

SAUDI ARABIAN OIL COMPANY (Saudi Aramco)
GENERAL INSTRUCTION MANUAL
G. I. NUMBER **Approved****1001.100**ISSUING ORG. **POWER DISTRIBUTION DEPARTMENT**

ISSUE DATE

REPLACES

03/19/2002

New

 SUBJECT: **RESPONSIBILITY FOR POWER SYSTEM OPERATION AND
 MAINTENANCE AT SUPPORT SERVICES AND COMMUNITY
 FACILITIES**

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CONTENT: This General Instruction outlines the areas of responsibility for the operation and maintenance of the Saudi Aramco electrical power systems at support services and community facilities. It covers Saudi Aramco operating areas within the eastern province (Udhailiyah, Abqaiq, Dhahran, Ras Tanura and Tanajib) excluding Saudi Aramco Government Built Schools. The text includes:

- 1.0 PURPOSE
- 2.0 DEFINITIONS
- 3.0 PROPONENCY
- 4.0 OPERATION
- 5.0 MAINTENANCE
- 6.0 WORK PERMIT
- 7.0 GENERAL TERMS

1.0 PURPOSE:

- 1.1 To establish & define area of responsibilities for the proponency, operation and maintenance of the Company's power systems at support services and community facilities. This will ensure safe and reliable operation and maintenance of Saudi Aramco power systems at support services and community facilities.

2.0 DEFINITIONS:

For the purpose of this instruction, the following terms will be used:

- 2.1 **Distribution Substation:** A step-down, step-up or switching substation, located at the load center, fed either from a receiving substation or from another distribution substation.
- 2.2 **High Voltage:** 1000V and above.
- 2.3 **Facility's Perimeter:** Any physical border enclosing assets owned by a facility department such as a fence, wall, building etc.
- 2.4 **Low Voltage:** Less than 1000V.
- 2.5 **Maintenance:** Any work performed using Saudi Aramco work order system including preventive maintenance, routine maintenance and emergency work.
- 2.6 **Operation:** Monitoring, controlling, and switching of electrical circuits (on/off) using the proper devices.

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- 2.7 **Receiving Substation/Switchgear:** A substation/switchgear directly receiving power from source distribution network.
- 2.8 **Power Circuit Breaker:** Withdrawable and maintainable circuit breakers that are not molded-case (e.g., where protection relays are not part of the breaker structure).
- 2.9 **Process Equipment:** Equipment directly involved in the process of proponent facilities such as rotating machines, welding machines, furnaces, appliances, etc.
- 2.10 **Protective Relaying:** Typically, this is equipment used to detect and isolate defective lines, defective apparatus, or other dangerous or intolerable conditions, through the input of Voltage Transformers (VT's) and Current Transformers (CT's). In this document, the words "Protective Relaying" will also include, Ammeters, Voltmeters, KW meters, KVar meters, synchronizing circuits, and transfer schemes associated with protection relays under PDD's maintenance.
- 2.11 **Source Distribution Network:** A network utilized for distribution of power to different customers.
- 2.12 **Support Services Facilities:** Non-industrial facilities providing services such as communities, office buildings, warehouses, clinics, hospitals, A/C plants, communication facilities, sewage treatment plants, non-industrial water wells, and mechanical shops located in non-industrial plants.
- 2.13 **Utility Services:** Saudi Aramco utility services under the responsibilities of Dhahran Utility Department, Northern Area Community Department or Southern Area Community Department.

3.0 PROPONENCY:

- 3.1 The Power Distribution Department (PDD) shall be the proponent of:
- 3.1.1 All residential substations and substations located external to and feeding multiple buildings or customers such as those located at the Dhahran core area.
- 3.1.2 Source distribution network cables or bus ducts feeding distribution substations up to but excluding the first receiving equipment (e.g., switches, transformers & breakers).
- 3.1.3 All overhead power distribution systems regardless of voltage levels.
- 3.1.4 All source distribution network equipment.

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3.2 Community or Support Services departments shall be the proponent of:

3.2.1 All substations and equipment located within the facility's perimeter.

4.0 OPERATION:

4.1 The Power Distribution Department shall be responsible for the operation of:

4.1.1 The first main incomer and tie breakers of double-ended receiving switchgear inside the facility's perimeter regardless of voltage level.

4.1.2 All high voltage systems at support services & community facilities except for equipment (including breakers) dedicated for the proponent's operation as stated below (section 4.2).

4.1.3 Overhead power lines and pole mounted electrical power equipment regardless of voltage level.

4.2 Proponent departments shall be responsible for the operation of:

4.2.1 Electrical equipment dedicated for the facility's operation such as process equipment, feeder breakers, incomer & tie breakers of a non-receiving switchgear (i.e., not directly receiving power from the source distribution network), Motor control centers (MCC's), motors, generators etc.

4.2.2 All low voltage systems within the proponent's facility except for the first main incomer and tie breakers of double-ended receiving switchgears. This shall include the low voltage feeder breakers, motors, etc.

4.2.3 Proponents may seek area utility services or third party to operate equipment under proponent responsibility. Details of such arrangement are outside the scope of this GI.

