlined in the hot work safety and health procedure.
- 1.21.17 Personnel conducting hot work shall be qualified to use hot work equipment and only use equipment that is in safe working condition.
- 1.21.18 Suitable fire extinguishing equipment must be maintained for instant use in the vicinity of combustible material. These include portable fire extinguishers, pails of water and/or buckets of sand.

Housekeeping Fire Prevention

- 1.21.19 Good housekeeping shall be maintained at all work locations and in all vehicles.
- 1.21.20 Combustible materials such as oil-soaked rags, waste, and shavings shall be kept in approved metal containers with self-closing lids. Containers shall be emptied as needed.
- 1.21.21 No clothing shall be allowed to hang in the space in back of switchboards. Rubbish, soiled cleaning towels, and unused clothing shall not be allowed to accumulate in lockers.
- 1.21.22 Paper and other combustible materials shall not be allowed to accumulate, and weeds or other rank vegetation shall not be permitted to grow, in or around the neighborhood of substations, gas regulator stations, pole yards, buildings, oil tanks, outdoor switchgear or other structures.
- 1.21.23 Flammable liquids such as gasoline, benzene, naphtha, lacquer thinner, etc., shall not be used for cleaning. Only approved cleaning solvents shall be used for this purpose.
- 1.21.24 Flammable liquids (flash point below 100 degrees F) shall be stored or transported in approved containers.
- 1.21.25 Employees shall not smoke in proximity to flammable liquids, gases, or explosives.
- 1.21.26 Fire doors shall be kept in good condition, and shall not be obstructed.

- 1.21.27 Materials shall be kept at least 18 inches below sprinkler heads and lighting fixtures. Materials in the vicinity of space heaters shall be located so they do not present a fire hazard.
- 1.21.28 No open flames (including candles) shall be lit in Company office areas.

1.22 FIRST AID/CARDIOPULMONARY RESUSCITATION

- 1.22.0 Qualified employees and first aid responders shall be trained in first aid and cardiopulmonary resuscitation (CPR) and refresher-trained every two years. Employees trained to use automatic external defibrillators shall be refresher-trained every two years.
- 1.22.1 First aid kits shall be maintained, inspected, and available at the jobsite.
- 1.22.2 All employees whose duties require the climbing of poles, trees, or structures shall be instructed in the various methods of first aid, CPR, and pole-top/tree-top rescue techniques.
- 1.22.3 When a medical facility for treatment of injured employees is not available in proximity to the workplace, a person or persons shall be trained to render first aid. Approved first aid supplies shall be readily available.

1.23 HAZARD COMMUNICATION

- 1.23.0 Employees shall read and follow warning labels, Material Safety Data Sheets, and manufacturer's instructions when using chemicals.

Material Safety Data Sheets may be obtained from the Safety and Health Services Infonet web-site under the MSDS Database section, or from the employee's supervisor. In addition, MSDS can also be obtained by calling Dolphin Software 24-hours a day, seven days a week at 1-877-279-0441. Live operators are available to answer emergency and poison control questions.

- 1.23.2 Employees shall wear personal protective equipment as required by warning labels, Material Safety Data Sheets, or manufacturer's instructions appropriate for the application.
- 1.23.3 Employees shall not consume food or beverages in any area where they are exposed to a toxic material.

1.24 HOUSEKEEPING

General

- 1.24.0 Maintain clean, neat, sanitary conditions in all Company buildings, yards, premises, and mobile equipment.
- 1.24.1 Combustible scrap and debris shall be removed daily.
- 1.24.2 Approved containers shall be provided for the collection and separation of all refuse. Covers shall be provided on containers used for flammable or harmful substances. Dispose of all refuse in the proper receptacles, following all federal, state, and local regulations.
- 1.24.3 When work is completed, remove tools, equipment, scraps, and refuse from floors, walks, balconies, yards, and work areas.
- 1.24.4 Keep tools and equipment stacked in a safe and secure position when work is completed or suspended.
- 1.24.5 Store tools in chests, racks, or other places where they will not create hazards.
- 1.24.6 Keep walks, aisles, and stairways clear. Storeroom aisles will be properly marked and maintained.
- 1.24.7 Never leave nails projecting from boards or walls where they may cause personal injury.
- 1.24.8 Keep showers, locker rooms, and washrooms neat and sanitary.
- 1.24.9 Do not allow oily or soiled clothing, waste, or food scraps to accumulate in lockers, washrooms, eating areas, or Company vehicles.

Buildings and Storage Yards

- 1.24.10 Keep general appearances orderly and clean.
- 1.24.11 Pile materials in a safe manner.
- 1.24.12 Maintain proper clearances for walks and work areas.

- 1.24.13 Use adequate areas for storage of equipment, tool carts, trailers, etc.
- 1.24.14 Keep roadway depressions filled.
- 1.24.15 Barricade all danger areas, openings, overhanging hazards, etc.
- 1.24.16 Remove tripping hazards.
- 1.24.17 Clean and rake periodically.
- 1.24.18 Remove snow and icy spots when necessary.
- 1.24.19 Shops shall be ventilated to remove exhaust fumes, dust, and shavings from wood-working machines, paint fumes, and wood and metal sandings.

Office Housekeeping

- 1.24.20 All wastepaper, rags, and rubbish are to be disposed of in approved containers. Broken glass and sharp-edged objects are to be so labeled and discarded separately.
- 1.24.21 Liquids or other material dropped, spilled, or leaked on the floor is to be wiped or mopped clean immediately.
- 1.24.22 Store supplies and materials in a manner that prevents tipping over and to assure proper clearances from sprinkler heads.
- 1.24.23 Keep aisles clear at all times.
- 1.24.24 All chemicals shall be kept in approved containers and properly labeled. Original containers furnished and labeled by the manufacturer are considered to be approved containers. The container shall be disposed of when empty.
- 1.24.25 The office area shall be free of tripping hazards.
- 1.24.26 Chairs or desks shall not be used to stand on.
- 1.24.27 Stored items shall not pose a hazard.
- 1.24.28 File cabinet drawers shall be open one at a time. Open drawers shall not be left unattended or left open more than necessary.

Vehicle Housekeeping

- 1.24.29 Keep vehicles clean and store all tools and materials in their proper places.
- 1.24.30 Keep truck beds in a neat, safe condition. The operator will see that materials are properly loaded and secured on trucks.
- 1.24.31 Work areas shall be cleaned up as soon as the job is completed. When necessary, work areas shall be cleaned up while work is in progress.
- 1.24.32 Remove snow when necessary; sand icy or slippery spots when necessary.
- 1.24.33 Truck cabs shall be kept clean. Paper and other debris shall be disposed of properly.

1.25 JOB BRIEF

- 1.25.1 Before each job begins for a crew of two or more, and whenever working conditions change, a documented job brief shall be conducted by the crew leader/chief, person in charge of the work, or supervisor to review hazards, precautions, procedures, energy sources/control, and personal protective equipment requirements. All crew members are required to sign or initial the documented job brief.
- 1.25.2 The job brief shall include such information as the method of accomplishing the job, the safety rules applicable, and the hazards to be eliminated or controlled. Comments and suggestions are encouraged, and the person in charge shall be satisfied that each crew member knows the job he or she is to perform.
 - a. When a safety observer is used, the person selected, task/activity to be observed, and hazards being mitigated shall be documented on the job brief.
- 1.25.3 When one or more departments are involved on the same job, a job brief shall be coordinated by all concerned.
- 1.25.4 Working alone: An employee working alone need not conduct a job brief; however, the employee must review the hazards associated with the job as if a formal job brief had been performed.

1.26 LADDERS

General

- 1.26.0 Only trained and qualified employees shall use ladders. Ladders and scaffolds shall not be used in excess of the working loads for which they are intended.
- 1.26.1 Before using a ladder, conduct a thorough inspection. Look it over carefully to make certain that there are no obvious defects. Tag and identify defective ladders.
- 1.26.2 Ladders must be used only on stable and level surfaces unless secured to prevent accidental movement.
- 1.26.3 Ladders must not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental movement.
- 1.26.4 Before climbing a ladder, always be certain the ladder is either tied at the bottom to some secure object or held by a fellow employee, or that the surface on which it rests will prevent the ladder from sliding out at the base. Where practical, tie the ladder at the top as soon as possible. Maintain a 4:1 pitch, so the ladder base is one foot away from the support for every four feet the ladder rises.
- 1.26.5 Do not place ladders on elevating work platforms or aerial lifts.
- 1.26.6 Ladders shall not be left standing unattended, especially outdoors, unless securely anchored at both the top and bottom to prevent wind, vibrations, etc., from knocking the ladder over.
- 1.26.7 Ladders used in aisles or on streets shall be guarded by an attendant, roped off, or otherwise barricaded.
- 1.26.8 Ladders shall not be placed at doorways unless the door is blocked open, locked, or guarded.
- 1.26.9 When climbing a ladder, keep both hands sufficiently free to grip the rails or rungs firmly, or if one hand cannot be used to grip the ladder, the other hand shall be entirely free to do so. Avoid carrying heavy or clumsy articles up or down a ladder.
- 1.26.10 Always face the ladder when ascending or descending.

- 1.26.11 More than one worker shall not be permitted on a ladder at the same time (except during an emergency rescue), unless the ladder is designed accordingly. Scaling ladders are excluded from this rule; however, the load limit must be verified prior to use.
- 1.26.12 Where practical, raise tools or material by means of a rope and/or canvas bucket when working from a ladder. If the ladder is not secured at the top section, only the person on the ladder shall be permitted to raise materials.
- 1.26.13 Never leave tools hanging on a ladder or lying on a stepladder.
- 1.26.14 Protect persons standing or passing below from injury. While working on a ladder, exercise care against dropping tools or materials.
- 1.26.15 Do not attempt to lean beyond the side rail while working on a ladder unless the ladder is tied to prevent overturning.
- 1.26.16 Safety belts shall be used when working from:
- a. Ladders which are permanently installed;
 - b. Portable, straight, or extension ladders when properly secured;
 - c. Hook ladders.
- Note: A ladder is considered secured for the purposes of belting off when the following conditions are satisfied, but not limited to:
- Ladder is tied off at the top or bottom, or held by another;
or
 - Proper 4:1 pitch used and the ladder's base is level, with non-skid feet/shoes appropriately placed on solid ground/surface;
or
 - Ladder spur feet are dug into mud, snow or ice;
or
 - The ladder base is supported by a fixed barrier (i.e. curb or structure).
- 1.26.17 Ladders shall not be used for any reason other than their intended purpose.
- 1.26.18 Ladders shall be carried at the employee's side with two hands.

- 1.26.19 Only fiberglass or non-conductive ladders shall be used near energized lines or equipment. Step ladders shall have non-conductive top steps.
- 1.26.20 Ladders shall never be placed against open wire or a multiplex secondary. When conditions necessitate work on a mid span tap, a messenger strand shall be installed and used to support and secure the ladder. An existing span guy may also be used.
- 1.26.21 Do not climb a ladder with climbers on, except where it is necessary to use a ladder to reach a working position where climbers are required.
- 1.26.22 When working on ladders in streets and alleyways, assure that the wire or rope with which you may be working cannot be struck by or entangled with passing vehicles or persons.
- 1.26.23 When installing service wires with a ladder, attach them at the building first, then pull them up from the pole. When removing service wires, remove the strain from the pole first.
- 1.26.24 Transmission ladders shall be firmly attached to **solid supports**. They shall be tied off to a structure with a rope of a minimum of 1/2 inch diameter polyethylene or equivalent working strength and interlaced to include a minimum of two rungs of the ladder.
- 1.26.25 Transmission ladders shall not be spliced unless authorized by the manufacturer's instructions.
- 1.26.26 Ladders shall not be used in tree work unless they can be set on a firm foundation. Ladders shall never be used in trees with the bottom rung or rail bases resting on a crotch.

Extension Ladders

- 1.26.27 Portable ladders used for access to an upper landing surface must extend a minimum of three feet above the landing surface, or where not practical, be provided with grab rails and be secured against movement while in use.
- 1.26.28 When performing work from a straight or extension ladder, the worker shall assume a position no higher than the fourth rung from the top.

- 1.26.29 In placing extension ladders, a 4 to 1 pitch ratio shall be maintained. The distance from the base of the ladder to the wall shall be 1/4 of the distance from the bottom of the ladder to the top support of the ladder.
- 1.26.30 After an extension ladder has been raised:
- Check to make certain that hooks are fully engaged.
 - Tie the lift rope securely to one or more rungs of lower section.
- 1.26.31 When additional stability is desirable, the safety strap may be placed around both side rails if it is also placed around a rung to prevent falling. If work from an extension ladder requires the use of two hands to be free, employees shall use a work positioning belt and safety strap properly attached to the secured ladder. (see 1.26.16 note)
- 1.26.32 When a fixed structure adjacent to the work provides a more desirable and equally substantial means for fastening the belt than the ladder, this method may be used.

Step Ladders

- 1.26.33 When performing work from a step ladder taller than four feet, follow the manufacturer's safety guidelines and assume a position no higher than the third step from the top (counting the top as a step).
- 1.26.34 Step ladders shall be fully open with braces locked before anyone uses them.
- Climb on the side of the step ladder designed for climbing
 - The worker shall face the ladder when climbing
- 1.26.35 Straddling or sitting on the top of the step ladder is prohibited.

1.27 LASERS

- 1.27.0 Laser equipment operators shall have proof of their qualifications in their possession at all times.

- 1.27.1 Employees, when working, who pass through or by an area where a potential exposure to direct or reflected laser light greater than 0.005 watts (5 milliwatts) exists shall use antilaser eye protection devices.
- 1.27.2 Beam shutters or caps shall be used, or the laser turned off, when laser transmission is not actually required. When the laser is left unattended for a substantial period of time, such as during lunch time, overnight, or at a change of shift, the laser shall be turned off.
- 1.27.3 Only mechanical or electronic detectors shall be used for guiding the internal alignment of the laser.
- 1.27.4 The laser beam shall not be directed at employees.

1.28 LOCKOUT/TAGOUT

- 1.28.1 All equipment or machinery not directly associated with generation, transmission or distribution system which may cause injury due to unexpected release of energy while being serviced or maintained, must be locked/tagged out according to the National Grid lockout/tagout policy/procedure. Written procedures shall be followed where required and only authorized employees shall perform service or maintenance under a lockout/tagout.
- 1.28.2 Equipment or machinery which is part of the generation, transmission or distribution system is covered by switching and tagging rules and is not effected by the lockout/tagout policy.
- 1.28.3 Prior to working on any equipment, employees shall inspect the equipment for all potential energy sources: electrical, mechanical, hydraulic, pneumatic, chemical, or thermal. Energy sources must be rendered non-hazardous before work is permitted.
- 1.28.4 When employees are working on equipment where the unexpected energization or release of stored energy could cause injury, such equipment shall be locked out and tagged out.
- 1.28.5 When tagout is used, and effectiveness demonstrated, an additional safety measure may be considered in lieu of the lock (i.e., opening an extra disconnect, blocking a control switch, removal of a valve handle, when available).

- 1.28.6 Tags must be legible, personally identified, understood by all employees, and securely attached.
- 1.28.7 Affected employees shall be notified when a tag is to be removed.
- 1.28.8 Where a tag cannot be attached to the energy isolating device, it shall be located as close as possible to the device and in a location obvious to anyone attempting to operate the device.
- 1.28.9 If energized parts under the lockout/tagout are to be exposed to possible contact, a test shall be performed to verify de-energization.
- 1.28.10 Before lockout/tagout devices are removed, the area shall be inspected, and affected employees notified.
- 1.28.11 If the employee who applied the lockout/tagout is not available, the device may be removed under direction of the supervisor if the employee is not at the facility, and efforts are made to contact the employee, and the employee is notified of the removal prior to resuming work.
- 1.28.12 For temporary removal of lockout/tagout, the following sequence must be conformed to: clear the equipment, clear employees, notify all affected employees, remove lock/tag, energize and test.
- 1.28.13 When servicing or maintenance work is performed by multiple persons, group lockout devices (one lock or tag per person) shall be used, and primary responsibility shall be given to one employee who shall ensure continuous protection.
- 1.28.14 Orderly transfer of protection shall occur between shifts.

1.29 MATERIAL HANDLING (LIFTING AND CARRYING)

- 1.29.0 The following requirements are necessary to perform a lift correctly:
 - a. Take a firm grip.
 - b. Secure a good footing.
 - c. Place the feet a comfortable distance apart, close to the load.

- d. Bend the knees.
 - e. Keep the back vertical.
 - f. Keep load close to your body.
 - g. Lift with the leg muscles.
 - h. Obtain help when needed.
 - i. When an object is too heavy to lift, get assistance or use material handling equipment.
 - j. Use cranes or hoists for lifting heavy loads.
- 1.29.1 Workers shall stay out from under suspended loads.
 - 1.29.2 Use gloves when handling rough or sharp material.
 - 1.29.3 No load shall be carried which obstructs the vision.
 - 1.29.4 When two or more workers are lifting or pulling together, one worker shall give the signals for the group.
 - 1.29.5 Pipes, conduits, reinforcing rods, and other conducting materials shall not be carried on the shoulders or overhead near exposed live electrical equipment or conductors.
 - 1.29.6 Care shall be exercised when material is moved on or off elevators. The areas immediately in front of the elevator shall be kept clear at all times.
 - 1.29.7 Material handling devices should be used when raising, lowering, or uplifting barrels and drums.

1.30 OFFICE – GENERAL

- 1.30.0 Employees shall not stand on chairs and/or desks.
- 1.30.1 Use caution in office buildings when opening doors and turning corners in halls.
- 1.30.2 Use caution when pushing carts in office buildings, particularly when approaching corners and other blind spots.

- 1.30.3 When stacking items atop file cabinets, make sure the items can not fall, can not be knocked over by equipment or passers-by, and do not create any kind of other hazard.

1.31 PERSONAL PROTECTIVE EQUIPMENT

- 1.31.0 Specialized personal protective equipment is required for tasks where unique hazards have been identified and documented on a “hazard assessment evaluation” form. Examples: slip resistant boots or detachable devices, radiation protection equipment, respiratory protection, etc.
- 1.31.1 All employees are required to wear safety eye protection with the side shields at all times when exposed to eye hazards. Additional eye and face protection, such as goggles or face shields, is required when employees are exposed to hazards from flying particles, molten metal, liquid chemicals, chemical gases and vapors, or potential light radiation.
- 1.31.2 Use only Company approved and issued personal protective equipment. Exception: The company does not issue safety shoes and prescription safety glasses.
- 1.31.3 Inspect all personal protective equipment before use each day to make sure that the equipment is in safe working condition.
- 1.31.4 Do not use defective equipment.
- 1.31.5 Work clothing or apparel which is considered unsafe by either the employee or the employee’s supervisor shall be replaced or repaired as directed by the supervisor.
- 1.31.6 All employees shall wear head protection at all times when exposed to head hazards. When employees are not working in or around construction zones, bump caps may be worn in lieu of hard hats, by meter readers, service reps, fleet employees, and members of other groups when authorized by supervision and supported by a hazard assessment. Protective helmets shall be worn during the operation of all-terrain vehicles and snowmobiles.
- 1.31.7 Employees shall wear protective footwear at all times when exposed to (foot) hazards. All protective footwear shall comply with ANSI Z41 part 91 by having an impact rating of 75, a compression rating of 75, and an electrical hazard (EH) rating.

Footwear with a slip resistant sole (rated good or better) and equipped with suitable heels are required. Six inch or higher boots are recommended for added ankle support.

- a. All employees working in an area of downed electrical wires, performing line patrols, or performing storm surveys are advised to wear non-conductive, EH-rated overshoes/rubbers over their approved safety footwear.

1.31.8 Where a job brief indicates ice as a hazard, additional protection such as Spiky or Stable-icer brand anti-slip footwear shall be used.

1.31.9 Wear approved hearing protection in posted areas.

1.31.10 Wear approved hearing protection when working near machinery or equipment producing noise levels above regulated limits. Examples include but are not limited to chain saws, air hammers, wood chippers, certain trenchers, tractors, hole diggers, emergency generators, and high-voltage circuit breakers (when operated).

1.31.11 Visitors and contractors will observe posted areas and will wear approved hearing protection as required.

1.31.12 All field employees exposed to vehicular traffic shall wear high visibility garments. Refer to the Work Zone Traffic Safety section.

- a. Within coned work areas high-visibility apparel is required.

1.31.13 Work Gloves

Employees shall wear work gloves appropriate for the job.

- a. Cut-Resistant: Kevlar work gloves, including Kevlar cut-resistant gloves, are required to be worn by all employees performing tasks that expose hands to hazards of cuts, abrasions, or other potential injuries.
- b. Chemical Resistant: Appropriate chemical resistant gloves are required for handling chemicals per recommendations contained in the applicable MSDS.
- c. Heat Resistant: Heat resistant gloves are required while handling materials that may present thermal injury to the hands.

- d. Anti-Vibration: Anti-vibration gloves are required when employees perform extended work with tools that have been identified as causing excessive vibration.

1.31.14 A shirt with full length sleeves rolled down and buttoned shall be worn by employees working on or near live parts.

1.31.15 Wear appropriate, long-sleeved apparel with the sleeves rolled down when:

- a. Rubber gloves are required
- b. Climbing poles
- c. Working in manholes or vaults
- d. Working with hot compounds, oils, metals, or open flames
- e. Working in or around poisonous vegetation
- f. Working with chemicals

1.31.16 Chaps

- a. Chaps are required to be worn when an employee operates a chain saw or is exposed when assisting in a cut.
- b. Leg protection shall cover the full length of each leg, to protect against contact with a moving chain saw. Chaps with wraparound legs are also recommended.
- c. Exceptions:
 - When employees are working from within the bucket truck of an aerial lift.
 - Qualified tree trimmers and line workers climbing and working from a tree or pole have the option of not using leg protection if it poses a greater hazard.

1.31.17 Flame Retardant Clothing

- a. Company approved flame retardant (FR) clothing shall be worn when employees control, operate, or work on energized equipment/lines and when distance and position will expose the employee to electric arc or flame hazards.
- b. FR clothing shall be worn as the outermost layer of clothing. Clothing worn beneath FR clothing shall be made of natural fiber material (cotton, wool, etc.).
- c. FR clothing shall be worn when employees measure voltages or test or ground electrical equipment or lines.
- d. FR clothing shall be worn when work on exposed energized equipment requires the use of rubber protective equipment or the use of insulated live line tools.
- e. FR clothing shall be worn where a hazard identification sign is posted.
- f. For enclosed space entry:
 - Entrant: required to wear FR clothing
 - Attendant: required to wear FR clothing

1.31.18 Respiratory Protection

- a. Employees shall be made aware of the respiratory hazards in their work areas, and shall use respirators which protect against the hazards. Respirator Standard Operating Procedures (RSOP's) or other appropriate procedures shall be followed.
- b. Employees shall wear respiratory protection only when there is an RSOP available for use that covers the work task. Employees shall follow the guidance contained within RSOP's.
- c. Persons shall only perform tasks requiring the use of respirators after a determination is made by health services personnel that they are physically able to perform the work and use the equipment. Respirator users' medical status shall be reviewed periodically for pass/fail.
- d. The employee using the respirator shall test for a proper seal before each use.

- e. Employees required in the function of their duties to wear respiratory protective devices will wear such devices with no interference from glasses, goggles, skull caps, or facial hair when any will interfere with a good facial seal.
- f. Respirators shall be cleaned, disinfected and inspected after each use. Deteriorating parts shall be replaced. Respirators for emergency use shall be inspected at least once a month. After inspection, cleaning, and necessary repair, respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators should be quickly accessible at all times. Respirators stored in lockers or tool boxes must be in carrying cases/cartons or their equivalent.
- g. Respirators shall be worn as they were originally designed, and modifications to respiratory equipment shall not be made.
- h. Training shall be provided to employees who are required to use respirators.

