Electrical Safety & Lockout Tagout Procedures

JPMC Corporate Services Sites & Route Technicians
Engineering Services Vendor – ABM & Cushman & Wakefield

Version 2.1

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1.0 Purpose

To establish the electrical safety policy and procedures for JPMorgan Chase Corporate Services facilities and their Facility Services Vendor, in the case of this procedure is ABM and Cushman&Wakefield. This document is intended to give those persons who may come in proximity with energized or potentially energized electrical parts, the minimum safety knowledge and required safe work practices necessary to protect themselves from potential electrical shock and/or burn hazards. These procedures will assist electrical workers in eliminating situations, practices and actions that can result in accidents to personnel and property. The risks of injury to personnel involved in the operation and maintenance of facilities is considerable when unsafe acts involving energy from electrical power systems are performed.

2.0 References

The requirements contained in this document are based on:

- *NFPA 70E: Standards for Electrical Safety in the Workplace*, 2012 Edition.
- *29CFR 1910.137, 145, 147, 303-308, 333, 335 & 399*
- *NFPA 70: National Electrical Code,* 2011 Edition

3.0 Responsibilities

The JPMorgan Chase Corporate Services has responsibility for maintaining this policy. Any questions arising from implementing this policy should be referred to JPMorgan Chase Corporate Services.

The Facilities Service Vendor is the vendor that JP Morgan has retained to provide daily operational and maintenance functions for the building infrastructure. The Facilities Service Vendor is responsible for the safety of its own employees and may exercise oversight of other contractors if their acts are deemed unsafe or deleterious to facility operation.

MANAGEMENT RESPONSIBILITIES

- Ensure that employees under their cognizance are provided a workplace that is free from recognized hazards.
- Ensure that employees under their cognizance performing electrical work are trained and qualified (see Section 6).
- Ensure that approved, maintained, and tested personal protective equipment (PPE) and clothing is provided to the employees under their cognizance, available, and used properly.
- Establish, implement, and maintain procedures and practices that will ensure safe conduct of electrical work.
- Keep and maintain records as required.
- Monitor compliance with this directive and take timely corrective actions when deficiencies are identified.

All Facility Employees

- Responsible for understanding and following the procedures and policies contained in this document.

- Immediately reporting to management any unsafe electrical condition or practice.
- Failure to comply with these directives may result in disciplinary action.

4.0 Definitions

- **Accessible**; Admitting close approach; not guarded by locked doors, elevation or other effective means.
- **Ampacity**; the current in amperes a conductor can carry continuously under the conditions of use without exceeding its temperature.
- **Arc Flash Hazard**; A dangerous condition associated with the possible release of energy caused by an electric arc. This hazard may exist when energized electrical conductors or circuit parts are exposed or within guarded or enclosed equipment, provided a person is interacting with the equipment in such a manner that could cause an electrical arc. Under normal operating conditions, enclosed energized equipment that has been properly installed and maintained is not likely to pose an arc flash hazard.
- **Arc Flash Hazard Analysis;** A study investigating a worker's potential exposure to arc flash energy, conducted for the purpose of injury prevention and the determination of safe work practices, arc flash boundary, end the appropriate levels of personal protective equipment (PPE).
- **Arc Rating**; The Arc Thermal Performance Value (ATPV) of a material, expressed in cal/cm^2, which describes the performance of the material when exposed to an electric arc discharge. Arc Rated clothing has been tested for exposure to an electrical arc.
- **Attachment plug**; a device that, by insertion into a receptacle, establishes a connection between conductors of the flexible cord and the conductors connected permanently to the receptacles.
- **Authority Having Jurisdiction (AHJ);** An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, and installation, or a procedure.
- **Balaclava;** An arc rated hood that protects the neck and head except for facial area of the eyes and nose.
- **Bare-hand work;** A technique of performing work on energized electrical conductors of circuit part, after the employee has been raised to the potential of the conductor or circuit part.
- **Barricade;** A physical obstruction such as tape and cones intended to provide a warning about and to limit access to a hazardous area.
- **Boundary, Arc Flash**; The distance from a prospective arc source beyond which a person's body would be exposed to an incident energy of less than 1.2 cal/cm2 (the onset of second degree burns).
- **Boundary, Limited Approach;** the distance from an exposed electrical conductor or circuit part within which a shock hazard exists. It is the distance at which unqualified, unprotected persons, and uninsulated equipment must be kept away from exposed live parts
- **Boundary, Restricted Approach;** the distance from an exposed electrical conductor or circuit part at which there is an increased risk of shock, due to an electrical arc-over combined with inadvertent movement, to personnel working in close proximity to the energized electrical conductor or circuit part.
- **Branch circuit**; circuit conductors between the final over-current device protecting the circuit and the outlet(s).

- **Circuit breaker**;
    - 600 volts nominal or less; a device designed to open and close a circuit by non-automatic means and to open the circuit automatically on a predetermined over-current without injury to itself when properly applied within its rating.
    - Over 600 volts nominal; a switching device capable of making, carrying and breaking currents under normal circuit conditions, and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions such as a short circuit.
- **Class I locations**; locations in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.
- **Class II locations**; locations that are hazardous because of the presence of combustible dust.
- **Conductor**;
    - **Bare**; a conductor having no covering or electrical insulation whatsoever.
    - **Covered**; a conductor encased within material of composition or thickness that is not recognized as electrical insulation.
    - **Grounded**; a system or circuit conductor that is intentionally grounded.
    - **Grounding**; a conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.

Insulated; a conductor encased within a material of composition and thickness that is recognized as electrical insulation.

- **Cutout**; (over 600 volts, nominal); an assembly of a fuse support with a fuse holder, fuse carrier or a disconnecting blade(s). The fuse holder or fuse carrier may include a conducting element (fuse link) or may act as the disconnecting blade by the inclusion of a non-fusible member.
- **Disconnecting means**; a device, or group of devices or other means by which the conductors of a circuit can be disconnected from their source of supply.
- **Diagnostic (testing);** taking readings or measurements of electrical equipment with approved testing devices that does not require making any physical change to the equipment.
- **Electrical Hazard;** A dangerous condition such that contact or equipment failure can result in electrical shock, arc flash burn, or blast.
- **Enclosed**; Surrounded by a case, housing, fence or walls that will prevent persons from accidentally contacting energized parts.
- **Energized Equipment;** Any installed electrical equipment, which has not been locked out, tagged out and verified de-energized and, if applicable temporary protective grounding devices installed, shall be considered energized equipment.
- **Equipment**; a general term including material, fittings, devices, appliances, fixtures, apparatus and the like, used as a part of, or in connection with, an electrical installation.
- **Exposed;** Capable of being inadvertently touched or approached nearer than a safe distance by a person; electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.

- **Feeder**; circuit conductors between the service equipment or the generator switchboard of an isolated plant and the final branch circuit over current device.

- **Flame-Resistant (FR)**; The property of a material whereby combustion is prevented, terminated, or inhibited following the application of a source of ignition, with or without subsequent removal of the ignition source.

- **Fuse**; an overcurrent protective device with a circuit opening fusible part that is heated and severed by the passage of overcurrent through it.

- **Ground**; the earth.

- **Grounded**; connected to earth or to some conducting body that extends the ground connection.

- **Ground Fault Circuit Interrupter** (GFCI); a device for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.

- **Guarded**; covered, shielded, fenced or otherwise protected by means of a suitable covers, platform, rails, or barriers to remove the likelihood of approach or contact by persons or objects to a point of danger.

- **Incident Energy;** The amount of energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. The most common units used to measure incident energy is calories per centimeter squared (cal/cm^2).

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

- **Listed;** Equipment, materials, or services included in a list published by an accepted organization that meets appropriate designated standards or has been tested and found suitable for a specific purpose.

- **Location**:

    - **Damp**; partially protected locations under canopies, marquees, roofed open porches and like locations and interior locations subject to moderate degrees of moisture, such as some basements.

    - **Dry**; a location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

    - **Wet**; installations underground or in concrete slabs or masonry in direct contact with earth and location subject to saturation with water or other liquids, such as locations exposed to weather and unprotected.

- **Motor Control Center** (MCC); an assembly of one or more enclosed sections having a common power bus and principally containing motor control units.

- **Outlet**; a point on the wiring system at which current is taken to supply utilization equipment.

- **Overcurrent;** Any current in excess of the rated current of the equipment or the ampacity of a conductor resulting from an overload, short-circuit, or ground fault.

- **Overload**; operation of equipment in excess of normal, full-load rating, or of a conductor in excess of rated ampacity which, when it persists for a sufficient length of time, will cause damage or dangerous overheating.

- **Qualified Person**; One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved. An individual may be considered qualified with regard to certain equipment onsite but not on other types of equipment.

- (Electrical) **Repair;** any physical alternation of electrical equipment (such as making or tightening connections, removing or replacing components.)

- **Receptacle**; a contact device installed at the outlet for the connection of a single attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is a single device containing two or more receptacles.

- **Service**; the conductors and equipment for delivering energy from the electricity supply system to the wiring system of the premises served.

- **Single-line Diagram;** A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices used in the circuit or system.

- **Switches** - General use; a switch intended for the use in general distribution/branch circuits. It is rated in amperes, and is capable of interrupting its rated current at its rated volts.

    - **General snap switch**; a general-use switch so constructed that it can be installed in flush device boxes or on outlet box covers.

    - **Isolating switch**; a switch intended for isolating an electric circuit from the source of power. It has no interrupting rating, and is intended to be operated only after the circuit has been opened by some other means.

    - **Motor circuit switch**; a switch, rated in horsepower, capable of interrupting the maximum operating overload current of a motor of the same horsepower rating as the switch at the rated voltage.

- **Voltage** (of a circuit); the greatest root mean-square (effective) difference of potential between any two conductors of the circuit concerned.

- **Voltage, Induced;** The voltage that is present in a conductor caused by magnetic field interact of nearby energized current carrying conductors
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- **Voltage, nominal;** A value assigned to a circuit for designating it voltage class (e.g., 120/240V, 480Y/277V, 600V). The actual voltage at which a circuit operates can vary from nominal within a range that permits satisfactory operation.

- **Working on** (energized electrical conductors of circuit parts); Intentionally coming in contact with energized electrical conductors or circuit parts with hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the PPE worn. The two categories are: *diagnostic* (testing) and *repair.*

5.0 General Procedures

All installation, operations, maintenance, and repair of any equipment should be in accordance manufacturer's literature and the instructions included in the listing or labeling. The instructions contained in this document are designed to supplement the manufacturer's literature, industry standards, experience, and knowledge. The instructions contained are not designed to be used by inexperienced personnel or address all possible situations, conditions, or hazards.

Posted warnings: Employees shall read and comply with all posted warning signs and instructions.

All electrical circuits shall be treated as Energized until they have been Locked Out, Tagged Out (LOTO) and verified de-energized with safety grounds applied, as applicable.

All electrical conductors and equipment shall be listed or labelled by a Nationally Recognized Testing Laboratory (NRTL), as permissible by the local Authority Having Jurisdiction (AHJ).

Conductors and equipment shall be protected from over-current in accordance with their ability to safely conduct current. Employees shall ensure that correctly rated circuit protection devices are verified during maintenance procedures and for any temporary wiring applications.

Cables and wires shall be spliced or joined with splicing devices suitable for intended use.

No wiring system of any kind shall be installed in ducts used to transport dust, loose stock or flammable vapors.

All splices, joints and free ends of a wire or cable shall be insulated.

Energized equipment shall be guarded at all times.

- All electrical switchboards and panelboards with locking devices shall remain closed and locked when not in use
- Electrical panels with exposed electrical conductors or circuit parts shall be guarded to make them accessible only to Qualified Persons.
- In addition to guarding, warning and high voltage signs shall be posted when unqualified personnel could come into contact with live parts.

