PESHAWAR ELECTRIC SUPPLY COMPANY

(PESCO)

Safety Manual

APPROVED, 2022

	Safety Manual		PESCO
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AMENDMENTS

Issue	Rev No.	Reason of Revision	Issue Date	Effective Date

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MESSAGE FROM CHIEF EXECUTIVE OFFICER

The electrical utilities business is a potentially dangerous place to work with a lot of hazards and risks. This requires rigorous and stringent adherence to safety standards to keep our man and material resources safe and intact. We have to strictly follow safety policy and practices at our offices, grid stations, warehouses and all workplaces.

We at PESCO are committed to work towards an interdependent safety culture where everyone looks out for each other. We take pride in our health and safety performance and value our staff to the highest possible level. We would never turn a 'blind eye' to any work activity being undertaken in an unsafe or unsecure manner, as we have a zero-tolerance policy for safety violations.

All PESCO employees are accountable and responsible for taking the requisite safety measures, while performing their jobs. The requirements and responsibilities described in this safety manual must be ensured in letter and spirit by all permanent and on-contract staff as well as contractors who work with PESCO.

CHIEF EXECUTIVE OFFICER PESCO

FOREWORD

I would like to start by expressing my gratitude to NEPRA which gave us technical assistance and boosted our efforts to work on this extremely essential document. I would also pay my gratitude to Operation Director/GM (Operations) PESCO who have wholeheartedly given me a chance to work with them in this long process of preparation of PESCO Safety Manual. Throughout this time they have been helping me to stay focused and on track by critically evaluating my work and contributing to its completion.

Dated: April 2022
Station: Peshawar

Director Safety PESCO

PREFACE

This safety manual has been prepared in conformity to the safety policy of PESCO and guidelines as well as procedures mentioned in NEPRA safety manual for all DISCOs. This manual is a highly important document, which underlines all aspects of safety and, therefore, must be complied with by all PESCO employees, from top management to lower staff.

The sole purpose of this manual is to provide procedures, processes, criteria, necessary definitions and tabulated information for PESCO staff so that they ensure the measures needed for the safety of employees, public, animals and company's property in the jurisdiction of PESCO.

Dated: April 2022
Station Peshawar

Chief Operation Officer PESCO

1 INTRODUCTION

1.1 Company Profile

TECHNICAL PROFILE

DESCRIPTION	QUANTITY/LENGTH
Grid stations	102
Power Transformers	255
11 KV Feeders	1148
Distribution Transformers	79160
Length of Transmission Line	4999
Length of HT Feeders	37315
Length of LT Line	45345

TECHNICAL PROFILE

	Company	220 KV	132 KV	66 KV	Total
Grid Stations	**PESCO**	-	**84**	**11**	**95**
	NTDC	-	-	-	-
	TOTAL	-	**84**	**11**	**95**

1.2 Our Vision

- Achieve and maintain the highest degree of efficiency, reliability, and responsiveness as a public service organization for a variety of customers.
- Public and company workers' safety shall be high on our priority.
- Retaining and growing our business, staff, and customer base will be of primary importance.
- Developing innovative business relationships both inside and outside our local distribution area will be key to our success.

1.3 Our Mission

Our mission is to provide a full-line electrical distribution that grows with our customers. We are dedicated to the safety and satisfaction of our employees and committed to our communities. We are committed to dedicated quality, values, and ethics.

1.4 Our Values

We always seek relevance to our CARES values. The pursuit of these values creates opportunities for success and the potential to provide our customers with more satisfactory services. These values also lead us to manage PESCO's environmental impact in ways that strike the right balance between society's economic and environmental needs.

CUSTOMER CENTRIC: We aim to satisfy our customers and all our stakeholders by anticipating their needs and delivering the best possible service and solution;

ACCOUNTABLE: WE take ownership, initiative & responsibility for all our actions and we are honest and fair in all our dealings;

RESPECT: We respect each other in all aspects and support our communities for societal and environmental well-being;

ENERGIZED: We are energized to inspire and empower our people to add real value for all our stakeholders;

SAFE: We ensure that safety remains our top priority in all our operations and behaviors.

1.5 PESCO Safety Policy

The prevention of accidents, injuries and occupational illness shall be integrated into all aspects of every work activity, performed for or on behalf of PESCO.

1. All levels of management and supervision shall be responsible for providing a safe working environment as well as elimination of the factors causing health hazards. They shall also be responsible for provision of adequate protective equipment, tools and devices for the safe execution of works and shall contribute for the development in performing their work so as to ensure their safety.
2. Management shall provide adequate training to employees in phases so that they become well acquainted to perform the assigned work safely.
4. All persons, whether employees of PESCO or contractors, working on a site, shall comply with the applicable safety legislation of the Government of Pakistan. In addition, they shall comply with safe working practice of PESCO, already established, to ensure their own safety as well as of fellow workers.
5. Contractors working at sites, involving electrical hazards, shall perform the work with specially trained personnel, following the procedures, generally recognized by PESCO, to be safe and risk-free for work in the proximity of live electrical apparatus.
6. Specific safety requirements for contractors shall be written in the contract documents.
7. All segments of PESCO will be responsible to organize and administer a safety program to develop safety culture among the employees. The Safety Directorate shall promote and monitor safety programs on all levels in PESCO.
8. The Basic Safety Code can be summed up as follows:

   "NO OPERATING CONDITION OR URGENCY OF SERVICE CAN EVER JUSTIFY ENDANGERING THE LIFE OF ANYONE".

Chief Executive Officer
April 2022

1.6 Purpose

The purpose of this Safety Manual is to lay down management framework which serves as a reference to all those responsible for execution and implementation of the safety management system. It provides direction to management at all levels for implementing Occupational Health, Safety, Environment and Fire Safety to achieve compliance of legal and regulatory requirements. It establishes a safety management structure built upon safety procedures and practices for PESCO especially focusing on electrical work related to high-tension and low-tension network.

This Safety Manual is for the guidance of employees/workers, in the prevention of accidents, which may result in injury to or death of the workers, their fellow employees, workers of contractors or the public, or damage to PESCO property or equipment. However, most of the instructions will help prevent injuries and sufferings in the normal life too. It applies to all the employees at work and the contractors working for PESCO.

No Manual can cover all conditions that may arise when work is in progress. Everyone is supposed to be alert and to exercise good judgment, as and when required, according to circumstances. This Manual prescribes minimum requirements and cannot be treated as a complete working guide. Additional safety practices will be incorporated as and when considered necessary and updated in the amendment sheet of this manual. Above all, the employees/workers/ and contractors are encouraged to submit safety suggestions.

This Safety Manual covers the following main areas of a safety program: -

a) Basic Safety Guide Lines.

b) General Provisions.

c) Electrical Works.

d) Transportation.

e) First Aid Procedures.

f) Resuscitation and Rescue Procedures.

The Safety policy of PESCO is designed to achieve the following objectives:

a) To completely integrate safety with construction, operation, maintenance and development of power distribution facilities.

b) To provide safe working conditions, proper and adequate tools, equipment and protective devices to PESCO staff.

c) To train employees, by practices, for the safe conduct of their work.

d) To enforce safety measures.

1.7 Scope

This Safety Manual shall apply to all workplaces and electrical network system managed by the company. All the PESCO employees, consultants, authorized contractors, or other entities - as applicable - performing design, construction, operation, or maintenance tasks for PESCO system shall be responsible for meeting applicable requirements. For all particulars not specified in this Manual, installation, operation and maintenance should be done in accordance with accepted good practice for given local conditions, known at the time for construction or maintenance work by employee or the contractor.