1.32 SCAFFOLDS

- 1.32.0 Scaffolds shall be erected on sound, rigid footing capable of carrying the maximum intended load without settling or displacement.
- 1.32.1 Scaffolds will be designed by a qualified person, constructed by competent persons and loaded according to the design, and capable of supporting without failure its own weight plus four times the maximum intended load.
- 1.32.2 Do not mix scaffold components from different manufacturers unless the components fit together without force and the structural integrity is maintained.
- 1.32.3 Scaffold planks shall be overlapped a minimum of twelve inches or secured from movement.
- 1.32.4 Scaffold planks shall extend over their end supports not less than six inches nor more than twelve inches.
- 1.32.5 All scaffolding and accessories shall have any defective parts immediately replaced or repaired.

1.32.6 An access ladder or equivalent safe access shall be provided.

1.32.7 Guardrails shall be installed at all working levels or fall arrest systems shall be implemented.

1.33 SPRAY PAINTING OPERATIONS

1.33.0 When spray painting in poorly ventilated enclosures, adequate ventilation will be provided.

1.33.1 Do not smoke or allow open flames within 20 feet of spray painting.

1.33.2 Spray painting pressure tanks will be equipped with:

- a. approved pressure relief valves and gauges, and
- b. a cutoff valve on the pressure tank outlet.

1.34 TOOLS

Inspect all tools daily before use.

1.34.0 Axes, Picks, and Sledge Hammers

- a. Do not use tools with cracked handles. Replace the handle or discard the tool. Do not use taped handles.
- b. Carry an axe with the head forward, by holding the handle next to the axe head. Do not carry any kind of axe or brush hook over your shoulder.
- c. On a truck, store axes and picks in a location where they cannot injure anyone.
- d. Make certain that you have enough room to swing an axe, pick, or sledge hammer.

1.34.1 Blocks—Safety Snaps

- a. Tackle block hooks shall be equipped with safety snaps.
- b. Securely fasten snatch blocks used overhead to prevent them from falling on persons below.

1.34.2 Chains

- a. Inspect chains prior to use.
- b. Avoid shock loading chains.
- c. Do not lay or run chains over unpadded sharp corners or edges.
- d. Do not kink or bolt a chain to shorten or lengthen it.
- e. Do not use a chain if inspection shows any of the following:
 - (1). a flaw
 - (2). an insecure weld
 - (3). a fracture
 - (4). another defect

1.34.3 Chain Saws

- a. Only trained and qualified employees shall be permitted to operate chain saws.
- b. Support power saws weighing more than 15 pounds by a separate line when you are working in trees.

Exception: When no supporting limb is available, such as during topping or removing operations.

- c. Maintain proper clearances from energized lines at all times.
- d. Power saws shall be equipped with:
 - (1). a control that will return the saw the idling speed when released, and
 - (2). a clutch adjusted so that the clutch will not engage the chain drive at idling speed.
- e. Be sure your footing is secure when you start a saw. When you are working from an aerial lift, you may drop start a saw outside the bucket if no one is in the area below. When you are a climber secured in a tree, you may drop start a saw if no one is in the area below.
- f. Start and operate power saw engines only when all co-workers are clear of the way.

- g. When employees are carrying a power saw up into a tree, the saw shall be turned off.
- h. Stop the power saw engine while you clean, refuel, adjust, or repair the saw or motor, unless the manufacturer's procedures require otherwise.
- i. Chain saw kickback devices shall not be removed or disabled.
- j. Chain saws shall be regularly inspected to see that they are clean, sharp, and properly tensioned.
- k. Both hands shall be kept firmly on a saw when it is in use; one hand on the handle bar, the other hand on the pistol grip.
- l. Saws shall not be left unattended with the engine running. When an employee carries a saw, the engine shall be off and the saw shall be carried with the blade to the rear.
- m. When a chain saw is being used, workers shall approach the operator of the saw from the front.
- n. Avoid using chain saws above shoulder level.
- o. Handle fuel safely. Use approved safety containers with flame arrestors. After refueling, wipe down before starting, and make sure the cap is in good repair and properly replaced.
- p. Chain guards shall be attached when saws are not in use.
- q. Chaps shall be worn when employees use saws. See Section 1.31.16.

1.34.4 Extension Cords

- a. Inspect cords, plugs and receptacles before each use.
- b. Three-wire extension cords used to supply portable electric tools (such as drills and saws) will be equipped with a separately insulated third wire for grounding.
- c. Do not splice or tape broken or defective cords. Tag and remove these cords from service until repaired or destroyed.
- d. Do not alter extension cords or their receptacles.

1.34.5 Generators, Vehicle mounted and Portable

Portable and vehicle-mounted generators used to supply cord- and plug-connected equipment will meet these requirements:

- a. The generator may only supply:
 - (1). Equipment located on the generator or vehicle.
 - (2). Cord- and plug-connected equipment through receptacles mounted on the generator or vehicle.
- b. Bond the following to the generator frame:
 - (1). Non-current-carrying metal parts of the equipment.
 - (2). Equipment grounding conductor terminals for the receptacles.
- c. When vehicle-mounted, bond the generator frame to the vehicle frame.
- d. Bond any neutral conductor to the generator frame.
- e. All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground-fault circuit interrupters for personnel protection. Specific-use generators for testing are exempt.

1.34.6 Grinding Tools-Abrasive

- a. All abrasive wheels shall be closely inspected and ring-tested before mounting to ensure they are free from cracks or other defects.
- b. Abrasive wheel machinery and portable power tools shall be used only if provided with safety guards, with the following exceptions:
 - (1). wheels used for internal work, within the work being ground.
 - (2). mounted wheels, used in portable operations, two inches or less in diameter.
- c. Work rests (bottom) shall be adjusted to be no more than 1/8 inch from the abrasive wheel.

- d. Fixed location machines shall not be used unless securely anchored to prevent movement during normal operation.
- e. A grinder shall not be used unless the distance between the tongue guard (top) and the abrasive wheel is less than 1/4 inch.
- f. Employees shall use eye/face protective shields when operating grinders.

1.34.7 Handlines

- a. Use only Company-provided handlines.
- b. Do not hang handlines and droplines on conductors, whether energized, de-energized, or grounded. Exceptions:
 - (1). While raising or lowering secondary services
 - (2). When working from de-energized substation buss work.
- c. When using handlines on poles, structures, or towers, keep the handline clear of all pedestrian and vehicular traffic.
- d. When performing aerial work, use a 1/2-inch handline, kept in a secure position.
- e. Store handlines out of the elements.
- f. For employees working in an energized area, the use of a handline between the ground and an insulated aerial bucket is strictly forbidden.

1.34.8 Hand Tools

- a. Always use tools suited to the job you are doing. Do not use makeshift tools.
- b. To prevent the hazard of falling tools, do not leave tools on ladders or at elevated places.
- c. Do not use defective and/or broken tools, or tools with broken, splintered, or loose handles.
 - Remove these tools from service and tag them until they are repaired or discarded.

- d. The worker's body shall be properly positioned, to prevent impacting a fixed object should the tool slip.
- e. Portable hand tools, electric tools, and equipment that exceed 50 volts shall be properly grounded and protected by an approved ground fault circuit interrupter.

- Exceptions: test equipment, double-insulated tools.

- f. Tools with sharp edges or points shall be stored in a safe manner.

1.34.9 Hoists-Ratchet, Lines and Cables

- a. Neither metal ratchet chain or cable hoists nor power pulls shall be attached to any energized conductor.
- b. Metallic hoisting lines shall not be taken above the level of any energized conductors, equipment, or parts, and shall not be used where they might accidentally contact any energized parts or equipment.
- c. Web type strap hoists shall not be considered insulating tools unless separated by an insulated link stick.

1.34.10 Insulated Hand Tools

All "insulated" hand tools rated for 1000 volts and below must have an ANSI approved 1000v insulated symbol.

- a. Visually inspect insulated hand tools prior to use.
- b. Do not modify insulated hand tools.
- c. Insulated hand tools are not intended to take the place of rubber gloves or proper isolate and insulate techniques.

1.34.11 Jacks, Hoists, and Load Binders

- a. Inspect jacks, hoists, and load binders prior to use.
- b. Center the jack properly under the load.
- c. Do not leave a jack standing under a load with the handle in the socket.

- d. Do not rely on jacks alone to support any load when you must work under it. Use blocking to support the load.
- e. Do not load hoists and load binders beyond their stated ratings.

1.34.12 Machine Guarding

Employees shall not use tools or equipment which are not properly guarded. Guards shall not be removed or made inoperative.

1.34.13 Pike Poles and Draw Bars

- a. Pike poles:
 - (1). Keep pike poles free from splinters.
 - (2). Keep spear points sharp and securely attached to the poles.
 - (3). Carry pike poles on the truck in a position that prevents injury from the points.
- b. Drawbars
 - (1). Inspect drawbars for bent or worn eyes, broken welds, and worn or missing safety chains.
 - (2). Equip drawbars with snap hooks.

1.34.14 Pneumatic and Hydraulic Tools

- a. Only trained and qualified workers shall be permitted to use pneumatic and hydraulic tools. Use hearing protection and other personal protective equipment as appropriate.
- b. All pneumatic and hydraulic tools and tool holders shall be inspected before use.
- c. A hydraulic or pneumatic tool will have a nonconductive hose when used where it could contact exposed energized equipment. Hydraulic and pneumatic tools, used where they may contact live parts, shall be designed and maintained for such use.
- d. Do not use any part of your body to locate or attempt to stop a pneumatic or hydraulic leak.
- e. Safety chains, or their equivalent (except threaded fittings), shall be applied across all pneumatic hose connections.

- f. A pneumatic tool will have an accumulator to collect moisture when used:
 - (1). on energized electrical lines or equipment, or
 - (2). where it could contact exposed energized equipment.

- g. All pneumatic hoses exceeding 1/2 inch (1.27 centimeter) inside diameter shall be used with a safety device at the source of supply or branch line to reduce pressure in case of hose failure.

- h. Release pressure before breaking connections unless you are using quick-acting, self-closing connectors. Do not kink hoses.

- i. All hydraulic tools will be equipped with a constant pressure switch that will shut off the flow of fluid when the pressure switch is released.

- j. Do not use hoses to hoist or lower any tools or equipment.

1.34.15 Powder-Actuated Tools

- a. Only trained and qualified employees shall be allowed to operate powder-actuated tools.
- b. All powder-actuated tools shall be visually inspected before use and all defects discovered before or during use shall be corrected.
- c. Tools shall not be loaded until immediately before use. Loaded tools shall not be left unattended.
- d. Prior to operation, the work area shall be reviewed and protected for any potential problems arising during operation.
- e. The operator shall implement proper work area protection to assure no unauthorized people enter the danger area.
- f. All charges shall be removed from the tool during non-use.
- g. All charges shall be stored in an approved or manufacturer-supplied container.

- h. The tool shall not be pointed horizontally to dispense misfires.
- i. The user shall be familiar and knowledgeable with the hangfire/misfire procedure.

1.34.16 Ropes - Inspection and Use

- a. Inspect all ropes and slings before use. Do not use rope made unsafe by damage or defects.
- b. Secure rope ends to prevent unraveling.
- c. Use climbing ropes when working aloft in trees. Ropes will have these characteristics:
 - (1). Minimum diameter of 1/2-inch
 - (2). Minimum breaking strength of 5400 pounds
- d. Employees on the ground or in contact with ground will treat a rope as energized if it is possible that the rope may come closer to exposed energized lines than the minimum clearance distances allow.

1.34.17 Sanding Machines

Belt sanding machines shall only be used with guards at each nip point where the sanding belt runs onto a pulley. The unused run of the sanding belt shall be shielded to prevent accidental contact.

1.34.18 Tapes and Rulers

Use only company-approved nonmetallic measuring tapes and rulers near energized equipment.

1.34.19 Torches and Furnaces

- a. Only employees trained and qualified in the use of torches and furnaces are permitted to operate them.
- b. Avoid lighting torches or furnaces within enclosures such as manholes, truck cabs, or empty barrels, or in atmospheres containing flammable vapors and/or gases.
 - Do not use a windbreak that is enclosed on all sides.

- c. When using torches or furnaces in manholes, provide adequate ventilation for employees and for combustion.
- d. Never leave a torch unattended or in a location where it could cause a fire.
- e. Preheat and dry ladles before use. Do not use cold or wet ladles when handling molten metals.

1.34.20 Tree Trimming Tools

- a. Tools shall be sent up in tool bags or attached to the hand line.
- b. Pruners or pole saws used aloft shall be hung securely in a vertical position. They shall not be hung on wires, cables, or any object that will not provide safe support.
- c. When not in use, tools shall be placed on the trucks in proper places or kept within the work zone.
- d. There shall be regular visual and mechanical inspection of tools and any tests of tools deemed necessary.
- e. Tools with sharp cutting edges, when not in use, shall have protective devices on their edges. They shall be stored separately from safety ropes, rubber goods, and slings.

1.34.21 Wire Rope and Wire Slings-Inspection

- Inspect wire slings and wire rope before use. Do not use the slings or rope if you find any of the following conditions:
- a. Distortion of strands and broken wires.
 - b. Wire rope with outside wires worn down to half their original diameter.
 - c. Wire rope showing signs of having been kinked or subjected to excessive strain.
 - d. Lack of an identification tag.

- 1.34.22 Wire Rope-Care
- a. Do not allow turns of wire rope to overlap on a drum or winch.
 - b. Do not run wire rope over pulleys in a way that will cause a reverse bend.
 - c. Ends of wire ropes shall be whipped or brazed.

1.35 WATER SAFETY

- 1.35.0 Employees working in locations where there is the possibility of falling into water shall wear an approved US Coast Guard life jacket or safety harness with life line attached.
- 1.35.1 Ring-type life preservers with line attached shall be placed in appropriate Company-owned locations where the possibility of falling into water exists.
- 1.35.2 Access ladders (portable or permanent) shall also be provided at such locations.

1.36 WELDING, CUTTING AND HEATING

- 1.36.0 Proper shielding, eye protection, and clothing to prevent exposure of personnel from welding hazards shall be used.
- 1.36.1 Workers or other persons adjacent to welding areas shall be protected from the welding flash by noncombustible or flameproof screens or shields or shall be required to wear appropriate goggles. The screens shall be so arranged that no serious restriction of ventilation exists.
- 1.36.2 Proper precautions (isolating welding and cutting, removing fire hazards and combustibles, or providing a fire watch) for fire prevention shall be taken in areas where welding or other "hot work" is being done.
- 1.36.3 Employees welding anywhere but in a shop shall be issued Hot Work Permits documenting that fire prevention and protection requirements have been implemented, indicating the date the hot work is to be performed, and identifying the objects upon which hot work is to be done.

- 1.36.4 When electrode holders are to be left unattended, the electrodes shall be removed and the holder placed or protected so it cannot make electrical contact with employees or conducting objects.
- 1.36.5 All arc welding, cutting cables, and terminals shall be completely insulated and be capable of handling the maximum current requirements for the job. There shall be no repairs or splices within ten feet of the electrode holder, except where splices are insulated equal to the original insulation of the cable. Defective cable shall be repaired or replaced. Arc welding cables with damaged insulation or exposed bare conductors shall not be used.
- 1.36.6 Fuel gas and oxygen hoses shall be easily distinguishable and shall not be interchangeable. Hoses shall be inspected at the beginning of each shift of use and shall be repaired or replaced if defective.
- 1.36.7 Welding or cutting fuel lines is permissible only under approved procedures.
- 1.36.8 Oxyacetylene cutting shall only be done by trained and qualified employees.

1.37 WELDING IN CONFINED OR ENCLOSED SPACES

- 1.37.0 All welding and cutting operations that are performed in confined or enclosed spaces (such as a tank, boiler, manhole, vault, or pressure vessel) shall be adequately ventilated to prevent the accumulation of toxic materials or a deficiency of oxygen.
- 1.37.1 In areas immediately dangerous to life and health (IDLH), air line respirators with escape air bottles or self-contained breathing equipment shall be used.
- 1.37.2 Where welding operations are performed in confined or enclosed spaces, and where welders and helpers are provided with air line respirators or self-contained breathing equipment, a worker shall be stationed on the outside of such confined or enclosed space to ensure the safety of those working within.
- 1.37.3 Oxygen shall never be used for ventilation.

1.38 WORK ZONE TRAFFIC PROTECTION

- 1.38.0 All work area protection and equipment used shall conform with applicable federal, state, and local requirements.
- 1.38.1 High visibility clothing shall be worn by employees exposed to traffic. Retro-reflective garments will be worn for night work. Flaggers, if necessary, will be illuminated.
- 1.38.2 Approved traffic control signs, cones, barricades, warning lights, and flags shall be placed before work commences. Exceptions: Emergency responses to protect the general public; short duration work as defined by the Manual on Uniform Traffic Control Devices.
- 1.38.3 Approved warning signs, barriers, guards, traffic cones, flags, work zone signs, and flashers shall be installed and properly maintained whenever hazards exist from moving or stationary machinery or vehicles, open excavations, construction operations, removal of manhole or handhole covers, or similar work.
- 1.38.4 Work areas not regulated by a state DOT (such as activities in O&M/Stations or Building Maintenance), shall use the appropriate cones, tape, signs, and other devices necessary to protect other employees or the public from injury.
- 1.38.5 Where safeguards are required, they shall be placed under the direction of the person in charge and shall be removed only under that person's direction.

*For additional guidance, refer to your applicable **Work Zone Traffic Control Pocket Reference Guide**.*

Section 2

GENERAL RULES FOR ALL ELECTRICAL EMPLOYEES

2.1 AERIAL BUCKETS, BASKETS, AND LIFTS

- 2.1.0 Only employees trained in the use of aerial buckets, baskets, or lifts will be allowed to use them.
- 2.1.1 Before buckets are uncradled, wheel chocks shall be in place and bucket truck outriggers, when provided, shall be lowered and shall rest on a suitable surface or blocking. See Section 9, Table 9A.
- 2.1.2 When in the bucket, employees shall wear an approved safety harness and shock absorbing lanyard attached to an approved attachment point.
- 2.1.3 Only one person is permitted in a single-type bucket.
- 2.1.4 Rated load limits of the equipment shall be observed.
- 2.1.5 The person in the bucket shall stand inside.
- 2.1.6 Belting off to an adjacent structure while working from an aerial lift or bucket truck is not permitted.
- 2.1.7 A worker may enter or exit an aerial lift in other than the cradled position (at heights above four feet) provided that fall protection such as guardrails or a fall arrest system is used while the worker moves between the lift and the working surface. Before any such transfer is made, including rescue operations, the employee shall be properly tied-off to an adequate support, the pole or structure prior to and in the direction of the transfer.

Note: additional safeguards, such as turning off the vehicle, shall be considered to prevent inadvertent movement.
- 2.1.8 Any aerial bucket equipment that does not have a current dielectric testing sticker will be designated as non-insulating and can not be used for rubber gloving voltages above 5 kV.

- 2.1.9 Work above conductors should be kept to a minimum. Contacting grounds or conductors with the boom or bucket shall be avoided.
- 2.1.10 To prevent a path to ground, no metallic or conducting material or device shall extend through or be hung over the lip of the bucket when employees are working on or near energized equipment.
- 2.1.11 When equipment is raised to or lowered from an elevated aerial bucket, a hand line shall be attached to a suitable structure and used for that purpose. Use of a hand line shall not compromise the insulating section of an aerial bucket while employees are working on energized equipment.
- 2.1.12 Riding in a bucket is not permitted for more than an average span on smooth ground, and only after booms have been lowered and cradled. In such cases the truck shall not exceed a walking pace.
- 2.1.13 Moving a vehicle while the boom is in the elevated position is prohibited.
- 2.1.14 All equipment designed to elevate personnel shall be tested daily through each of its normal operating movements by use of ground controls. No personnel shall enter a bucket until such tests are completed.
- 2.1.15 The manufacturer's operating manual shall be maintained in the vehicle.
- 2.1.16 Booms shall be secured as designed by the manufacture when stowed for travel.

2.2 BACKFEED

- 2.2.0 If the possibility of backfeed exists, the circuit shall be de-energized, tested dead, and grounded (where applicable) or worked as if it is energized.

2.3 CAPACITORS

- 2.3.0 Before work is performed on a capacitor or bank of capacitors, including tanks or supporting metal, the capacitors shall be:
- a. Removed from all known energy sources;

- b. Disconnected for five minutes;
- c. Short-circuited and grounded.

- 2.3.1 Before the units are handled, each unit in series-parallel capacitor banks shall be short-circuited between all terminals and the capacitor case or its rack. If the cases of capacitors are on ungrounded substation racks, the racks shall be bonded to ground.
- 2.3.2 If the cases of capacitors are on ungrounded substation racks, the racks must be grounded before employees work on capacitors.
- 2.3.3 Store capacitors in a discharged condition, with the terminals short circuited with wire.
- Capacitors not in service and not shorted with a wire are considered energized. Rubber gloves are required to be worn when capacitors considered energized are handled.
 - Capacitors not in service but shorted are not considered energized. Rubber gloves do not need to be worn when capacitors not considered energized are handled.

2.4 CURRENT TRANSFORMERS

- 2.4.0 Do not open the secondary side of a current transformer while the transformer is energized. If the primary of the current transformer cannot be de-energized, bridge the circuit so that the current transformer secondary will not be opened. Electrical measurements shall be taken to ensure the current circuit to be worked is shorted/bridged.

2.5 ENCLOSED SPACES

Preparation

- 2.5.0 A hazard evaluation shall be completed for all entries to enclosed spaces.
- 2.5.1 Before any entrance cover is removed, a check for hazardous atmospheres and for temperature or pressure differences that may present a hazard is required.

- 2.5.2 Before an employee enters any enclosed space, atmospheric testing shall be performed at various levels within the enclosed space. After an employee enters, additional sampling shall be taken high, low, in corners, in seams, near ducts, and at other potential sources of leakage. Continuous monitoring shall be in use any time an employee is in an enclosed space. Reevaluation shall be done after shift changes, breaks, or when conditions have changed.
- 2.5.3 Approved, calibrated instruments shall be used by trained employees prior to entry to test for oxygen deficiencies, carbon monoxide, hydrogen sulfide and flammable gases. Refer to Hazardous Atmosphere glossary definition, page 15.
- 2.5.4 Approved lifting devices shall be used to open or remove covers. Covers shall be placed clear of vehicular and pedestrian traffic and coned/ribboned off as necessary.
- 2.5.5 Appropriate barriers or attendant shall be used to prevent anyone from falling into the opening.
- 2.5.6 An attendant is required for enclosed space entry. The attendant shall be trained in first aid, cardiopulmonary resuscitation (CPR) and manhole/vault rescue procedures. The attendant may perform other duties outside the manhole or vault as long as the employees in the enclosed space are monitored. The attendant shall not enter the manhole/vault under any circumstances.
- 2.5.7 Flame shall not be used on or around manhole covers before testing for explosive atmospheres has been completed.
- 2.5.8 If flammable gases or vapors are detected or if an oxygen deficiency is found, forced air ventilation shall be used to maintain oxygen at a safe level and to prevent a hazardous concentration of flammable gases and vapors from accumulating. Continuous monitoring must also take place.
- 2.5.9 If the flammable gases or vapors and oxygen are found to be at safe levels, continuous monitoring can be used in lieu of forced air ventilation to ensure that no increase or enrichment in flammable gas or vapor concentration occurs.

- 2.5.10 Continuous power ventilation shall be used at all times when an employee is performing a lead splice, using an open flame, using solvents, or welding.
- 2.5.11 Continuous power ventilation shall be required in all instances where test monitoring indicates a hazardous work space contains or has the potential to contain a hazardous atmosphere and continuous power ventilation alone is sufficient to keep the space safe for entry.
- Entering
- 2.5.12 Ladders shall be used to enter or leave manholes or vaults. Racks or cables shall not be used as steps.
- 2.5.13 Upon entering a vault or manhole, workers shall visually inspect the interior for abnormal or hazardous conditions.
- 2.5.14 All employees entering an enclosed space shall be trained in the potential hazards, entry, and approved rescue procedures, and shall have rescue equipment in use.
- 2.5.15 Entrants shall wear an approved full body harness and shall be connected to the rescue device unless crew leader/chief or supervisory waiver is obtained. Authorization to work un-tethered shall be documented on the job brief form (see the company's Enclosed Space Procedure).