Ground wires must be identified and distinguishable from all other wires in accordance with the National Electrical Code. Grounding bus cables, external to electrical equipment enclosures, shall be protected from damage and remaining visible for inspection.

Electrical circuits shall be identified as to their use as follows:

- Each service, feeder, and branch circuit, at its disconnecting means or over-current device, shall be legibly and durably marked to indicate its purpose, unless located and arranged so the purpose is evident.
- Each disconnect switch or over-current device required for a service, feeder, or branch circuit must be clearly labeled to indicate the circuit's function, and the label or marking should be located at the point where the circuit originates.
- Each switchboard or panelboard shall be labeled as to where the power supplying it originates.

- Sufficient workspace shall be provided and maintained around electrical equipment to permit safe operation and maintenance of equipment. The area surrounding work areas is free of conductive equipment, parts or debris.

Inspection and evaluation the electrical equipment

- All portable electrical tools, equipment and cords shall be inspected prior to each use. The inspection shall include but is not limited to the following:
    - Physical integrity of enclosures and cabling insulation.
    - Insulation of portable test equipment and tool cords and casings.
    - Test instruments and equipment and their accessories shall be rated for the circuits and equipment to which they will be connected and shall be suitable for the environment in which they will be used.
    - Test equipment calibration is within periodicity (normally annually) where required.
    - Any equipment not meeting the above criteria shall be immediately reported to the employee's supervisor and taken out of service until repairs are made or it is removed from the site. An appropriate locking device and a tag, indicating that the equipment is out-of-service, shall be affixed in a manner that will prevent operation.
- Energized parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by approved cabinets or other forms of approved enclosures, or by any of the following means:
    - By location in a room, vault, or similar enclosure that is accessible only to Qualified Persons.
    - By suitable permanent, substantial partitions or screens so arranged that only Qualified Persons would have access to the space within reach of the energized parts. Any openings in such partitions or screens shall be so sized and located that persons are not likely to come into accidental contact with the energized parts or to bring conducting objects into contact with them.
    - By location on a suitable balcony, gallery, or platform.
    - By elevation of eight feet or more above the floor or other working surface. Note that, although equipment elevated at least eight feet is considered to be guarded, this may not be adequate if material being handled is likely to make contact with energized parts.
    - Entrances to rooms and other guarded locations containing exposed energized conductors or circuit parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter. (See 29 CFR 1910.145 "Specifications for Accident Prevent signs and Tags" for sign formatting guidance).
    - In addition to the above requirements the JPMorgan Chase shall conduct, or cause to be conducted, and document an annual physical integrity inspection of all permanently installed electrical enclosures. Criteria and checklists used for this inspection shall be derived from NFPA 70E Chapter 3.
- Additionally, all maintenance employees shall conduct a physical integrity and grounding system visual inspection anytime a piece is equipment is opened for servicing.

Job planning, briefing and documentation

- All energized electrical work at the facility shall be planned and first-time procedures shall be documented and retained by the manager responsible for the work for future reference. Hazard analysis for job planning shall be conducted using the guidance contained in NFPA 70 E and the JP Morgan-Chase Change Management process. Job plans and briefs shall be used as a tool to eliminate or control hazards associated with the work.

- The job plan shall contain the following minimum elements:

    - Purpose of task

    - Qualifications and number of employees to be involved

    - Hazardous nature and extent of task

    - Limits of approach

    - Safe work practices to be utilized

    - Personal protective equipment involved

    - Insulating materials and electrically rated tools involved

    - Special precautionary techniques

    - Electrical diagrams, equipment details, sketches/pictures of unique features, and any reference data to be used.

    - Energized work permit information

Job briefings

- The person responsible for the work shall brief all jobs with the affected employees and supervisors.

- An affected employee is one whose job requires him/her to operate or use a machine or equipment, or whose job requires him/her to work in an area, on which servicing or maintenance is being performed.

- The brief shall encompass the elements of a job plan contained above. If a qualified worker is working alone, he/she shall consider the items listed and take precautions accordingly

- In addition to the above requirements, supervisors shall ensure that all job plans and briefs attempt to anticipate unexpected events and identify and minimize all possible hazards.

- Where a task will be repeated throughout the day, only one briefing is required to be performed prior to the commencement of work.

- A brief discussion shall be satisfactory if the work involved is routine and if the employee, by virtue of training and experience can reasonably be expected to recognize and avoid the hazards involved in the job.

- Additional job briefings shall be conducted if significant changes, that might affect the safety of the employee, occur during the course of the work.

Energized Work

- Normally when working within the limited approach boundary or the arc flash boundary of exposed energized electrical conductors or circuit parts (> 50 volts) which an employee may come into contact with the equipment shall be put into an electrically safe condition utilizing the Lock-Out / Tag-Out (LOTO) procedure.

- **Only when it can be demonstrated that de-energizing the equipment will introduce additional or increased hazards, or is infeasible due equipment design or operational limitations, will energized work be authorized by the Chief Engineer, the Facility Manager or their designated representatives.**

- Performing checks to verify that equipment is de-energized shall be considered Energized Work for the purpose of this instruction.

- Only qualified personnel shall perform tasks such as testing, troubleshooting, and voltage testing within the limited approach boundary of energized electrical conductors or circuit parts operating a 50 volts or more or where an electrical hazard exist.

- Personnel shall not make cable connections to energized components connections unless connectors are specifically listed for that purpose and approved by the Chief Engineer.

- All electrical conductors shall be considered energized until placed in an electrically safe condition and verified de-energized via the LOTO procedure.

- Bare-hand work or work without safety glove(s) is never to be conducted on exposed energized electrical conductors or circuit parts above 50 volts to ground.

- Authorization for energized work shall be obtained utilizing the Energized Electrical Work Permit contained in **Enclosure (1).**

    - Routine testing, voltage measurements, and troubleshooting by qualified employees may be conducted without the use of an energized work permit **as long as the safe work procedures and required PPE of this document are utilized. Removing bolted covers from energized equipment or the insertion or removal of circuit breakers or motor control units from energized cubicles shall never be considered routine work.**

    - Examples of work not requiring an energized work permit:

        - Opening a hinged cover on an enclosure to perform a visual inspection

        - Performing voltage measurements to verify a zero energy state

        - Connecting an I/O device to a PLC or Variable Frequency Drive.

        - Infrared scanning or visual inspections performed outside the Restricted Approach Boundary

        - Other frequently performed tasks which local site management has approved.

    - The Chief Engineer, Facility Manager or their designated representatives shall approve all Energized Work Permits.

- Personnel precautions for performing energized work

  - No personnel shall perform energized work when alertness may be impaired due to illness, fatigue or other reasons.

  - Personnel shall not reach blindly into energized areas.

  - Doors, hinged panels, and the like shall be secured to prevent their swinging into an employee and causing the employee to inadvertently make contact with energized circuit parts or conductors if it is likely to create a hazard.

  - Personnel shall not perform energized work where the view is obstructed or adequate illumination does not exist.

    Personnel shall verify that they are not wearing conductive articles, clothing or jewelry prior to working on energized electrical equipment. Conductive articles that are unable to be removed from one's person shall be covered with insulating material (e.g., insulating tape).
  - Personnel shall only wear clothing, including undergarments, made from natural fibers when performing energized work.
  - Personnel shall not bring any non-electrically rated tools or equipment into the work area (this includes ladders and stools).

  - Personnel shall not perform housekeeping duties inside the limited approach boundary where there is a possibility of contact with energized electrical conductors or circuit parts; unless adequate safeguards (e.g., insulating equipment or barriers) are provide to prevent contact.

  - If work is to be accomplished on or in the vicinity of potentials in excess of 50 volts or the work is deemed particularly hazardous, a safety observer shall be assigned. The safety observer shall remain outside the established work area boundaries and monitor the area for unsafe conditions, provide warnings when these conditions exist and shall be briefed on location of the equipment disconnecting means, electrical casualty emergency procedures, including back-up methods (i.e., Shepherd's Hook) used to remove working personnel from energized components. The safety observer will be qualified in CPR and have no other duties.

Selection and Use of Personal Protective Equipment (PPE)

  - Personal Protective Equipment for the Prevention of Electrical Shock

  - Insulating material for the prevention of electrical shock will be selected based on the highest nominal voltage that will be exposed during the performance of the work (see **Table (1)** below).

Table (1)

Class	AC Maximum Use Voltage OSHA 1910.137
00	500
0	1000
1	7,500
2	17,000
3	26,500
4	36,000

- Insulating equipment made of materials other than rubber shall be rated to provide electrical and mechanical protection at least equal to that of rubber equipment.

- PPE will be maintained in a safe, reliable condition and shall be inspected before each use (defined as once per shift) and electrically tested in accordance with **Table 1 of Enclosure (2)**. The equipment shall be replaced if the insulating capability of the protective equipment is decreased due to damage during use. Before each use, the insulating equipment will be visually inspected and again immediately following any incident where the equipment may have been damaged. Visual inspections will consist of examining for holes, tears, punctures or cuts; ozone checking; embedded foreign objects; textural defects such as swelling, softening, hardening or stickiness; any other defect that results degradation of the insulating quality.

- Insulating gloves will be inflated with air and then sealing off the cuff area or rolling up the sealed cuff. Hold the glove to the side of the face to better detect leakage. The glove shall stay inflated with no leakage. The cuff of the glove must also be visually inspected.

- **Leather protective gloves** must be made of heavy-duty leather, be of the correct size, and the length must not extend beyond the cuff of the rubber insulating glove. They are worn to protect rubber insulating gloves from puncture damage and damage caused by exposure to an electrical arc flash. Because of this, removal of leather glove(s) shall only be considered when added dexterity is required by the work method being performed. Leather glove(s) may only be removed if all of the following circumstances are met:

    - Rubber insulating gloves used are of Class 0 insulation
    - Equipment nominal voltage is 240 volts or less
    - Physical (puncture) damage to rubber insulating glove(s) is unlikely to occur
    - Calculated Incident energy level is less than 1.2 Cal/Cm^2
    - A detailed inspection of the rubber insulating glove(s) is performed after use

- Pre-use Glove Checks may be recorded on a form similar to **Table 5 of Enclosure (3).**

- Defective equipment will be removed from service and destroyed.

- Insulating material shall be tested in accordance with **Enclosure (2)**

- Personal Protective Equipment for Arc Flash Hazards

    - Employees must wear protective equipment for the eyes or face wherever there is a potential danger of electric arcs or flashes or from flying materials resulting from an arc blast. This shall include polycarbonate safety glasses with side shields, a full-face shield, and additional flame-retardant protective clothing to cover the arms and torso. The following scenarios are examples of situations with the potential for arcs:

        - Switching of 208-volt phase-to-phase or higher circuits.
        - Installation or removal of low voltage circuit breakers in 208-volt phase-to-phase or higher energized circuits
        - Installation or removal of low-voltage motor starters with an energized bus in 208-volt phase-to-phase or higher circuits
        - Any energized electrical work task that could initiate a short circuit condition.

- PPE for the prevention of arc-flash injuries and electrical shock shall be selected based on the incident energy involved and shall be in accordance with **Table (2)** below.

- For equipment where incident energies have not yet been determined, the PPE shall be in accordance with **Table (3)** below.