5.0 MAINTENANCE:

5.1 Power Distribution Department shall be responsible for the maintenance of the following equipment:

5.1.1 All high voltage systems at community and support services facilities.

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- 5.1.2 Low voltage first main incomer and tie breakers of double-ended receiving switchgear inside the facility's perimeter.
- 5.1.3 The low voltage bus ducts connecting the main transformers to the incomer breakers of double-ended receiving switchgear.
- 5.1.4 Low voltage cables up to the main breaker of the premises at Saudi Aramco communities (residential houses) except for cable terminations at the equipment end.
- 5.1.5 Overhead power lines and associated equipment, regardless of voltage level and location.
- 5.1.6 Re-lamping and repairing of pole-mounted light fixtures at a height of 20 feet or above accessible by bucket trucks.
- 5.1.7 All protective relaying excluding molded case circuit breakers with built-in non micro-processor protection.
- 5.1.8 Direct Current (D.C.) systems dedicated for protective relays including battery banks and chargers.
- 5.1.9 Supervisory Control And Data Acquisition (SCADA) devices and fault recorders exclusively used by Power Distribution Department.
- 5.1.10 Uninterruptible Power Supply (UPS) system at Dhahran Core area (Tower & EXPEC Building).
- 5.2 Area Utility Services shall be responsible for maintenance of the following:
 - 5.2.1 All low voltage equipment except for low voltage incomer and tie breakers of double-ended receiving switchgears and as described in section 5.1 above.
 - 5.2.2 All low voltage bus ducts or cables that are not directly receiving power from source distribution network. This shall include cable terminations at equipment end.
 - 5.2.3 Proponent organizations shall be responsible for maintenance of equipment identified in item 5.2.1 and 5.2.2 above for areas outside area utility services' jurisdiction such as Tanajib area.

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6.0 WORK PERMIT:

This section specifies requirements that are additional to, or modifications of, those in G.I. 2.100, "Work Permit System." Where requirements of G.I. 2.100 are not discussed in this section, the requirements as specified in G.I. 2.100 are to be enforced.

- 6.1 Work permits shall be written for all maintenance work on power distribution systems of 480V or greater. This requirement prescribes that such systems are declared restricted areas (refer to G.I. 2.100, §2.1). This is a minimum requirement, i.e., power distribution systems of less than 480V may also be declared restricted areas by proponent management.
- 6.2 The issuer of the work permit shall be from the organization that operates the equipment. This requirement differs somewhat from G.I. 2.100 which assumes that the proponent organization operates the equipment (refer to G.I. 2.100, §2.2). This may not be the case for power distribution systems.
- 6.3 The issuer of the work permit shall be responsible for ensuring that the requirements of G.I. 6.012, "Isolation, Lockout and Use of Hold Tags," are met.
- 6.4 If the issuer is not from the proponent organization:
 - 6.4.1 The issuer and the receiver must be from distinct operations and maintenance organizations.
 - 6.4.2 The proponent organization must concur on the work permit. This ensures that the proponent organization is aware of the maintenance work and the potential impact to their operation.

7.0 GENERAL TERMS:

- 7.1 Operation and maintenance personnel must adhere to all corporate and departmental safety rules and regulations, especially work permit, switching, tagging and lockout procedures.
- 7.2 In case of a relay operation under PDD's maintenance responsibility, the circuit shall NOT be re-energized unless authorized by PDD. The operating organization shall immediately report to the PDD power/local dispatcher all trips initiated by these protective relays.
- 7.3 The equipment operating organization is responsible for inspection of equipment for which it has operating responsibility.

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- 7.4 Proponent organization shall be responsible for the inspection of substation buildings, air conditioning units, fences, yard etc.
- 7.5 PDD shall furnish reports and relevant information to the proponent department on major electrical equipment failures/anomalies for which PDD has operating and/or maintenance responsibilities.
- 7.6 Proponent departments shall release equipment for maintenance as per schedule to meet maintenance cycle requirements.
- 7.7 Maintenance organization shall provide a two-week notification request prior to taking equipment out of service for scheduled maintenance. A one week request is provided for normal repair maintenance. Emergency jobs shall be attended to immediately.
- 7.8 It is the responsibility of the proponent to remove all damaged/unneeded electrical assets from the plant. Maintenance organization shall be informed of the asset retirement or change in location.
- 7.9 Maintenance organization shall witness the pre-commissioning of all electrical equipment under its maintenance area of responsibility as defined in this instruction.
- 7.10 It is the responsibility of the equipment operating organization, as specified in this instruction, to ensure one-line diagrams and operating instructions are kept up-to-date.
- 7.11 For equipment under joint operation (such as the receiving switchgears) between PDD and an other organization, it shall be the responsibility of both PDD and the operating organization to maintain the operating instruction and on-line diagrams.
- 7.12 It is the responsibility of the equipment maintenance organization, as specified in this instruction, to ensure that maintenance manuals and schematic drawings are kept up-to-date.
- 7.13 For equipment under joint maintenance (such as the receiving switchgears) between PDD and an other organization, it shall be the responsibility of both PDD and the maintenance organization to maintain the maintenance instruction and schematic drawings.
- 7.14 Proponents shall ensure proper housekeeping of all substations under their proponency.
- 7.15 Maintenance organization shall provide assistance to project organizations in commissioning of new switchgear or modifications to the existing switchgear and motor control line-ups on low priority work-order basis for equipment under its maintenance responsibility. Additions, modifications or adjustments to equipment and circuitry shall remain project's responsibility

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(i.e., pre-commissioning). PDD will provide trip protective relay settings and assist in evaluation of control schemes.

7.16 Maintenance organization shall provide recommendations of spare parts and equipment for power system repairs.

RECOMMENDED BY:

**Manager,
 Power Distribution Department**

APPROVED BY:

**Vice President,
 Supply, Planning & Terminal**

**Executive Director,
 Safety & Industrial Security**

**Executive Director,
 Industrial Services**

**Executive Director,
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