2.6 FALL PROTECTION (SEE ALSO SECTIONS 1.19, 1.20)

- 2.6.0 Single D ring body belts and "job made" lanyard pole straps are not acceptable for fall arrest.
- 2.6.1 For climbing wood poles, the fall protection equipment to be used will be the Company-approved fall protection device equipped with a second pole strap or retractable lanyard.
- a. At a minimum, employees assigned pole climbing duties will be required to wear enhanced fall protection ground to ground as prescribed

Note: Any exception for not using enhanced fall protection must be valid and must be documented on the job brief by the individual climbing and by the responsible crew leader/chief.

b. A fall arrest or work positioning system, such as a full body harness or tree saddle system, shall be worn when an employee works from any of the following:

- (1). Steel structures/towers
- (2). Station electrical equipment
- (3). Extension/hook ladders (properly tied off)
- (4). Trees

c. "Free climbing" is allowed in emergency situations for pole top rescue and for conditions which impede the use of enhanced fall protection as documented on the job brief.

2.6.2 Pole top, tree, and structure rescue techniques shall be practiced as required, but not less than once in a twelve month period. Recertification shall be completed while tethered from the pole top, tree, or structure.

2.7 GROUNDING OF CRANES AND MOBILE EQUIPMENT IN THE VICINITY OF CONDUCTORS

Applicability

- 2.7.0 Company-owned equipment and rented equipment under immediate control of the Company.
- 2.7.1 Cranes with booms, trucks with derricks, earth borers, backhoes, skylifts, loading equipment, diggers, and similar apparatus.
- 2.7.2 Caterpillar, metal-wheeled, and rubber-tired equipment.
- 2.7.3 Insulated aerial equipment rated below the circuit voltage level.

Exclusions

- 2.7.4 Aerial buckets when employees are performing routine street light maintenance beneath primary distribution circuits.
- 2.7.5 Street light maintenance trucks with the aerial portions insulated from the truck body.
- 2.7.6 Insulated aerial buckets when employees are trimming trees or doing distribution or transmission line work.

When to Ground

- 2.7.7 The ground connection shall be securely attached to such equipment upon approaching the work area and shall not be removed until the boom or any other substantial extension of the mobile equipment has been removed from the danger area.
- 2.7.8 The work area includes the vicinity of electrical conductors when employees are operating within falling, reaching, or maneuvering distance from conductors or systems energized at or above 50 volts.

Grounding

- 2.7.9 Mobile equipment shall be solidly grounded by means of appropriately sized copper cable where required. The cable shall be fastened to a securely attached metallic portion of the equipment, or shall be fastened to a grounding stud provided for the purpose at one end and an adequate ground at the other end.
- 2.7.10 Station grounds, water hydrants, metallic pipe water systems, the common neutral wire, or steel tower earth footings provide grounds that are likely to be adequate in the order of preference listed. When such grounds are not available, ground rods temporarily driven shall be used to secure a low resistance ground.

Vehicles Operating near Energized Equipment

- 2.7.11 Effectively ground or barricade a boom truck, crane, or aerial basket truck that does not have an insulated boom when using it near energized lines or equipment. If a trailer is connected, ground or barricade it separately, in the same manner as the truck or crane.
- 2.7.12 In all cases, consider the truck or crane to be energized, and avoid contact.
- 2.7.13 Employees shall keep clear of equipment located within minimum approach distances of primary conductors.
- 2.7.14 A safety observer may also be necessary where mechanical equipment operates near energized lines or equipment.
- a. When operating mechanical equipment, maintain minimum approach distances from exposed, energized lines and equipment.

- b. If an employee (operator) determines that it is difficult to accurately determine the distance between the equipment (minimum approach distances) and the energized parts, a qualified co-worker will act as safety observer, observe the clearance, and promptly warn the operator when the equipment approaches the minimum approach distance.

Note: Appendix D applies only to New England based operations personnel only.

2.8 LIVE LINE TOOLS

Care and Inspection

- 2.8.0 Each live line tool such as, but not limited to, hot sticks, switch sticks, and telescopic sticks, shall be wiped clean and visually inspected each day before use.
- 2.8.1 Remove from service and tag any live line tool found to be defective or contaminated. Notify the Engineering Laboratory.
- 2.8.2 Protect all fuse pullers, switch sticks, hot sticks, and insulated sticks from the weather.
- 2.8.3 Live line tools used for primary protection must be removed from service for inspection and testing annually in accordance with Electric Operating Procedures.
- 2.8.4 When live line tools are to be used, they shall be designed and tested for the specific use.

General Use

- 2.8.5 Live line tools and equipment shall be used only by persons thoroughly trained in their use for the purpose, and on work, for which they are authorized.
- 2.8.6 Manufacturer's ratings for live line tools shall not be exceeded.
- 2.8.7 Tools and equipment shall be stored, maintained, tested in accordance with Electric Operating Procedures and transported according to established practices required to retain their mechanical and dielectric strength.

- 2.8.8 Live line tools shall be of sufficient length so minimum clearances can be maintained.

2.9 MATERIAL STORAGE AND MATERIAL HANDLING IN ENERGIZED AREAS

- 2.9.0 Material shall not be stored within general clearances from energized lines and equipment. (See applicable clearance tables).
- Storage areas within substations shall be identified per the Substation Work Area Identification procedure.

2.9.1 Handling Materials

- a. Materials such as tools, connectors, etc., shall be raised or lowered by means of hand lines or tool bags. Care shall be taken to prevent hand lines from being caught on passing vehicles.
- b. Broken insulators, broken glass, and other sharp objects that may cut fingers or puncture rubber gloves shall be handled separately in tool bags and emptied in a safe place.

- 2.9.2 When hoisting equipment is used (excluding insulated material handling buckets) by qualified electrical workers near energized high voltage lines or equipment and comes closer than the OSHA general construction clearances (for New England, see the tables at the end of Section 2; for New York, see Appendix A), the vehicle must be grounded and crew members shall wear FR clothing and rubber gloves until the load is in position. The operators of the equipment shall use one or more of the following methods to protect themselves from the hazards of accidental energization of the device:

- Wear Class 2 rubber gloves when operating equipment from the ground.
- Use rubber insulating mats when operating equipment from the ground.
- Remain at the same potential as the equipment by being off the ground and on the equipment (Rubber gloves are not required when using this method).

2.10 PERSONAL PROTECTIVE GROUNDS

Preparation

- 2.10.0 Ensure appropriately-rated test devices are available and used, and clearances are maintained.
- Refer to applicable distribution and transmission grounding EOP's.
- 2.10.1 Use only a company approved live line tool, such as a shotgun stick, when attaching and removing grounds.
- 2.10.2 Employees applying grounds shall make sure the connection points are clean.

Application

- 2.10.3 Two qualified and authorized employees shall be assigned to install and remove protective short circuiting and grounding equipment required for the protection of personnel working on de-energized conductors or equipment.
- 2.10.4 Protective grounds shall be placed to limit step or touch potential.
- 2.10.5 Once the apparatus tests de-energized, the apparatus shall be grounded at the point of test with a grounding device approved for the location and apparatus.
- 2.10.6 The grounds shall be attached at the point of testing before any of the workers involved have left the place of testing. Should the workers leave the place of testing before grounding, then the testing procedure must be repeated before grounds are attached.
- 2.10.7 If the installation of a ground on lines or equipment is impractical, or if the conditions resulting from the installation of a ground would present greater hazards than working without grounds, the line or equipment may be treated as de-energized provided all of the following conditions are met:
- a. lines and equipment have been de-energized in accordance with the Clearance and Control procedure;
 - b. there is no possibility of contact with another energized source;

- c. the hazard of induced voltage is not present.

- 2.10.8 When routine job-related testing is done under the Clearance & Control rules, the apparatus shall remain grounded at all times, except for the duration of the actual test, or the apparatus shall be electrically disconnected from the system in such a way that the tags and grounds are left in place with cables disconnected and tied back, or Doble Links opened, or cubicle-type switchgear completely drawn, etc., to physically isolate the apparatus from the system.
- If an apparatus is not electrically disconnected from the system, test leads shall be attached to the apparatus before the grounding device is removed from the apparatus and, at the completion of the test, the grounding device shall be reattached before the test lead is moved or removed.

2.11 RUBBER GLOVES, SLEEVES, AND BLANKETS

Testing

- 2.11.0 Rubber gloves, rubber sleeves, and blankets shall be tested in accordance with approved Electric Operating Procedures established for that purpose.
- 2.11.1 Prior to use, verify the test date on rubber protective equipment.

Rubber Glove Inspection

- 2.11.2 Rubber gloves shall be inspected as follows:
- Inspect each glove for cuts or weak spots and perform appropriate air tests. Gloves which show weak spots or air leakage in this inspection or are suspected of being damaged shall be immediately removed from service.
 - Inspect for damage before each day's use and immediately following any incident that can reasonably be suspected of having caused damage.
 - Rubber gloves shall also be air-tested before each shift and following a suspected damage event.
 - Return defective rubber gloves to the testing laboratory.

Rubber Sleeve Inspection

- 2.11.3 Rubber sleeves shall be inspected before each day's use. Sleeves which show cuts or weak spots shall not be used for voltage protection and shall be replaced immediately.

Rubber Blanket Inspection

- 2.11.4 Rubber blankets shall be inspected before each day's use. Blankets which show cuts or weak spots shall not be used for voltage protection.

Care

- 2.11.5 Rubber gloves, sleeves, and blankets shall not be left in sunlight or in ozone-producing atmospheres for any time greater than required for use.
- 2.11.6 When not in use, rubber gloves and sleeves shall be stored in approved protective bags with the cuffs down. Blankets shall be protected from injurious substances and conditions.
- 2.11.7 Rubber gloves, sleeves, and blankets shall be kept free of all contact with petroleum products, and if so inadvertently contaminated, shall be replaced or cleaned immediately.
- 2.11.8 Rubber protective equipment shall not be bound or held with any electrical tape.
- 2.11.9 Employees shall not wear rings while using rubber gloves when the size or shape of the ring could result in stress or damage to the rubber gloves.

General

- 2.11.10 Leather protectors shall be worn with rubber gloves at all times except as follows:
- Protective gloves need not be used with Class 0 rubber gloves under limited use conditions where small equipment and parts manipulation necessitates unusually high finger dexterity.
 - The Class 0 rubber gloves must then be inspected and air-tested before re-using.

- 2.11.11 Leather protectors shall not be used as work gloves.

- 2.11.12 General work gloves shall not be used as rubber glove protectors.

- 2.11.13 Rubber gloves shall be worn unless the circuit is tested, de-energized, and grounded. (See rule 2.11.20 for exceptions)

- 2.11.14 The ratings for rubber protective equipment are as follows:

Class 0—up to 1 kV
Class 1—up to 5 kV
Class 2—up to 15 kV
Class 3—up to 26.5 kV

- 2.11.15 Where upper arm contact with exposed energized sources above 600 volts is likely, rubber sleeves shall be worn. Class 2 rubber gloves and sleeves shall be worn on a pole or structure or in an elevated position while employees work on or within minimum approach distance of conductors or equipment which is, or may become, energized at primary voltage.

Note: Full-length shirt sleeves need not be rolled down and buttoned when rubber sleeves are worn. Short sleeve FR shirts are permitted when wearing rubber sleeves.

- 2.11.16 In situations requiring rubber gloves, gloves shall be donned before the employee leaves the ground and shall be worn until the employee returns to the ground (commonly referred to as "ground to ground" or "cradle to cradle").

- a. You will not remove gloves and protectors until you reach the ground, unless your work requires an exchange between Class 0 and Class 2 rubber gloves.
- b. To exchange rubber gloves, the rubber glove user will be at a fixed position on the pole, structure, or aerial device and not within reaching or falling distance of energized conductors or equipment. When working on a multi-person crew, the glove user will communicate to the qualified person on the ground (who is trained and approved to use Class 0 and/or Class 2 rubber gloves and trained in and approved to do the work being performed) that the exchange is occurring.

2.11.17 Appropriate Rubber Gloves Shall Be Worn:

- a. By persons placing insulated protective equipment (blankets, line hose, insulator hoods, etc.) on all wires or energized parts (secondary, services, telephone, guys, etc.) which are or might become energized from 50 volts to 15 kilovolts, or if any such wires or parts will be within the reaching distance of any part of the worker while in the working position.
- b. By all persons operating the controls (from the ground position) of equipment which might contact energized conductors. Appropriate rubber gloves shall also be worn by all persons who might touch the vehicle or the equipment during such operations.
- c. By all persons manually opening, closing, or decoupling gang-operated switches.
- d. By all persons operating disconnects or cut-outs with a switch stick.
- e. By persons using testing devices equipped with insulating handles on energized parts, or by persons using an insulated shotgun stick or any other insulated tool while switching.
- f. By persons installing and removing protective grounds on de-energized lines or equipment.
- g. By persons on the ground handling any ground connection of equipment (such as lightning arrestors, transformers, metering ground conductors, etc.) which is or might become energized.
- h. By persons on the ground who might contact a conductor that is being strung in or pulled out near other energized conductors.
- i. By persons handling conductive objects being installed or removed which might contact energized conductors or equipment.
- j. By persons opening or unlocking a padmount transformer, submersible vault, and/or switchgear; they shall wear Class 2 gloves.
- k. By persons checking circuits or equipment during or following electrical, wind, or ice storms; investigating and checking high

voltage or electric shock complaints; or involved in any other unusual situation until the voltage has been determined.

- l. When employees work on meters, meter sockets, and metering equipment with exposed conductors or components energized at levels over 50 volts.
- m. When employees operate test equipment attached to ungrounded system apparatus or when employees attach or remove test leads to ungrounded system apparatus.

2.11.18 All persons digging with jackhammers, bars, or other hand tools in areas where the exact location of underground electric conductors is unknown shall use Class 2 rubber gloves and protectors.

2.11.19 If inclement weather develops after rubber gloving work has begun on energized conductors or on equipment at 5kV or greater, the job must be made safe by one of the following methods: de-energize and ground the circuit; or use hot stick method to make safe in accordance with crew chief/leader discretion.

- IBEW Local 97 employees refer to appropriate “rubber gloving” memorandum of understanding, which requires only the de-energizing and grounding of the circuit.

2.11.20 Rubber Glove Exceptions

You are not required to wear rubber gloves when:

- a. Replacing plug fuses on installations energized at 300 volts or less.
- b. Replacing cartridge fuses on circuits energized at less than 600 volts. In this case, use approved fuse pullers.
- c. Testing relays or control circuits energized at 300 volts or less, when insulated tools and/or test equipment are used.
- d. Performing work on transformer-rated metering circuits, relay circuits, or control circuits energized at 300 volts or less, if you:
 - have covered up energized, exposed equipment, and are insulated from the ground, or
 - use insulated tools.

- e. You are working in an equipotential zone.
- f. You are working on a clean pole with no possibility for induced voltage or energization by a foreign wire.
 - Includes climbing a transmission structure.
- g. You are working with de-energized cable terminations, stress cones, and similar devices which require a high degree of manual dexterity in the application of tape insulation, tape may be applied bare handed provided the following conditions are adhered to:
 - (1). Secondaries and primaries are covered with rubber protective equipment to a degree that accidental contact is improbable.
 - (2). Taping is done from a position that excludes any possibility of contact with exposed energized equipment.
- h. When work is exclusive to substation, telecom, and relay disciplines, and when work is on equipment like switchboards, etc., in confined areas where it is not possible to use rubber gloves, other protective equipment such as rubber blankets or guards shall be used.
 - At control panels, etc., where the phase-to-phase voltage is below 300 volts and where the limited work space or the delicate nature of the task is such that work cannot be satisfactorily performed wearing rubber gloves, insulating and/or isolating methods may be substituted.
 - Insulating materials and/or isolation methods used in the manufacture of these types of electrical devices and equipment may be considered an insulating or isolating method for purposes of this section when energized below 300 volts or when de-energized but not grounded.
 - Handling properly insulated extension cords and appliance cords energized at not more than 600 volts.
- i. Operating test equipment that has a constant connection to system ground during testing.

- j. When Transmission Line Services performs "hot stick" work on transmission lines at 69 KV or greater and no other energized wires are on the pole or structure below the worker.
- k. When Transmission Line Services performs work on a structure carrying only energized conductors (115KV and above) and the Live Line Techniques are not being employed. While performing these activities, the worker shall utilize conductive clothing such as conductive gloves, conductive boots, leg straps and/or any other applicable conductive clothing
- l. When performing "hot stick" work in accordance with the IBEW LU 97 memorandum of agreement.

2.11.21 Exceptions for specific jobs are permitted only with the dated, written approval of a division director or operations manager.

2.12 SERIES STREET LIGHTING

- 2.12.0 A series loop shall not be opened unless the street lighting transformer is de-energized and isolated, or unless the loop is bridged to avoid an open circuit.
- 2.12.1 Series street lighting circuits shall be treated as distribution circuits.
- 2.12.2 When work is to be done on series street lighting circuits, the same precautions in opening switches, tagging circuits, and the use of rubber protective equipment shall be observed as on any other distribution circuit.
- 2.12.3 Series street light conductors which are or might become energized shall not be opened without first applying an approved jumper.

2.13 STRUCTURES

General

- 2.13.0 "Structures" is a general term intended in this section to include, as applicable, such facilities as single wood poles, multiple pole structures, towers, steel frame work, etc.
- 2.13.1 Work may be performed on static (shield) wires built over energized transmission circuits, on a case by case basis, the

following conditions must be met; however, the preferred method is to perform the work de-energized.

- a. Proper working clearances shall be maintained.
- b. Control of the static (shield) wire is maintained during any movement or repair.
- c. Grounding (bonding) of static wire to the structure will be maintained using proper grounding leads and clamps.
- d. Verify that the static wire is safe to work on through visual inspection; where static is contained in shoes, clamps, deadends, etc., take protective measures to ensure continuity and integrity of the static wire.
- e. Obtain a non-reclose assurance.

Climbing

- 2.13.2 Before climbing any pole or structure, an employee shall understand the circuits, voltage, and apparatus on the pole or structure, and shall be satisfied of the following:
 - a. What work is to be done and the procedure to be followed.
 - b. That the worker has a sufficient amount of each kind of protective equipment on hand to thoroughly protect the worker in his working position from conductors, parts or equipment which may cause electric shock.
- 2.13.3 If more than one person is to climb structure, the first worker shall climb to a given position and be secured before the second worker shall start to climb. When descending, comparable precautions shall be taken.
- 2.13.4 Precautions shall be taken to protect workers below when climbing or descending.
- 2.13.5 The following are examples of the safe practices to be followed in work on structures, along with all other safe work procedures which a specific job may require:
 - a. Before climbing, employees shall satisfy themselves that a pole or structure is strong enough to support them safely.

- b. Structures that are questionable shall be braced or supported before climbing, then securely guyed.
- c. Existing anchor guys shall be checked before climbing structures.
- d. All unguyed dead-end poles shall be securely guyed, braced or supported before work is started.
- e. Before working on a structure on which the stress is to be substantially changed, adequate guying (preferably in four directions), bracing, lashing or support shall exist.

2.13.6 Ground workers shall maintain a safe distance from the base of the structure on which work is being performed, except when serving workers on the structures.

2.13.7 Prevent the dropping or dislodging of objects that endanger the safety of ground personnel in the vicinity.

2.13.8 Do not throw materials and tools upward to employees working aloft. Use a handline or handline and canvas bucket to raise and lower these items.

- You may, however, drop material that cannot be lowered safely after you have determined no persons or traffic are within the danger zone.

2.14 TESTING AND TEST FACILITIES (HIGH VOLTAGE AND HIGH POWER TESTING)

2.14.0 Permanent test areas shall be guarded with walls, fences, or barriers to keep qualified and unqualified persons out.

2.14.1 Temporary test areas shall be guarded by a barricade or waist high barrier of high visibility colored tape which limits access to the test site. To warn the general public against entering, safety signs shall be attached to the tape indicating the hazard. Additional observers may be required at the test site, or at remote boundaries of the test so the area can be monitored.

- Refer to EOP 499.10.2 for temporary testing and work area identification in substations.

- 2.14.2 For field testing, an observer may be substituted for guarding the test area provided the entire test area is visible. Work area protection must still be maintained in the work area.
- 2.14.3 Temporary barrier tape and signs shall be removed when work is completed.
- 2.14.4 Test equipment shall be guarded so that test personnel do not accidentally contact energized parts.
- 2.14.5 Employees shall maintain clearances from energized parts under test and from exposed energized parts of test equipment, or energized parts shall be adequately guarded to prevent accidental contact by employees in the test area.
- 2.14.6 All conductive parts accessible to the tester shall be maintained at ground potential except for those which are guarded. Any ungrounded terminals of the equipment under test shall be treated as energized.
- 2.14.7 When grounding is impractical because of the unavailability of a ground source, such as when testing new equipment in a storage yard, the equipment shall be considered energized and proper work clearances shall be maintained during the test.
- 2.14.8 When the test area is entered, the test equipment shall be tested de-energized and a ground shall be applied to the high voltage terminal. On high capacitance equipment, a resistive discharge is required before grounding. Exception: Doble Power Factor test equipment (non-capacitance).
- 2.14.9 Apply visible grounds, either automatically or manually, using properly insulated tools, to the high-voltage circuits:
- after they are de-energized, and
 - before work is performed on the circuit, item, or apparatus under test.
- 2.14.10 Solidly connect common ground connections to the test equipment and the apparatus under test.
- 2.14.11 An isolated ground return conductor shall be used in high power testing to prevent hazardous step potentials.

- 2.14.12 When testing devices cannot be used with the supply cord ground because of safety or measurement considerations, equivalent protection, such as the use of an isolation transformer or other suitable method, shall be incorporated.
- 2.14.13 When you can not ground the test equipment through the equipment grounding conductor in the power cord, because of increased hazards to test personnel or the prevention of satisfactory measurements, provide an equivalent safety ground.
- Clearly indicate this condition in the test set-up.
- 2.14.14 If a test trailer or test vehicle is used in field testing its chassis shall be grounded. It shall be grounded and bonded to prevent touch potentials.
- 2.14.15 Where practical, control wiring, test leads, and cables running from a test area shall be contained to the test area. Where they must run outside of the test area, they shall be contained in a grounded metallic-sheathed enclosure, or otherwise protected, and shall terminate in a grounded metallic enclosure to prevent contact. Signal, control, grounding, and power cables shall be kept separate.
- 2.14.16 If employees must remain near equipment being tested or otherwise exposed, an additional employee test observer shall be present and shall be capable of de-energizing the test circuit immediately.
- 2.14.17 Before each series of tests, the test operator shall perform a safety check to ensure:
- a. Barriers and guards are in workable condition and properly placed;
 - b. System test status signals, if used, are in operable condition;
 - c. Test power disconnects are clearly marked and readily available in an emergency;
 - d. Ground connections are clearly identifiable;
 - e. Personal protective equipment is provided and used as required;
 - f. Signal, ground, and power cables are properly separated;

g. All personnel are clear of hazards.

2.14.18 When entering the test area after it has been de-energized:

- a. Test and place a ground on the high-voltage terminal and any other exposed terminals.
- b. Discharge high-capacitance equipment or apparatus through a resistor rated for the available energy.
- c. After the stored energy drops to a level at which it is safe to do so, apply direct ground to the exposed terminals.

2.15 TOOLS AND EQUIPMENT

2.15.0 Portable and vehicle-mounted generators used to supply cord and plug-connected equipment shall:

- a. Supply equipment connected through receptacles mounted on the vehicle or the generator;
- b. Have non-current carrying (grounded) parts of equipment and receptacles bonded to the generator frame;
- c. Have the frame of the generator bonded to the frame of the vehicle (vehicle mounted generators only).
- d. Have all neutral conductors bonded to the generator frame.