- Energized Work shall not be performed on equipment with calculated incident energy levels greater than 40 Cal/cm^2. Whenever possible, equipment shall be placed in an electrically safe condition by de-energizing the equipment prior to conducting operations that have an increased potential of producing an Arc Flash (e.g., opening/closing circuit breakers). If unable to place the equipment in an electrically safe condition, the following are examples of techniques that can be used to increase the distance of an operator and thus decrease incident energy to the operator:

    - Use of installed remotely operated controls to open/close a circuit breaker

    - Use of “chicken switches” (solenoid operated, magnetically mounted, switch operators) to remotely trip circuit breakers

    - Use of extension poles to locally open/close, if remote operation is unavailable

    - Use of a proximity voltage detection devices in conjunction with contact voltage meters to verify equipment is de-energize

    - Use of a manufacture-supplied remote CB racking devices

Table (2) Arc Flash PPE When Incident Energy is Known

Incident Energy	Personal Protective Equipment Required
$0 \leq 1.2$ cal/cm^2 Value obtained from arc flash label	**Clothing** • Natural Fiber Shirt [Long Sleeve] ****** • Natural Fiber Pants [Long] ****** • Voltage Rated Gloves[ASTM D 120-09]* Leather Gloves [ASTM F 696-06]* **Arc Rated Protective Equipment** • Voltage Rated Tools [ASTM F 1505-94] • Safety Glasses [ANSI Z87.1-03] • Leather boots w/rubber soles[ASTM F 2413-05] *Insulating glove choice based on highest nominal voltage to be encountered [see **Table (1)]** **Outer Clothing Fabric Weight must be at least 4.5 oz/yd^2 and be non-melting according to ASTM F 1506-10a ***See Section 5, Page 11 for additional guidance
>1.2 cal/cm^2 $\leq$ 8 cal/cm^2 Value obtained from arc flash label	**Minimum Arc Rating of Personal Protective Equipment 8 cal/cm^2** **Clothing** • Natural Fiber Undergarments • Natural Fiber Shirt [Long Sleeve] • Natural Fiber Pants [Long] • Voltage Rated Gloves[ASTM D 120-09]* • Leather Gloves [ASTM F 696-06] *Insulating glove choice based on highest nominal voltage to be encountered **Arc Rated Protective Equipment** • Voltage Rated Tools [ASTM F 1505-94] • Class E or G Hard Hat [ANSI Z89.1-09] • Arc Flash Rated Face Shield [ANSI F 2178-08] • 8 cal/cm^2 Arc Rated Balaclava or hood • 8 cal/cm^2 Arc Rated Clothing outer layer or coverall • Safety Glasses [ANSI Z87.1] • Leather boots w/rubber soles [ASTM F 2413-05] • In canal Hearing Protection
>8 cal/cm^2 $\leq$ 25 cal/cm^2 Value obtained from arc flash label	**Minimum Arc Rating of Personal Protective Equipment 25 cal/cm^2** **Clothing** • Natural Fiber Undergarments • Natural Fiber Shirt [Long Sleeve] • Natural Fiber Pants [Long] • Voltage Rated Gloves[ASTM D 120-09]* • Leather Gloves [ASTM F 696-06] *Insulating glove choice based on highest **Arc Rated Protective Equipment** • Voltage Rated Tools [ASTM F 1505-94] • Class E or G Hard Hat [ANSI Z89.1-09] • Arc Flash Rated Face Shield [ANSI F 2178-08] • 25 cal/cm^2 Arc Rated Arc Flash Hood • 25 cal/cm^2 Arc Rated Clothing outer layer or coverall • Safety Glasses [ANSI Z87.1-03] • Leather boots w/rubber soles [ASTM F 2413-05]
> 25 cal/cm^2 $\leq$ 40 cal/cm^2 Value obtained from arc flash label	**Minimum Arc Rating of Personal Protective Equipment 40 cal/cm^2** **Clothing** • Natural Fiber Undergarments • Natural Fiber Shirt [Long Sleeve] • Natural Fiber Pants [Long] • Voltage Rated Gloves[ASTM D 120-09]* • Leather Gloves [ASTM F 696-02] *Insulating glove choice based on highest nominal voltage to be encountered. **Arc Rated Protective Equipment** • Voltage Rated Tools [ASTM F 1505-94] • Class E or G Hard Hat [ANSI Z89.1-09] • Arc Flash Rated Face Shield [ANSI F 2178-08] • 40 cal/cm^2 Arc Rated Arc Flash Hood • 40 cal/cm^2 Arc Rated Clothing outer layer/coverall****** • Safety Glasses [ANSI Z87.1-03] • Leather boots w/rubber soles [ASTM F 2413-05] **Layering 25 cal/cm^2 Arc Rated outer layer over 8 cal/cm^2 FR rated Shirt and Pants base layer achieves 40 cal/cm^2 total arc protection. 40 cal/cm^2 Arc Rated Arc Flash Hood required.
> 40 cal/cm^2	**No Safe PPE Exists** (See Section 5 for Guidance)

Table (3) Arc Flash PPE When Incident Energy is Unknown			
System Voltage	**Equipment and/or Task**	**Personal Protective Equipment Required**	**Hazard Category**
0 V – 50 V	All	Not Applicable (N/A)	N/A
50 V – 208 V	**Equipment examples:** Non Motor Control Center Non PDU or RPP breaker panel **Task Examples:** • Performing circuit testing, including a live/dead/live on equipment disconnect devices • CB/disconnect operation with covers on	• Natural Fiber Undergarments • Natural Fiber Shirt [Long Sleeve]* • Natural Fiber Pants [Long]* • Safety Glasses [ANSI Z87.1-03] • Voltage Rated Gloves[ASTM D 120-09]** • Leather Gloves [ASTM F 696-06] • Voltage Rated Tools [ASTM F 1505-94] • Leather boots w/rubber soles [ASTM F 2413-05] • In canal hearing protection *Outer Clothing Fabric Weight must be at least 4.5 oz/yd^2 and be non-melting [ASTM F 1506-10a] **Insulating glove choice based on highest nominal voltage to be encountered.	**HC 0**
208 V – 480 V	**Equipment examples:** CRAC/CRAH units Non Switchgear Non Motor Control Center Non UPS Non Generator **Tasks Examples:** • Performing circuit testing, including a live/dead/live • Removing/installing CBs in live panels • CB/disconnect operation with covers off • Infrared scanning or visual inspections outside restricted approach boundary • Removing bolted covers	**Minimum Arc Rating of Personal Protective Equipment 8 cal/cm** • Natural Fiber Undergarments • Natural Fiber Shirt [Long Sleeve] • Natural Fiber Pants [Long] • Safety Glasses [ANSI Z87.1-03] • Voltage Rated Gloves[ASTM D 120-09]* • Leather Gloves [ASTM F 696-06] • Voltage Rated Tools [ASTM F 1505-94] • Leather boots w/rubber soles [ASTM F 2413-05] • Class E or G Hard Hat [ANSI Z89.1-09] • Arc Flash Rated Face Shield [ANSI F 2178-08] • In canal Hearing Protection • 8 cal/cm^2 Arc Rated Balaclava or hood • 8 cal/cm^2 outer layer of clothing or coverall *Insulating glove choice based on highest nominal voltage to be encountered.	**HC 2**
208 V – 38KV	**Equipment examples:** Switchgear Motor Control Center UPS Generator **Task Examples:** • CB operation with doors open • Racking of circuit breakers and Motor Control Center buckets [doors open or closed] • Removing or Installing Bolted Covers • Installing protective grounding equipment , after voltage testing • Opening transformer compartments	**Minimum Arc Rating of Personal Protective Equipment 40 cal/cm** Natural Fiber Undergarments • Natural Fiber Shirt [Long Sleeve] • Natural Fiber Pants [Long] • Safety Glasses [ANSI Z87.1-03] • Voltage Rated Gloves[ASTM D 120-09]* • Leather Gloves [ASTM F 696-06] • Voltage Rated Tools [ASTM F 1505-94] • Leather boots w/rubber soles [ASTM F 2413-05] • Class E or G Hard Hat [ANSI Z89.1-09] • In canal Hearing Protection • 40 cal/cm^2 multi-layer flash pants, coat, switching hood** *Insulating glove choice based on highest nominal voltage to be encountered. **Layering 25 cal/cm^2 Arc Rated outer layer over 8 cal/cm^2 FR rated Shirt and Pants base layer achieves 40 cal/cm^2 total arc protection. 40 cal/cm^2 Arc Rated Arc Flash Hood required.	**HC 4**

- A work area shall be established and marked around the energized work at either the limited approach or Arc Flash boundary whichever distance is greater.

    - Barricades shall be erected using "DANGER" tape and cones/pylons or like equipment, whenever possible. If access door to the work space are located inside the work boundaries, tape and/or warning signs shall be placed on non-work side of the doors. If signs and/or barricade do not provide sufficient warning and protection from the electrical hazards (e.g., in high traffic areas) then an attendant may be stationed to warn and protect the worker(s).

    - No unqualified persons shall cross the established boundaries unless conducting on the job training and accompanied by a qualified person.

    - Qualified persons shall only cross these boundaries when their duties require them and only when wearing the proper PPE listed in **Table (2) or (3).**

    - The Arc Flash Boundary is determined by conducting an incident energy study. For voltages at below 600 V, where the incident energy has not been determined, a MINIMUM distance of 4 ft shall be used.

    - The Limited Approach Boundary shall be determined based on the values contained in **Table (4)**. An unqualified person may only cross this boundary if their job task requires it and then only under the continuous supervision of a qualified employee.

    - When a qualified person is working in the vicinity of exposed energized conductors or circuit parts, they may not approach or take any conductive object without an approved insulating handle closer to exposed energized conductors or circuit parts than shown in **Table (5)** unless all of the following are true:

        - The person is insulated from the energized part (gloves, with sleeves if necessary, rated for the voltage involved are considered to be insulation of the person from the energized conductor or circuit part on which work is performed), or

        - The energized conductor or circuit part is insulated both from all other conductive objects at a different potential and from the person, or

        - The person is insulated from all conductive objects at a potential different from that of the energized part.

        - The person has justified the reason for the work and has a plan based on risk analysis.

        - The person has an approved procedure and energized work permit or be performing an approved routine task per section 4.

Table (4)

Limited Approach Boundaries		
Nominal System Voltage	Exposed Movable Conductor	Exposed Fixed Conductor
50-750 V	3.05 m (10 ft)	1.07 m (3 ft 6 in)
751 V-15 kV	3.05 m (10 ft)	1.53 m (5 ft)
15.1 kV-36 kV	3.05 m (10 ft)	1.83 m (6 ft)

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Table (5)

Restricted Approach Boundaries	
Nominal System Voltage	
50-300 V	Avoid Contact
301-750 V	304.8 mm (1 ft 0 in)
751 V-15 kV	660.4 mm (2 ft 2 in)
15.1 kV-36 kV	787.4 mm (2 ft 7 in)

6.0 Training & Qualifications

All Employees

All employees shall be trained in the electrical hazards associated with their specific work environments.

Qualified Employees

In order for a facilities service vendor employee to be considered qualified, he / she shall have been an employee at the site for at least 6 weeks, received training and have demonstrated to the Chief Engineer the requisite knowledge and skill to work safely around energized conductors.

An employee who is undergoing on-the-job training for the purpose of obtaining the skills and knowledge necessary to be considered a qualified person and who, in the course of training, has demonstrated an ability to perform specific duties safety and who is under the direct supervision of a qualified person, shall be considered to be qualified for the performance of those specific duties.

As a minimum, the training will include the topics listed below:

- Identification of live parts.
- Determination of nominal voltages.
- Determination and significance of approach distances.
- Hazard identification, mitigation and PPE required.
- Proper inspection and use of portable test equipment including calibration and grounding.
- Safely de-energizing of parts and subsequent electrical lockout and tagging procedures as required by the LOTO policy.
- Proper precautionary work techniques.
- Proper use of personal protective equipment to include non-conductive gloves, head protection, safety glasses and face shields.
- Proper selection and use of rated test instruments and equipment including the capability to visually inspect all parts of the test equipment for defects and their limitations.
- Use of insulating and shielding materials for employee protection to include auxiliary shields, guards, mats, blankets or other specific equipment.