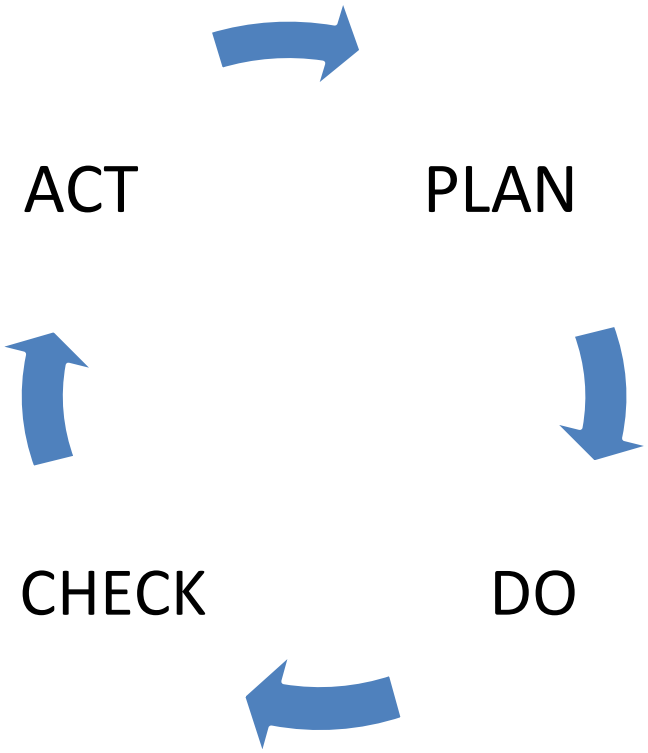
2 SAFETY MANAGEMENT SYSTEM

2.1 General Requirements

PESCO is committed to promote the highest standards of Safety, Health & Environment and minimizing risks to human health and the environment in and around the work place. PESCO has established and maintain a Safety Management System (SMS) and is devoted to provide safe work conditions to its employees, customers and general public as well as preserving the integrity of our environment.

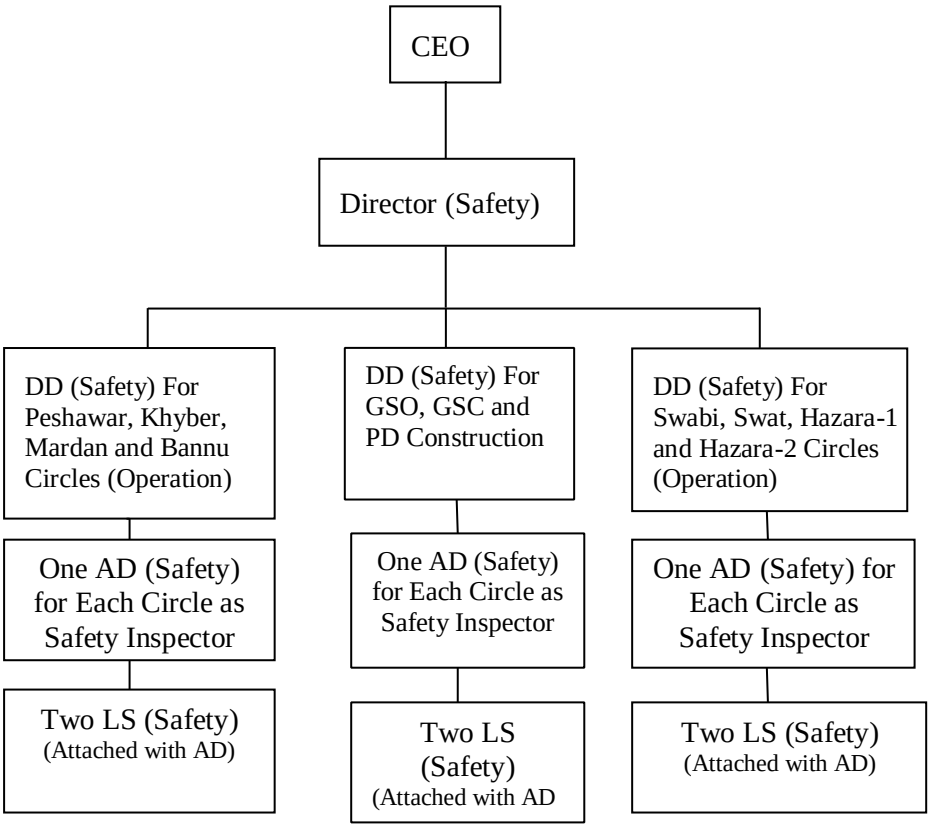
2.2 Safety Management System Overview

Our SMS is a process designed to systematically identify, assess and manage the operational risks to employees, contractors, stakeholders, business and the environment. The routine application of the SMS provides on-going identification, prioritization and control of these risks. Maintenance and continual improvement of the Safety Management System shall be pursued by performing Plan Do Check Act (PDCA) cycle.



2.3 Safety Directorate

The Safety Directorate has been established directly under CEO PESCO. In order to promote the safety culture on the modern concepts and realization of the importance of safety for achieving the target of zero safety incidents, Safety Directorate has been restructured and consists of minimum 01 Director (Safety) directly reporting to CEO, 03 Nos. Deputy Directors (Safety), 11 Nos. Assistant Directors (Safety) and 22 Nos. Line Superintendents (Safety) excluded other required staff. The AD (Safety) for each circle (Operation/GSO/GSC/PD Construction) will be safety inspectors under administrative and functional control of Safety Directorate PESCO and will act as safety auditors for the field formation. The hierarchy organogram is depicted below.



A minimum of 01 Assistant Director and 02 Line Superintendent shall be deputed at circle level.

2.4 Responsibilities of Safety Directorate

Director (Safety) and his team are responsible for:

a) Oversight of Safety functions.

b) Arranging internal and external safety related trainings, inspections and audits.

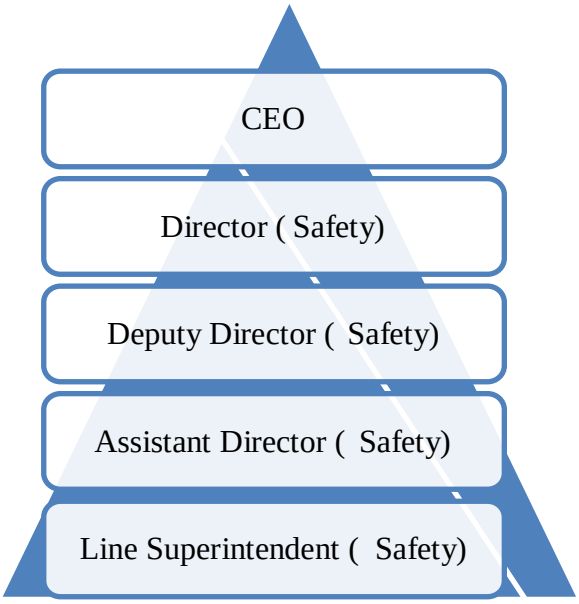
c) Evaluating the needs of training of different employees as per field requirements.

d) Internal audits and safety performance measurement regarding implementation upon safety SOPs and instructions issued from time to time.

e) Recommending needs for improvement in safety/environment procedures and controls.

f) Facilitate departments in execution of safety related matters.

g) Evaluating performance of field formation regarding implementation upon safety/environment SOP.



2.5 Safety, Health and Environment Auditors

The Assistant Director posted in Safety Directorate shall carry out audit of field formation regarding implementation upon safety, health and environment SOP by field formation. He shall check their activities regarding safety and submit report to Safety Directorate PESCO. Further, he shall carry out schedule and surprise site visits and inspections of workers of contractor(s) during performing any maintenance or construction work at PESCO system.

2.6 Review of Goals/Objectives

Progress shall be reviewed at least annually by management with input from employees and stakeholders.

3 SAFETY MANAGEMENT SYSTEM

OPERATION LEVEL

Note:

In this section, the responsibility of each and every individual has been described regarding safety only. Job descriptions of the posts are not covered in this section. In case of Noncompliance of these responsibilities action under the set procedure (Annexure-05) shall be initiated against him.