2.15.1 Hydraulic and pneumatic tools, used where they may contact live parts, shall be designed and maintained for such use.

2.15.2 Approved fuse pullers shall be used when employees remove or install cartridge type fuses.

2.16 TRAINING

2.16.0 Employees shall be trained in and familiar with the safety related work practices, safety procedures, and other safety requirements of this manual that pertain to the respective job assignments.

2.16.1 Employees shall be trained and shall be familiar with any other safety practices, including applicable emergency procedures, that are related to their work and necessary for their safety.

2.16.2 Employees shall annually practice pole top, bucket, electric manhole, tree, and structure rescue, as required.

2.16.3 “Qualified employees” will be trained and competent to perform all of the following tasks:

- a. Distinguish exposed live parts from other parts of electric equipment.
- b. Determine the nominal voltage of exposed live parts and know the applicable minimum approach distances (for New England, see the tables at the end of Section 2; for New York, see Appendix A).
- c. Use special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electric equipment.

2.17 WORK AREA IDENTIFICATION

2.17.0 Barrier tape, rope, flags, or suitable barriers constructed of rigid material shall be used to identify the limits of the safe work area.

2.17.1 Safe work areas at floor or ground level shall be established with markings or barriers placed no less than three feet or more than five feet above floor or grade level. Safe entry into work areas shall be identified by the use of yellow flags.

2.17.2 At elevated work positions, employees shall place and remove markings or barriers without violating safe minimum working clearances for the voltage involved, or by using approved insulated tools.

2.17.3 For work on transmission circuits, red tape shall be placed around any energized pole, pole structure, or tower adjacent to the de-energized line on which work is to be done.

2.17.4 When one circuit of a double circuit pole or tower line is de-energized for work, a red or orange flag shall be placed on the energized side of the pole or tower nine feet below the lowest energized conductor. In addition, on the side toward the energized circuit a red or orange flag shall be placed at each arm level as employees work on them, or pass them, on the tower cage.

2.18 WORKING ON OR NEAR ENERGIZED/ ELECTRICAL EQUIPMENT

- 2.18.0 Only qualified electrical workers may work on or near energized lines or equipment, or in areas containing uninsulated, unguarded energized lines or equipment greater than 50 volts.
- 2.18.1 At least two qualified electrical workers shall be present when exposed to lines or equipment with voltages greater than 600 volts.

Exceptions:

- Two employees are not required for routine switching;
- Two employees are not required for work with live line tools if the employee is positioned so that he or she is neither within reach of nor otherwise exposed to contact with energize parts;
- Two employees are not required for emergency repairs to the extent necessary to safeguard the public.

- 2.18.2 No employee shall approach or take any conductive object closer to exposed, energized parts than the distances listed in the tables at the end of this section or in Appendix A.

Note: New York IBEW Local 97 employees shall comply with the Minimum Approach Distance Tables as stated in Appendix A.

- 2.18.3 When you must lay energized cable on the ground for emergency use, properly barricade connections and terminations.
- a. Use support bridging to prevent damage to cable and injury to personnel when laying energized cable across walkways or driveways.
- 2.18.4 If equipment could become energized, the operation shall comply with at least one of the following:
- a. The energized lines exposed to contact shall be covered with portable insulating equipment that will withstand the type of contact that might be made during the operation; or
- b. The equipment shall be insulated for the voltage involved. The equipment shall be positioned so that uninsulated portions

cannot approach the lines or equipment any closer than the minimum approach distances; or

- c. Each employee shall be protected from hazards that might arise from equipment contact with energized lines. The measures used shall ensure that employees will not be exposed to hazardous differences in potential by:
- (1). Using the best available ground to minimize the time the line remains energized;
 - (2). Bonding equipment together to minimize potential differences;
 - (3). Providing ground mats to extend areas of equal potential;
 - (4). Employing portable insulating protective equipment or barricades to guard against any remaining hazardous potential differences.

- 2.18.5 Insulating gloves or insulating gloves and sleeves shall be used to work within minimum approach distances.

Class 0—up to 1 kV
Class 1—up to 5 kV
Class 2—up to 15 kV
Class 3—up to 26.5 kV

- 2.18.6 Each employee shall work in a position and take necessary precautions, to the best extent possible, so that a slip or shock will not bring the employee's body into contact with an exposed part.

- 2.18.7 When placing or removing protective devices on or around energized equipment,

- wear appropriate rubber gloves and sleeves where applicable
- use live line/hot sticks, where applicable.

- 2.18.8 Avoid touching or leaning against protective devices covering energized lines or apparatus.

- 2.18.9 Securely fasten all protective devices so that they will not slip out of place.

- 2.18.10 Provide insulated barriers and line shields with cords or handles suitable for safely placing these devices in position.

- 2.18.11 When work is performed on or near energized equipment, employees shall not wear clothing which will contribute to burn injuries.
- 2.18.12 Acetate, nylon, rayon, and polyester shall not be worn. Where exposure exists to the hazards of electric arc or flame, company-issued flame retardant clothing appropriate for the hazard shall be worn. Only clothing made from natural fibers shall be worn beneath flame retardant clothing.
- 2.18.13 All exposed conductive articles, including eyeglasses, jewelry, etc., shall be removed or rendered nonconductive.
- 2.18.14 Wear an approved electric flash ensemble when performing switching and/or grounding in designated areas of indoor substations.
- 2.18.15 Face shields and safety glasses shall be worn by an employee working on any piece of equipment where a risk assessment deems them necessary.
- 2.18.16 For employees installing or removing fuses at 300 volts or greater, insulating tools or insulated gloves rated for the appropriate voltage are required.
- 2.18.17 When you work on fuses and disconnects, position yourself to prevent:
- Injury from flying debris in the event of a blown fuse.
 - The switch being thrown back against your body if a fuse blows.
- 2.18.18 Use tools or gloves rated for the voltage when fuses must be installed or removed with:
- one or both terminals energized at more than 300 volts, or
 - exposed parts energized at more than 50 volts.
- 2.18.19 When installing an expulsion-type fuse with one or both terminals energized at more than 300 volts:
- use a tool rated for the voltage, and

- stay clear of the exhaust path of the fuse barrel.

- 2.18.20 Non-current-carrying metal parts of equipment like transformer cases, pad mount switches, and circuit breaker housings shall be treated as energized until inspected to prove that they are grounded. Exception: secondary voltages.
- 2.18.21 Employees shall inspect the ground connection of energized equipment before considering the equipment's case or non-current-carrying parts to be de-energized.
- 2.18.22 When work is done by an employee in any department in the vicinity of exposed circuits or parts* which are or might become energized, the person in charge of the work shall see that sufficient safe distance from such equipment is maintained, and if necessary, that substantial barriers** are erected.

** Exposed circuits or parts mean any lines or equipment having energized parts not shielded by grounded metal which are towards the working position of the employee in such a manner that grounded parts of the equipment do not in themselves provide an adequate barrier.*

*** Substantial barriers shall be sufficiently strong and supported rigidly and securely enough to prevent them from being displaced or dangerously deflected by a person slipping or falling against them.*

- 2.18.23 Appropriate rated rubber gloves, EH work boots, and eye or face protection shall be worn by employees unlocking electrical equipment (padmount transformers, meters) unless the equipment is known to be de-energized and grounded between that location and all possible sources of energy, including backfeed. Continue to wear the appropriate rubber gloves until the equipment is re-locked or de-energized and grounded.
- 2.18.24 Any work on circuits or parts which are or might become energized above 15 kV (nominal phase to phase) shall be done only:
- a. After obtaining protection in accordance with the Company Clearance and Control procedures; or
 - b. By the use of hot stick tools.

Tables 2A — 2D

MINIMUM APPROACH DISTANCES

Tables 2A through 2D are the Minimum Approach Distance Tables for New England based employees only. Minimum Approach Distance Tables for New York IBEW, LU 97 based employees are located in Appendix A.

Table 2A

MINIMUM APPROACH DISTANCES

No employee shall approach or take any conductive object closer to exposed, energized parts than the distances listed below: (For phase to ground and phase to phase clearance:)

Minimum Approach Distance: The closest point of approach to energized lines or equipment by a qualified employee, or by any other conductive object, without the use of insulating gloves, sleeves or portable protective devices, shall be in accordance with the table below.

Reaching Distance: The distance that an employee's hand or any other body part and the end of any uninsulated tool being handled can reach while working, using a normal range of movement required by the work. (For example, not stretching, leaning or reaching in excess of what is required by work).

Nominal Voltage ¹	D I S T A N C E	
	Phase to Ground ²	Phase to Phase
.05 – 1.0 kV	Avoid contact	Avoid contact
1.1 – 15.0 kV	2 feet, 1 inch	2 feet, 2 inches
15.1 – 36.0 kV	2 feet, 4 inches	2 feet, 7 inches
36.1 – 46.0 kV	2 feet, 7 inches	2 feet, 10 inches
46.1 – 72.5 kV	3 feet	3 feet, 6 inches
72.6 – 121 kV	3 feet, 2 inches	4 feet, 3 inches
138 – 145 kV	3 feet, 7 inches	4 feet, 11 inches
161 – 169 kV	4 feet	5 feet, 8 inches
230 – 242 kV	5 feet, 3 inches	7 feet, 6 inches
345 – 362 kV	8 feet, 6 inches	12 feet, 6 inches
500 – 550 kV	11 feet, 3 inches	18 feet, 1 inch
765 – 800 kV	14 feet, 11 inches	26 feet

¹Nominal voltage in kilovolts phase-to-phase.

²The minimum approach distances listed above are phase to ground clearances for the protection of personnel working on or near energized equipment, e.g., when testing dead or the application of protective grounds. Note: Greater distances may be required for phase to phase exposure.

³From 0-15,000 volts, work may be performed on or within reaching distance of energized circuits and equipment while employees are wearing appropriate, approved rubber goods and/or using portable insulating protective equipment as necessary.

Table 2B

MINIMUM WORKING APPROACH DISTANCES FOR VEHICULAR AND MECHANICAL EQUIPMENT

<u>Voltage</u>	<u>OSHA Phase to Ground</u>	<u>General¹</u>
.05 – 1.0 kV	Avoid Contact	Avoid Contact
1.1 – 15.0 kV	2 feet 1 inch	10 feet
15.1 – 36.0 kV	2 feet 4 inches	10 feet
36.1 – 46.0 kV	2 feet 7 inches	10 feet
46.1 – 72.5 kV	3 feet	10 ft to 10 ft 8 in
72.6 – 121 kV	3 feet 2 inches	10 ft 8 in to 12 ft 4 in
138 – 145 kV	3 feet 7 inches	12 ft 8 in to 13 feet
161 – 169 kV	4 feet	13 ft 8 in to 14 feet
230 – 242 kV	5 feet 3 inches	15 feet to 16 feet
345 – 362 kV	8 feet 6 inches	24 ft 8 in to 25 ft 4 in
500 – 550 kV	11 feet 3 inches	37 ft 8 in to 41 ft 4 in
765 – 800 kV	14 feet 11 inches	59 ft 8 in to 61 ft 4 in

¹General clearances are for unqualified equipment operators.
Up to 50 kV, the approach distance is 10 feet. Thereafter,
add 4 inches of approach distance for every 10 kV.

Table 2C

DC MINIMUM CLEARANCE FROM LIVE PARTS

<u>Maximum Line to Ground Voltage in Kilovolts</u>	<u>Distance in Feet</u>
250 kV	4 feet, 3 inches
400 kV	6 feet, 5 inches
500 kV	8 feet, 7 inches
750 kV	15 feet, 9 inches

Table 2D

LIVE-LINE WORK MINIMUM APPROACH DISTANCE WITH OVERVOLTAGE FACTOR PHASE-TO-GROUND EXPOSURE

<u>Per-unit Transient Overvoltage</u>	<u>(DISTANCE IN FEET-INCHES)</u>						
	<u>Maximum phase-to-phase voltage in kV</u>						
	<u>121</u>	<u>145</u>	<u>169</u>	<u>242</u>	<u>362</u>	<u>552</u>	<u>800</u>
1.5	-	-	-	-	-	6-0	9-8
1.6	-	-	-	-	-	6-6	10-8
1.7	-	-	-	-	-	7-0	11-8
1.8	-	-	-	-	-	7-7	12-8
1.9	-	-	-	-	-	8-1	13-9
2.0	2-5	2-9	3-0	3-10	5-3	8-9	14-11
2.1	2-6	2-10	3-2	4-0	5-5	9-4	-
2.2	2-7	2-11	3-3	4-1	5-9	9-11	-
2.3	2-8	3-0	3-4	4-3	6-1	10-6	-
2.4	2-9	3-1	3-5	4-5	6-4	11-3	-
2.5	2-9	3-2	3-6	4-6	6-8	-	-
2.6	2-10	3-3	3-8	4-8	7-1	-	-
2.7	2-11	3-4	3-9	4-10	7-5	-	-
2.8	3-0	3-5	3-10	4-11	7-9	-	-
2.9	3-1	3-6	3-11	5-1	8-2	-	-
3.0	3-2	3-7	4-0	5-3	8-6	-	-

1. The distance specified in this table may be applied only where the maximum anticipated per-unit transient overvoltage has been determined by engineering analysis. Otherwise, Table 2C applies.
2. The distances specified in this table are the air, bare-hand, and live-line tool distances.

Section 3

OVERHEAD LINES

3.1 AERIAL SPACER CABLE

- 3.1.0 Proper protective equipment shall be used because protective covering on any cable shall not be considered an adequate insulating barrier.
- 3.1.1 When an employee works from a cable car on a de-energized cable circuit, he or she shall not belt into the cable car but will secure himself or herself to the messenger and cable.
- 3.1.2 The cable car and its occupant shall be kept away from energized conductors, equipment, and parts. Work shall be planned and platforms or ladders employed so the work commences at, and proceeds away from, transformers and other energized equipment. Exception: Bare hand live line work.
- 3.1.3 On a Bolson chair, the worker shall be protected by a personal fall arrest system. Chairs shall not be pulled by a motorized device unless visual contact is maintained at all times.

3.2 APPLYING AND REMOVING PROPER COVERUP

- 3.2.0 Whenever possible, employees shall be positioned below the conductors when installing or removing insulating protective equipment. Install or remove insulating protective equipment so that the worker shall not reach over or between unprotected wires or parts.
- 3.2.1 The application or removal of such equipment shall be done with an appropriate live line tool, by maintaining the minimum approach distance, or through use of appropriate personal protective equipment rated and tested for the voltage exposure.

3.3 CLIMBING EQUIPMENT AND CLIMBING

Equipment

- 3.3.0 Use only Company-issued climbers.
- 3.3.1 Do not use climbers having any of the following defects:
- Dull or worn gaffs
 - Broken buckles
 - Rotten or frayed straps
 - Defective leg supports
- 3.3.2 Maintain gaffs and climbers in accordance with manufacturers' recommendations.
- 3.3.3 Store gaffs in gaff guards when not in use.
- 3.3.4 Climbers shall be worn only when employees are engaged in work requiring their use. Climbers are prohibited when employees are driving or riding in a vehicle, setting poles, removing poles, handling poles, working from step or extension ladders, or performing work from aerial lifts unless the work involves an immediate transfer to a wooden structure. Caution must be exercised so as not to damage the bucket liner with the gaffs.
- 3.3.5 Pole climbing gaffs shall not be worn for climbing trees.

Climbing

- 3.3.6 At a minimum, the following checks shall be performed before any employee ascends a pole. The employee will make the final determination if the pole is safe to climb by examining and assessing:
- General conditions
 - Cracks
 - Holes
 - Knots
 - Indications of improper depth
 - Soil condition
 - Burn marks
 - Hammer test
 - Pole prod
 - Rocking test

Structures that are questionable shall be braced or supported before climbing, then securely guyed.

- 3.3.7 The following are examples of the safe practices to be followed in work on structures, along with all other safe work procedures which a specific job may require:
- a. Before climbing, employees shall satisfy themselves that a pole or structure is strong enough to support them safely.
 - b. Structures that are questionable shall be braced or supported before climbing, then securely guyed.
 - c. Existing anchor guys shall be checked before climbing structures.
 - d. All unguyed dead-end poles shall be securely guyed, braced or supported before work is started.
 - e. Before working on a structure on which the stress is to be substantially changed, adequate guying (preferably in four directions), bracing, lashing or support shall exist.
- 3.3.8 The following precautions are required when employees are working on or handling chemically-treated wood, such as "blackjack" or "green" poles:
- Keep shirt sleeves rolled down.
 - Wear appropriate work gloves.
 - Do not rub or wipe perspiration from your eyes with your hands or with shirt sleeves that have been exposed to chemicals.
 - Keep your neck well covered with your collar.
- a. All precautions should be taken to avoid climbing chemically-treated poles. Use bucket trucks or ladders where possible. The decision to climb is at the discretion of the crew leader/chief.
- 3.3.9 Do not stand on mail boxes, signs, fire alarm boxes, or similar foreign equipment that may be attached to the pole or located near it.
- 3.3.10 Remove all signs, tacks, or nails that may impede climbing.
- 3.3.11 Do not grasp pins, brackets, crossarms, braces, or other attachments that might pull loose.

3.4 FALL PROTECTION

3.4.0 For climbing wood poles, the fall protection equipment to be used will be the Company-approved fall protection device equipped with a second pole strap or retractable lanyard.

3.4.1 At a minimum, employees assigned pole climbing duties will be required to wear enhanced fall protection ground to ground as proscribed in the Company procedure unless in the judgment of the crew leader the use of the equipment will endanger the worker. An example of a dangerous obstruction is multiple telephone steps or risers on a pole.

Note: The exception for not using enhanced fall protection must be valid and must be documented on the job brief by the individual climbing and by the responsible crew leader.

3.4.2 "Free climbing" is allowed in emergency situations for pole top rescue and for conditions which impede the use of enhanced fall protection as documented on the job brief.

3.4.3 When climbing in icy or windy conditions, employees shall use appropriate fall protection equipment at all times.

3.5 PERFORMING HOT STICK WORK

3.5.0 Maintain working clearances.

3.5.1 If inclement weather develops after work has begun on energized conductors or equipment at 5kV or greater, the job must be made safe by the following methods: de-energize and ground the circuit; or use hot stick method to make safe in accordance with crew chief/leader discretion.

Note: IBEW Local 97 employees refer to appropriate "Hot Stick" memorandum of understanding.

3.5.2 Before starting any job, the adjacent structures should be checked to ensure that they will take any added strain that might be put upon them when conductors are put into temporary position on the structure being worked.

3.5.3 Poles shall be temporarily guyed to equalize any change of stress caused by the untying of conductors.

3.5.4 When hot stick work is in progress, no other work shall be done on the pole or structure.

3.5.5 Only one phase shall be worked at a time.

3.5.6 When a conductor is being untied or tied in from the insulator, the tie wire shall be kept cut off or rolled up to prevent it from contacting the pin, arm, or other non-insulated equipment.

3.5.7 When conductors are displaced and tied off, the link stick between the conductor and rope shall be rated for the voltage being worked and the rope shall be of adequate strength and firmly secured to an object such as a pole, tree or driven steel bars.

3.5.8 All hot sticks will be equipped with distance markers that indicate how far out the employee can safely touch. Do not reach beyond these markers.

3.5.9 Exceptional care shall be taken when moving conductors because of conductor alignment and sag.

3.5.10 Proper attention should be given to make sure the conductor is properly seated in the insulator groove and the conductor controlled until it is tied in to the insulator.

3.6 LINE INSTALLATION AND REMOVAL

3.6.0 Contact with energized lines or equipment shall be avoided by the use of:

- the tension-stringing method,
- barriers, or
- other equivalent measures

3.6.1 When setting or removing a pole, do not allow the pole to contact exposed energized conductors.

- Holes shall be attended or physically guarded to prevent falls by employees and others.

3.6.2 Wear appropriate rubber gloves when setting, moving, or removing a pole near an exposed energized overhead conductor. Do not contact the pole with uninsulated parts of your body.

- 3.6.3 When setting, removing, or moving a pole near energized lines, employees shall use protective equipment to prevent electrical injury and the reclosure shall be put in the non-reclose (manual) position as conditions dictate.
- 3.6.4 If the conductors being installed or removed cross over energized conductors in excess of 600 volts, and if the design of the circuit-interrupting devices protecting the line so permits the automatic reclosing of these devices shall be made inoperable.
- 3.6.5 Non-reclose assurance is required under the following conditions:
- When rubber gloving energized primary conductors or distribution feeders up to 15kV which are protected by station and/or line reclosers and
 - Conductors are unprotected by fuses,
 - Conductors are protected by fuses greater than 65K/T**, or
 - Judgment or past experience indicates whether non-reclosing is warranted**
- ** Because of unique construction designs, this applies only to New England operations.*
- When performing hot stick or bare hand work on any energized conductor including work performed from ground-based bucket trucks and lifts, helicopters and aerial baskets suspended from conductors, or
 - When climbing structures to do other work at or above the level of energized conductors which puts a worker within reaching or falling distance of energized conductors.
 - When transferring from a helicopter.
 - When moving transmission/distribution phases that could become energized.
- 3.6.6 Maintain reel-handling equipment, including pulling and tensioning devices, in safe operating condition.
- 3.6.7. Maintain reliable communications between the reel tender and pulling rig operator.

- 3.6.8 While a conductor or pulling line is pulled (in motion) with a power-driven device, employees are not permitted directly under overhead operations or on the cross arm, except as necessary to guide the pulling grip or sled over or through the stringing sheave.
- 3.6.9 When a hazard exists for the line or equipment to become energized, anyone who may come in contact with either shall wear rubber gloves.
- 3.6.10 When wires are being strung or taken down near energized conductors, running lines and holding lines shall be used and control of the wire shall be maintained at all times.
- 3.6.11 The conductors must be grounded while being installed or removed. No point along the conductor shall be more than two miles from a ground.
- 3.6.12 Approved devices shall be used to ground conductors, trucks, tension machines, reels, and pulling machines when wire is being pulled near energized conductors.
- 3.6.13 When lines are installed parallel to energized lines to protect against induced voltage, the new conductors shall be treated as energized.

Section 4

UNDERGROUND LINES

4.1 CONSTRUCTION AND MAINTENANCE OF UNDERGROUND STRUCTURES AND CONDUIT LINES

- 4.1.0 Stripping conduit and concrete envelopes from sections of duct bank containing live cables shall be undertaken only when required, and with great care:
- a. Cables should be de-energized when possible.
 - b. Concrete envelopes and conduit shall be chipped away with extreme caution to expose the conduit.
 - c. When cable is exposed (sheath intact), inserts of suitable size, shape, and material shall be placed inside conduit in each direction from the point of opening, such that chipping of concrete and conduit along the conduit line may proceed using pneumatic tools without danger of damaging the cable.
 - d. Appropriate rubber gloves with protectors and appropriate flame resistant clothing shall be worn when employees use tools in excavations near live cables.

4.2 DE-ENERGIZED CABLE OR EQUIPMENT

- 4.2.0 Cable or equipment to be worked upon shall be positively identified by tags, duct location charts, maps, or other approved means and shall be isolated from all sources of supply.
- 4.2.1 Before work is performed on cable or equipment, an approved test shall be performed to verify that it is de-energized. All isolation points must be opened and tagged in accordance with clearance and control rules and procedures, and grounds of an approved type shall be applied to protect the worker from all sources of energy.

- 4.2.2 At the work site, cable to be worked on shall be proven to be de-energized by being cut from outside the manhole, vault, or trench or tested by other approved methods, before work is begun. The use of testing equipment requires the use of the approved class of rubber gloves.
- 4.2.3 While work is in progress, grounds can be removed (in accordance with the appropriate clearance and control rules) long enough to allow orientation of phase conditions, and then reapplied. The approved class of rubber gloves shall be worn during this operation.
- 4.2.4 Underground Residential Distribution terminations shall be handled by workers wearing appropriate personal protective equipment, using approved URD tools and accessories until tested de-energized and grounded.