- Proper use of insulated tools or other non-conductive devices such as fuse pullers, fish tapes, hot sticks, Shepherd's Hooks, ropes or hand lines.
- The importance of illumination and to work only in properly illuminated areas.
- Proper work techniques for work in enclosed or confined workspaces.
- Removal or special handling of any conductive materials and equipment.
- Proper and safe use of portable ladders around electrical equipment.
- Removal of any conductive apparel or jewelry.
- Proper alerting techniques such as safety signs and tags, barricades, attendants, and work practices
- Emergency procedures including release of victims from contact with energized conductors, first aid and approved methods of resuscitation.
- Any other safety related work practice not listed above but is necessary for them to safely do their job.

Record Documentation

- The Chief Engineer shall maintain a list of qualified employees in their areas and shall conduct and document annual reviews of the training and safety performance of these personnel (see section 8)
- Documentation of training for each employee who attended training shall be retained for the duration of employment.
- Training documentation shall include the content of training, each employee's name and the date(s) of training.

Refresher training on the above topics shall be conducted annually.

7.0 Contractors

Outside contractors that will be performing work on site shall follow at a minimum, the JP Morgan-Chase Corporate Services Electrical Safety Procedure and be pre-qualified to perform electrical work.

- The site engineering facility vendor and the outside Contracting firm must inform each other of their respective Electrical Safety procedures. The responsibility of training outside contractor's employees lies with their employer. However JP Morgan Chase or its designated representative may conduct training for the outside contractor.
- All Contractors shall be trained in JP Morgan-Chase's Critical Environment and Electrical Safety procedures consistent with section 6 of this standard and have been pre-qualified prior to conducting any work associated with electrical equipment.
- JP Morgan-Chase or its designated representative shall review the Contractor's Electrical Safety program and performance record in detail to assure safe coordination and implementation that protects all workers.

8.0 Audits and Reports

An annual audit of the principles contained in this document shall be conducted by JP Morgan Chase or a firm retained by them.

The Engineering Services Vendor Chief Engineer or their designee will complete an internal audit of each assigned engineer who is qualified to perform Lock-Out/Tag-Out isolation for electrical equipment once per calendar year. The assessments shall be conducted during work-in-progress using a Lock Out / Tag Out Audit Form. Audits shall be retained for two years for review.

The results of the audit shall be forwarded to Management for review.

- Results of the audits shall include an overall assessment of facility and program compliance, as well as specific deficiencies noted and proposed corrective actions and follow ups to be conducted.

Supervisors shall conduct training with all employees on discrepancies found and lessons learned from the audits.

9.0 Reserved

10.0 Miscellaneous Requirements

Work in Hazardous Locations

- Energized electrical work in a Class I or Class II, Division 2 rated-location requires special hazard precautions. Work shall only be performed after a thorough analysis has been made to verify the work can be performed safely, and approval has been obtained from the responsible manager.

- A thorough test of the area must be performed with a properly calibrated (to the type of vapor that might be present) combustible gas indicator and continuously during any energized electrical work. If any indication of a vapor in the air is sensed on the combustible gas indicator, work will not proceed or will stop until the source of the vapor is controlled or entirely eliminated. In all cases work shall be performed in a de-energized and locked out condition to prevent an electric spark potential in such an area. Energized electrical work in a hazardous location shall be pre-approved by the JPMorgan Chase designated representative in all cases to insure that hazard controls are adequate.

Work in Wet or Damp Locations

- Standing water, which could pose a risk to electrical equipment, shall be removed, pumped, or squeegeed with all electrical power in the affected area disconnected and locked out. Any electrical equipment used to remove water shall be rated for wet or dry work and must be connected to a GFCI-equipped power source; any extension cords used will have molded end caps and be free of any defects in the insulation. All other energized electrical work shall be postponed until the standing liquid can be cleaned up to a damp condition.

- Work in damp locations shall be accomplished with the highest level of regard for safety. Equipment shall be powered through GFCI-equipped circuits. Energized electrical work shall be minimized except for testing or metering to verify de-energized conditions until the area can be properly dried.

Cords

- Flexible cords (extension cords) shall not be substituted for fixed wiring.

- Flexible cords shall be protected from accidental damage.

- Cords shall be routed so that they do not present a trip hazard in aisles and workspaces. Temporary wiring shall be run overhead where possible and never thorough walls, doors, partitions, or holes in the floor or ceiling. This includes any extension cords or power strips used in cubicle, office, or employee eating areas. Cords shall be kept at least 6 inches above floor surfaces wherever there is a potential for liquid leaks and spills.

- Insulation integrity must be assured or protected to prevent current leakages. A visual inspection for insulation damage is required before use.

- Flexible cords used with grounding-type equipment shall contain an equipment grounding conductor. Portable plugs (e.g., extension cords) shall not be altered in a manner that would interrupt continuity of the grounding conductor.

- Repairs of damaged extension cords are not permitted.

Overriding Safety Interlocks

- When a qualified person is required to override safety interlocks to perform metering, testing or troubleshooting equipment with the power on (e.g., energized electrical work), the following safe work practices shall be followed:

- Overriding safety interlocks shall only be performed by Qualified Persons or Qualified Electrical Workers who are experienced with the equipment being serviced and understand the consequences of overriding the interlocks.

- All safety interlocks shall be restored after the work has been completed. Where possible, positive confirmation should be made to verify that each interlock functions as intended. This may be accomplished by a de-energized continuity check where possible or by activating the interlock with the equipment energized.

Switching

- A high percentage of accidents occur during switching operations. The following steps will minimize risk to personnel and equipment while performing switching:

- Devices used to open circuits under load conditions must be designed to interrupt the current involved.

- Secure authorization before performing any switching, preferably in writing as part of a MOP.

- Review the associated single-line diagram to identify all equipment affected by operation.

- Perform a system walkthrough to verify diagrams and identify location specific hazards.

- When deemed necessary, affix switching tags adjacent to devices to be operated.

- Notify all personnel affected by the switching operation.

- Personal protective equipment shall be worn as determined by a flash hazard analysis, by using **Section 5, Table (2)** or as required **Section 5, Table (3).**

    - **Section 5, Tables (2) and (3)** generally apply when panel or equipment covers are removed, exposing energized (or potentially energized) electrical conductors or circuit parts.

- During circuit switching operations on equipment with nominal voltages between 50V and 480V and panel covers installed, as a minimum, CAT 0 PPE (see **Table (3)** for requirements) shall be worn as long as all of the following conditions exist:

    - IE levels are known to be less than 8 Cal/cm^2
    - Load through the switching device has been removed
    - Circuit equipment supplied by the disconnecting means is not malfunctioning
    - Equipment enclosure is in good material condition (e.g., all panel/door fasteners installed and secure, door latches functional, and hinges not rusted)
    - Equipment has been installed and maintained by qualified persons.
    - Proper switching methods are used

      NOTE: Since a shock hazard does not exist, rubber insulated gloves and insulated tools are not required.

- Identify the immediate blast zone. If the switch fails, where will the blast go? If you cannot operate the device remotely, stand off to the side that offers the most protection from an anticipated blast.

- Have a backup person who can render assistance, if necessary, but ensure they stay out of the immediate blast zone.

- Keep all others out of the switching area.

- Make sure panel covers and doors are secure.

- Once the worker is prepared to operate the switch, it should be operated as if it may fail.

- Before re-energizing, verify that all locks, blocks and tags have been removed and a qualified person has verified the circuit is safe to re-energize.

Reenergizing Circuits following Protective Device Operation

After a circuit is de-energized by automatic operation of a circuit protective device (e.g., a circuit breaker or fuse) the circuit shall not be manually re-energized (using remote or local operation) until it has been determined, by examination and testing, that the equipment and circuit can be done so safely. Repetitive manual reclosing of circuit breakers or re-energizing circuits by replacing fuses is prohibited. When it is determined that the automatic operation of a device was caused by an overload rather than a fault condition, examination of the circuit or connected equipment is not required before re-energizing the circuit. Safe switching methods shall be followed.

Tool Control & Inventory

- Chief Engineer or his designee will implement a Tool Inventory process for major maintenance or troubleshooting for electrical switchboards, battery rooms, and UPS equipment.

- The Chief Engineer or the designee will designate boundaries for the work area that require inventorying all tools entering or leaving the area. Examples of boundaries include; room access doors, electrical switchboard cubicles, or marked boundaries.

- Chief engineer or designee will ensure that the engineering services vendor and/or contractors perform a tool inventory for tools that are within the delineated boundary utilizing a form similar to **Enclosure (4).**

- Use of tool inventory is at the discretion of the Chief Engineer or designee for equipment such as cooling towers, CRACs, variable air volume handlers, air handlers, and other equipment.

Personal Protective Grounds

Grounding devices shall be installed on Medium Voltage (>600V nominal) equipment that has been isolated for maintenance or repair. Grounding devices shall be installed on de-energized Low Voltage (<600V nominal) Switchboards when there is a possibility of back-feed or induced voltages >50V during the conduct of work.

Multiple grounding sets may be necessary if the equipment is being feed by multiple sources.

During the performance of LOTO if it is necessary to apply personal protective grounds, they shall only be applied and removed by qualified electrical workers in accordance with the below procedures. **ONLY AFTER THE EQUIPMENT IS APPROPRIATELY DE-ENERGIZED, LOCKED, TAGGED, AND VERIFIED, MAY GROUNDING CABLES BE APPLIED.**

Ratings:

- Grounding cable sets must be rated for the maximum available fault current of the system on which they are applied.
- Where the available fault current exceeds the rating for one set of ground cables, multiple sets must be applied.
- ASTM has developed grading criteria for grounding set component ratings. This ASTM standard (F855) is based on either 15 cycle or 30 cycle ratings (for 60Hz systems).

Maximum Available Fault Current (kA)			
ASTM Grade	15 Cycle Clearing Time	30 Cycle Clearing Time	Copper Cable Size (AWG)
1	14.5	10	#2
2	21	15	1/0
3	27	20	2/0
4	36	25	3/0
5	43	30	4/0
6	54	39	250 MCM
7	74	54	350 MCM

- When applying grounding devices (including manufacture-supplied insertable devices), wear the personal protective equipment as listed in Section 5, Table 2 or 3 of this policy.
- Procedure: When installing grounding cable devices, the following shall be performed in the order given:
    - Perform checks to verify that no voltage is present.
    - If necessary, discharge residual (induced) voltages to ground using an approved shorting probe with insulated extension pole.
    - Securely connect the ground cable or the ground set to an effective ground point.
    - Securely clamp other end of the ground cable or one free end of the grounding cable set into contact with the closest phase of the de-energized apparatus using an insulating handle, "shotgun", or other suitable device. In close clearance low voltage cubicles, it may be necessary to apply the grounds without an insulating handle.
    - Repeat for the remaining phases of the apparatus.

- The application or removal of any ground shall be completed so it will not be required to cross an ungrounded system phase.

Tagging:

- After the application of grounds is complete, the location of the grounding set should be tagged with a "Caution Grounds Applied" sign. This sign should be connected to the ground set yoke using high visibility yellow tape/rope.
- An additional caution sign should be placed outside the enclosure near the normal switching means used to re-energized the switchboard.

Each individual shall personally satisfy himself or herself that all necessary steps have been executed in the proper manner before they begin work.

Temporary Removal:

- Grounds should be left on circuits, except when it is necessary to remove them for testing, while work is in progress.
- When any work requiring the removal of grounds is complete, the grounds shall be reapplied until final removal in preparation for re-energization.

Emergency Response

Employees who are part of the emergency response team shall be trained in techniques for recognizing electrical hazards, coordinating with qualified Facilities or Equipment personnel to ensure that power is turned off (and various methods for accomplishing this) before attempting rescue, techniques for extracting persons from live circuits, and first aid response. The persons shall be practiced and proficient in their response to insure their own safety as well as the victims being rescued.