3.1 Responsibilities of ALM (Operation)/Associating Employees

a) He must know his job plan and safety measures needed to be taken for the job.

b) He shall ensure that all safety measures regarding the work are adopted by LM.

c) He shall inform LS/SDO immediately in case LM violates safety SOP.

d) No work shall be done without SJO/Complaint Number. If any such work is done, he shall report to SDO/Director Safety.

e) He must know the SJO/Complaint Number of the job he is performing.

f) While the LM is working on line, the associating employee shall not go anywhere, keep vigilant and provide guidance to the LM regarding safety concerns.

g) He shall ensure that no work is done without PTW, when required.

h) He must know when PTW is required.

i) He must know how earthing is done and how earthing is done in case of PC poles.

j) He shall ensure that no work is done without earthing.

k) When required, if work is being done on busy road/street, traffic cones shall be placed to divert the traffic.

l) He shall report any near miss incident.

m) He shall ensure that the pole/structure LM is climbing is safe to climb or not.

n) He shall not let LM climb up any damaged pole/structure.

o) He shall ensure that he and LM have beepers/voltage tester and shall test the line before starting the work.

3.2 Responsibilities of LM (Operation)/ Authorized ALM (Operation)

Note: *Authorized ALM is an ALM who is authorized by XEN to work on lines*

a) He shall not start work without proper job briefing taking into account all hazards and implementing their controls.

b) No work shall be done by him without SJO/Complaint Number. If he is directed to do any unregistered work, he shall refuse and report to SDO/Director Safety.

c) He must know the SJO/Complaint Number of the job he is performing.

d) He shall ensure that all safety procedures are adopted while doing a job.

e) He shall not work without PTW, when required.

f) He must know when PTW is required.

g) He must know how earthing is done for structures and how earthing is done in case of PC poles.

h) He shall not work without earthing where required.

i) He shall always use necessary and required T&P and PPE while working.

j) He shall report near miss accident to the LS/SDO immediately.

k) He shall not work without reporting to LS/SDO/Complaint Shift In-charge.

l) He shall report to LS/SDO if proper T&P is not provided to him.

m) He shall not use mobile phone while working on line, transformer or while he is on pole/structure.

n) He shall keep his T&P safe, neat and clean in every manner in a proper condition.

o) He shall ensure prior to climbing that the pole/structure he is climbing is safe to climb.

p) He shall not climb up any damaged pole/structure.

q) He shall always keep beeper/voltage tester along with him and shall test the line before starting the work.

r) He shall keep temporary earthing tools like lifesaving chain in his bag.

s) He shall report any hazard found in the field in the hazard register kept at complaint office and also tell immediately to SDO and LS verbally.

t) Provide barricade and warning signs to restrict unauthorized entry of public person or vehicle at job site.

3.3 Responsibilities of LS Feeder In-charge (Operation)

a) He shall ensure that no work is done without SJO/Complaint Number.

b) He shall ensure that no work is done without PTW, when required.

c) He shall maintain T&P and PPE inventory for the line staff.

d) He shall frequently check T&P and PPE to ensure that they are in healthy condition.

e) He shall maintain Record of PTW, hazard points, hotspot points, quality of work register, SPT form & near miss accidents, and T&P register on regular basis.

f) He shall maintain single line diagram of feeder.

g) He shall conduct patrolling of feeder at least once a month and patrolling report with discrepancies shall be sent to XEN office.

3.4 Responsibilities of LS Complaint In-charge (Operation)

a) He shall provide and ensure that no work is done without Complaint Number.

b) SJO (Sundry Job Order) book shall be with the complaint shift in-charge.

c) He shall maintain repeat fault register.

3.5 Responsibilities of LS Work In-charge (Operation)

a) He shall ensure that no work is done without SJO/Complaint Number.

b) He shall ensure that no work is done without PTW, when required.

c) He shall arrange T&P and PPE including earthing sets and beepers/voltage tester for the line staff.

d) He shall frequently check PPE of the line staff and shall ensure that they are in healthy condition.

e) He shall check health issues of the line staff.

f) He shall take PTW if required and ensure to be on site while work is in progress.

g) He shall ensure earthing of HT/LT lines in his presence.

h) He shall inform LM/ALM about all hazards and shall ensure to implement controls of hazards.

i) He shall stop a job and withdraw a PTW, in case of major unsafe practices or conditions, which are potentially dangerous to life or health or he determines that safety of the job does not meet the conditions specified in the SOP/PTW.

j) Provide barricade and warning signs to restrict unauthorized entry of public person or vehicle at job site

3.6 Responsibilities of LS Safety (Operation)

a) He shall ensure that no work is done without SJO/Complaint Number.

b) He shall frequently check T&P and PPE of the line staff and shall ensure that they are in healthy condition.

c) He shall frequently check the availability T&P and PPE including earthing sets and beepers/voltage tester for the line staff and shall ensure that they are in healthy condition.

d) He shall assess site hazards and shall ensure to implement controls of hazards.

e) He shall stop a job and immediately inform LS Work In-charge (Operation), in case of major unsafe practices or conditions, which are potentially dangerous to life or health or he determines that safety of the job does not meet the conditions specified in the SOP/PTW.

a) He shall maintain patrolling book for each feeder.

f) He shall send safety reports to XEN on weekly basis.

3.7 Responsibilities of Sub-divisional Officer (SDO) Operation

3.7.1 Daily Responsibilities

i) **Morning Assembly**

He shall conduct morning assembly on daily basis and shall briefly discuss the safety measures to be taken to create safety awareness among line staff. He shall also share the details of at least one accident from the brief of individual accident file maintained at sub-division.

He shall maintain the record of daily morning assembly and submit it to XEN and Director Safety.

ii) **Safety Walk-Around**

SDO shall carry out surprise checking of the staff working at site during safety walk-around on daily basis. He shall note the name of gang members and document any violations. He shall save the pictures of site checking

showing himself at site and send them to XEN and Director Safety through WhatsApp.

iii) **Safety Calls**

SDO shall make safety call to every LM/ALM of gangs of only one shift daily telling them to observe safety and take care of their lives and lives of their associating gang members. This process shall continue after end of each cycle. He shall check for any wrong practices daily and take corrective measures and report to XEN and Director Safety on weekly basis.

A sample questionnaire for safety calls;

a) Whether different instructions read

b) Whether know earthing

c) Whether prior to working on the line you earth the line

d) Whether you use beeper/voltage (HV/LV) tester

e) Whether emergency lights are there

f) Whether ladders are in OK condition.

3.7.2 Weekly Responsibilities

SDO shall weekly inspect the quality of work done by the maintenance and complaint staff i.e. HT/LT jumpers, Transformer jumpers, Drop out cut out jumpers, LT breakdowns and note down the discrepancies in the Quality of Work register and submit report to XEN. Not only poor work is a hazard but also it causes repeated maintenance (increase chances of accident). Hence, SDO shall ensure that all works are done strictly according to SOP with fine quality of work.

SDO shall maintain, check and sign safety registers i.e. Hazard Register, PTW register, Repeat Fault register, SJO register, quality of work register Near Miss Accident Register, safety violation register, SPT Forms on weekly basis. He shall also ensure that all major complaints of HT/LT line jumper burnt/ line broken/ transformer damaged/ jumper burnt from transformer HT/LT sides are addressed.

Violations caught shall be noted and recorded as challans done by SDO. He shall maintain the record of number of challans done by him and report to XEN and Director Safety on weekly basis.