4.3 ENERGIZED CABLE OR EQUIPMENT

- 4.3.0 Cable and equipment not known to be de-energized and grounded shall be considered energized.
- 4.3.1 Energized cables in service which are protected by metal sheath (intact) or by concentric neutral cable with protective covering shall not be considered "exposed parts." Physical protection of the sheath shall be provided without such practices as piling rubble on cable or hanging tools and equipment on cable.
- 4.3.2 Minimal movement of energized cables shall be undertaken only if deemed safe to do so through a documented job brief and a thorough hazard assessment of the cable. An attempt shall be made to de-energize the cables before handling.
- 4.3.3 If energized cables must be moved, workers shall:
 - a. Inspect the cables carefully for defects
 - b. Consider age of cable and splices, etc.
 - c. Wear appropriate class rubber gloves
 - d. The recloser may be put into the manual position

Note: New England based operations personnel only. Reference of moving cables applies to secondary cable only. Primary voltages will not be moved unless de-energized.

- 4.3.4 Workers that can be exposed to energized parts or equipment in the work area shall be protected by:
 - a. An adequate insulating barrier consisting of portable rubber protective equipment (blankets, hoses, hoods, etc.)
 - b. A substantial barrier which ensures required minimum safe working clearance.
 - c. Workers will wear all appropriate personal protective equipment during installation.
 - d. To the extent possible, suitable protective covering of grounded parts in work areas shall be employed if exposed live parts are within reach.
- 4.3.5 Energized cable terminations which are in service or properly placed on feedthrough or parking devices, and parts which are properly capped, shall be considered live parts. Protect the cable and terminations from physical damage.

4.4 PULLING CABLE

- 4.4.0 Pulling lines and cables are to be positioned with rollers and sleeves to reduce friction and to keep them from contacting energized parts or equipment.
- 4.4.1 Cables are to be lubricated to reduce friction and strain.
- 4.4.2 Workers shall position themselves so they stay clear of cables and lines on all pulls.
- 4.4.3 No person shall be in the pulling manhole or vault when cable is being pulled in or out using rigging methods. Rigging includes, but is not limited to, the use of pulleys, pulling eyes, jacks, blocks, sheaves, or rollers.
- 4.4.4 If duct rods are used, an employee shall be stationed at the far end to ensure minimum approach distances are maintained.

4.5 RAISING AND LOWERING MATERIALS INTO MANHOLES OR VAULTS

- 4.5.0 Furnaces and hot material on the surface shall be placed so they do not tip into the hole. The worker in the hole shall be warned to stand clear before hot material is lowered, and lowering shall not proceed until the worker below is ready.
- 4.5.1 Tanks of liquefied petroleum gas shall not be lowered into a manhole or vault. Tanks shall be secured so they will not be knocked or pulled into a manhole or vault.
- 4.5.2 Torches and Furnace
- a. Only employees trained and qualified in the use of torches and furnace are permitted to operate them.
 - b. Do not light torches or furnace within enclosures such as manholes, truck cabs, or empty barrels, or in atmospheres containing flammable vapors and/or gases.
 - Do not use a windbreak that is enclosed on all sides.
 - c. When using torches or furnace in manholes, provide adequate ventilation for employees and for combustion.
 - d. Never leave a torch unattended or in a location where it could cause a fire.
 - e. Preheat and dry ladles before use. Do not use cold or wet ladles when handling molten metals.

4.6 HAZARD ASSESSMENTS

- 4.6.0 Hazard assessments must include a visual inspection for electrical abnormalities on all equipment and work areas prior to the start of work. Hazard assessments and electrical abnormalities shall be fully discussed and documented during the job brief.

4.7 UNDERGROUND ELECTRICAL INSTALLATIONS

- 4.7.0 A ladder shall be used to enter and exit manholes or vaults exceeding four feet in depth.

- 4.7.1 Before tools and equipment are lowered, all personnel shall be clear of the opening.
- 4.7.2 An outside attendant is required when work is being performed in a manhole or vault. Note: Attendant may not enter under any circumstances.
- 4.7.3 When required, effective communications shall be established between employees in the space and the attendant.
- 4.7.4 When a cable in a manhole or vault has one or more abnormalities, and/or there is an indication of an impending fault, it shall be de-energized.
- 4.7.5 Metallic sheath continuity shall be maintained, or the sheath shall be treated as energized.
- 4.7.6 When an employee is installing or removing a relay from an energized network protector, the protector must be in the open position.

Section 5

SUBSTATIONS

5.1 ACCESS TO/ENTERING

- 5.1.0 Unqualified employees may not enter substation areas containing exposed energized parts within general clearances unless continuously escorted by a qualified company employee.
- 5.1.1 Before any entrance gate is opened, entrance gates shall be visually checked to ensure grounds are attached.
- 5.1.2 When entering a substation, the person in charge of the work at that station or the system operator shall be notified. The system operator or person in charge of the work shall also be notified:
 - when leaving, and
 - of any changes in station condition
- 5.1.3 Before entering a substation or switchyard with a motor vehicle, make sure that the highest point of the vehicle will maintain safe clearance distances to (a minimum of four feet when vehicles are traveling) any energized, exposed conductors or equipment in or near its path.
- 5.1.4 All entrances to rooms, facilities, or yards containing energized parts shall be attended or locked, except when employees are working in sight of the entrance and it is impractical to do so.

5.2 DIGGING

- 5.2.0 When the exact location of underground power circuits is unknown, qualified employees using bars, shovels, or similar tools are required to wear Class 2 rubber gloves, flame retardant clothing, and electric hazard-rated safety shoes or over boots.

5.3 ELEVATED AREAS

- 5.3.0 Workers shall maintain safe working clearances while entering or leaving energized areas. When permanently-installed ladders, stairs, or stepped structural members are not available for access to elevated areas, the following approved methods shall be used:
- Use of a non-conductive portable ladder properly held, tied, or secured.
 - Use of a properly grounded mobile aerial work platform, basket, or bucket-type equipment with workers wearing approved fall protection systems (full body harnesses and shock absorbing lanyards). Scissors lifts without an approved permanently affixed attachment point are exempt from wearing harnesses and attachments.
 - Use of scaffolding. Conductive scaffolding shall be grounded according to departmental procedures when assembled in an energized substation.
 - Climbing on porcelain bushings or insulators is not permitted.

5.4 FENCES

- 5.4.0 Keep gates to unattended substations locked.
- 5.4.1 When you must expand or remove a substation fence for construction purposes, install a temporary fence that provides similar protection when the site is unattended. Maintain adequate interconnection with ground between the temporary fence and the permanent fence.

5.5 ACCESS/GENERAL WORK

NOTE: Appendix D applies to New England based operations personnel only. "Safety Observer" was previously referred to as "Safety Supervisor".

- 5.5.0 While employees are working in substations in proximity to exposed energized equipment, clearly delineate the work area in accordance with the Substation Work Area Identification Electrical Operating Procedure. Two qualified/authorized workers trained in the procedures shall be assigned to install and remove protective short circuiting and grounding equipment required for the

protection of personnel working on de-energized conductors or equipment.

- 5.5.1 Sufficient access and working space shall be maintained around electrical equipment to provide ready and safe access and egress as well as safe operation and maintenance.
- 5.5.2 Ground connections in the work area, shall be inspected prior to work beginning.
- 5.5.3 When circuits or equipment are installed, the ground wire shall be connected first and disconnected last.
- 5.5.4 Test areas shall be kept clear of unnecessary personnel and others in the immediate vicinity shall be warned of all hazards.
- 5.5.5 When routine job-related testing is done under the Clearance and Control rules, the equipment shall remain grounded at all times except for the duration of the actual test or the equipment shall be electrically disconnected from the system in such a way that the tags or grounds are left in place with cables disconnected and tied back, or Doble links opened, or cubicle type of switchgear completely withdrawn, etc., to physically isolate the equipment from the system.
- If the equipment is not electrically disconnected from the system, test leads shall be attached to the equipment before the grounding device is removed from the apparatus and, at the completion of the test, the grounding device shall be reattached before the test lead is moved or removed.
 - Do not remove the tail ends of the grounds before removing the lead ends.
- 5.5.6 Switches or interrupting devices shall be operated within their rating.
- 5.5.7 Lock all gang-operated switches at substations and remote unfenced structures in either the open or closed position.
- 5.5.8 Climbing on porcelain bushings or insulators is not permitted.
- 5.5.9 When wiring switchboards and working on energized electric circuits, in addition to necessary personal protective equipment, employees shall remove all exposed conductive jewelry such as rings, watches, wrist bands, necklaces, etc.

5.6 GROUNDING OF VEHICLES

5.6.0 When to Ground

- a. The ground connection shall be securely attached to such equipment upon approaching the work area and shall not be removed until the boom or any other substantial extension of the mobile equipment has been removed from the danger area.
- b. The work area includes the vicinity of electrical conductors when employees are operating within falling, reaching, or maneuvering distance from conductors or systems energized at or above 50 volts.

5.6.1 GROUNDING

- a. Mobile equipment shall be solidly grounded by means of appropriately sized copper cable where required. The cable shall be fastened to a securely attached metallic portion of the equipment, or shall be fastened to a grounding stud provided for the purpose at one end and an adequate ground at the other end.
- b. Station grounds, water hydrants, metallic pipe water systems, the common neutral wire, or steel tower earth footings provide grounds that are likely to be adequate in the order of preference listed. When such grounds are not available, ground rods temporarily driven shall be used to secure a low resistance ground.

5.6.2 Vehicles Operating near Energized Equipment

- a. Effectively ground or barricade a boom truck, crane, or aerial basket truck when using it near energized lines or equipment. If a trailer is connected, ground or barricade it separately, in the same manner as the truck or crane.
- b. In all cases, consider the truck or crane to be energized, when operated within minimum approach distances, and avoid contact.
- c. Employees shall keep clear of equipment located within minimum approach distances of primary conductors.

- d. Ground all aerial lift, excavating equipment, and hoisting equipment to the substation ground grid when operating near energized lines or equipment in an energized substation. If it is deemed by the person in charge of the work that the application of a ground creates a greater hazard, this shall be documented on the job brief.
- e. All vehicles, tankers, and tank trailers used during oil handling operations shall be connected to the substation grid.
- f. Other circumstances, such as, but not limited to, cable testing, will require that vehicles be grounded.
- g. While grounding vehicles, employees shall wear required personal protective equipment, including Class 2 rubber gloves, flame retardant clothing, hard hat, and safety glasses.

5.7 GUARDING OF ENERGIZED PARTS TO PROTECT EMPLOYEES

- 5.7.0 All live parts operating above 150 volts to ground without an insulated cover shall be guarded unless the location of the live parts gives sufficient horizontal or vertical clearance, or a combination of these clearances, to minimize the possibility of accidental employee contact.
- 5.7.1 Except for fuse replacement or other necessary access by qualified persons, maintain the guarding of energized parts within a compartment during operation and maintenance functions to prevent:
 - accidental contact with energized parts, and
 - tools or other equipment from being dropped on energized parts
- 5.7.2 When guards are removed from energized equipment, install barriers around the work area to prevent employees in the area who are not working on the equipment from contacting the exposed live parts.
- 5.7.3 Keep doors to enclosures containing live equipment secured, except when working inside.

5.7.4 Maintain sufficient access and working space around electric equipment to permit ready and safe operation and maintenance of this equipment.

5.7.5 Lock all gang-operated switches at substations and remote structures in either the open or closed position.

5.8 INDOOR SUBSTATIONS

5.8.0 Flame retardant clothing is required any time work is being performed while working on or near exposed energized primary circuits or equipment.

5.8.1 While working in indoor substations, where energized circuits or equipment have been identified as a hazard, clearly delineate the work area in accordance with the Substation Work Area Identification procedure.

5.8.2 In substations where fault currents have been determined to be a hazard during switching and grounding operations, the station shall be posted with the requirement for additional flash protection.

5.8.3 Where identified by arc flash analysis, a Company-approved electrical flash ensemble* is required when employees are:

- a. switching primary disconnects;
- b. Exposed to energized primary or secondary conductors that have been identified as arc flash hazards by either condition or damage.
- c. Performing testing for, and when applying, protective grounds.
- d. Exceptions:
 1. When testing and grounding in indoor/outdoor metal clad type substations, where an analysis does not indicate the necessity for an ensemble, and the only exposed conductors are the de-energized conductors to be grounded.
 2. When the use of protective equipment introduces a greater hazard, it must be documented in the written job brief and PPE hazard assessment.

5.9 POWER TRANSFORMERS AND CIRCUIT BREAKERS

5.9.0 Give adequate warning before manually operating any apparatus that would:

- energize equipment adjacent to where others are working, or
- cause a noise that might startle persons in the area.

5.9.1 Once a permit confined space or a confined space has been established for entry into circuit breakers or transformers, the permit confined space procedure shall be followed.

5.9.2 Prior to beginning work which requires access to hazardous areas of the equipment, ensure all forms of hazardous energy (mechanical, electrical, hydraulic, pneumatic, chemical thermal, or other) have been relieved or blocked.

- a. Draw-out type circuit breakers shall be opened before removal or insertion.
- b. Guards shall be in place except when access is necessary.
- c. Except for fuse replacement or other necessary access by qualified persons, maintain the guarding of energized parts within a compartment during operation and maintenance functions to prevent:
 - accidental contact with energized parts, and
 - tools or other equipment from being dropped on energized parts

5.10 TESTING IN SUBSTATIONS

5.10.0 This section applies to temporary testing in substations with test equipment that operates at voltages greater than 600 volts. All test sets and cables shall be located within the boundaries of the test area. Any vehicle containing active (energized) test equipment shall also be within the boundaries of the test area, and shall be grounded.

- 5.10.1 If employees are present within the test area during testing, an observer shall be designated and capable of implementing the immediate de-energization of the test equipment, if the equipment is so designed, for safety purposes.
- 5.10.2 Temporary test areas shall be marked with yellow and black tape and yellow flags shall be used to identify the safe entry/exit point. Placement of tape and flags shall be based on the applicable minimum approach distances associated with the nominal test voltage(s) applied to the equipment (allow for increased voltages stepped up from applied voltages). During an active test, yellow and black tape shall be placed across the safe entry/exit point to prevent inadvertent entry into the active test area.
- 5.10.3 As an alternative to the use of yellow and black tape, the test area may be guarded by one or more test observers stationed such that the complete active test area (all equipment that will be energized as part of the test) can be monitored.
- 5.10.4 A work area boundary may be used as a test area boundary provided that during an active test, yellow and black tape is placed across the safe entry/exit point to prevent inadvertent entry into the active test area.
- 5.10.5 If the original work area boundary is to be used by the test crew, one of the following options shall be used:
- a. The original work crew may be asked to stop work and exit the work area until tests are completed.,
 - b. The test crew may set up an additional work area boundary within the original work zone established and shall ensure the entry point is closed during active tests.
- 5.10.6 Before the initial application of test voltage, the person in charge of the test shall conduct a routine safety check to verify the following conditions:
- a. Work area identification is properly installed and is documented on the job brief.
 - b. System test status signals, if used, are in operable condition (Le., strobe).

- c. Test power disconnects are clearly marked and readily available in an emergency (Le., safety switches).
- d. Ground connections are clearly identified.
- e. Required personal protective equipment is being used.

- 5.10.7 After testing cables or other high capacitance apparatus, discharge the apparatus through a resistor rated for the available energy.

Test equipment which has an internal discharge resistor and metering to verify the apparatus is discharged may be used.

Section 6

METERING SERVICES, METER TEST, AND COMMUNICATIONS

6.1 GENERAL

- 6.1.0 All personnel must use all appropriate personal protective equipment (PPE) when performing their field duties. PPE consists of approved safety glasses, required flame retardant clothing, approved EH rated footwear, appropriate head protection (i.e., bump cap or hard hat), Class 2 and Class 0 rubber gloves with leather protectors, and a face shield as necessary.
- 6.1.1 A face shield is required for all meter installations where a risk assessment deems one necessary. This may include installations on secondary voltages above 300 volts, including four-wire, seven-bladed metering installations (all three phase). All other appropriate PPE must also be worn.
- 6.1.2 When employees respond to customer calls related to unknown voltage problems, Class 2 rubber gloves with leather protectors shall be worn until the voltage has been determined. All other appropriate PPE must be worn.
- 6.1.3 When employees investigate unknown voltages, and when employees conduct tests required to determine voltage levels, an approved, tester must be used to determine the range of the voltage before a multi-meter is used to determine exact voltage readings. All appropriate PPE must be worn.
- 6.1.4 When employees work on energized equipment, or equipment that has the potential to be energized, in excess of 50 volts but less than 1000 volts, Class 0 rubber gloves, at a minimum, with leather protectors are required except as allowed in Section 2. All other appropriate PPE must be worn.

- 6.1.5 Leather protectors shall be worn with rubber gloves at all times except as follows:
- Protective gloves need not be used with Class 0 rubber gloves under limited use conditions where small equipment and parts manipulation necessitates unusually high finger dexterity.
 - The Class 0 rubber gloves must then be inspected and air-tested before re-using.
- 6.1.6 Before employees install or re-energize self-contained watt hour meters, appropriate tests shall be done to determine if there is a safe voltage, back feed, ground, continuity, shorts, etc. All other appropriate PPE must be worn.
- 6.1.6.1 When employees re-energize or install transformer-rated meters, all appropriate tests shall be performed prior to the meter installation.
- 6.1.7 All employees working in an area of downed electrical wires are advised to wear non-conductive, EH-rated overshoes/rubbers over their approved safety footwear.
- 6.1.8 All employees should be able to recognize insulated and non-insulated tools and their proper use.
- 6.1.9 All electric meters being installed and tested in the field should be of correct type, form, class and voltage to ensure safety and accurate metering. All new electric meter sets shall be installed on National Grid-approved metering devices and shall be properly inspected in accordance with company policy.
- 6.1.10 All personnel will wear Class 2 rubber gloves with leather protectors when digging, installing ground stakes, bar-holing, etc., where the locations of underground electric facilities are unknown.
- 6.1.11 When metering employees are working on the secondary circuit of an energized current transformer, the secondary circuit shall be short-circuited.
- a. Do not short the secondary circuit of a voltage transformer while the transformer is energized.
- If you cannot de-energize the primary of the voltage transformer before working on an instrument, meter, relay, or

other section of a voltage transformer secondary circuit, open the circuit to the source side of the work area to prevent a short circuit.

- b. Follow Meter Standards for all metering applications, unless Meter Services and Engineering provides approval and direction.

6.2 CUSTOMER PREMISES (WORK ON)

- 6.2.0 When entering, working in, or exiting a customer's premise, use handrails and be alert for overhead obstructions, debris, sump pumps, furnace pits, slips hazards, etc. When entering or leaving through an outside cellar door, be alert to the hazard of the door falling and the hazard of tripping on stairs. When traveling on a customer's property, regular walkways and gates shall be used.

6.3 MICROWAVE FACILITIES

- 6.3.0 Employees shall not look into an open waveguide connected to an energized source of microwave radiation.
- 6.3.1 Accessible areas of microwave communication systems shall be posted with the appropriate signs.
- 6.3.2 Employees exposed to energized communication devices shall be trained in the dangers of radiofrequency.
- 6.3.3 Only employees trained and qualified in structure climbing and rescue will be allowed to climb structures, and only employees trained and qualified in elevated bucket operation and rescue will be allowed to operate an elevated bucket. This training will be performed annually, or before such work is performed.

6.4 FIBER OPTICS

- 6.4.0 Employees shall not look into an open fiber optic cable.
- 6.4.1 Employees shall use fiber optic tools and wear appropriate personal protective equipment when splicing.

6.5 ANTENNA AND RADIO WORK

- 6.5.0 Employees shall not touch energized antennas.
- 6.5.1 Employees erecting antennas shall maintain electrical and radiofrequency clearances.
- 6.5.2 When employees are repairing radios in the field, the field vehicle shall be not engaged in any activities that could potentially energize the vehicle.

Section 7

GENERAL RULES FOR GAS EMPLOYEES

7.1 GENERAL

- 7.1.0 Methods of eliminating live gas work shall be considered and employed where practical.
- 7.1.1 Every effort shall be made to eliminate tripping hazards at job sites. Tripping hazards which can not be eliminated shall be clearly identified with cones or barricades. Air hoses shall be kept out of the path of pedestrians and vehicles if possible. Cones and flags shall be used when necessary to cross such paths. Avoid kinks in hose and roll it up when not in use.
- 7.1.2 In winter make every effort to remove snow and sand icy spots in all work areas, where practical.
- 7.1.3 Rights of way shall be kept in safe condition for foot patrol, such as along gas transmission lines.
- 7.1.4 Work zone areas shall be maintained to allow for safe pedestrian passage.
- 7.1.5 Follow all trenching and excavation safety requirements as specified in Corporate SHP 3.07 Excavations.
- 7.1.6 Follow all Work Zone Traffic Control and flagging requirements as specified in the pocket reference guide.
- 7.1.7 Backhoe operation
 - a. The backhoe shall be used in accordance with manufacturer's approved lifting capacities and the known weights of the materials being lifted.
 - (1). Load capacity charts need to be available in backhoe cabs.
 - (2). Weights of material lifted by backhoes must be known and communicated to Gas Operations.

7.2 BONDING

- 7.2.0 When connections to pressured or unpressured lines are made that entail severing the line, an electrical bonding cable shall be connected across the section to be cut. See the Gas Standards Manual for further guidance.

7.3 DIGGING/PROBING IN THE VICINITY OF UNDERGROUND ELECTRIC FACILITIES

All underground electric cable shall be considered energized and shall be respected as such. Additional precautions shall include:

- 7.3.0 Before excavating or probing in the vicinity of underground energized conductors, proper grounding of equipment and tools should be completed, as appropriate.
- 7.3.1 Hand digging and probing activities conducted within two feet of electrical conductors shall be performed with non-conductive tools while wearing appropriate rubber gloves with protectors, EH-rated footwear, and FR coveralls. Note: This distance is not to be confused with electrical clearances.
- 7.3.2 Hand digging and probing activities conducted where the location of electrical conductors is unknown shall be performed with non-conductive tools while wearing appropriate rubber gloves with protectors, EH-rated footwear, and FR coveralls.
- 7.3.3 When using pneumatic tools, extreme care shall be exercised. Neither pneumatic tools nor metallic probes shall be used within two feet of underground facilities. Exception: in accordance with Code Rule 753, concrete and black top may be removed.
- 7.3.4 While employees are working on gas facilities, portable protective equipment such as plywood or other suitable material shall be used to maintain proper separation from electrical facilities. This protective equipment is not considered a dielectric barrier, but rather a measure enacted to help prevent an employee's body or equipment from contacting the electric facility.
- 7.3.5 When working in the vicinity of electric underground facilities, a qualified person shall be contacted to locate and mark facilities prior to excavation activities, except in the case of emergency (immediate danger to life or property, etc.), as defined in state

codes and regulations. Available maps, along with suitable instruments, shall be used to determine their locations.

- 7.3.6 If conditions or situations arise where electric facilities prevent safe gas operations, the appropriate department must be consulted to assist in developing a safe course of action.
- 7.3.7 Contact the Underground Lines Department if any buried cable is damaged or any irregularities are noticed.

7.4 ELECTRIC CLEARANCES

- 7.4.0 Gas operations in the vicinity of exposed, energized electric facilities shall be conducted in accordance with safe operating clearances identified in applicable minimum approach distance tables.

7.5 GAS LEAK INVESTIGATION

- 7.5.0 All enclosed structures in which gas is present shall be properly ventilated (this includes manholes and other underground structures). All underground openings in the vicinity shall be thoroughly checked for explosive mixtures.
- 7.5.1 No one is permitted to enter manholes without the use of the necessary safety equipment.
- 7.5.2 Entrants and attendants shall be trained in confined space entry and follow the applicable procedure requirements for activities in a manhole containing a hazardous atmosphere.