11.0 Enclosures

(1) Energized Work Permit

(2) Required Personal Protection Equipment (PPE) For Electrical Work

(3) Linemans Glove Log

(4) Tool Inventory Sheet

Energized Work Permit

Date Issued:

Date Expired:

Assigned personnel or contractor (performing work):

Mop # or WO #:

Description and location of the circuit and equipment to be worked on:
Justification for why the work must be performed in an energized condition:
Description of the Safe Work Practices to be employed (barricades, PPE, cones, tape, insulated tools, Etc.)**:**
Results of the shock hazard analysis.
Determination of shock protection boundaries
Results of the flash hazard analysis (Affixed labels may be used for this determination).
The flash protection boundary (Affixed labels may be used for this determination). If flash hazard analysis has not been conducted, use tables listed in NFPA 70E.
Personal Protective Equipment (PPE) determined necessary to safely perform the assigned task: If flash hazard analysis has not been conducted, use tables listed in electrical safety policy.
Means employed to restrict the access of unqualified persons from the work area:
Evidence of completion of a job briefing, including a discussion of any job specific hazards: See MOP

Submitted (Qualified Worker) **Date**

Reviewed (Supervisor) **Date**

Approved By **Date**

Enclosure (1)

Required Personal Protection Equipment (PPE)
For Electrical Work

1. Standards
    a. ASTM D 120-09 approved insulating gloves rated for the highest voltage to be encountered.
    b. ANSI Z87.1-03 approved safety glasses.
    c. ASTM F 696-06 approved leather glove protectors.
    d. ANSI Z89.1-09 approved electrically rated hardhat, types E and G
    e. ANSI Z87.1, ASTM F 2178-08 approved arc rated face shield.
    f. ASTM F 1959-99 approved Fire Retardant pants and long sleeved shirt or Fire Retardant coverall with a minimum Arc Thermal Performance Value (ATPV) equal to or greater than the highest incident energy, which may be encountered.

2. Insulating Equipment

Table (1) Rubber Insulating Equipment Testing Intervals	
Type of Equipment	**Electrical Testing Frequency**
Rubber Insulating Gloves	Before first issue and every 6 months thereafter.
Rubber Insulating Blankets, Cloth, and Floor Mats	Before first issue and every 12 months thereafter.
Rubber Insulating Sleeves	Before first issue and every 12 months thereafter.
Insulating poles. (e.g. Hot sticks, Shepherd's Hooks, shotgun sticks, discharge poles, etc.)	Every 2 years.

(Note: If any insulating equipment has been electrically tested but not placed in service, it may not be placed into service unless it has been electrically tested within the previous 12 months. Employees are responsible for ensuring the above requirements are met prior to use.)

Table 5 Lineman's Glove Log								
DATE	NAME	GLOVE TEST - BEFORE USE			GLOVE TEST - AFTER USE			REMARKS
		PASS		FAIL	PASS		FAIL	

Enclosure (3)

Tool Inventory Sheet

Job Title/MOP#:	Date:
Vendor Company:	
Vendor Personnel Name:	
Assigned Site Personnel:	
Switchboard/Room:	

Tools

Description of Tool or Equipment	Time In	Time Out	Initials

Enclosure (4)

1.0 Program Objectives

The purpose of this policy is to ensure that before any employee performs any servicing or maintenance on machinery or equipment, where the unexpected energizing, start up or release of any type of energy could occur and cause injury, the machinery or equipment shall be rendered safe to work on by being locked and tagged out and verified to be in a zero energy state.

2.0 Purpose and Scope

Effective hazardous energy control procedures shall protect all workers potentially exposed to unexpected energization or release of stored energy which could cause injury to employees during the servicing, installation, or maintenance of machines, equipment or systems, as well as while working on or near exposed de-energized electrical conductors and parts of electrical equipment.

This procedure meets or exceeds the requirements specified by the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.147, Control of Hazardous Energy (LOTO); 29 CFR 1910.333, Lockout / Tagout Electrical Safe Work Practices; and NFPA 70E Article 120..

This program does not apply to the work on cord and plug connected electrical equipment for which exposure to the hazard of unexpected energization or startup of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control (within arm's reach and line of sight) of the employee performing the servicing or maintenance.

This program applies to all JP Morgan-Chase, the site facilities services vendor, and all prime or subcontractor employees performing work at JP Morgan-Chase Corporate Services facilities.

3.0 Definitions

Affected Employees – An employee whose job requires him/her to operate or use equipment on which servicing or maintenance is being performed under Lockout /Tagout or whose job requires him or her to work in an area in which such servicing or maintenance is being performed. An affected worker cannot perform work under a Lockout / Tagout permit.

Authorized Employee – A person who either applies the locks and tags on machines, equipment and systems or works under the protection of Lockout / Tagout in order to perform servicing or maintenance on that machine or equipment. This person has completed the mandatory training delineated in Section (10) of this standard and is qualified and listed by the facility Chief Engineer (for employees under his cognizance) or the Facility Manager as an Authorized Employee. Only an Authorized Employee may prepare, verify or, in the case of a group lock out, serve as the supervising employee in the performance of Lock Out / Tag Out procedures.

Authorized Locks and Tags – These are locks and tags that are used to ensure the safety of the Authorized Employees performing servicing, installation, and maintenance of machines, equipment or systems. Servicing or maintenance may not begin until these devices are applied to the Energy Isolation Device(s). These locks and tags **shall not** be used for any other purpose. The locks shall be singularly keyed and the Authorized employees shall retain the keys to individual locks. The keyed lock will be distinctive in color. The print and format of tags shall be standardized and will warn against hazardous conditions if the machine or equipment is energized. The tag shall read "**Danger – Do Not Operate**" and will have black lettering with a red and white background. The tag attachment means shall be capable of withstanding at least a 50 pound force exerted at a right angle to the disconnect means surface. Tags will identify the Authorized Employee applying

the devices and the date the tag was hung. Only Authorized Employees may perform service or maintenance work on the system, equipment or machine. All locks and lock boxes used in this procedure will be marked with a unique serial number.

Energized Equipment – Any installed electrical equipment, which has not been locked out, tagged out and verified de-energized and, if applicable temporary protective grounding devices installed, shall be considered energized equipment.

Energy Source – Any source of hazardous energy or materials. Energy sources include, but are not limited to; electrical, mechanical, hydraulic, pneumatic, chemical, radiation and thermal energies, as well as various forms of potential energy such as that stored in springs, compressed gases, or in suspended objects (gravitational).

Double Block and Bleed – The closure of a line, duct, or pipe by closing, locking, and tagging two line valves and by opening and locking/tagging a drain or vent in the line between the two closed valves.

Energy Isolation Device – A device that prevents the transmission or release of hazardous energy or hazardous materials. Examples include, but are not limited to; restraint blocks, electrical circuit breakers, disconnect switches, slide gates, slip blinds, or line valves. For Lockout / Tagout purposes, isolating devices that provide visible indication of the device's position are desirable. Control circuit devices shall not be the sole means of assuring electrical de-energization.

Lockout Device – A device that utilizes a positive means such as a lock, either keyed or combination type, to hold an energy-isolating device in a safe position to prevent the energization of a machine, equipment or system. Other Lockout Devices include dead ends (blanks), bolted slip blinds, valve hand wheel covers, and cable or chain/lock. All locks require a Danger Tag.

Lockout / Tagout (LOTO) – Installation of lock(s) and tag(s) on the Energy Isolation Devices to ensure that work can be performed safely. The lock(s) and tag(s) ensure that the Energy Isolating Device(s) and the machine, equipment or system(s) they isolate and/or control, cannot be operated until the lock(s) and tag(s) are removed.

Other Employees – Employees whose work operations are or may be in an area where energy control procedures are utilized.

Safe Condition Check (Verification of De-energization) – The inspection or test of a system or component performed by the Authorized employee to ensure that the hazardous energy or materials are controlled to prevent injury or accident. **Note: This is an essential element of all energy control programs and procedures, which ensures the safety of all potentially exposed personnel.**

Maintenance and/or Construction – Work place activities such as maintenance inspections, construction, installing, setting up, modifying, adjusting and maintaining and or servicing machines, equipment, or systems. These activities include lubrication, cleaning, or un-jamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or start-up of the equipment or release of hazardous energy. This applies to all personnel regardless of job title, (i.e., operator, maintenance, electrician, etc.)

Qualified Person – One who, by possession of a recognized degree, certificate, professional standing, or who by extensive knowledge, training, or experience, has successfully demonstrated their ability to solve or resolve problems relating to the subject matter or project at hand.

Qualified Electrical Personnel – A Qualified Person who is also trained to recognize and avoid the electrical hazards that are, or might be present with respect to equipment and/or work methods. This person shall be trained and thoroughly familiar with the protective safety requirements set forth in NFPA 70E and OSHA 29 CFR 1910 Subpart S and shall be qualified in accordance with the JP Morgan-Chase Electrical Safety Policy.

Tag – A "**Danger - Do Not Operate**" tag, which can be securely fastened to an energy-isolating device by an attachment means with an unlocking strength of >/= 50 pounds, to indicate that the Energy Isolating Device and the equipment being controlled cannot be operated until the Tag is removed. Tags are essentially warning devices affixed to energy isolating devices and do not provide the physical restraint of a lock.

Supervisor – A member of Facility Services management with the responsibility of overseeing Lockout / Tagout activities.

Supervisory Lock Box – A keyed lock box; where access is limited to the Chief Engineer, Assistant Chief Engineers, and/or the Safety Coordinator.

4.0 Responsibilities

Chief Engineer / Facility Manager – Are responsible for the training and qualification of facility personnel under their cognizance, reviewing, approving and ensuring compliance with this procedure.

Safety Coordinator – Is responsible for the training of personnel under his / her cognizance. The Safety Coordinator will also provide timely advice and assistance to the Chief Engineer in complying with this policy.

Supervision – Is responsible for initiating and controlling this procedure on shifts.

Authorized Employees – Are responsible for isolating all energy sources to a system, machine or equipment and reassuring equipment is in a safe condition before work is performed. They will conduct a walk down of the equipment to ensure that all energy has been properly isolated, locked, tagged and verified prior to conducting work on equipment.

Affected and Other Employees – Shall be trained in and are responsible for understanding the principals of this policy including recognizing lock out and tag out devices, authorized and unauthorized lock / tag removal, and the possible consequences resulting from violations of the procedures contained in this policy.

5.0 Lockout / Tagout (LOTO) Principles

This procedure establishes the minimum requirements for the Lockout / Tagout of energy isolating devices.

- It is **Mandatory** that all personnel comply with the restrictions and limitations of this Lockout / Tagout program and related procedures.
- No individual shall attempt to start, energize, use, or operate a piece of equipment that has been locked out and tagged out after the safe condition check has been completed.
- No individual other than the Authorized Employee who placed the device and tag shall attempt to remove it, except as noted in Section (7).
- All locks and keys to be used will be stored in locations designated by the Chief Engineer/Facility Manager, with the exception of each Authorized Employees personal locks, which will be controlled by him/her.

- The personal lockout and "Danger-Do Not Operate" tag signifies that there is an Authorized Employee working on a component, that it was installed by that task's Authorized Employee prior to starting work and that it will be removed by that Authorized Employee when their work is complete.

- The Authorized Employee "Danger – Do Not Operate" tag is reserved for the exclusive use of the authorized worker identified on that tag.

- No one shall authorize another person to ignore or violate this program and its procedures.

- No person shall remove a Lockout Device when an unsafe condition exists, until they have corrected the condition or another person has installed a Lockout Device.

- No Authorized Employee shall install a Lockout / Tagout on any equipment or system without notifying the Facility Services site **Chief Engineer, Assistant Chief Engineer, or their designated representatives.** This is to ensure that operating personnel know the status of their equipment/systems.

- A check valve cannot be used as an Energy Isolation Device.

- Control circuit devices such as E-stops, selector switches or equipment interlocks shall never be used as the **sole form** of isolation.