3.7.3 Monthly Responsibilities

a) SDO shall conduct T&P parade to check the condition of T&P, PPE and its shortage.

b) SDO shall arrange the inventory of T&P / PPE and shall conduct T&P parade on monthly basis to check the condition of T&P, PPE and its shortage.

a) SDO shall maintain record of T&P parade and monthly shortage of T&P/PPE and report to XEN.

b) SDO shall check the condition of vehicles and emergency lights.

c) SDO shall assess physical fitness of line staff and if he feels, health related issues in any employee, shall refer them to WAPDA hospital for medical checkup. Maintain the record of health issues (eye sight checkup) of line staff and send monthly report to XEN.

d) SDO shall not at all take any work done by construction staff which is not up to the standards of work and safety.

e) He shall ensure circulation of staff in different sections.

f) He shall ensure that danger allowance is not given to LM who does not do his jobs.

g) He shall declare the worst LM/ALM and best LM/ALM on monthly basis in the light of his safety walks and weekly inspection of quality of work and report to XEN.

h) Any problems of LM pending TA/DA bill or any other matter, they will note the problems in register, SDC shall make backup and submit to SDO. SDO shall take measures to resolve the issue at its own office and office of XEN.

i) In case of non-rectification of problems, LM/ALM shall visit XEN/SE/Chief office for their personal issue. SDO shall maintain a register and weekly as well as monthly report shall be sent to XEN. For any delay, SDO shall be held personally responsible.

j) In case any issue of staff is not resolved within 15 days, report shall be sent to divisional office. Divisional office shall monitor the progress of problems resolution and accordingly sent a report to SE office. SE shall send biweekly/monthly report to Chief Engineer.

3.8 Responsibilities of Executive Engineer (XEN) Operation

a) Conduct safety walk-around on weekly basis (without repetition till completion of cycle of all Sub-Divisions). He shall conduct meeting with SDO and issue minutes and send copy to SE with Cc to Director Safety. He shall do surprise

checking of the LM working at site during safety walk-arounds and its pictures shall be taken and sent to SE and Director Safety through WhatsApp.

b) Check and sign safety registers i.e. Hazard Register, PTW register, Repeat Fault register, SJO register, quality of work register Near Miss Accident Register, safety violation register, SPT Forms safety walk-around.

c) Arrange, provide and check T&P and PPE at all Sub-Divisions.

d) Ensure implementation of SOPs/Procedures at all Sub-Divisions.

e) Ensure the maintenance of HT/LT lines, ground clearance, earthing and protection relays.

f) Report to incident site, conduct initial investigation and report to headquarter.

g) Arrange safety trainings for Sub-Divisions staff.

h) Ensure compliance by SDO's for their duties.

i) Ensure to maintain the record of number of challans done by him and consolidated record of challans sent by SDOs and accordingly report to SE and Director Safety

3.9 Responsibilities of Superintending Engineer (SE) Operation

a) Conduct safety walk-around once a week (without repetition till completion of cycle of all Sub-Divisions). He shall do surprise checking of the LM working at site during safety walk showing himself checking the site and send the pictures through WhatsApp to Chief Engineer (O&M) and Director Safety.

b) Review different record/reports sent by XENs and take necessary action as required.

c) Conduct meeting with circle training center staff to assess the staff performance and take necessary action for arrangement of training as required.

d) Hold monthly meeting with XENs to review the safety activities, training updates and issue the minutes of meeting with copy to Chief Engineer (O&M) and Cc to Director Safety.

e) Implement safety instructions issued from time to time.

j) Arrange, provide and check T&P and PPE at Circle level.

f) Ensure implementation of SOPs/Procedures at Circle level.

g) Maintain the record of number of challans issued by SE and consolidated record of challans sent by XEN's and submit report to Chief Engineer (O&M) and Director Safety.

3.10 Responsibilities of Project Director (PD) Construction

a) Conduct safety walk-around once a week (without repetition till completion of cycle of all Sub-Divisions) at project site telling them to observe safety and take care of their lives and lives of their associating gang members.

b) Carry out surprise checking of the LM working at site during safety walk.

c) Obtain the site pictures showing himself checking the site and shall send it to concerned Chief Engineer and Director Safety through WhatsApp.

d) Hold quarterly safety committee meetings at Circle level for project and maintain the record accordingly.

e) Ensure implementation upon other instructions issued from time to time.

f) Ensure implementation upon safety SOPs/procedures.

g) Ensure quality of work is being done by construction staff which is up to the standard of work and safety.

3.11 Responsibilities of Project Director (PD) Grid System Construction (GSC)

a) Conduct safety walk-around once a week (without repetition till completion of cycle of all Sub-Divisions) at project site telling them to observe safety and take care of their lives and lives of their associating gang members.

b) Carry out surprise checking of the LM working at site during safety walk.

c) Obtain the site pictures showing himself checking the site and shall send it to concerned Chief Engineer and Director Safety through WhatsApp.

d) Hold quarterly safety committee meetings at Circle level for project and maintain the record accordingly.

e) Ensure implementation upon other instructions issued from time to time.

f) Ensure implementation upon safety SOPs/procedures.

g) Ensure quality of work is being done by construction staff which is up to the standard of work and safety.

3.12 Responsibilities of Grid System Operation (GSO) Staff

3.12.1 Inspection of Grids

i) Cleanliness ii) Fire Extinguishers

a) Shortage

b) Filling

iii) Water supply mechanism for fire iv) Whether direction of emergency discharge pipe is correct v) Cables are scattered on ground vi) Trenching vii) Open panels viii) Ventilation of battery room

ix) Grass cutting

3.12.2 Maintenance of Cameras at Grids if available

i) SSO shift in-charge and Assistant Engineer Technical (AET) shall be responsible for healthy operation of all the cameras.

ii) Any fault in camera shall be immediately reported to concerned XEN (SS&T) and Director Safety on their designated numbers. They shall daily report the fault till the camera operation come in order.

iii) XEN (SS&T) shall take immediate action and ensure that the camera operation is restored in same day.

3.13 Responsibilities of Safety Wardens

In every building of PESCO Safety Wardens shall be nominated who shall perform following duties:

a) Point out safety hazards.

b) Report failure/absence of any safety equipment.

c) Conduct monthly safety meeting.

d) Conduct monthly evacuation mock exercises to deal with emergency condition.

e) To ensure that at least one employee in every room knows usage of safety equipment /fire extinguishers etc.

f) Submit progress report to head of the building.

g) The head of the building shall submit monthly progress report to his administrative head and Director Safety.

3.14 Responsibilities of Power Distribution Centre (PDC)

a) PDC shall ensure one telephone number for each operation circle so that no one has to wait for PTW.

b) PDC shall allow PTW immediately after receiving request from the concerned SDO and also inform the concerned grid station without any delay.

c) PDC shall inform the concerned SE and Director Safety for the repeated faults on the same feeder on weekly, monthly, quarterly, bi annually and annually basis.

d) PDC shall point out the feeder with same name in a sub-division. Such report shall be given to SE, Chief Engineer (Planning) and Director Safety.

e) PDC shall ensure smooth issuance of PTW to sub-divisions.

f) PDC shall check the load profile of each feeder and inform the concerned SE and Director Safety if there is any major load variation.

g) PDC shall point out discrepancies (if any) and take corrective measures against them.

h) PDC shall point out wrong feeder names of sub-divisions.

i) PDC shall point out same feeder names in one sub-division.

j) Voice reading and activity metering system shall be installed at PDC.

k) All the conversation done at grid and at PDC shall be recorded.

Security cameras should also be installed at all the grid stations so that the SDO/XEN of operation and GSO shall be able to monitor the activities done at grid station.

3.15 Responsibilities of Private Contractors

All private contractors shall abide by all the PESCO safety rules. They shall get registered all their employees and get vetted through PESCO. Only registered labor shall be authorized to work on lines/poles etc. Unregistered workers shall not be allowed to do any sort of PESCO work. The gangs deputed for work by them shall be notified to the SDOs and XENs daily.

Any unauthorized/unregistered worker if found working on lines/poles of PESCO, show cause shall be issued to the contractor. He shall be fined a penalty amounting to Rs. 100,000/- and upon two such violations the contractor and his company shall be black listed.

If any contractor is found not conforming to other relevant SOP/rules/instructions, then show cause shall be issued to the contractor. He shall be fined a penalty amounting to Rs. 50,000/- and upon three such violations the contractor and his company shall be black listed. All the workers engaged by the contractors shall be insured for any accidents at par with PESCO employees.