7.6 LIVE GAS OPERATIONS

- 7.6.0 When qualified employees are performing live gas operations, Company-provided personal protective equipment shall be worn, including respiratory protection and fire suit with hood. A fire extinguisher shall be readily available. "Qualified employee" is defined in Section 1 and the Glossary.
- Personnel working in a live gas atmosphere shall wear complete protective apparel, including fire suits, hoods, respirators, gloves, and, when appropriate, harnesses. Reflectorized vests shall not be worn in an excavation during live gas work unless the vest is made of flame retardant material.

7.6.1 A qualified attendant shall be stationed above ground wearing complete protective apparel, including a fire suit, and have protective breathing equipment readily available while personnel in the excavation performing live gas work.

- Natural fiber clothing (e.g. cotton or wool) shall be worn underneath the fire suit.

7.6.2 Smoking shall not be permitted while employees are in barricaded areas, conducting live gas operations, working in the vicinity of gas leaks, working in underground structures, or where No Smoking signs are posted.

7.6.3 Precautions to be observed in all live gas operations shall include the following:

- a. Reduce the gas pressure in the piping or equipment to the minimum permitted by operating conditions.
- b. If gas or gaseous vapors are present, clear with a Company-provided blower or air mover.
- c. Eliminate all possible sources of ignition.
- d. Use intrinsically safe lights.
- e. Cell phones, "i-pods", pagers and other electronic devices are prohibited.

7.6.3 Follow all safety requirements for "squeezing off" as specified in GOPB 415 and Metering Services 415.

7.7 MAKING CONNECTIONS TO GAS LINES

7.7.0 Drilling, tapping, stopping, or bagging equipment for making pressured connections to gas lines shall be examined in advance to ensure its satisfactory condition. Such equipment shall not be used for any purpose which exceeds limitations prescribed by the manufacturer.

7.7.1 When a gas main is to be tapped, the opening over the tap shall be large enough to permit the gas mechanic to have sufficient working space, adequate ventilation, and clear observation by a fellow worker at all times.

7.8 PURGING GAS MAINS AND SERVICES

Successful and safe purging operations are the result of thorough understanding of the principles concerning explosive mixtures and following all steps carefully as set up for each job.

7.8.0 Purging is the act of replacing air within the pipeline by an inert substance in such a manner as to prevent the formation of explosive air-gas mixtures.

7.8.1 Clearing is the act of replacing the air by direct displacement so rapidly as to cause a minimum of mixing between the gas and air.

7.8.2 In general, clearing shall only be done on four-inch mains or less. Purging shall be the accepted method on all gas lines larger than four inches regardless of length.

7.8.3 Retired Mains shall be purged of residual gas in the same manner as above for new mains purged of air.

7.8.4 Purge Rate. Little mixing will occur in a proper purge, so it is only necessary to introduce enough inert gas for a slug or piston between the air and the natural gas.

7.8.5 Minimum Flow Rate. A flow rate of 200 lineal feet per minute is recommended for purging. This will result in the least amount of mixing.

7.8.6 Large Low Pressure Mains

- When purging large, low pressure mains of considerable length from a smaller supply main, a bypass with valves should be installed across the stoppers.
- Do not attempt to control the rate of purge by deflating a stopper. This would prevent losing gas pressure in the supply main in case of stopper failure.
- In such a case, it is advisable to insert a larger slug of inert gas, as the purging rate would be slowed down.
 - a. Inert gas may be introduced into the main either by a solid connection or by a loose, flexible, connection inserted through a tap hole.

- b. Bag pressure shall be constantly observed during the purging of low pressure mains when inflatable bags for stoppering-off are used.

- 7.8.8 The purging operation should begin immediately after the insertion of the inert gas into the main. A delay of approximately three minutes has been found experimentally to have destroyed the slug.
- Low pressure mains should not be purged so fast as to decrease pressure in nearby services to the point of extinguishing pilots. If there is any doubt, check nearby houses for outages.
- 7.8.9 Large service lines should be considered as mains for clearing or purging purposes.
- 7.8.10 End Point Determination. Completeness of purge can be determined with a combustible indicator that reads percent of gas. Combustible gas indicators which do not give a 100% gas indication shall not be used.
- 7.8.11 When a tie-in is made between a new main and an existing main, a valve or bags (stoppers) can be used. After these mains are physically connected, they should be purged immediately, as the valves and bags (stoppers) can't be considered 100% leak proof. If a positive shutoff is desired for a valve, a blank should be inserted between the flanges or fitted with an approved end cap, downstream of the valve.
- 7.8.12 Purging Stack (Vent Pipe). The grounded purging stack shall terminate not less than 7 feet above ground level. The riser valve on the vent pipe should be opened before purging operations begin and shall be constantly attended during the purge. A fire extinguisher shall be present during the purge.

7.9 STATIC ELECTRICITY PRECAUTIONS

- 7.9.0 Discharge body static electricity by contact with a grounded metal surface immediately before direct approach to escaping gas and/or gas regulator stations.

7.10 LIVE MAIN INSERTION

- 7.10.0 Combination coil pipe trailers involving the loading of four inch coiled plastic requires appropriate rated loading equipment and the following of manufacturer's loading and operating procedures/instructions.
- 7.10.1 Residual gas must be purged from the portion of main being retired which will affect service renewals.
- 7.10.2 Follow all safety requirements specified in the Live Main Insertion section of the Gas Standards manual.

7.11 KEYHOLE TECHNOLOGY

- 7.11.0 Sandblasting process requires appropriate respiratory protection and full face shield.
- 7.11.1 When operating vacuum excavation equipment, operators must wear safety glasses with side shields and a full face shield.
- 7.11.2 All current bonding and static protection procedures remain.
- 7.11.3 Live gas procedures must be followed as identified in appropriate GOPB's for this new work method.
- 7.11.4 As identified in GOPB 701, coal tar wrap must be wetted down with leak soap, chipped off and removed, prior to utilizing wire wheel for the cadweld installation of wires to all steel facilities during the keyhole process.
- 7.11.5 Personal protective equipment is required when performing cadweld process.
- 7.11.6 Discuss available emergency exit route(s) during the job brief and clear the exit path(s) prior to beginning the work.

Section 8

LINE CLEARANCE TREE TRIMMING

8.1 GENERAL PRECAUTIONS

- 8.1.0 Tools and equipment shall be properly secured and stored and debris promptly removed from sidewalks or entrances so as not to create a hazard.
- 8.1.1 All sides of a work area shall be guarded to protect the public and passing vehicles. The quantity of warning devices shall be determined by the location of the work area and the direction and density of traffic.
- 8.1.2 Employees selected to work in storm situations shall be trained to identify special hazards encountered during a storm and its aftermath.
- 8.1.3 Hazardous materials, including herbicides, shall be properly stored in designated areas. Avoid storing food or beverages in the same compartment with hazardous materials.
- 8.1.4 Limb and wood removal that has the potential to damage equipment and/or property shall be controlled using proper rope size and rigging techniques.
- 8.1.5 Workers shall not leave a bucket to enter a tree unless they are tied in to a suitable crotch before leaving the bucket.
- 8.1.6 Because of the risk of fire, chips shall not be stored in trucks for an extended period of time.

8.2 CHAIN SAWS/CHIPPERS

- 8.2.0 Each power saw shall return to idle automatically, and the clutch shall not engage the chain at idle.
- 8.2.1 Chain saws used by employees shall not be running when being carried up into a tree.

- 8.2.2 Power saw engines shall be stopped for all cleaning, refueling, maintenance, adjustments, and repairs to the saw, chain or engine. Exceptions: Carburetor and idle speed adjustments.
- 8.2.3 Chain-saw kickback devices shall not be removed or disabled.
- 8.2.4 Chain saws shall be regularly inspected to see that they are clean, sharp, and properly tensioned.
- 8.2.5 When starting a chain saw on the ground, employees shall place the saw on or against something solid to support and steady the saw.
- 8.2.6 Both hands shall be kept firmly on a saw when it is in use; one on the handle bar, the other on the pistol grip.
- 8.2.7 Saws shall not be left unattended with the engine running. When employees are carrying a saw, the engine shall be off and the saw shall be carried with the blade to the rear.
- 8.2.8 When employees use a chain saw aloft, the following procedures shall be used:
- a. Start and test operate the power saw engine on ground.
 - b. Under no conditions shall the power saw be raised from the ground or lowered to the ground with the engine running.
- 8.2.9 When a chain saw is being used, workers shall approach the operator of the saw from the front.
- 8.2.10 Avoid using chain saws above shoulder level.
- 8.2.11 Handle fuel safely. Use approved safety containers with flame arrestors. After refueling, wipe down before starting, and make sure the cap is in good repair and properly replaced.
- 8.2.12 Chain guards shall be in place when saws are not in use.
- 8.2.13 Chipper operators shall be trained, shall be familiar with, and shall adhere to all "Safety Statements" on the unit and shall be familiar with chipper operation and use.

- 8.2.14 Make certain no one is standing in line with the feed or discharge chute when starting a chipper.
- 8.2.15 All brush chippers used by employees shall have keyed ignition systems.
- 8.2.16 Trailer chippers, when detached from the truck, shall be chocked or otherwise secured.

8.3 CLIMBING

- 8.3.0 Employees climbing trees shall not use power saws weighing more than 15 pounds unless supported with a separate line.
- 8.3.1 Before climbing a tree, the tree trimmer shall observe its general condition such as structural defects and environmental conditions and take appropriate precautions.
- 8.3.2 Tree Trimmers shall be tied in or secured while ascending the tree and remain tied in or secured until the work is completed and the tree trimmer has returned to the ground.
- Exception: While ascending a tree where the density of branches growing from the stem prevents the tree trimmer from crotching a climbing line or work positioning lanyard through the branches, then and only then is the three-point climbing technique acceptable.
- 8.3.3 Tree Trimmers shall have available a minimum of two means of being secured while working aloft; for example, a climbing line and a work-positioning lanyard.
- 8.3.4 When work is being done aloft, one employee shall remain on the ground and shall be the designated ground person.

8.4 CLIMBING LINES

- 8.4.0 Climbing lines shall be protected from damage by falling objects, sharp tools, and unnecessary abrasions.
- 8.4.1 Cross arms, guys, cables, braces, or similar fixtures shall not be used to support a climbing line.
- 8.4.2 Climbing lines shall have a minimum breaking strength of 5400 pounds.

- 8.4.3 Climbing lines shall be stored away from sharp edges, chemicals, oil and Gasoline. They shall be inspected before use and shall not be spliced.

8.5 FELLING TREES

- 8.5.0 Inspection shall be made to see if the tree to be felled is dead, hollow, or unsound, and a check shall be made of its general condition.
- 8.5.1 Trees to be felled shall have all limbs removed to a sufficient height and width to allow the tree to fall without striking wires or other objects in the vicinity.
- 8.5.2 All workers in the vicinity shall be notified to stand clear.
- 8.5.3 Appropriate measures shall be used to control the fall if there is a chance that tree may strike or damage property.

8.6 PERSONAL PROTECTIVE EQUIPMENT

- 8.6.0 Tree trimming personnel shall wear natural fiber clothing when working near (within 10 feet of) energized facilities. Long, tight-fitting sleeves, snug at the wrist, shall be worn when employees are clearing brush, chipping brush, felling trees, or trimming trees.
- 8.6.1 Chaps shall be worn by an employee operating a chain saw. The leg protection shall cover the full length of each leg, to protect against contact with a moving chain saw.
- Exceptions:
- a. When employees are working from within the bucket of an aerial lift.
 - b. Qualified Tree Trimmers and Line Mechanics climbing and working from a tree or pole have the option of not using leg protection if it poses a greater hazard.
- 8.6.2 Hearing protection shall be worn while employees are operating chippers and gasoline powered chain saws.

8.7 SPRAYING

- 8.7.0 Herbicide sprays shall be directed to avoid spraying off target, or on another member of the crew.
- 8.7.1 Applicators shall be familiar with and comply with the manufactures labeling for the product being used.

8.8 WORKING IN PROXIMITY TO ENERGIZED CONDUCTORS

- 8.8.0 Conductors shall be considered energized unless they have been de-energized, tested de-energized, grounded, and tagged by qualified personnel.
- 8.8.1 When tree trimming is performed in the vicinity of energized conductors, the necessary clearance shall be maintained in accordance with the minimum approach distances referenced in applicable minimum approach distance tables.
- 8.8.2 The parts of a tree in contact with or likely to contact energized conductors shall be cut or removed with approved, non-conductive tree trimming tools.
- 8.8.3 When it is necessary to work near energized conductors, the climbing line shall be secured so that in the event of a slip or a limb breaking the worker will swing free away from the conductor.
- 8.8.4 A rope that is wet, is contaminated to the extent that its insulating capacity is impaired, or that is otherwise not considered to be insulated for the voltage involved may not be used near exposed energized lines.
- 8.8.5 Before work is commenced, a determination of the maximum nominal voltage of power lines shall be made.
- 8.8.6 A second qualified line clearance tree trimmer or line clearance tree trimmer trainee shall be present within normal voice distance when any conductor is energized at 750 volts or more, when any conductor is within 10 feet of the worker, or when branches being worked are not within the safe working clearances.

Section 9

VEHICLES AND EQUIPMENT

9.1 GENERAL

- 9.1.0 Employees shall operate all vehicles and equipment in a safe and non-abusive manner.
- 9.1.1 Employees shall possess a valid and appropriate driver's or operator's license to operate a company vehicle or equipment.
- 9.1.2 Employees shall operate vehicles and equipment in accordance with all state and federal laws and regulations, all appropriate company policies, and manufacturer operator manuals.
- 9.1.3 Drivers and operators shall operate vehicles and equipment at speeds consistent with roadway conditions, posted speed limits, vehicle load and traffic conditions.
- 9.1.4 Employees shall have the appropriate training prior to operating a company vehicle or equipment.
- 9.1.5 All occupants of a vehicle must wear seatbelts before the vehicle is moved.
- 9.1.6 No one is permitted to ride in or on a vehicle or equipment unless in a seat with a seatbelt.
- 9.1.7 Seat belt usage is required on equipment that is equipped with a rollover protective structure.
- 9.1.8 Employees shall never leave a vehicle unattended with the engine running and/or with the keys in the ignition or elsewhere in the vehicle. Unattended means the lesser of 25 feet and/or in line of sight.
- 9.1.9 Drivers or operators shall never disable vehicle or equipment safety devices.

- 9.1.10 The use of cell phones should be limited to those cases where they will not be a distraction to the safe operation of vehicles or equipment. Cell phones shall not be used where law prohibits their use in vehicles.
- a. Hand-held cell phones should not be used by drivers of company vehicles while the vehicle is in motion or stopped in traffic. Hands-free cell phones should be used.
- b. Drivers using hands-free cell phones are encouraged to keep conversations brief, and to promote the use of phone's voice-activation or speed-dial features, if available.
- c. Company-issued two-way radios are not considered cell phones.
- 9.1.11 Drivers and operators shall ensure that the vehicle has proper housekeeping both in and outside the vehicle.
- 9.1.12 Drivers and operators shall not operate vehicles that have been tagged out of service.
- 9.1.13 Employees shall not modify vehicles, equipment or vehicle-based tools without authorization.
- 9.1.14 Drivers and operators shall not back up a vehicle until they are sure that the vehicle can be moved safely. Backing guides are to be used when another individual is in the vicinity of the vehicle to be moved.
- 9.1.15 When getting on or off of vehicles or equipment, employees shall maintain three points of contact and face the machine when equipment design permits.
- 9.1.16 When a vehicle or equipment is left at a job location, it shall be locked and secured to prevent unauthorized use and to prevent vandalism or theft of company property.
- 9.1.17 Wheel chocks shall be used in accordance with Table 9A.
- 9.1.18 For proper grounding rules, refer to Sections 2.7 and 5.6.
- 9.1.19 When employees operate equipment necessary precautions should be observed to avoid striking above-ground and under-ground facilities.

- 9.1.20 Operators shall observe and follow all safety alert decals on equipment and vehicles.

9.2 INSPECTIONS

- 9.2.0 Drivers and operators shall inspect vehicles and equipment before use each day or shift to ensure that it is safe to operate.
- 9.2.1 Operators of commercial vehicles shall prepare a report at the completion of the day's work documenting the condition of the vehicle using the appropriate form.
- 9.2.2 Operators of commercial vehicles shall review the previous day's condition form prior to operation.
- 9.2.3 Employees shall notify Fleet Management of all defects, malfunctions and damage as soon as possible.
- 9.2.4 Rental equipment shall be inspected before initial use and periodically as necessitated by its use.

9.3 REFUELING

- 9.3.0 Turn off the engine and other sources of ignition when refueling
- 9.3.1 No smoking.
- 9.3.2 Don't spill – clean up all fuel spills.
- 9.3.3 Because fuel can expand, do not fill to capacity.
- 9.3.4 Maintain contact between the fuel nozzle and all approved portable fuel containers and fuel cells. Persons must be in control of fueling handle at point where fuel tank is filled.
- 9.3.5 Portable containers shall be filled while on the ground.

9.4 AERIAL DEVICES

For additional guidance, refer to Section 2.1.

- 9.4.0 When employees operate any aerial device they must wear all appropriate personal protective equipment.

- 9.4.1 Do not move the vehicle while the boom is out of the boom rest.
- 9.4.2 Do not stand on the rim of the basket.
- 9.4.3 No person shall be in bucket or bed of vehicle while it is moving, except as permitted by 2.1.12.
- 9.4.4 Do not use the aerial basket or boom to support a ladder or utility pole.
- 9.4.5 Do not wear or use climbers from an insulated aerial basket.
- 9.4.6 The use of electric tools with cords in insulated aerial platforms is prohibited while working on or near energized lines or equipment.
- 9.4.7 While working in an aerial basket use only hydraulic tools that have approved hydraulic power sources, or approved battery powered tools.
- 9.4.8 Do not exceed the load capacity charts of the boom or basket capacity.
- 9.4.9 Do not allow the aerial basket or boom to rest against energized conductors or equipment.
- 9.4.10 In case of any repair or incident that may affect the dielectric integrity of the device, the equipment must be tested before it is returned to service.
- 9.4.11 Do not apply side load forces to booms.

9.5 DIGGER/DERRICKS

- 9.5.0 Don't walk under the load or allow anyone to do so.
- 9.5.1 Protect the work zone to prevent anyone from being injured during operation of the device.
- 9.5.2 All winch ropes and hoisting accessories shall be inspected prior to each use and replaced as necessary.
- 9.5.3 Don't leave equipment controls when a load is suspended by the device

- 9.5.4 Keep device within all safe clearances and grounded during operation around energized lines. See also Sections 2.7 and 5.6.
- 9.5.5 No person shall be hoisted or moved in any manner on a load hook.
- 9.5.6 Wire rope shall be taken out of service and tagged as defective when wires are broken.
- 9.5.7 Never move the load or the derrick unless you are certain the signal given is understood.

9.6 TRAILERS AND LOAD SECUREMENT

- 9.6.0 The operator of any trailer is responsible for checking and using all tie downs and other safety equipment prior to and during transport.
- 9.6.1 Operators shall test all trailer electric or air brakes prior to use.
- 9.6.2 On trailers with tongue height adjustment, the operator must check the height to the towing vehicle to ensure the trailer is level and the weight is evenly distributed on all wheels.
- 9.6.3 All loads, including equipment and scrap, shall be secured in accordance with federal, state, and Department of Transportation regulations to ensure that any movements would not cause the load to shift and/or fall.
 - a. Cargo must be firmly immobilized or secured on or within a vehicle by structures of adequate strength, dunnage or dunnage bags, shoring bars, tie downs, or a combination of these.
 - b. Articles of cargo that could roll must be restrained by chocks, wedges, cradle, or other equivalent.
 - c. Use one tie down for items less than five feet in length and less than 1,100 pounds in weight.
 - d. Use two tie downs if the item is less than five feet in length but more than 1,100 pounds in weight, or if the item is longer than five feet but less than ten feet in length regardless of its weight.

e. Use two tie downs for items ten feet in length plus an additional tie down for each additional ten feet in length or fraction thereof.

9.6.4 Pilots and/or escorts shall be used where the load or route involves unusual hazards. They shall also signal with suitable staff-mounted flags by day, and with lights, preferably red, at night.

9.6.5 Any load that extends four feet or more beyond either end of the vehicle itself shall carry warning devices. Light bars shall be used at night.

9.7 BULLDOZERS, TRACTORS, AND BACKHOES

9.7.0 The operator shall set the brakes, land the blade and put the shift lever in neutral before he leaves the machine.

9.7.1 The dozer blade shall be kept close to the ground for balance when the bulldozer is traveling up a steep grade.

9.7.2 The blade shall not be used as a brake for going down a grade or incline.

9.7.3 Always walk all the way around the machine to inspect the area for clearance or obstructions if you have left the operators seat for any reason.

9.7.4 The operator shall not allow anyone to ride on the machine or in the loader.

9.7.5 Employees shall not use a backhoe to lift a trench box or a reel of plastic pipe unless the lifting capacity of the backhoe allows.

9.8 FORKLIFTS

9.8.0 At every intersection or crosswalk, operators shall slow down and shall sound the horn.

9.8.1 Operators shall make a complete stop and sound the horn before passing through any doorway used as an exit or entrance.

9.8.2 All loaded fork lifts shall be driven forward up inclines and backwards down inclines, except when unloading from a truck.

9.8.3 Forks shall always be placed as far as possible under the load, with the mast tilted.

9.8.4 Loaded or unloaded fork trucks shall be operated with the forks six to ten inches from the ground.

9.8.5 Whenever a load obstructs an operator's forward vision, the truck shall be operated in reverse at a low speed.

9.8.6 No person shall position themselves under or on a raised fork whether loaded or unloaded.

9.8.7 Powered industrial trucks shall be inspected prior to initial use on each shift, with the inspection documented and retained on the truck for the entire shift.

9.8.8 Fork trucks shall be equipped with vertical-load backrest extensions when the type of loads present a hazard to the operators.

9.8.9 Truck brakes (which are being unloaded or loaded) shall be set and wheel chocks placed under the rear wheels (both sides of the wheel) to prevent the movement of trucks, trailers, or railroad cars during loading or unloading.

9.8.10 The capacity of a fork truck and attachments shall not be exceeded.

9.9 TRENCHER OPERATION

9.9.0 Never leave trencher unattended when the motor is running. When not in actual operation, all trencher attachments shall be locked and /or blocked and lowered to the ground.

9.9.1 Operator shall be responsible for field maintenance of the trencher as outlined in operators manual.

9.9.2 Use lowest gear when loading and unloading off trailer.

9.9.3 The trenching machine shall be shut down while making adjustment or clearing obstructions.

9.10 WINCH OPERATION

- 9.10.0 The operator shall remain at the controls at all times while the winch is under power operation.
- 9.10.1 Always keep the winch line wound level and tight on the winch drum.
- 9.10.2 Load line must be payed out when extending booms to avoid two-blocking.
- 9.10.3 Never exceed the rated capacity of the winch line.
- 9.10.4 To maintain tension always use hand over hand technique when winding winch cable on drums.
- 9.10.5 Keep all parts of body and clothing clear of cable rollers and winch drum.
- 9.10.6 Always maintain at least four full wraps in a winch drum at all times

9.11 NON-INSULATED MANLIFTS

- 9.11.1 Work shall be performed from the base of the platform only.
- 9.11.2 If provided, utilize the manufacturers attachment point to anchor fall protection.

9.12 CRANE OPERATION

- 9.12.1 All functional operating mechanisms, air and hydraulic systems, chains, slings, hooks, and other lifting equipment shall be visually inspected, prior to initial use, at the beginning of each day of use.
- 9.12.2 Accessible areas within the swing radius of the rear of the rotating superstructure shall be properly barricaded to prevent employees or pedestrians from being struck or crushed by the crane.
- 9.12.3 Observe clearance and grounding rules while operating crane
- 9.12.4 The employer is responsible to ensure that complete inspection of the crane shall be performed at one month to 12 month intervals (periodic inspections) depending on its activity, severity of service, and environmental conditions. The inspection shall include, but not

be limited to, the following areas: deformed, cracked, corroded, worn, or loose members or parts; the brake system; limit indicators (wind, load); power plant, and electrical apparatus and mounting bolts.