- Whenever an outside firm is contracted to perform work, the facility services vendor shall inform the management of the outside contractor of the contents and requirements of this program. This is to ensure the safety of all employees. Except under exceptional circumstances, and then only when specifically approved by the facility Chief Engineer or Facility Manager, the JP Morgan-Chase Lockout / Tagout Procedure shall be used. Additionally JP Morgan-Chase or its prime contractor may serve as the primary Authorized Employee and will perform all equipment isolations. Sub-contracted personnel will be afforded the opportunity to isolate equipment and review and witness the isolation, as well as performing their own verification of de-energization, prior to commencing work.

- When LOTO requires safety grounding, approved devices shall be installed immediately following assured de-energizing, and removal shall be the last step before re-energizing. Only **Qualified Electrical Personnel** shall apply or remove grounding devices. Tags shall be attached to affected equipment any time personal protective grounds are installed. The application and removal of personal protective grounds shall be in accordance with Section (10) of the JPMorgan Chase Electrical Safety Policy.

- All employees shall receive the appropriate level of training based upon their LOTO duties (see Section (10)).

- Any employee who observes any apparent violation of this program or related procedures shall immediately notify their supervisor.

6.0 Procedure for Building Engineers

6.1 Detailed Lockout/Tag out Procedure for Building Engineers

**** For Detailed Lockout/Tagout Procedure for Route Technicians see Section (11) ****

1) Using appropriate diagrams, equipment walk-downs and manufacture's literature, the Authorized Employee will determine all potential sources of hazardous energy.

   - The Authorized Employee will develop a specific written procedure for isolating the equipment if one does not already exist.
   - Existing procedures, if used, shall be thoroughly reviewed for accuracy and current applicability. Isolation information shall be recorded on a Lock Out / Tag Out Record Sheet similar to the one contained in Enclosure (1).
   - Where the isolation covers multiple crafts, mechanical and electrical isolations should be recorded on separate sheets.

2) A second Authorized Employee will verify the adequacy of the proposed isolation of medium voltage switchgear, low voltage switchgear, UPS equipment, batteries and generators.

   - Where a disagreement exists between the first and second person as to proper isolation of the affected equipment, the disagreement shall be resolved prior to continuing.
   - If the two Authorized Employees cannot agree on the adequacy of the isolation, facility supervision shall be contacted.

3) Once the procedure has been prepared, the Facility Services site Chief Engineer, Assistant Chief Engineer, or their designated representative shall grant authorization to isolate the affected equipment.

Note: Authorization may be accomplished via the release of a work order or MOP.

4) The Authorized Employee will obtain locks, group lock out devices, and/or a lock box as appropriate.

   - Some Lockouts might require the use of other lockout devices (valve covers, chains, cables, branch breaker individual lockout devices, etc.). Tags will have the name of the Authorized Employee performing the work and the date the tag is hung.

5) The Authorized Employee will coordinate with all Affected Employees and inform them that the affected equipment will be secured and de-energized.

6) A Qualified Employee will shut down affected equipment in accordance with approved procedures.

7) The Authorized Employee will go to each isolation device listed on the lock out/tag out procedure and isolate that device using locks and, if appropriate group lockout devices.

   - Locks shall be verified to ensure they have properly latched. Where possible, the Authorized Employee should attempt to operate the isolation device to ensure the device cannot operate with the lock/locking device installed.
   - After removing the key from each lock, the Authorized Employee will maintain personal custody of the keys or will place them into the lockbox, if used, to prevent them from being lost or misplaced.
   - If a lock box is used, keys to all locks shall be kept inside the lockbox and the Authorized Employee shall then place his/her lock and tag on the lockbox and lock it.
   - The Authorized Employee's personal key will be kept with him/her. Also, a designated Supervisor may put his/her lock on the lockbox. This would only be completed in order to secure the lockbox if

an employee left the jobsite and another employee took control of the job. If other personnel will be conducting work under the lockout, they will then put their lock(s) on the lockbox or group lock-out devices.

8) When all energy isolation devices have been properly de-energized and locked/tagged out, a Qualified Employee shall attempt to activate the affected equipment. This may include operating local start buttons or switches, opening air start valves, etc. Following test all controls will be returned to their off or neutral position.

Note: All conditions necessary to actually start the equipment are required to be met prior to performing this step (e.g., interlocks not met that would prevent operation) and area is safe to start (e.g., guards and equipment covers in place, personnel clear of swing circles, etc.)

Note: All circuit breakers capable of being racked out (disconnected from buss) shall be racked out to the test position, then the lock and tag shall be applied. Special consideration shall be taken for Medium Voltage Vacuum-Operated circuit breakers due to the potential of a leaking vacuum bottle causing back-leakage voltage to the work area. Exceptions to this requirement shall be made on case basis by the Chief Engineer or Facility Manager.

9) Verify equipment has been placed in a state of Zero Energy using the following steps:

- For pressurized systems:
  - i. Bleed off system pressure through approved methods of controls
    1. Using gauges, sound, or other appropriate measures ensure system pressure has been removed for affected area.
- For electrical systems:
  - i. A voltage-detecting instrument rated for the application shall be used. Inspect the instrument and test leads for visible damage. Ensure lead finger guards are in place and perform a continuity check on leads. If the instrument has the capability, internal fuses shall be verified to be good. **Do not** proceed if there is an indication of damage to the instrument until an undamaged device is available.
    1. For voltages less than or equal to 600V, a Category III rated meter such as the Fluke model 87 or equivalent shall be used.
    2. For voltages greater than 600 V, a proximity tester such as the Salisbury 4244 or 4344 or equivalent shall be used.
  - ii. Verify proper instrument operation on a known live source or manufacturer's test source for presence of voltage.
  - iii. Test the equipment for the absence of voltage. For 3-phase contact measurements, readings shall be taken between ground and each phase and between phases.
  - iv. After testing re-verify proper instrument operation on a known live source for presence of voltage.

- For systems with additional hazards:
  - i. Expert system knowledge shall be used to identify proper method for determining when the equipment has been placed in a Zero-Energy state prior to working being exposed to the potential hazard.

10) Dissipate stored energy (Examples: discharging capacitors, allow rotating fly wheels to coast to a stop, lower or block elevated machine members, bleed hydraulic, and air, gas, steam or water systems, etc.).

Note: Do not rely on installed capacitor bleeder circuits to discharge stored energy.

11) Install safety grounds cables, as deemed necessary. At a minimum, personal protective grounds shall be installed in accordance with JPMorgan Chase Electrical Safety Procedure Section (10) if either:
    - If the system is rated at greater than 600V
    - If there is a potential for back feed, which cannot be isolated

12) If other authorized employees will be commencing work on the affected equipment, where possible, the authorized employee shall make a visual inspection to verify the position of the isolation devices prior to placing their locks and tags.
    - Affected personnel that did not witness the authorized employee perform the initial Zero-Energy State verification are responsible to ensure the equipment is placed in a safe condition prior to exposing themselves to the hazardous equipment.

Note: For the safety of other workers and the equipment, no attempt shall be made to restart the affected equipment or to re-test an isolation device's effectiveness while work is in progress on the affected equipment.

13) When all work on the system is complete, the Authorized Employee will ensure that all machines, equipment, systems, and areas are clear of personnel; the equipment interior is inspected, tools are removed and inventoried; and controls are verified to be in neutral before a qualified person removes safety grounds, if applicable.

14) Once affected equipment has been closed out, the Facility Services site Chief Engineer, Facility Manager, or their designated representative shall grant authorization to release the affected equipment from Lock Out / Tag Out.

15) The Authorized Employee will coordinate with all Affected Employees and inform them that the affected equipment will be re-energized.

16) The Authorized Employees shall remove their personal locks from the lockbox or group lockout devices and then remove all locks and tags from all energy isolation devices. The system or equipment shall be energized in the proper order noted on the LOTO procedure or Method of Procedure. Qualified operators in accordance with approved procedures will then put the system back into service as necessary.

17) Perform any required operational or quality control tests as required.

Exceptions to Written Lockout / Tagout Procedures

There are occasions where specific Lockout / Tagout procedures are not required. They are not required when all of the following conditions are met:

- The machine or equipment has no potential for stored, residual energy (Example: AC/DC capacitors), alternate or back fed power sources after shut down which could endanger employees.

- The isolation and locking out of a single energy source will completely de-energize and de-activate the machine, equipment or system.

- The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.

- A single lockout device will achieve a locked-out condition.

- The lockout device is under the exclusive control (only one key exists) of the Authorized Employee performing the service or maintenance.
- The servicing or maintenance does not create hazards for other employees.
- The servicing or maintenance does not extend beyond one shift.

Understanding the Definition of Exclusive Control

"Under the exclusive control of the employee" means that the authorized employee has the authority to and is continuously in a position to prevent (exclude) other individuals from re-energizing the machine or equipment during his servicing or maintenance activity."

Notice that the definition contains NO MENTION of "line of sight" type language, but rather states the worker "*is* continuously in a position *to prevent (exclude) other individuals from re-energizing the machine or equipment".*

- This makes it clear that the worker must be in a position to prevent someone from energizing the source. Additionally, if the service technician is working with another service technician, helper, or a vendor; this nullifies the use exclusive control. The service technicians, helpers, or vendors must fully comply with the corporate services energy isolation policy.

Procedure for Group Lockout/Tag out

When more than one person performs servicing and/or maintenance, the following procedure shall be followed. This procedure has been designed to provide an equivalent level of protection as that provided by individual lockout/tag out devices.

- One authorized employee must be designated as responsible for a set number of employees working under the protection of a group lockout/tag out device.
- Each employee in the group shall review the lockout/tag out procedure to be used.
- If more than one crew, craft, etc., is involved, one authorized employee must coordinate the lockout/tag out to ensure that all control procedures are applied and that there is continuity of protection for the group.
- A method shall be available for each authorized employee to affix a personal lockout/tag out device to the group lockout device, group lockbox, or comparable device before beginning work, and must remove it upon completion of his or her work following the procedures of the Detailed Lockout / Tagout section.

Procedure for Shift Change or Personnel Changes

This procedure shall be used during shift or personnel changes to ensure the continuity of lockout/tag out protection, for individual and group lockout/tag out.

- The on-coming authorized employee must exchange Lockout / Tagout devices with the off-going authorized employee if work is continuing, or the LOTO status requires change by the on-coming authorized employee.
- Re-testing shall be done to ensure the de-energized state of the equipment.
- Employees shall discuss the status of maintenance or servicing and any notification of startup or testing to be performed.

Supervisory Lock Box

This procedure shall be used when equipment which has been isolated and is not transferred to an engineering services vendor employee at the end of the shift:

- The isolated equipment will remain locked out and the keys to the isolation point(s) will remain or be placed into a lock box.
- The Chief Engineer, Assistant Engineer, or Safety Coordinator will place a supervisory lock on the lock box.
- The key to the lock box will be placed into a wall mounted, labeled and secured supervisory lock box.
- The Chief Engineer, Assistant Engineer, or the Safety Coordinator will have access to the secured supervisory lock box and authorization to assign continuation of work.

Outage Work

Where it is anticipated that equipment will be returned to service sequentially for testing, multiple procedures and log sheets should be used.

An Authorized Employee will be chosen to put on an authorized lock on all energy isolation devices on the permit.

- He/she will have all of the duties as stated in the Detailed Lockout / Tagout section and will have the responsibility as the Supervisor to ensure the continuity of protection for all Authorized Employees and to coordinate affected crafts.
- **The Supervisor will ensure all locks and tags are properly installed on the energy isolating devices by visually checking all energy isolation points.**

Where more than one person is involved in the LOTO, the Supervisor will list all of the Authorized Employees on the permit.

Each Authorized Employee will put his/her own lock on the lockbox or group lockout devices before beginning work.