SDO and XEN shall check at least twice a week the contractor labor working at site and report shall be submitted to SE with Cc to Director Safety. SE shall report to GM (Technical) with Cc to Director Safety.

4 SAFETY IMPROVEMENT MEASURES AND GENERAL PROVISIONS

4.1 Morning Assembly

To ensure the importance of Health, Safety and Environment and to develop sense of understanding across all the disciplines that a strong culture of Safety and Health is requirement of PESCO's business and interest, a new SOP has been implemented for 15-20 minutes morning assembly session at all sub divisions, camp offices and workplaces operational under PESCO. Every morning all staff members shall attend the Morning Assembly on daily basis at all above mentioned work places.

4.2 Safety Precaution Talk (SPT)

As per revised SOP mentioned, each complaint gang/maintenance gang shall comprise of three (03) members. Before dispatching the gang, the concerned Supervisor/LS shall conduct Safety Precaution Talk (SPT). During SPT, the concerned officials shall check Personal Protective Equipment (PPE) and necessary Tools & Plants (T&P) and give job briefing about the possible hazards that the gang may face and also discuss their controls according to the nature of the complaints/work.

When gang reaches at site, before starting job, LS shall give site briefing in which he shall discus the nature of job to be performed and highlight the hazards that may be faced and their control. The specimen for SPT form is given in Annexure-01 to this manual.

4.3 General Provisions

1) Learn and understand the following six basic principles in job safety to deal with the hazards.
   a) IDENTIFY the hazard;
   b) ELIMINATE the hazard, wherever possible;
   c) CONTROL the hazard, if it cannot be eliminated;
   d) PROTECT against injuries, in case a hazard gets out of control;
   e) MINIMIZE severity of an injury, if an accident takes place;
   f) AVOID future occurrences.

2) Accident prevention can be accomplished only through wholehearted cooperation of all members of the organization. Neither the management nor the safety code can prevent accident, without the cooperation of every employee.

3) Unsafe workers are a danger to themselves, their fellow workers, the public, property, and the equipment & machinery of the organization. Due care and attention to all safety rules and devices is essential not only to prevent injury to the workers but also to protect PESCO equipment & machinery.

4) Capable and mentally alert employees will avoid accidents, by learning all about their work, using proper safeguards and protective equipment and avoiding shortcuts and make-shift work methods.

5) GOOD OPERATION IS SAFE OPERATION. This is true both for employees and equipment. A job done safely is a job done efficiently.

6) Accidents do not "just happen". Accidents are the natural result of UNSAFE CONDITIONS OR UNSAFE ACTS, usually a combination of both.

7) Machinery and equipment are generally manufactured to perform safely within limits of design. In fact, statistics show that more than 90% of accidents are due to the human element, such as failure to use safety devices and observe safety rules and procedures.

8) Some examples of UNSAFE CONDITIONS, which may cause accidents, are:-

   a) **Improper Guarding** such as unshielded moving parts of machines, unbarricaded floor openings and excavations, unenclosed high voltage equipment, lack of protective equipment and insufficient warning signs etc.

   b) **Defective Material or Equipment** such as mushroomed chisels, split handles, deteriorated poles, poorly manufactured or weak equipment.

   c) **Hazardous Arrangements** such as those due to poor housekeeping at work locations, unsafe planning or inadequate working space.

   d) **Insufficient Light** unsuitable location producing glare or objectionable shadows.

   e) **Improper Ventilation** such as insufficient change of air or presence of harmful vapor, dust or gas.

   f) **Unsafe Clothing** that fits loosely and can become entangled in wires and machinery, and failure to use goggles, proper shoes and insulated gloves or sleeves.

   g) **Unsafe Design and Construction** due to deviations from standard design and specifications and poor workmanship.

9) Some examples of UNSAFE ACTS, which may cause accidents, are:

a) **Operating Without Authority or Warning** such as closing switches without authority, operating hoists and trucks without warning, failure to place warning signs or signal man where needed, failure to block equipment against unexpected movement, failure to observe work clearance procedures.

b) **Operating or Working at Unsafe Speed** such as driving too fast, throwing material or tools to another worker, jumping from vehicles or platforms or running.

c) **Making Safety Devices Inoperative** such as removing guards from machines, using oversize fuses, blocking safety valves, bypassing interlocks and isolating fire protection etc.

d) **Use of Unsafe Equipment or Improper Use of Equipment** such as using dull cutting tools, mushroom-head chisels, and pipe extensions on wrenches not designed for them, or the wrong tool for the job, or using hands instead of hand tools.

e) **Unsafe Loading** such as overloading cranes and winches, carry load beyond limit.

f) **Placing or Leaving Objects** where they are likely to fall.

g) **Mixing Improper Packing** or combining chemicals to form a dangerous mixture.

h) **Taking Unsafe Position or Posture** such as working on live conductors from above instead of below, walking under suspended loads or too close to openings, lifting while in awkward position, entering areas where there are dangerous gases or fumes, passing on curves of hills, riding on running boards or other unsafe places on vehicles.

i) **Working on Equipment without Taking Proper Precautions** such as installing and removing temporary earth, cleaning, oiling or adjusting moving machinery, and working on or near live electrical equipment.

j) **Distracting, Teasing or Startling** such as practical joking, horseplay, quarrelling or annoying.

k) **Failure to Use Safe Clothing or Protective Equipment** such as failure to use insulated gloves, proper shoes, hard hat or goggles.

10) No person shall operate any apparatus or equipment without having authority/permission or instructions from the competent authority. In the existing set up of PESCO, NPCC is the Chief Operating Office of entire GSO System. In addition to the specific and general instruction of the NPCC, whether written or oral, the guidelines given in this Manual shall be followed by all PESCO employees, engaged in operation and maintenance work, at all levels of PESCO management. The main areas of GSO operations are: - a) Operation of apparatus.

b) Operating orders and messages.

c) Authority to work, Permit to work, Hold-off, Caution notices/tags.

d) Office work and record.

5 SAFETY AUDIT

By implementing PESCO safety policy, we will be able to restore PESCO to its rightful position as per the expectations of its customers and reduce the environmental impact of our activities. It will also enhance the performance with respect to quality, health, safety and over all well-being of our people and strive to recognize their diversity and skills.

5.1 Audit

To check whether the SOPs are being implemented in all the jobs and whether the measures are being taken to detect the wrong practices and corrective measures are being taken, audit shall be done. The audit activity shall be of two types; a) Internal audit

b) External audit

5.2 Internal Audit

Internal audit shall be carried out by the field officers i.e. SDO, XEN, DDT and SE. They shall check the following registers; a) Hot spot register

b) Hazard register

c) Near miss accident register

d) PTW register

e) SJO register

f) Complaint register

g) Attendance register

h) Quality of work register

i) Safety call register

j) Safety Precaution Talk form

k) Patrol book

l) T&P register

5.2.1 Internal Audit by SDO

SDO shall do internal audit of his sub-division on **weekly** basis. He shall ensure the implementation of safety SOP in true spirit. He shall check that different safety registers mentioned in section 5.2 are being maintained or not on regular basis and

corrective measures are being taken to remove the deficiencies or otherwise. Record shall be maintained for onward submission to XEN office.

5.2.2 Internal Audit by XEN

XEN shall do internal audit of only **one sub-division per week**. He shall ensure the implementation of safety SOP in true spirit. He shall check that different safety registers mentioned in section 5.2 are being maintained or not on regular basis and corrective measures are being taken to remove the deficiencies or otherwise. Record shall be maintained for onward submission to SE office.

5.2.3 Internal audit by SE

SE shall do internal audit of only **two divisions per week**. He shall ensure the implementation of safety SOP in true spirit. He shall check that different safety registers mentioned in section 5.2 are being maintained or not on regular basis and corrective measures are being taken to remove the deficiencies or otherwise. Record shall be maintained for onward submission to Chief Engineer (O&M) office.

5.3 External Audit

The Safety Directorate team shall do scheduled visit of sub-divisions, divisions and circle offices to evaluate their performance regarding safety on the prescribed safety proforma. They shall ensure that safety SOP is being implemented in true spirit and shall report any violations found in their audit.