- 9.12.5 There shall be no hoisting, lowering, or traveling while any employee is on the load or hook.
- 9.12.6 All operators shall be trained in the safe operation of hoists and crane operation to company standards. For all mobile crane operation the operator must maintain a state and/or federal license if required.
- 9.12.7 The operator of any mobile crane, tower crane or derrick shall not leave his/her position at the controls while any load is suspended, nor shall any person be permitted to work or pass under a suspended load.

9.13 VEHICLE JUMP STARTING

- 9.13.1 Only trained employees are permitted to jump start vehicles.
- 9.13.2 Appropriate PPE shall be worn when jump starting vehicles.
- 9.12.3 Consult the vehicle/equipment manual for proper procedures.

Table 9A

WHEEL CHOCK UTILIZATION

VEHICLE TYPE	S U R F A C E		
	Level Surface: Company Properties	Level Surface: Public Ways	Incline*
	<ul style="list-style-type: none"> Company parking lots Company garages Substations 	<ul style="list-style-type: none"> Road ways Commercial parking 	Both company and non-company property
Class III vehicles equipped with spring loaded air parking brakes (typically line construction vehicles)	<ul style="list-style-type: none"> E-brake set (spring loaded air) 	<ul style="list-style-type: none"> E-brake set (spring loaded air) Chock (front & back of rear tire) 	<ul style="list-style-type: none"> E-brake set (spring loaded air) Double chock (one each side of vehicle rear wheels on downhill side)
Class III stores vehicles	<ul style="list-style-type: none"> E-brake set (spring loaded air) Chocks are always required if backed to a loading dock in front of each rear wheel 	<ul style="list-style-type: none"> E-brake set (spring loaded air) Chocks are always required if backed to a loading dock in front of each rear wheel 	<ul style="list-style-type: none"> E-brake set (spring loaded air) Double chock (one each side of vehicle rear wheels on downhill side)
Class II vehicles (typically UG/O&M vehicles)	<ul style="list-style-type: none"> In "park" E-brake set 	<ul style="list-style-type: none"> In "park" E-brake set Chock (front & back of rear tire) 	<ul style="list-style-type: none"> In "park" E-brake set Single chock in front of downhill side tire
Class I vehicles (empty weight >4000 lbs.) Examples: 3/4 Ton Pick-up, Crew cabs, Compact, 3/4 & 1-Ton vans	<ul style="list-style-type: none"> In "park" E-brake set 	<ul style="list-style-type: none"> In "park" E-brake set 	<ul style="list-style-type: none"> In "park" E-brake set Single chock
Class I vehicles Examples: Light Duty Pick-up, Explorers, cars	<ul style="list-style-type: none"> In "park" 	<ul style="list-style-type: none"> In "park" 	<ul style="list-style-type: none"> In "park" E-brake set
Loading trucks, trailers and railroad cars	See Rule 9.8.9 Forklifts		

* **Incline:** Defined as if vehicle in neutral, brake off, wheels pointed forward, truck will roll. As an added precaution, we encourage front wheels turned forward toward curb.

Wheel chocks required 'shaded' areas of this chart

Section 10

CHARTS AND VISUAL AIDS

10.1 BASIC KNOTS AND HITCHES

SOME DEPENDABLE ROPE KNOTS AND HITCHES:



Square or Reef Knot for joining ropes.



Bowline gives loop that will not slip under strain, and can be easily untied after strain is released.



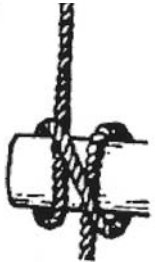
Running Bowline—Passing long end of bowline through loop makes a good slip knot.



Double Blackwall Hitch for hitching rope to hook for hoisting.



Fisherman's Bend for fastening rope to a ring or anchor.



Clove Hitch for snubbing a line.



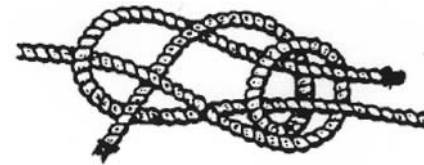
Wall Knot to prevent unstranding and act as a stopper.



Timber Hitch and **Half Hitch** for lifting can be easily loosened after strain is released, but will not slip under pull.



Rolling Hitch for hauling spar or large cable.



Double Sheet Bend for joining two ropes, especially those of unequal size, will hold new and wet ropes.



Sheepshank for shortening a rope or to bypass a weak spot.

10.2 BASIC RIGGING PRACTICES

USE OF CHOKERS



Bad—Because of cutting action of eye splice on running line



Bad—Bolt on running line can work loose



Good—No cutting action on running lines

EYE SPLICES



Bad Practice—Wire rope knot with clip. Efficiency 50% or less.



Bad Practice—Thimble should be used to increase strength of eye and reduce wear on rope

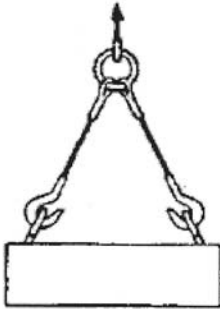


Good Practice—Note use of thimble in eye splice

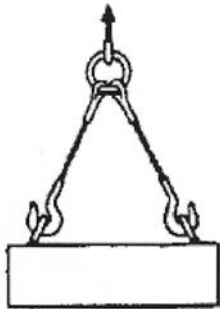


Good Practice—Use of thimble in eye splice

HOOK SLINGS



Bad Practice—Hook openings should be turned out



Good Practice—Hooks are turned out

10.3 EYE PROTECTION—WELDERS

Ready reference table for filter lens shade numbers for various welding and cutting operations:

Type of Operation	Shade Number
Shielded Metal-Arc Welding (1/16, 3/32, 1/8, and 5/32 in. diameter electrodes)	10
Gas-Shielded Arc Welding (Nonferrous) (1/16, 3/32, 1/8, and 5/32 in. diameter electrodes)	11
Gas-Shielded Arc Welding (Ferrous) (1/16, 3/32, 1/8, and 5/32 in. diameter electrodes)	12
Shielded Metal-Arc Welding (3/16, 7/32, and 1/4 in. diameter electrodes)	12
Shielded Metal-Arc Welding (5/16 and 3/8 in. diameter electrodes)	14
Atomic Hydrogen Welding	10-14
Carbon-Arc Welding	14
Soldering	2
Torch Brazing	3 or 4
Light Cutting, up to 1 in.	3 or 4
Medium Cutting, 1 to 6 in.	4 or 5
Heavy Cutting, over 6 in.	5 or 6
Gas Welding (Light), up to 1/8 in.	4 or 5
Gas Welding (Medium), 1/8 to 1/2 in.	5 or 6
Gas Welding (Heavy), over 1/2 in.	6 or 8

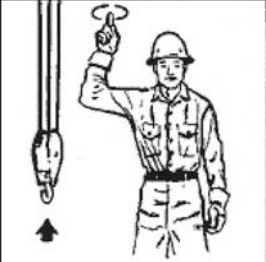
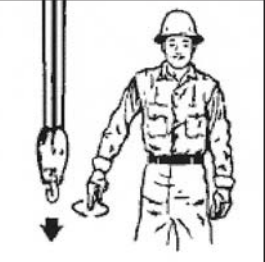
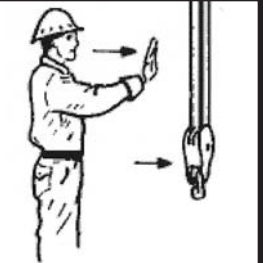

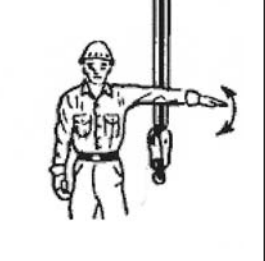
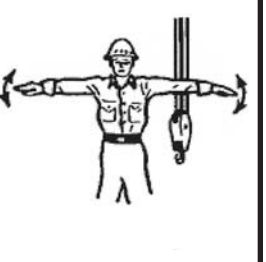
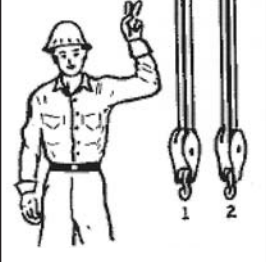
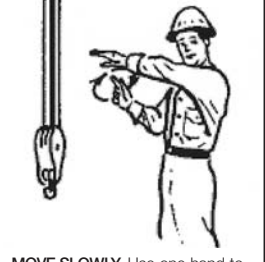
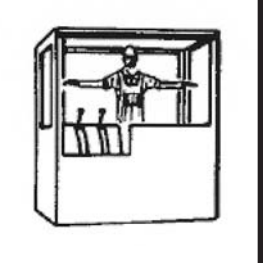
10.4 HAND SIGNALS FOR CRANE OPERATIONS

<p>HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.</p>	<p>LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circle.</p>	<p>USE MAIN HOIST. Tap first on head; then use regular signals.</p>
<p>USE WHIPLINE (Auxiliary Hoist). Tap elbow with one hand; then use regular signals.</p>	<p>RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.</p>	<p>LOWER BOOM. Arm extended, fingers closed, thumb pointing downward.</p>
<p>MOVE SLOWLY. Use one hand to give any motion signal to place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)</p>	<p>RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.</p>	<p>LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.</p>

10.4 HAND SIGNALS FOR CRANE OPERATIONS (CON'T.)

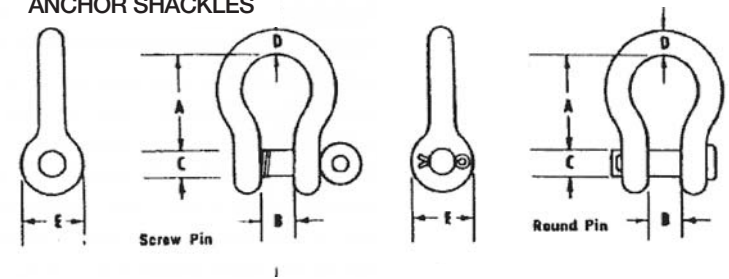
<p>SWING. Arm extended, point with finger in direction of swing of boom.</p>	<p>STOP. Arm extended, palm down, move arm back and forth horizontally.</p>	<p>EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.</p>
<p>TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.</p>	<p>DOG EVERYTHING. Clasp hands in front of body.</p>	<p>TRAVEL (Both tracks). Use both fists in front of body, making a circular motion about each other, indicating direction of travel, forward or backward. (For land cranes only.)</p>
<p>TRAVEL (One track). Look the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For land cranes only.)</p>	<p>EXTEND BOOM (Telescoping Booms). Both fists in front of body with thumbs pointing outward.</p>	<p>RETRACT BOOM (Telescoping Booms). Both fists in front of body with thumbs pointing towards each other.</p>

10.5 HAND SIGNALS FOR OVERHEAD AND GANTRY CRANES

 <p>HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.</p>	 <p>LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circle.</p>	 <p>BRIDGE TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.</p>
 <p>TROLLEY TRAVEL. Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.</p>	 <p>STOP. Arm extended, palm down, move arm back and forth horizontally.</p>	 <p>EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.</p>
 <p>MULTIPLE TROLLEYS. Hold up one finger for block marked "1" and two fingers for block marked "2". Regular signals follow.</p>	 <p>MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)</p>	 <p>MAGNET IS DISCONNECTED. Crane operator spreads both hands apart—palms up.</p>

10.6 SHACKLES—WORKING LOADS

ANCHOR SHACKLES



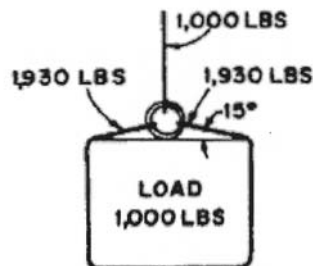
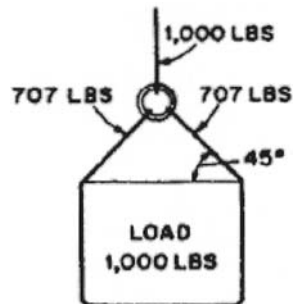
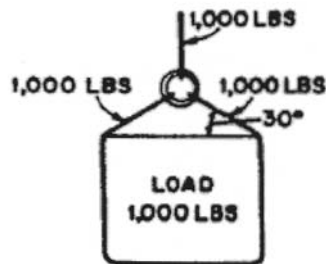
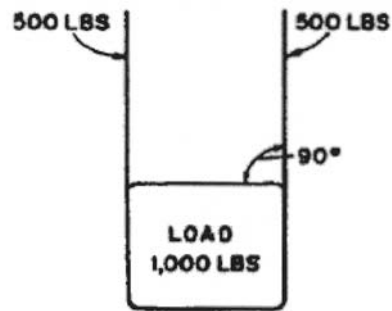
10.6 SHACKLES—WORKING LOADS (CON'T.)

SAFE WORKING LOADS OF SHACKLES

D Size In.	A	B	C	E	Safe Working Load in Lbs.
1/4	1 1/8	5/32	5/16	11/16	720
5/16	1 7/32	17/32	3/8	13/16	1060
3/8	1 7/16	21/32	7/16	31/32	1600
7/16	1 11/16	23/32	1/2	1 1/16	2170
1/2	1 7/8	13/16	5/8	1 5/16	2820
5/8	2 13/32	1 1/16	3/4	1 9/16	4420
3/4	2 27/32	1 1/4	7/8	1 7/8	6375
7/8	3 5/16	1 7/16	1	2 1/8	8650
1	3 3/4	1 11/16	1 1/8	2 3/8	11300
1 1/8	4 1/4	1 23/32	1 1/4	2 5/8	13400
1 1/4	4 11/16	2 1/32	1 3/8	3	16500
1 3/8	5 1/4	2 1/8	1 1/2	3 5/16	20000
1 1/2	5 3/4	2 1/4	1 5/8	3 5/8	23750
1 3/4	7	2 7/8	2	4 5/16	32350
2	7 3/4	3 1/4	2 1/4	5	42500
2 1/4	9 1/4	3 3/4	2 1/2	5 1/4	54000
2 1/2	10 1/2	4 1/8	2 3/4	6	67600
2 3/4	11 1/2	4 1/2	3	6	81000
3	13	5	3 1/4	6 1/2	97000
3 1/4	15	5 3/4	3 1/4		125000
3 1/2	15 1/2	6	4		150000
4	16 1/2	6 1/2	4 1/2		200000

10.7 SLING ANGLES AND LOADING

LOADS ON SLINGS CHANGE WITH ANGLE



10.8 SLINGS—NYLON AND POLYESTER

Nylon & Polyester Web Slings

DURA-WEB NYLON SLINGS

Best in Abrasion Resistance

Available in two strength classes, all *DURA-WEB* slings feature abrasive resistant *Cordura*** yarns covering all surfaces, for extended sling life and long-term value.

***Dura-Web* Features, Advantages and Benefits:**

Promotes safety

- Red core yarn warning system aids in the inspection process
- Striped webbing helps identify proper capacity
- *Tuff-Tag* provides serial numbered identification for traceability




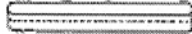
Saves Money

- Abrasion resistant *Cordura* covering on faces and edges for greater sling life
- *Tuff-Tag* provides required OSHA information for the life of the sling, not just the life of the tag

Saves Time



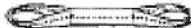
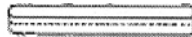
- Striped capacity for quick identification

10.8 SLINGS—NYLON AND POLYESTER (CON'T.)

	Code	Web Width (In.)	Rated Capacity (lbs.)*		
			Vertical	Choker	V. Basket
 Type U					
One Ply	UU1-202	2	4,000	3,200	8,000
	UU1-203	3	6,000	4,800	12,000
	UU1-204	4	8,000	5,400	16,000
Two Ply	UU2-202	2	8,000	5,400	16,000
	UU2-203	3	10,800	8,600	21,600
	UU2-204	4	14,400	11,500	28,600
 Type 3  Type 4					
One Ply	EE1-201	1	2,000	1,600	4,000
	EE1-202	2	4,000	3,200	8,000
	EE1-203	3	6,000	4,800	12,000
	EE1-204	4	8,000	5,400	16,000
Two Ply	EE2-201	1	4,000	3,200	8,000
	EE2-202	2	8,000	6,400	16,000
	EE2-203	3	10,800	8,600	21,600
	EE2-204	4	14,400	11,500	28,600
 Type 5					
One Ply	EN1-201	1	4,000	3,200	8,000
	EN1-202	2	8,000	5,400	15,000
	EN1-203	3	12,000	9,600	24,000
	EN1-204	4	16,000	12,800	32,000
Two Ply	EN2-201	1	7,800	6,200	15,600
	EN2-202	2	15,200	12,200	30,400
	EN2-203	3	20,400	15,300	40,800
	EN2-204	4	25,800	20,600	51,600

* **WARNING** Do not exceed rated capacities. Ratings must be reduced when slings are used at angles of less than 90 degrees (?) from horizontal.

10.8 SLINGS—NYLON AND POLYESTER (CON'T.)

	Code	Web Width (In.)	Rated Capacity (lbs.)*		
			Vertical	Choker	V. Basket
 Type U					
One Ply	UU1-102	2	2,000	1,600	4,000
	UU1-103	3	3,000	2,400	6,000
	UU1-104	4	4,000	3,200	8,000
Two Ply	UU2-102	2	4,000	3,200	8,000
	UU2-103	3	5,400	4,300	10,800
	UU2-104	4	7,200	5,700	14,400
 Type 3  Type 4					
One Ply	EE1-201	1	1,000	800	2,000
	EE1-202	2	2,000	1,600	4,000
	EE1-203	3	3,000	2,400	6,000
	EE1-204	4	4,000	3,200	8,000
Two Ply	EE2-101	1	2,000	1,600	4,000
	EE2-102	2	4,000	3,200	8,000
	EE2-103	3	5,400	4,300	10,800
	EE2-104	4	7,200	5,700	14,400
 Type 5					
One Ply	EN1-101	1	2,000	1,500	4,000
	EN1-102	2	4,000	3,200	8,000
	EN1-103	3	6,000	4,800	12,000
	EN1-104	4	8,000	6,400	16,000
Two Ply	EN2-101	1	3,900	3,100	7,800
	EN2-102	2	7,600	6,100	15,200
	EN2-103	3	10,200	8,200	20,400
	EN2-104	4	12,900	10,300	25,800

* **WARNING** Do not exceed rated capacities. Ratings must be reduced when slings are used at angles of less than 90 degrees (?) from horizontal.

10.9 SLINGS—WORKING LOADS

WIRE ROPE SLINGS

The hook should be the weakest part of any crane, hoist, or sling. It seldom, if ever, breaks, but it may fail by straightening out and finally releasing the load. A distorted hook is evidence of overloading and the hook shall be junked.

When a sling is purchased, the recommended safe working load should be given by the supplier.

If a hook and/or shackle are added to a wire rope sling, the capacity of each must be known. The capacity of the assembly shall be determined by the safe working load of the weakest member. When a hook is used, the safe working load shall be less than the other parts of the sling. In case of inadvertent overload, the hook will distort before any failure.

SAFE WORKING LOADS ON VARIOUS TYPES OF SLINGS

Type of Sling	Nominal size, in.	Single sling, lb.	Choker sling, lb.	U sling, lb.	Basket sling, lb.	Total load on two-leg slings (For three-leg sling multiply by 1-1/2. For four-leg sling, multiply by 2.)			Weight per ft. (exclusive of hook, ring, thimble, or splice), lb.
						60-degree bridle, lb.	45-degree bridle, lb.	30-degree bridle, lb.	
6 x 19 improved plow steel rope (Federal spec. RR-R-571) Factor of safety = 8 Splice efficiency = 80% Rope diameter →	3/8	1,350	1,010	2,700	2,360	2,330	1,910	1,350	0.23
	7/16	1,840	1,380	3,680	3,220	3,180	2,600	1,840	0.31
	1/2	2,420	1,815	4,840	4,240	4,180	3,420	2,420	0.40
	9/16	2,900	2,175	5,800	5,080	5,000	4,110	2,900	0.51
	5/8	3,800	2,850	7,600	6,650	6,570	5,400	3,800	0.63
	3/4	5,260	3,940	10,520	9,200	9,100	7,450	5,260	0.90
	7/8	7,000	5,250	14,000	12,250	12,100	9,900	7,000	1.23
	1	9,000	6,750	18,000	15,750	15,550	12,750	9,000	1.60
	1 1/8	11,200	8,400	22,400	19,600	19,400	15,900	11,200	2.03
	1 1/4	13,800	10,350	27,600	24,200	23,900	19,550	13,800	2.50

PROPERTIES OF ROPE

E—Excellent
VG—Very Good
G—Good
F—Fair
P—Poor

ROPE SAFETY FACTORS

<u>Size</u>	<u>Safety Factor</u>
3/16"–5/16"	10
3/8"–1/2"	9
9/16"–5/8"	9
3/4"–2"	7

A safety factor as recommended by the manufacturer and the College Institute has been applied to all ratings in this section. The safety factor varies with the size of the rope in question. Generally, a greater safety factor is required for smaller diameters of rope.

e.g. Safety factor = $\frac{\text{Breaking strength}}{\text{Working strength}}$ **or** Working strength = $\frac{\text{Breaking strength}}{\text{Safety factor}}$

Type	Manufacturers Trade Name	Application					
KEVLAR	KEVLON II	WINCH LINES (UG SAFETY HARNESSES)	E	E	E	E G	
	NATURAL FIBER	TREE					
	NYLON	GENERAL PURPOSE	VG	F	F	VG G P	
	POLYESTER	DACRON/ESTERLON	PULLING LINES	E	E	VG	G P
		RHINO-FLEX	PULLING LINES	E	E	VG	G P
		UN-LINE	PULLING LINES	E	E	VG	G P
		SPIDER-FLEX	STRINGING	E	E	VG	G P
		POLY T/C	TREE	E	E	VG	G P
	POLYPROPYLENE	S.F.T. UNTREATED POLY POWER CROWE (MFG.)	GENERAL PURPOSE	G	P	E	F E G
	BLENDS	SPLIT FILM TWIST (U.V.A.)	FOR ENERGIZED	G	F	E	F E G
TREATED FOR U.V.		AREA	G	F	E	F E VG	
NONCO/SUPER T&D TREATED FOR MOISTURE		TREE	E	G	G	VG G P	
ARBOR-FLEX NYSTRON		WINCH LINES & TREE	E	E	E	G G P	
POLYDYNE		WINCH LINES & TREE	E	E	E	G G P	
	DURA-FLEX	PULLING/WINCH (EHV)	E	G	G	VG G P	
	MAGNUS	GENERAL PURPOSE	E	G	E	G G P	
	HI-POWER/POLY-D	GENERAL PURPOSE	VG	G	E	G G P	
	POLYPLUS	GENERAL PURPOSE	VG	G	E	G G P	
	SSR-100	GENERAL PURPOSE	VG	G	E	G G P	

Note: Ratings are based on new condition comparisons

- 1) **Uni-Line** is used on pulling machine
- 2) **Spider-Flex** is used on Sherman Reilly Spider system
- 3) **S. F. T.** = split film twist
U. V. + = treated for ultra-violet protection
- 4) Rope has special wax coating for moisture resistance/high die-electric strength

RECOMMENDED WORKING STRENGTH OF ROPE IN POUNDS

Type Blend (Rope)	Manufacturers Trade Name	Diameter in Inches						
		1/4	5/16	3/8	1/2	5/8	3/4	1
MANILA POLYESTER	MANILA	55	90	135	265	495	695	1160
	DACRON/VESTERLON	165	255	410	710	1250	1785	3140
	RHINO-FLEX			750	1530	2700	3240	7200
	UNI-LINE (1)					2000	3285	5840
	SPIDER-FLEX (2)			390	620	975	1500	2430
POLYPROPYLENE	POLY TC.				690			
	POLY POWER	110	170	270	420	700	1095	1800
	S.F.T/S.F.T. (U.V.+ (3)	115	170	245	420	700	1090	1800
	SUPER T&D (4)			365	600	1025	1515	
	NONCO (4)	130		295	539	875	1350	
NYLON POLYESTER & POLYPROPYLENE	CROWE (MFG.)	125	190	270	485	775	1215	2000
	NYLON	165	255	410	710	1300	2030	3570
	POLY PLUS			330	600	900	1400	2430
	MAGNUS	120		270	460	830	1200	1500
	SSR-100			310	530	750	1200	2080
POLYESTER-OLEFIN & POLYOLEFIN	HI-POWER/POLY-D			275	555	880	1400	2000
	POLYESTER & NYLON	250	370	590	1165	2000	3285	5815
	POLYDYNE	250	380	555	1055	2000	3285	6000
	POLYESTER & POLYOLEFIN				745	1450	2070	
	DURA-FLEX	195	390	430	745	1450	2070	3570
KEVLAR & POLYESTER COVERED	KEXLON II	400	600	890	1780	3000	4570	7430

Notes: When identifying a manufacturers rope, refer to label on reel for name and types of material.