When the Lockout / Tagout extends for more than one day, the authorized employees or group supervisor shall verify the LOTO to be still in place at the beginning of the next day. Where the LOTO is continued on successive shifts, refer to the Procedure for Shift Change or Personnel Changes section.

The Supervisor cannot remove any locks or tags from the energy isolation devices unless all other Authorized Employees have first removed their locks and tags from the lockbox.

Note: If there is a need to remove a lock and tag from the lockbox because an Authorized Employee is not on site, then Section (7) shall be followed.

Energy Isolation Devices Not Capable of Accepting a Lock

If an energy isolation device is physically incapable of accepting a lock, a Tagout system shall be used which will offer full employee protection similar to that of a lockout system.

The Tagout system **shall** include all of the steps of this Lockout Program except the actual use of a lockout device on that particular energy isolation device.

Additional means to be considered as a part of the demonstration of full employee protection shall include the implementation of additional safety measures to reduce the likelihood of inadvertently reenergizing equipment. Care shall be taken when selecting additional protective measures, and may consist of:

- Removal of an isolating circuit element
- Blocking of a controlling switch
- Opening of an extra disconnecting device
- Removal of a valve handle
- Blocking of fan blades

Adding Energy Isolation Devices

Energy Isolation Devices may be added to the existing LOTO. The Authorized Employee responsible for the LOTO will review the scope of the additional work task and determine if it can be addressed under the existing LOTO procedure, or constitutes generation of a new LOTO procedure.

If the work can be performed under this LOTO, the Authorized Employee responsible for the LOTO shall perform the steps per the Detailed Lockout / Tagout Procedure section of this procedure. If this task cannot be addressed by the existing LOTO, a new LOTO procedure shall be developed.

Note: If the scope of the work changes, consideration should be given to the use of a new LOTO procedure even if the isolation points stay the same. Reevaluating the procedure allows supervision to concur with changes.

Abnormal Conditions

If during the verification of a zero energy state the equipment starts or voltage is found, the procedure will be stopped and the affected equipment will be closed up. The Chief Engineer will be notified, the source of the energy will be determined and the LOTO and/or MOP revised before work is allowed to continue.

If during the performance of work a lock or tag is found to be missing or the isolation is found to be inadequate, all work being performed under that LOTO shall cease and shall not recommence until the discrepancies and causes have been found and corrected.

Temporary Re-energization for Testing

During the performance of maintenance or troubleshooting, it may become necessary to temporarily re-energize a piece of equipment for testing. When this is required the below steps will be used:

- Check the machine or equipment and the immediate area around the machine to ensure that nonessential items and personal protective grounds have been removed and that the machine or equipment components are operationally intact.

- Check the work area to ensure that affected personnel have been informed and are safely positioned or removed from the area.

- Verify that the equipment controls are in the desired position.

- Remove the Lockout / Tagout devices and re-energize the machine or equipment for testing or positioning. Documenting the removal of locks on the associated record sheet is not required until testing is completed satisfactory and equipment is no longer required to be isolated.

- When testing or positioning is complete and work is to continue, de-energize machine or equipment and reapply control measures.

- Re-verify a zero energy state using the procedure detailed in this procedure.

7.0 Removal of Authorized Employee Locks and Tags When Off-Site

There may be times when the LOTO needs to be closed out to put equipment back into service when an Authorized Employee still on the LOTO, is off-site and cannot be located. Removal of an Authorized Employee's lock and tag without the Authorized Employee's signature shall require a review by the Authorized Employee's direct Supervisor.

The Authorized Employee's Supervisor shall attempt to reach the Authorized Employee to determine if the LOTO may be closed. If the Authorized Employee indicates that the LOTO may be closed, the Authorized Employee must return to the facility to follow the normal LOTO removal procedure.

If the Authorized Employee cannot be contacted or cannot return to the facility, the Authorized Employee's Supervisor may **Authorize Removal** of the Authorized Employee from the LOTO.

If the Supervisor authorizes the removal of the Authorized Employee's lock(s) and tag(s), all potentially Affected Employees shall be notified.

The Authorized Employee shall be contacted by his/her Supervisor immediately upon their return to work, to notify the employee they have been removed from the LOTO.

8.0 Contractors

Outside contractors that will be performing work on site **shall** follow at a minimum, the **JP Morgan-Chase Corporate Services LOTO** procedures and meet the requirements as stated in Section (8).

The JPMorgan- Chase and the outside Contracting firm must inform each other of their respective Lockout / Tagout procedures. **The responsibility for training outside contractor's employees lies with their employer.** However JP Morgan Chase or its designated representative may conduct training for the outside contractor.

All Contractors shall be informed of **JP Morgan-Chase's Corporate LOTO procedures** consistent with Section (10) of this standard. Additionally, if the contractor's work will be electrical in nature, they will have received the training denoted in JP Morgan-Chase's Electrical Safety procedure.
JP Morgan-Chase or its designated representative shall review the Contractor's LOTO program and record in detail to assure safe coordination and implementation that protects all workers.

There are several LOTO conditions that must be met by the outside contractors before they begin work at the facility.

- The contractor shall establish and have available for review a LOTO program that meets all necessary regulatory requirements.

- Prior to the Contractor performing work, a designated point of contact will be made within the Contractor's organization for the purpose of interfacing and coordinating the Lockout / Tagout procedures.

- The site engineering facility vendor designated employees will place his/her lock on the same energy isolating point(s) as the Contractor in accordance with this procedure. The site engineering facility vendor employee's lock(s) shall be the first on and last off; this shall apply to all LOTO's that involve personnel other than the site engineering facility vendor.

9.0 Lockout / Tagout Periodic Inspections

Annually, **JP Morgan-Chase** or its designated representative shall perform a review of its energy control program and procedures for the purpose of ensuring that the LOTO procedures and requirements of 29 CFR 1910.147, 1910.333,NFPA 70E and this policy are being met. A written report shall be made documenting inspection findings, results, and as appropriate any corrective actions taken for LOTO program deficiencies.

- Periodic inspections of the Facility's LOTO program and procedure shall be scheduled, conducted, and documented. The Engineering Services Vendor Chief Engineer or their designee will complete an internal audit of each Authorized Employee once per calendar year.
    i. The assessments shall be conducted on work-in-progress using Enclosure (2), Lock Out / Tag Out Audit Form.
    ii. The representative may not review any Lockout/Tag out that they are currently working under.
    iii. The representative must review the procedures being implemented by and under the control of other Authorized Employees.
    iv. The inspection shall include a review of every Authorized Employee's responsibilities under the program and related procedures.
    v. Written documentation of the findings shall be made and retained for at least **two years** for review.

- An inspection of various active and closed LOTO will be inspected to verify compliance. Written documentation of findings shall be made and retained.

- The periodic inspection shall include a review, between the inspector and the Authorized Employees, of the employee's responsibilities under the Energy Control Procedures being inspected. Written documentation of this review/training shall be kept.

- If during the inspection a discrepancy or procedural inadequacy is found, steps shall be taken immediately to determine the reason for, and the corrective action necessary to remedy the discrepancy. Written documentation of findings shall be made and retained.

- All discrepancies or noncompliance with the Facility's program and procedures shall be corrected as soon as possible but no later than 60 days from the date of identified discrepancies/noncompliance. If a discrepancy or inadequacy is identified, the appropriate individuals shall be retrained.

- The Auditor shall certify in writing that the periodic inspection has been performed. This certification shall identify and document the machine, equipment or system, on which the LOTO procedure was utilized, date of inspection, the employees (by name) covered by the inspection, and the individual performing the inspection.

10.0 Personnel LOTO Training and Qualification

Employees shall be trained so that they understand the purpose and function of the LOTO program and procedures. Employees shall also be trained so that they understand the purpose, contents and requirements of 29 CFR 1910.147, The Control of Hazardous Energy (Lockout / Tagout) and 1910 Subpart S for electrical utilizations.

Authorized Employees shall receive training in the recognition of sources of hazardous energy, the types and magnitude of hazardous energy and the means and methods of isolation and control. This training shall include as a minimum:

- Types of locks and tags used
- Proper installation of locks and tags
- Development and execution of written LOTO procedures
- Exceptions to written procedures
- Use of diagrams and manufacturer's literature
- Authorized and unauthorized removal of locks/tags
- Verification of zero energy states
- Sources of stored energy and means of dissipation
- Application and removal of personal protective grounds by qualified employees
- Safe use of test equipment

In addition to the above training, in order to be an Authorized Employee the following conditions must be met:

- Has demonstrated to the Chief Engineer the requisite knowledge and skill to safely implement the LOTO program.
- Under no circumstances will an apprentice be designated as an Authorized Employee
- Apprentices may perform LOTO isolation under the direct supervision of an Authorized Employee for training purposes only

The Chief Engineer shall maintain a record of Authorized Employees and their training.

Nothing in this instruction shall be construed as limiting facility supervision from selecting specific Authorized Employees to perform specific LOTO duties based on their knowledge, experience and the complexity of the procedures used.

Affected Employees shall be instructed in the purpose and use of the Facility's LOTO program.

All Employees shall be instructed about the Facility's LOTO program and about the prohibition against attempting to restart equipment, machines or systems that have been locked and tagged out of service.

Employees will receive refresher training annually. Additionally, retraining will be conducted when there are changes in job assignment; machines, equipment or processes; or in Facility's LOTO program and procedures. Retraining will also be conducted when periodic inspection of the effectiveness of this procedure reveals inadequacies in employee knowledge or performance.

A record of all training and retraining shall be maintained. The training record shall include the name of the employee, level of training, name of instructor and date of training. The Supervisor will keep all training records on file. (Training records will be retained indefinitely or until the employee is no longer employed or at the Facility.)

11.0 Addendum 1 – Route Technician Lockout/Tag out Procedure

11.1 Addendum Objectives

Energy Control Program For Route Technicians:

Because route technicians' work practices and scope of work are dissimilar to building engineers, a modified but equally protective LOTO procedure was created to substitute Section (6) of this procedure. The purpose of this addendum is to outline the procedures and requirements specific to Route Technicians and Route Technician Supervisors. This addendum is not intended to contradict the Objectives, Principles, and Scope of any other sections of the JP Morgan Chase Corporate Services LOTO procedure.

LOTO Principles:

All principles specified in Section (5) will be adhered to with the following additions:

- RTs shall ensure adequate communication is established with effected client personnel to ensure operation of equipment is not attempted.
- Route Technicians may perform isolations for routine daily tasks without notifying their Supervisor. Abnormal conditions shall be brought to the attention of the Supervisor for clarification.

11.2 Responsibilities

Route Technician Supervisor – Are responsible for the training and qualification of Route Technicians under their cognizance. They are responsible for communication with Route Technicians regarding the review, approval, and compliance with this procedure.

Route Technician / Authorized Employees – Are responsible for isolating all energy sources to a system, machine or equipment and reassuring equipment is in a safe condition before work is performed. They will conduct a walk down of the equipment to ensure that all energy has been properly isolated, locked, tagged and verified prior to conducting work on equipment. They responsible for ensuring their own compliance with this procedure, and for communicate any situations that contradict with this procedure to their respective Supervisor.

11.3 Definitions

Note: The following definitions are in addition to the definitions listed in Section (3).

LOTO Record Sheet for Route Technicians (LRS-RT) – Form utilized by all Route Technicians to document and track the use of energy isolations and devices. **(Enclosure (3))**

11.4 Detailed Lockout / Tagout Procedure

1) Using appropriate diagrams, equipment walk-downs and manufacture's literature, the Authorized Employee will determine all potential sources of hazardous energy. The Authorized Employee will develop a specific written procedure for isolating the equipment if one does not already exist. The completion Enclosure (3) satisfies the requirement for an equipment specific written procedure. Existing procedures, if used, shall be thoroughly reviewed for accuracy and current applicability. Isolation information shall be recorded on the LRS-RT form.