5.4 Suggested Measures for Preventive Actions

A sub-division Safety Management System (SMS) shall contain a description of Risk Assessment activities performed including both formal and informal hazard identification and risk assessment of those hazards. Processes or procedures shall include provisions for committing hazards to potentially affected personnel. In addition, assessed risks must be communicated to and addressed by specified levels of sub-division's supervision and management. Formal risk assessments must be documented, implemented and maintained.

The SMS shall have processes and procedures to document the three basic steps associated with risk management i.e. Hazard Identification, Risk Evaluation & Analysis and Risk Treatment. PESCO shall periodically update the various risk assessments based on audits, reviews and changing regulatory requirements.

The scope of the assessments shall include activities, operations, projects and products from acquisition or inception through decommissioning, abandonment and

disposal. The assessment shall consider normal, abnormal and emergency operating conditions. Importantly, it will address related impacts to the PESCO, its staff, facilities, contractors, customers, the general public, the environment and surrounding community.

6 SAFETY TRAINING PROGRAMS

6.1 General

1) The training programs are designed to meet the requirements of leading international standards/codes and practices.

2) All segments of PESCO shall be responsible for organizing and administering a safety program to develop safety culture among employees. The Safety Directorate shall monitor safety programs, safety drills and crash programs in PESCO on Regional, Circle and Divisional levels.

3) PESCO top Management shall provide the employees adequate training, information and instructions, in phases so that they should become well acquainted to execute the assigned work safely. If any technical aspect/instruction regarding any equipment changes, it shall be conveyed in writing as well as in seminars and safety workshops.

4) All national and international based training programs for HQ officers and field officers/officials on safety, first aid, fire protection etc. shall be arranged.

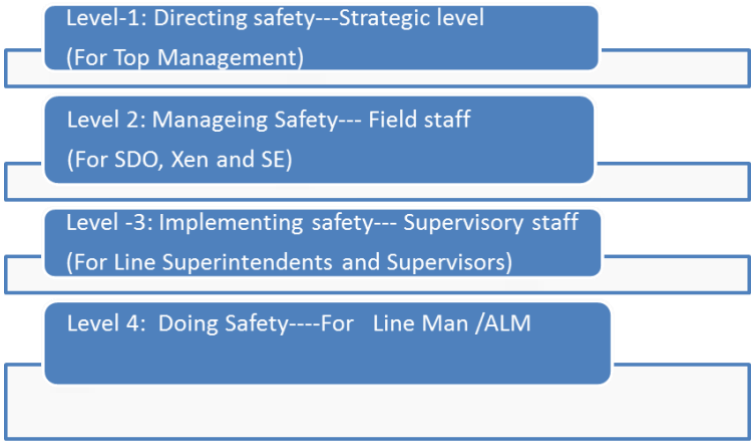
6.2 Training and Development for Safety Directorate

i) Levels of Trainings

a) For non-management.

b) For management

ii) Depiction in Symbolic Form:



6.3 Salient Features of Safety Training Program

a) Safety training shall be mandatory for all levels, from top management to bottom staff.

b) DD Training shall conduct different level trainings as requirement raised by Director Safety.

c) Fire protection trainings to all safety wardens.

d) First aid trainings to management and non-management.

6.4 Training Types

6.4.1 Regular/Mandatory Trainings

These trainings are given to each and every officer/official of PESCO at least once in a year which includes training related to: a) Fire safety

b) Emergency response plan

c) Housekeeping

d) General safety

e) Technical safety training to the line staff

6.4.2 Gap Analysis Trainings

These trainings are given to officers/officials as and when required. The department head shall send the requirement to DD training and accordingly he shall conduct the same.

6.5 Training Planning

Prior to the start of every year, DD trainings shall ask all heads of department regarding their training requirements. On the basis of that, annual training plan shall be designed and gap analysis shall be carried out. Thereafter, trainings shall be scheduled for all departments on quarterly basis.

6.5.1 Training Scope

Employees shall be trained in, and be familiar with, any electrical safety related practices necessary for their safety. These trainings shall cover certified courses of ISO 45001, ISO-45001, EMS ISO-14001, QMS ISO-9001 and NEBOSH.

6.5.2 Training Modes/Channels

a) Videos
b) Real time pictures

c) Real stories of victims of accidents

6.6 Training Evaluation

1) Pre and post training evaluation of trainers
2) Spot Checks
3) Reporting of problems (if any)
4) Training of trainers to value the training up to the mark

6.7 Career Development

From field staff to line managers, HR Director shall conduct different learning and career development programs by conducting meetings with all HODs. All trainings related to employee safety are referred to DD trainings to incorporate in their program.

At Regional Training Center, having capacity intake of 500 participants at a time; two types of trainings are being conducted there.

i) Hard Skills – Tech Skills (also pre-promotional Trainings).
ii) Soft Skills – Behavioral Skills.

6.8 Internal Trainings

RTCs and CTCs should be more specific and shall work and plan trainings as per requirement of concerned Manager. They shall be checked by Safety Directorate frequently.

6.9 External Trainings

External safety trainings shall also be imparted to the SDO/XEN/SE and senior

Leads at all levels to cover following areas: a) Awareness Enhancing

b) Habits Improvement (Behavior Based)
c) Proactive Management
d) Investigation Procedures
e) Occupational Health & Industrial Hygiene Management
f) Workplace Safety Policies and Procedures

6.10 HSE Orientations

Orientation plan has been developed to brief new inductees and contractors about relevant HSE policies & procedures that has to be followed by all employees and stakeholders.

For the purpose of orientation, the training module will include but not limited to:

1. HSE Policy and SOPs
2. HSE system and work instructions
3. Site specific hazards
4. Emergency response
5. Use and care of PPE/T&P

HSE Orientation trainings will be conducted on as required basis and HR department will coordinate and oversee the Orientation program with the help of RTC/CTC and relevant department.

6.11 Job specific Trainings

Purpose of Job specific trainings is to contribute to the growth and productivity of the company by providing individuals with the highest quality of technical training by adopting modern training methodology with an aim to harvest innovative mindsets and thereby increasing the productivity of the company.

The Job specific training shall be provided to new inductees, contractors on initial induction and then later on as a refresher after every two years.

The focus of Job Specific Training will be on the following but not limited to:

a. Hazard identification and Risk Management.
b. Identification of unsafe acts and unsafe conditions for safe operation.
c. Operation and maintenance.

Technical trainings will be delivered throughout the year as per requirement and considering business priorities also. Job specific trainings are categorized into following two types

6.11.1 Long Term Skillset

These trainings shall be delivered to augment the proficiencies of a particular cadre. These trainings will cultivate technical, analytical and social skills of the staff and includes both theory and practical training depending on the cadre.

6.11.2 Short Term Skillset

These trainings are focused on specialized sessions on key skills to enhance workmanship. Sole purpose of these trainings is to develop new skills and enhance existing skills for job performance of the staff.

6.12 HSE Awareness Trainings

Primary objective of HSE Awareness training is to ensure that all employees and contractors of PESCO undertake their allocated tasks in a safe and risk-free manner. HSE awareness training will be an annual feature for which Annual training plan will be developed by Safety Directorate in coordination with HR Directorate. This will aim on minimizing occupational Health & Safety incidents. The training shall provide relevant information and instructions to understand processes and risks, as governed by the national and provincial legal requirements, to ensure the safety of all personnel at the work place, and for protection of equipment & the environment.

Following minimum topics will be covered in the training:

a. Hazard identification & risk management
b. PTW
c. Electrical and mechanical isolation
d. Use and care of PPE/T&P,
e. Fire prevention and hot work
f. Working in hazardous conditions e.g., working at height and working in confined space etc.
g. Emergency management & first aid
h. Environment management & housekeeping.

The HSE awareness training shall be provided initially to all PESCO employees and its contractor on their induction and subsequently a refresher training course within next three years.