EFFICIENCY OF WIRE ROPE CONNECTIONS AS COMPARED WITH SAFE LOADS ON WIRE ROPE

Figure	Type of Connection	Efficiency
	WIRE ROPE	100%
2	SOCKETS—ZINC TYPE—properly attached	100%
3	WEDGE SOCKETS	70%
4	CLIPS	80%
5	KNOT AND CLIP (CONTRACTORS KNOT)	50%
6	PLATE CLAMP—THREE BOLT TYPE	80%
7	SPLICED EYE AND THIMBLE:	
	1/4" AND SMALLER	90%
	5/16"–7/16"	88%
	1/2"	86%
	5/8"	84%
	3/4"	82%
	7/8" AND LARGER	80%

* Not recommended



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7

EFFICIENCY OF KNOTS IN FIBER ROPE

Approximate efficiency of various knots in fiber rope as a percentage of the full strength of the rope:

Type of Knot	Efficiency
NEW ROPE (unknotted)	100%
EYE SPLICE OVER IRON THIMBLE	90%
SHORT HAND SPLICE	80%
TIMBER HITCH (round turn & half hitch)	65%
BOWLINE, SLIP-KNOT, OR CLOVE HITCH	60%
SQUARE KNOT, WEAVER'S KNOT	
OR SHEET BEND	50%
FLEMISH LOOP OR OVERHAND KNOT	45%

10.13 WIRE ROPE/U-BOLT CLIPS

APPLICATION OF WIRE ROPE U-BOLT CLIPS

Crosby Type:



1. **Correct Method**—U-Bolts of clips on short end of rope.
(No distortion on live end of rope.)



2. **Wrong Method**—U-Bolts on live end of rope.
(This will cause mashed spots on live end of rope.)



3. **Wrong Method**—Staggered clips; two correct and one wrong.
(This will cause a mashed spot in live end of rope due to wrong position of center clip.)

4. After rope is in service and is under tension, tighten clips to take up decrease in rope diameter.

NUMBER OF CROSBY OR SAFETY CLIPS AND DISTANCE
BETWEEN CLIPS NEEDED FOR SAFETY

Diameter of Rope (Inches)	Number of Clips	Distance Between Clips
$\frac{1}{4} - \frac{1}{8}$	3	2 $\frac{1}{4}$ "
$\frac{7}{16} - \frac{5}{8}$	3	3 $\frac{3}{4}$ "
$\frac{3}{4} - 1\frac{1}{8}$	4	6 $\frac{3}{4}$ "
1 $\frac{1}{4} - 1\frac{1}{2}$	5	9"
1 $\frac{5}{8} - 1\frac{3}{4}$	6	10 $\frac{1}{2}$ "
2" and over	7	6 x (diam. of cable)

10.14 EXCAVATIONS

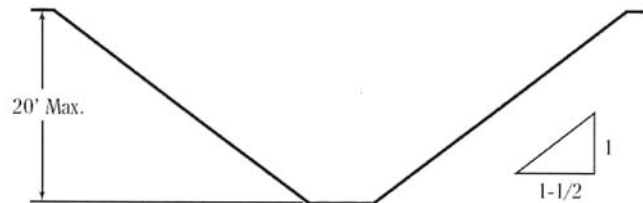


FIGURE 1. EXCAVATIONS MADE IN TYPE C SOIL

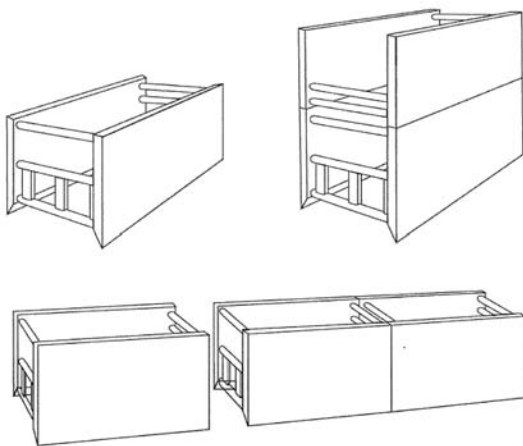


FIGURE 2. TRENCH SHIELDS

Appendix A

MINIMUM APPROACH DISTANCES— NEW YORK IBEW LOCAL 97 ONLY

No employee shall approach or take any conductive object closer to exposed, energized parts than the distances listed below:
(For phase to ground and phase to phase clearance;)

Minimum Approach Distance: The closest point of approach to energized lines or equipment by a qualified employee, or by any other conductive object, without the use of insulating gloves, sleeves or portable protective devices, shall be in accordance with the table below.

Reaching Distance: The distance that an employee's hand or any other body part and the end of any uninsulated tool being handled can reach while working, using a normal range of movement required by the work. (For example, not stretching, leaning or reaching in excess of what is required by work).

MINIMUM APPROACH DISTANCES

System Voltage	Electrically Qualified
50-1,000 V	Avoid Contact
1,001-15,000 V	Reaching Distance + 2 Ft. 2 In.
23 kV	Reaching Distance + 3 Ft.
34.5 kV	Reaching Distance + 3 Ft.
46 kV	Reaching Distance + 4 Ft.
69 kV	Reaching Distance + 4 Ft.
115 kV	Reaching Distance + 5 Ft.
230 kV*	Reaching Distance + 7 Ft.
345 kV**	Reaching Distance + 9 Ft.
*230 kV	Phase to Phase – Reaching distance + 7'6"
**345kV	Phase to Phase – Reaching distance + 12'6"

MINIMUM APPROACH DISTANCES FOR VEHICULAR AND MECHANICAL EQUIPMENT

Unqualified persons must maintain 10 feet of clearance from overhead lines or exposed energized circuits for voltages to ground up to 50 kV. For voltages to ground over 50kV, 10 feet plus 4 inches for every 10 kV over 50 kV must be observed.

<u>VOLTAGE</u>	<u>ELECTRICALLY QUALIFIED</u>	<u>OSHA General</u>
50 – 1000 V	Avoid Contact	Avoid Contact
1000 V – 15 kV	2 Feet 2 Inches	10 Feet
23 – 34.5 kV	3 Feet	10 Feet
34.6 – 46 kV	4 Feet	10 Feet
50 – 69 kV	4 Feet	10 Ft. 8 In.
115 kV	5 Feet	12 Ft. 4 In.
(1) 230 kV	7 Feet	16 Feet
(2) 345 kV	9 Feet	20 Feet
(1) 230 kV	Phase to Phase – 7' 6"	16 Feet
(2) 345 kV	Phase to Phase – 12' 6"	24 Ft. 8 In.

Appendix B

POLICY AND PROCEDURE CROSS-REFERENCE

Employee Safety Handbook Section Number		Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
1.3	Incidents Resulting in Employee Injury	Incidents Resulting in Employee Injury	Safety Procedure (SHP) Incident Notification SHP - Incident Analysis
1.4	Incidents - Motor Vehicle	Motor Vehicle Incidents	SHP - Incident Notification SHP - Incident Analysis
1.4	Incidents - Property Damage	Property Damage Incidents	SHP - Incident Notification SHP - Incident Analysis
1.4	Incidents - Near Miss	Near Miss Incidents	SHP - Incident Notification SHP - Incident Analysis
1.4	Hazardous Conditions	Hazardous Conditions	SHP - Incident Notification SHP - Incident Analysis
1.8	Asbestos	Asbestos	SHP - Asbestos Hazard Management Program, Asbestos work methods
1.9	Batteries - Station and Storage	Work Involving Batteries	EOP 406.01.2
1.10	Bloodborne Pathogens	Working Around Bloodborne Pathogens	SHP - Bloodborne Pathogens and Other Infectious Agents
1.13	Confined Space Entry, Permit Required	Preparation, Entering, Ventilation	SHP - Permit Required Confined Space Program, GOPB 704 Standard 03-23, Work Method 06-04

Employee Safety Handbook Section Number	Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
1.14	Drinking Water	SHP - Drinking Water Quality
1.15	Electrical Safety - Related Work Practices	SHP - Safeguarding Portable Power GOBP 711
1.16	Excavations	SHP - Excavations, GOBP 705 NG-USA EOP G013, GOBP 101
1.17	Exits	SHP - Emergency Action Plan Requirements
1.18	Eyewash / Drench Showers	Chemical Hygiene Plan
1.19	Fall Protection	SHP - Fall Protection, GOBP 706 Work Method 05-04 Work Method 05-24 Work Method 04-10 Standards 03-16
1.20	Fall Protection Railing	SHP - Fall Protection, GOBP 706
1.21	Fire Protection	SHP - Emergency Action Plan Requirements SHP - Hot Work Procedure Work Method 04-18

1/07

1/07

Employee Safety Handbook Section Number	Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
1.22	First aid/ CPR	SHP - AED SHP - Bloodborne Pathogens
1.23	Hazard Communication	SHP - Hazard Communication Program GOBP 707
1.25	Job Brief	SHP - Job Briefing
1.26	Ladders	SHP - Portable Ladders SHP - Fall Protection Work Method 04-24 Work Method 01-02
1.27	Lasers	SHP - Protective Equipment and Hazard Assessment
1.28	Lockout/Tagout	SHP - Lockout/ Tagout- Control of Hazardous Energy, GOBP 712, NG-USA, EOP, G014 Work Method 06-15, EOP 19
1.31	Personal Protective Equipment	SHP - Protective Equipment and Hazard Assessment, GOBP 708, GOBP 709 SHP - Respiratory Protection Program Work Method 05-27, Bulletin 02-01 NG-USA EOP G002, O&M Services 12-22-99

Employee Safety Handbook Section Number		Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
1.32	Scaffolds	Scaffold Safety	SHP - Scaffolds, SHP - Fall Protection Work Method 06-07 Work Method 05-07 Work Method 05-25 Work Method 04-14 Work Method 04-15 Work Method 03-01 Work Method 03-06 Work Method 03-12 Work Method 03-15 Work Method 03-17 Work Method 03-18 Work Method 99-04 Work Method 98-05 NG-USA EOP G002
1.34	Tools	Use of a Variety of Tools	
1.35	Water Safety	Water Safety	
1.36	Welding, Cutting and Heating	Hot Work	
			SHP - Portable Ladders SHP - Hot Work SHP - Protective Equipment and Hazard Assessment, EOP 16 SHP - Permit Required Confined Space Program SHP - Enclosed Space Program

Employee Safety Handbook Section Number		Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
1.36	Welding in Confined or Enclosed Spaces	Welding in Confined or Enclosed Spaces	SHP - Permit Required Confined Space Program SHP - Enclosed Space Program SHP - Respiratory Protection Program GOPB 710, Safety Bulletin 02-01 SHP - Fall Protection Work Methods 98-05 NG-USA EOP G002 NG-USA EOP G014 EOP 208A NG-USA EOP G012 EOP 408.01.2 NG-USA EOP G001 SHP - Enclosed Space Program Standard 03-23 Work Method 06-04 SHP - Fall Protection Work Method 05-04 Work Method 05-24 Work Method 04-10 Standards 03-16
1.38	Work Zone Traffic Protection	Work Zone Traffic Control	
2.1	Aerial Buckets, Baskets and Lifts	Aerial Buckets, Baskets and Lifts	
2.2	Backfeed	Backfeed Protection	
2.3	Capacitors	Working with Capacitors	
2.4	Current Transformers	Work With Current Transformers	
2.5	Enclosed Spaces	Preparation, Entering	
2.6	Fall Protection	Fall Protection For Electrical Employees	

Employee Safety Handbook Section Number		Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
2.7	Grounding of Cranes and Mobile Equipment in the Vicinity of Conductors	Applicability, Exclusions, Grounding, Vehicles Operating Near Energized Equipment	SHP - Elevating Aerial Platforms Work method 06-17
2.8	Live Line Tools	Care and Inspection, General Use	MS 509, MS 510 NG-USA EOP G005.00 Work Method 06-07 Work Method 03-01 Work Method 03-06 Work Method 02-09 EOP 499.10.2
2.9	Material Storage and Material Handling in Energized Areas	Material in Energized Areas	
2.10	Personal Protective Grounds	Preparation, Application	NG-USA EOP G014 NG-USA EOP D002 NG-USA EOP G 005.00
2.11	Rubber Gloves, Sleeves and Blankets	Use of Rubber Gloves, Sleeves and Blankets, Rubber Glove Exceptions	NG-USA EOP G005.00 MS 708 GOPE 708 NG-USA EOP D002 NG-USA EOP G005.07
2.13	Structures	General, Climbing	SHP - Fall Protection NG-USA EOP G014 EOP 499.10.1, EOP 499.10.2 NG-USA EOP T008

Employee Safety Handbook Section Number		Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
2.14	Testing and Testing Facilities	High Voltage and High Power Testing	EOP 499.10.1 EOP 499.10.2 EOP 480.10.1
2.15	Tools and Equipment	Tools and Equipment for Electrical Employees	Work Method 05-26 Work Method 04-15
2.16	Training	Training of Electrical Employees	SHP - Safety and Health Training Process
2.17	Work Area Identification	Work Area Identification	EOP 499.10.1 EOP 499.10.2
2.18	Working on or Near Energized/ Electrical Equipment	Working on or Near Energized/ Electrical Equipment	Work Method 05-03
3.1	Aerial Spacer Cable	Aerial Spacer Cable	Standard 06-20 Standard 06-09
3.3	Climbing Equipment and Climbing	Climbing Equipment and Climbing	Work Method 04-10
3.4	Fall Protection	Fall Protection for Overhead Employees	SHP - Fall Protection Work Method 05-04 Work Method 05-24 Work Method 04-10 Standards 03-16

Employee Safety Handbook Section Number	Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
3.5	Performing Hot Stick Work	Hot Sticks NG-USA EOP G005.00 Work Method 06-07 Work Method 03-01 Work Method 03-06 Work Method 02-09 NG- USA EOP G014 Work Method 01-04
3.6	Line Installation and Removal	Running and Removing Wires, Pole Sets Near Energized Lines, NRAs
4.1	Construction and Maintenance of Underground Structures and Conduit Line	Stripping Conduit And Concrete Envelopes From Duct Barks NG-USA EOP G014
4.2	De-energized Cable or Equipment	De-Energized Cable or Equipment EOP 20
4.3	Energized Cable or Equipment	Energized Cable or Equipment NG-USA EOP G014 SHP - Protective Equipment and Hazard Assessment
4.4	Pulling Cable	Underground Cable Pulling NG-USA EOP UG002
4.6	Hazard Assessments	Underground Hazard Assessments SHP - Protective Equipment and Hazard Assessment SHP - Job Briefing
4.7	Underground Electrical Installations	General Rules of Underground Electrical Installations SHP - Portable Ladders SHP - Enclosed Space Program EOP 20

1/07

1/07

Employee Safety Handbook Section Number	Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
5.2	Digging	Digging in a Substation SHP - Excavations NG-USA EOP G013
5.3	Elevated Areas	Elevated Areas Of Substations SHP - Portable Ladders SHP - Elevating Aerial Platforms SHP - Scaffolds
5.5	Access / General Work	General Work in Substation EOP 499.10.1 EOP 499.10.2 NG-USA EOP G014
5.6	Grounding of Vehicles	When to Ground, Grounding, Vehicles Operating Near Energized Equipment
5.8	Indoor Substations	Work in an Indoor Substation SHP - Elevating Aerial Platforms Work Method 06-17 EOP 499.10.1 EOP 499.10.2 SHP - Protective Equipment and Hazard Assessment
5.9	Power Transformers and Circuit Breakers	Manual Operation and Work On Power Transformers and Circuit Breakers SHP - Permit Required Confined Space Program SHP - Lockout / Tagout - Control of Hazardous Energy NG-USA EOP G014
5.10	Safety Observers	Substation Safety Observer SHP - Protective Equipment and Hazard Assessment SHP - Job Briefing

Employee Safety Handbook Section Number	Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
6.1 General	Metering Services, Meter Test and Communications Safety	MS- 708
6.3 Microwave Facilities	Working Near Microwaves	SHP - Radiofrequency (RF) Safety Procedure
6.5 Antenna and Radio Work	Working With Antenna and Radios	SHP - Radiofrequency (RF) Safety Procedure
7.1 General	General Safety for Gas Employees	SHP - Excavations GOPB 705, GOPB 710
7.2 Bonding	Bonding of Gas Lines	GOPB 401
7.3 Digging / Probing in the Vicinity of	Digging/ Probing Near Electric Facilities Underground Electric Facilities	SHP - Excavations GOPB 705 NG-USA EOP G013
7.4 Electric Clearances	Electric Minimum Approach Clearances	GOPB 711
7.5 Gas Leak Investigation	Gas Leak Investigation	SHP- Permit Required Confined Space Program GOPB 704, GOPB 201 GOPB 205
7.6 Live Gas Operations	Live Gas Operations	SHP - Respiratory Protection Program GOPB 401, GOPB 415 MS 205, MS 201, MS 415

1/07

1/07

Employee Safety Handbook Section Number	Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
7.8 Purging Gas Mains and Services	Gas Purging	GOPB 402 GOPB 403
7.9 State Electricity Precautions	Gas Lines and State Electricity	GOPB 401
7.11 Keyhole Technology	Keyhole Technology	SHP - Respiratory Protection Program GOPB 701 GOPB 701.1 GOPB 401 SHP - Protective Equipment and Hazard Assessment SHP - Job Briefing
8.2 Chain Saws/ Chippers	Use of Chain Saws and Chippers	NG- USA EOP G002
8.3 Climbing	Tree Climbing	SHP - Fall Protection
8.6 Personal Protective Equipment	Line Clearance Tree Work PPE	NG-USA G002
8.7 Spraying	Use of Herbicides	N/A
8.8 Working in Proximity to Energized Conductors	Line Clearance Tree Work Near Energized Conductors	NG-USA G014 MS 510
9.2 Inspections	Vehicle and Equipment Inspections	MS 317
9.4 Aerial Devices	Use of Aerial Devices	SHP - Fall Protection

Employee Safety Handbook Section Number		Topic/Rule Summary	Applicable Corporate Policy, Procedure, Work Method, or Bulletin
9.5	Digger/ Derricks	Use of Digger/ Derricks	Work Method 06-17
9.6	Trailers and Load Securement	Trailers and Load Securement	NG-USA EOP G0006 Working Methods 06-10
9.10	Winch Operation	Winch Use	Work Method 03-12 Work Method 01-04 Work Method 01-07
9.11	Non- Insulated Manlifts	Non- Insulated Manlifts	SHP - Fall Protection SHP - Elevating Aerial Platforms
9.12	Crane Operation	Use of Cranes	Work Method 05-07 Work Method 03-15

Appendix C

NATIONAL GRID CORPORATE SAFETY & HEALTH PERSONAL PROTECTIVE EQUIPMENT HAZARD ASSESSMENT WORKSHEET

Date of Assessment:	<input type="checkbox"/> Original Assessment <input type="checkbox"/> Reassessment
Location and Description of Workplace Evaluated:	
Job Title(s) of Person(s) Exposed:	
Name of Person Conducting the Assessment:	
Job Title of Person Conducting the Assessment:	
Summary of Job Activities and Types of Exposures: (Complete when/where PPE is required)	
HEAD PROTECTION AND EXPOSURES Exposed to: <input type="checkbox"/> Electrical Conductors/Flash <input type="checkbox"/> Falling Objects <input type="checkbox"/> Bump Hazard <input type="checkbox"/> Other Details: (Specify required equipment)	
HAND PROTECTION AND EXPOSURES <input type="checkbox"/> Cuts/Lacerations/Abrasions <input type="checkbox"/> Punctures <input type="checkbox"/> Chemicals <input type="checkbox"/> Thermal <input type="checkbox"/> Other Details: (Specify required equipment)	
FOOT PROTECTION AND EXPOSURES <input type="checkbox"/> Electrical Hazard <input type="checkbox"/> Falling/Rolling Objects <input type="checkbox"/> Piercing Sole <input type="checkbox"/> Other Details: (Specify required equipment)	
EYE/FACE PROTECTION AND EXPOSURES <input type="checkbox"/> Flyings <input type="checkbox"/> Chemical <input type="checkbox"/> Radiation <input type="checkbox"/> Other Details: (Specify required equipment)	
OTHER EXPOSURES <input type="checkbox"/> Legs <input type="checkbox"/> Body <input type="checkbox"/> Other Parts Details: (Specify required equipment)	

Appendix D

SAFETY OBSERVERS

NOTE: Appendix D applies to New England based operations personnel only. "Safety Observer" was previously referred to as "Safety Supervisor".

SAFETY OBSERVERS

A Safety Observer shall be required when work in a substation is to be performed on or near energized electrical apparatus:

- The Safety Observer shall never be a substitute for minimum approach distances, personal protective equipment, insulate/isolate techniques, and work area identification as a form of employee protection.

A Safety Observer is a qualified employee who has been appointed by the person in charge of the work, based on the hazard assessment and the job brief.

- The Safety Observer shall observe the worker performing the task or activity until all hazards have been eliminated or the task or activity has been completed.
- Is an additional safety measure to assist the qualified worker in identifying existing hazards and communicate those hazards in a timely manner during the task or activity.

The Safety Observer:

- Shall be qualified and must have demonstrated proficiency in the task/activity for which he or she has been asked to observe.
- Can be appointed from the existing crew compliment.
- Shall observe this task/activity while the hazard exists.
- Shall remain continuously focused on the task or activity being performed and not perform or assist in any other job activities while observing the worker performing the task/activity

- Shall notify the worker and/or the person in charge of the work if there is a need to leave, even for a few minutes. Work must stop until a new observer is appointed or the Safety Observer returns

The person in charge of the work:

- Shall be responsible to hold a documented job brief covering:
 1. The hazards associated with the job
 2. Work procedures involved
 3. Special precautions
 4. Energy source controls
 5. Personal protective equipment requirements
- Shall cover additional subjects in the job brief such as the location of energized equipment, in or adjacent to the work area, and the limits of any deenergized work area.
- Shall appoint the qualified employee to perform the task of Safety Observer.
- Shall appoint additional Observers if the job requires more than one.
- Shall discuss the scope of the work and communication techniques to warn or notify with the Safety Observer prior to performance of the task/activity.
- Shall communicate with the Safety Observer when the task or activity is complete or if there is a need to stop the task or activity and resume later.
- Inform the Safety Observer when their assistance is no longer necessary and allow the safety observer to go back to performing their assigned job.
- When necessary, select another Safety Observer if there is a need for the existing observer to leave, even for a few minutes.

A Safety Observer shall be required when the mechanical equipment has the potential to operate near energized lines or equipment.

- a. When operating mechanical equipment, maintain minimum approach distances from exposed, energized lines and equipment.
- b. If an employee (operator) determines that it is difficult to accurately determine the distance between the equipment (minimum approach distances) and the energized parts, a qualified co-worker will act as safety observer, observe the clearance, and promptly warn the operator when the equipment approaches the minimum approach distance.

In areas other than substations, a safety observer shall be appointed, when deemed necessary, by the person in charge of the work.