- Exception: The requirement for equipment specific written procedure will be followed unless all of the following are met:
    i. Equipment meets all requirements to be exempted per "Exceptions to Written LOTO Procedure" section of this Addendum.
    ii. Equipment is low voltage <500 VAC
    iii. Equipment restoration will be unaffected regardless of means of shut down (i.e. equipment operation cycle at time of shut down or means of securing power has will not damage equipment)

2) The Authorized Employee will obtain locks and lockout devices necessary to prevent operation of the isolation device. Tags will have the **NAME** of the authorized employee hanging the tag and the **DATE** the tag is hung. The Authorized Employee shall document the purpose of the particular LOTO on the LRS-RT.

3) A Qualified Employee will shut down affected equipment in accordance with applicable procedures.

4) All Isolation Points will be clearly identified on the LRS-RT. The Authorized Employee will go to each isolation device listed on the LOTO procedure and isolate the device using tags, locks and appropriate Lockout Devices, if required.

5) When two or more individuals are exposed to the affected equipment covered by the LOTO, all personnel will affix their own lock and tags in a manner to prevent operation of the isolation device and document the applied lock on the associated LRS-RT. This requirement applies to all JP Morgan-Chase, the site facilities services vendor, and all prime- or sub-contractor employees performing work at JP Morgan-Chase Corporate Services facilities.

6) After locks and tags have been installed, both the lock and isolation device will be tested to ensure unwanted / inadvertent operation is not achieved.

7) After removing the key from each lock, each Authorized Employee will maintain personal custody of the keys for each lock he/she attached.

8) Verify equipment has been placed in a state of Zero Energy using the following steps:
- For pressurized systems:
    i. Bleed off system pressure through approved methods of controls
        1. Using gauges, sound, or other appropriate measures ensure system pressure has been removed for affected area.
- For electrical systems:
    i. A voltage-detecting instrument rated for the application shall be used. Inspect the instrument and test leads for visible damage. Ensure lead finger guards are in place and perform a continuity check on leads. If the instrument has the capability, internal fuses shall be verified to be good. **Do not** proceed if there is an indication of damage to the instrument until an undamaged device is available.
        1. For voltages less than or equal to 600V, a Category III rated meter such as the Fluke model 87 or equivalent shall be used.
        2. For voltages greater than 600 V, a proximity tester such as the Salisbury 4244 or 4344 or equivalent shall be used.
    ii. Verify proper instrument operation on a known live source or manufacturer's test source for presence of voltage.
    iii. Test the equipment for the absence of voltage. For 3-phase contact measurements, readings shall be taken between ground and each phase and between phases.
    iv. After testing re-verify proper instrument operation on a known live source for presence of voltage.

- For systems with additional hazards:
    i. Expert system knowledge shall be used to identify proper method for determining when the equipment has been placed in a Zero-Energy state prior to working being exposed to the potential hazard.

9) Dissipate stored energy (Examples: discharging capacitors, allow rotating fly wheels to coast to a stop, lower or block elevated machine members, bleed hydraulic, and air, gas, steam or water systems, etc.)

10) When available, the Authorized Employee shall perform a visual verification on the isolation device to ensure proper isolation has been achieved.

11) When work is complete, the Authorized Employee shall perform a close out of the equipment to ensure a safe environment for all personnel and equipment upon restoration.

12) The Authorized Employee shall inform all Affected Employees / Venders that the equipment is to reenergized.

13) The Authorized Employee shall remove their personal lock from the Isolation Device and document the removal on the LOTO Record Sheet.

Exceptions to Written Lockout / Tagout Procedures

In the event all of the following conditions are met, the Route Technician may choose to not utilize the LRS-RT. Route Technician Supervision maintains authority to revoke the use of this exception, and require the use of the LRS-RT to be utilized for all isolation points.

There are occasions where a written equipment-specific lockout/ta Lockout / Tagout gout procedures are not required. They are not required when all of the following conditions are met:

- The machine or equipment has no potential for stored, residual energy, alternate or back fed power sources after shut down which could endanger employees.
- The isolation and locking out of a single energy source will completely de-energize and de-activate the machine, equipment or system.
- The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
- A single lockout device will achieve a locked-out condition.
- The lockout device is under the exclusive control (only one key exists) of the Authorized Employee performing the service or maintenance.
- The servicing or maintenance does not create hazards for other employees.
- The servicing or maintenance does not extend beyond one shift or the amount of time the Authorized Employee is on site, whichever is shorter. The intent of this requirement is to ensure no LOTO remains in progress when the Authorized Employee is not on site without appropriate documentation.

11.5 Lockout / Tagout Periodic Inspections

Annually, **JP Morgan-Chase** or its designated representative shall perform a review of its energy control program and procedures for the purpose of ensuring that the LOTO procedures and requirements of 29 CFR 1910.147, 1910.333,NFPA70E and this policy are being met. A written report shall be made documenting inspection findings, results, and as appropriate any corrective actions taken for LOTO program deficiencies.

- The Route Technician Supervisor shall perform an audit on the Route Technicians under their cognizance at their discretion with regard to geographical limitations, performing at least one audit per year.

- Enclosure (2) shall be utilized to perform Audits. Audit documentation shall be maintained in a method designated by the Route Technician Supervisor and available for review a minimum of 2 years.

12.0 References

29 CFR 1910.147, the control of Hazardous Energy (Lockout / Tagout).

29 CFR 1910.333, Lockout / Tagout Electrical Safe Work Practices.

NFPA 70E Article 120, Establishing an Electrically Safe Work Condition.

13.0 Enclosures

(1) Lock Out/Tag Out Record Sheet

(2) Lock Out/Tag Out Audit Form

(3) Lock Out/Tag Out Record Sheet for Route Technicians (LTR-RT)

Lockout/Tagout Log Sheet

[1] Job/MOP#/Verbal Authorization (Chief/Asst.Chief only):	[2] Job/MOP Title:
[3] Description of work to be performed:	
[4] Isolation Prepared by: (print, sign & date)	
[5] Isolation Plan Verified by: (print, sign & date)	
[6] Isolation Authorized by: (print, sign & date)	
[7] Release Authorized by: (print, sign & date)	

Isolation Points

[8] Description of Isolation Point	Energy*	[9] Lock #	[10] Locked by (print name)	[11] Date	[12] Removed by (print name)	[13] Date	[14] Initials

Lock Box #

Contractor Lock Information and/or Lock Box Section

[15] Contractor Company Name	[16] Lock #	[17] Locked by (print name)	[18] Date	[19] Removed by (print name)	[20] Date	[21] Initials

Continued on additional sheets? Yes ☐ No ☐ Page _____of_____

*Energy. M=Mechanical E=Electrical H=Hydraulic PN=Pneumatic TH=Thermal G=Gravity R=Radiation CH=Chemical

Enclosure (1)

Lockout/Tagout Continuation Sheet

[1] Job/MOP#/Verbal Authorization (Chief/Asst.Chief only):	[2] Job/MOP Title:

Isolation Points

[8] Description of Isolation Point	Energy*	[9] Lock #	[10] Locked by (print name)	[11] Date	[12] Removed by (print name)	[13] Date	[14] Initials

Lock Box #

Contractor Lock Information and/or Lock Box Section

[15] Contractor Company Name	[16] Lock #	[17] Locked by (print name)	[18] Date	[19] Removed by (print name)	[20] Date	[21] Initials

Continued on additional sheets? Yes ☐ No ☐ Page _____of_____

*Energy. M=Mechanical E=Electrical H=Hydraulic PN=Pneumatic TH=Thermal G=Gravity R=Radiation CH=Chemical

Enclosure (1)

LOCK OUT / TAG OUT AUDIT FORM

Equipment or Circuit Isolated:

MOP/WO Title: **MOP/WO Number:**

Employee(s) Performing LOTO:

Location:

Auditor (Print Name): **Date:**

LOTO PREPARATION

1. Was the LOTO record sheet completely filled out?	☐ Yes	☐ No	☐ N/A
2. If a Lock-Box was used, is it labeled?	☐ Yes	☐ No	☐ N/A
3. Has the work been authorized by a MOP,WO or Supervisor verbal directive?	☐ Yes	☐ No	☐ N/A
4. Have the LOTO isolation points been prepared and verified by two separate people (two journeyman, MOP and journeyman or existing procedure and journeyman)?	☐ Yes	☐ No	☐ N/A
5. Were up to date diagrams, manufacturer's literature and/or pre-existing procedures used to determine and verify isolation points?	☐ Yes	☐ No	☐ N/A
6. Is the isolation adequate for the work being performed?	☐ Yes	☐ No	☐ N/A
7. Is the person(s) performing the LOTO on the authorized employee list?	☐ Yes	☐ No	☐ N/A

LOTO PERFORMANCE

1. Were all affected personnel notified of the equipment to be isolated and the expected duration?	☐ Yes	☐ No	☐ N/A
2. Was the equipment shutdown in accordance with approved operating instructions?	☐ Yes	☐ No	☐ N/A
3. Were all sources of energy properly isolated, locked and tagged?	☐ Yes	☐ No	☐ N/A
4. Were approved locks and tags used?	☐ Yes	☐ No	☐ N/A
5. If a tag only or a control circuit was used in the isolation, was a second method employed to prevent inadvertent start-up?	☐ Yes	☐ No	☐ N/A
6. Was an attempt to start the equipment made if applicable?	☐ Yes	☐ No	☐ N/A
7. For electrical equipment:			
a. Was an approved meter utilized to verify a zero energy state?	☐ Yes	☐ No	☐ N/A
b. Was the meter within calibration periodicity?	☐ Yes	☐ No	☐ N/A
c. Was the meter verified prior to and after verification checks?	☐ Yes	☐ No	☐ N/A
d. Were the test points selected sufficient to establish a zero energy state?	☐ Yes	☐ No	☐ N/A
e. Was the required PPE utilized during voltage testing?	☐ Yes	☐ No	☐ N/A
8. For other sources of energy, was a method employed to verify a zero energy state (installed temperature or pressure gauges, contact temperature readings, low point drain verification)?	☐ Yes	☐ No	☐ N/A

continued

LOCK OUT / TAG OUT AUDIT FORM (continued)

LOTO PERFORMANCE (continued)			
9. Were possible sources of stored energy blocked, bled or dissipated in a safe manner?	☐ Yes	☐ No	☐ N/A
10. For MV electrical equipment, were approved personal protective grounding sets installed in accordance with approved procedures?	☐ Yes	☐ No	☐ N/A
11. Was the placement of all applied locks and tags documented on the LOTO log sheet?	☐ Yes	☐ No	☐ N/A

LOTO CLEARANCE			
1. Was the clearance authorized by a MOP, WO or Supervisor verbal directive?	☐ Yes	☐ No	☐ N/A
2. Were all affected personnel notified of the clearance?	☐ Yes	☐ No	☐ N/A
3. Was the equipment inspected, closed out and returned to an operationally intact condition?	☐ Yes	☐ No	☐ N/A

Other Deficiencies Noted:

Auditors Signature:

Supervisor Review:

Recommended Corrective Actions*:		
1. Retrain individuals?	☐ Yes	☐ No
2. Retrain all Authorized Employees?	☐ Yes	☐ No
3. Cover during next scheduled toolbox talk?	☐ Yes	☐ No

Other:

*For deficiencies involving subcontractors, audit should be forwarded to the Facility Manager and reviewed with subcontractor supervisor.

LOTO Record Sheet for Route Technicians

Reason For LOTO	Description of Isolation Point	Energy*	Lock #	Locked By (print name)	Date	Cleared By (print name)	Date	Initials

Enclosure (3)

Energy* **E = Electrical** **M** = Mechanical **PH** = Pneumatic **TH** = Thermal **G** = Gravity **CH** = Chemical