7 INCIDENT REPORTING AND INVESTIGATION

7.1 General

All the accidents/incidents whether major or minor, fatal or non-fatal, involving equipment or transport vehicles, related to PESCO property, must be treated seriously as they result in loss. Accidents should be reported, analyzed and investigated to look for their causes and taking corrective measures to control and minimize their reoccurrence.

7.2 Incident Reporting for Employees

The incident reporting in case of any incident/accident to an employee is carried out in the following manner;

1) The In-charge LS/LM/ALM shall give First Aid to victim and inform his immediate Assistant Manager.

2) Assistant Manager shall through telephone/WhatsApp/SMS and in writing inform Deputy Manager, Manager and Safety Directorate immediately within one hour of the occurrence of accident.

3) Assistant Manager/Deputy Manager/Manager shall also submit initial report to Safety Directorate within 24 hours of accident which shall cover details as per proforma.

4) Upon getting the initial report of incident/accident from Assistant Manager/Deputy Manager/Manager, Safety Directorate shall submit formal preliminary report to CEO within 24 hours of receiving the report from field formation.

5) After approval of the recommendations by CEO, immediate action shall be taken against the responsible officer/official depending upon the intensity of the accident.

6) Each electrical incident shall be individually reported to NEPRA on an immediate basis giving the following information:
Time and date of electrical incident, FIR lodged or not, names and occupation of persons involved, number of fatalities, extent of injuries, names and contact details of witnesses, distribution company's inquiry held or not, immediate action taken, and remedial actions proposed and/or taken or to be taken.

7.3 Incident Reporting for Public or Animal or Loss to Public Property

The incident reporting in case of any incident/accident to public or animal or loss to public property is carried out in the following manner:

1) In case of any incident/accident to public person or animal or loss to public property, the concerned Assistant Manager shall inform his concerned Deputy Manager and Manager immediately but not later than 24 hours of the occurrence of accident through telephone/WhatsApp/SMS and in writing.

2) Assistant Manager/Deputy Manager/Manager shall also submit initial report to Safety Directorate within 24 hours which shall cover details as per proforma.

7.4 Accident Investigation

i) The investigation of the accident shall be carried out on the following issues:

   a) What is the cause of accident?

   b) Who is responsible for the accident?

   c) What SOP was violated?

   d) Was the situation such that the SOP did not cover it?

   e) Whether any failure of T&P found?

ii) The investigation shall be carried out in the following manner:

   a) All the site pictures and evidences shall be taken.

   b) Statements of the persons involved in the accident shall be recorded.

   c) LS, SDO and other directly involved in the check of events shall be placed under suspension.

   d) Official documents relied upon shall be verified.

   e) Evidences and statements shall be analyzed to reach to the findings.

   f) Primary and contributory causes of the accident shall be identified.

   g) Corrective and preventive actions shall be recommended.

   h) Conclude that how this accident could be avoided.

   i) The investigation report of fatal/non-fatal accident to employee(s), general public or animal(s) and loss to public property shall be finalized within 15 working days of occurrence and shall be sent to Operation Director who shall send the case file to CEO for approval of recommendations.

j) After the approval of recommendations by CEO, inquiry report shall be sent to HR Directorate for initiating the disciplinary action against the employee(s) responsible for accident and for implementing upon any other recommendations to eliminate root/immediate causes of the accident as per set procedure. (Annexure-05)

k) If any modification/addition in SOP is required, Director Safety shall prepare the case for amendment/addition and put up to CEO for approval.

l) All inquiries of road accidents to employees shall also be conducted by Director Safety and findings/recommendations shall be submitted to CEO.

7.5 Standing Investigation Committees

Nature of Accident	Convener	Member	Member	Member
Fatal accident of employee(s)	Operation Director	HR Director	Director Safety	Member nominated by Secretary MoE-PD
Non-fatal accident of employee(s)	Director Safety	DD Safety	Member nominated by OD	-
Fatal/non-fatal accident of Public/Animal and loss to Public Property	Director Safety	DD Safety	Member nominated by OD	-

7.6 Competent Authority Regarding Employees Involved in Fatal/Non-fatal Accidents

Sr. No.	Basic Pay Scale of the Employee	Competent Authority	Appellate Authority
1	BPS - 1 to BPS - 7	Concerned Assistant Manager	Concerned Deputy Manager
2	BPS - 8 to BPS - 11	Concerned Deputy Manager	Concerned Manager
3	BPS - 12 to BPS - 16	Concerned Manager	Concerned Chief Engineer
4	BPS – 17	Concerned Chief Engineer	Operation Director
5	BPS – 18	Operation Director	Chief Executive Officer
6	BPS – 19	Chief Executive Officer	Board of Directors
7	BPS – 20	Chief Executive Officer	Board of Directors
8	Directors/Functional Heads	Chief Executive Officer	Board of Directors

8 PROCEDURES

8.1 List of Procedures

i) Procedure for Electrical and Mechanical Isolation
ii) Procedure for PTW
iii) Procedure for PTW
iv) Procedure for Cancellation of PTW
v) Procedure for Temporary Earthing
vi) Procedure for Transformer Installation
vii) Procedure for Line Patrolling
viii) Procedure for Ladder Installation
ix) Procedure for Tree Trimming
x) Procedure for Earthing

8.2 Electrical and Mechanical Isolation following will be adhered to for Electrical and Mechanical Isolation.

i. Concerned supervisor of relevant department shall ensure the electrical and mechanical isolation before any employee contractor performs any servicing or maintenance on machinery or equipment or any electrical apparatus, where the unexpected energizing, start up or release of any type of energy (electrical, kinetic, potential, thermal, chemical) could occur, cause damage to equipment, injury to personnel and/or environment can be adversely impacted.

ii. All electrical circuit conductors and circuit parts shall be considered energized until the source(s) of energy is (are) removed, electrical energy discharged and deenergized through a mechanically secure connection to an effective ground potential. Electrical conductors and circuit parts that have been disconnected, but not under isolation, tested and grounded (where appropriate) shall not be considered to be in an electrically safe work condition, and safe work practices appropriate for the circuit voltage and energy level shall be used. Isolation requirements shall apply to fixed, permanently installed equipment, temporarily installed equipment and portable equipment.

iii. In situation where it is not possible to lockout or chain off an isolating device, isolation may be accomplished by removal of fuses, disconnection of electrical cables, or physical removal of component of the system supplying energy to the equipment. The point of physical interruption should be identified with installation and securely fastening of "Danger Card/ Tag — Do Not Operate or Remove Tag" with purpose/ Reason of installation, date and time of installation, isolating location/ equipment, Card/ Tag installer name, his badge number, contact number and signature. No individual shall attempt to remove Danger Card/ Tag except installer, after verification when it is safe to do so.

iv. Up-to-date drawings shall be considered a primary reference source for isolation location. When up-to-date drawings are not available, the company shall be responsible for ensuring that an equally effective means of locating all sources of energy is employed.

v. All personnel who are required to actually do the electrical isolation shall wear proper PPE to ensure safe switching Off & On and applying isolation.

vi. No individual shall attempt to start, energize, use, or operate a piece of equipment that has been isolated. Implementation of lockout/ tagout (LOTO) systems shall be ensured to prevent any accidental energizing of equipment. vii. Isolation will be considered complete only when no associated control device, such as a push button, control interlock or automatic start-up control circuit, shall have the capability of energizing the equipment. viii. Verification test shall be conducted on each isolating device and on each piece of equipment isolated. ix. Sometimes de-energized circuits may become energized because of the following reasons:

i) Switching errors, ii) Unusual conditions which may bring an energized conductor into electrical iii) contact with the de-energized circuit, iv) Back feeding of current from any generating source i.e. Generator or UPS,

ii) Lightning strikes (All work on or near apparatus where a lightning strike may cause personal injury should be suspended immediately),

iii) Stored charges from capacitors, cables, transformers, motors, and generators.

8.2.1 Mechanical isolation of Vessels & Pipes shall be achieved by any of the following appropriate methods:

i) Valve closure with use of blinds at outlet and inlet.

ii) Removal of pipe spool with the use of blind flange

iii) Double block and bleed with use of blind.
iv) Removal of mechanical coupling.
v) The blind shall be of the manufacturer recommended thickness and material. vi) The blind rating must be equal to the pressure setting of the pressure relief valve protecting the line or equipment.
vii) If there is no pressure relief valve, then the rating must be equal to lowest rated equipment in the system (most likely pipe flange).
viii) Each blind must have a handle that can be easily identified.

ix) Prior to blind installation, the following documents need to be prepared x) Blind list and the blind register.
xi) Marked Process and Instrument Drawing (P&ID) reflecting numbered locations of blinds.
xii) Operation staff is responsible for identifying physical locations of blinds.
xiii) Permit to Work issuer and receiver shall cross check between the Process and Instrument Drawing (P&ID), blind list and the blind register before installation of blinds.
xiv) Implementation of Log Out Tag Out (LOTO) systems will be ensured to prevent the accidental removal of safety systems that would lead to unsafe situations.
xv) When the job or task is completed, appropriate tests and visual inspections shall be conducted before electric circuits or equipment are re-energized to verify that all tools, mechanical restraints and electrical jumpers, short circuits, and temporary protective grounding equipment have been removed, so that the circuits and equipment are in a condition to be safely energized. All workers involved in these activities shall acknowledge that they have completed their work and understand that the system will be energized. xvi) Operation staff shall physically verify the removal of blinds in field and update the blind register accordingly.

8,3 Permit to Work

8.3.1 Work Incharge shall follow the Permit to Work System and work shall be carried out only when there is a valid permit to work issued for corrective and preventive maintenance activities, etc.
8.3.2 The Permit to Work System shall be applied whenever;

i) The hazards associated with the activities can result in immediate danger to life or health (i.e., lost time injury, disability or death) of personnel involved in work and/or other personnel in or around the facility.
ii) Damage to company assets or property i.e., physical damage, fire/explosion damage, loss.

iii) Significant impact on the environment by way of toxic release, or pollution, etc.

iv) Permit to Work shall be applied for all critical activities such as but not limited to; welding, cutting, grinding, maintenance and repair electrical apparatus, deenergized/ energized activities, hydro-jetting, lifting, work at elevated areas, confined space entry, excavation and any other activity previously defined.

v) Permit to Work shall be issued and received only by trained and authorized Permit to Work Issuer & Receiver. Licensee shall establish specific training requirements for these functions as well as maintain a list of staff who is authorized to act as a permit to work issuer or receiver.

vi) Permit to Work shall cover all hazards, PPE/ T&P requirements, Exact Work

Location, Apparatus/ equipment number, Job/ Work Order Number, Work

Description, Joint site inspection by Issuer & Receiver, Isolation/ Lockout/ Tagout application, Barricade at job site, job briefing with all involved person including discussion of any job-related hazards. A Permit to work is only valid for the time and date as specified on the permit.

vii) All internal and external affected parties shall be informed in writing or get counter signature on permit to work for necessary precautions before issuing permit to work.

viii) Permit to Work Receiver shall obtain a copy of the Permit to Work and shall keep it at the work site.

ix) Permit to Work Receiver shall remain at work site continuously when the job activities are in progress to adequately supervise the work till completion of the work, however, if Receiver must leave the job site for any reason, for example to obtain additional tools or equipment, tea/ lunch/ washroom break, etc., then an another Receiver that is certified and authorized can be delegated to carry out the responsibilities of the Receiver during the remaining part of the job or the job shall be stopped till break time and all workers shall be out of designated job site/barricaded area. The delegated Receiver shall write his badge number and sign the Permit to Work.

x) When job is complete, housekeeping shall be conducted, all tools, waste shall be removed and staff members withdrawn before removal of temporary earth connections, removal of Isolation and LOTO. xi) Energizing and operation shall be carried out after verification by Issuer & Receiver at the time of Permit to Work closure.

8.3.3 Procedure for PTW

The Procedure for PTW is as under;

i) Fault shall be reported by LM to LS and he shall request for PTW if required.

ii) LS shall visit site and shall ask SDO for PTW. iii) SDO shall ask PDC for PTW. iv) PTW shall be approved by PDC.

v) LS shall reach grid station for obtaining PTW.

vi) LS shall write a request in the request register of Grid Station for obtaining PTW with following details (same shall also be noted on the PTW paper, specimen attached at Annexure-06);

a) Nature of work with precise location;

b) Names and cell numbers of the gang members.

vii) PTW shall be signed by LS and SSO. viii) PTW shall be issued by SSO. ix) Feeder Trolley shall be racked out in presence of LS.

x) PTW Caution shall be displayed, trolley shall be locked and keys shall be handed over to LS. xi) SSO shall call the lineman and tell him that PTW has been issued and shall issue following instructions;

a) Make use of beeper to find any presence of voltage in the vicinity;

b) Use temporary earthing before touching the line;

c) Use all PPE;

d) Observe all possible hazards.

xii) LS shall reach at site and show PTW to LM.

xiii) LM shall start work after receiving phone call of SSO.

8.3.4 Procedure for Cancellation of PTW

a) After Completion of work and removing the earthing from both sides of working area, LM shall come down.

b) LS shall obtain signature of LM on PTW and SSO shall not cancel the PTW if LM signature are not present.

c) LS shall go to the grid station for cancellation of PTW.

d) LS shall give clearance certificate to the SSO.

e) SSO shall verify the signatures of the lineman from the list already maintained by him.

f) SSO shall call the lineman telling him that the PTW has been cancelled and line is being energized.

g) SSO shall cancel the PTW, switch ON the feeder and shall remove the caution notice.

Note: Copy of signatures and cell numbers of all LMs shall be provided by SDO to SSO for verification.

8.4 Procedure for Temporary Earthing

a) Earthing should be done on both sides of the working place.

b) First of all, check the line with the help of 11 kV testers.

c) Connect the earth clamp with the structure.

d) Then connect the earth rod with the nearest phase to the LM.

e) Then connect the second phase and then the third phase.

f) After completion of work, remove the earth rod from the farthest phase first and then second phase and then third phase, then in the end remove earth clamp.

8.5 Procedure for Transformer Installation

a) SDO shall issue SJO for transformer installation.

b) LS shall take PTW on the feeder and other safety PTWs if required where transformer is to be installed.

c) After taking PTW, LS shall reach at the site where transformer is to be installed.

d) After seeing PTW, LM shall check the line by 11 kV tester or D-rod.

e) After checking line, LM shall earth the line on both sides as per earthing procedure.

f) With the help of crane, transformer shall be placed at the platform.

g) LM shall tight the HT and LT jumpers and connect D-fuse links with the help of D-rod.

8.6 Procedure for Line Patrolling

The objective of foot patrolling of transmission & distribution lines is to identify the mechanical and electrical defects and point out other problems that require further attention and corrective measures, for smooth and reliable performance of lines.

8.6.1 Procedure for Foot Patrolling

a) Foot patrolling shall be done at least twice a year on all transmission & distribution lines.

b) Line patrolling should be performed with caution. Patrollers shall be alert to avoid walking into fallen wires or metal fences that may be energized.

c) Patrollers should be alert and avoid stumbling hazards, poisonous plants and snakes.

d) Patrollers shall break all matches and crush all discarded smoking tobaccos lying in the vicinity of lines.

e) The report of line patrolled shall be made on patrol books as per transmission & distribution lines maintenance package.

8.6.2 Points to be Noted during Line Patrolling

During line patrolling, shortcomings/defects in the following important areas should be identified and noted by the patrollers:

a) Towers structures - footings, stubs/base plates, counterpoise, towers, structures members/braces, anti-climbing devices, step bolts, nuts & bolts, painting, warning and identification signs (such as number plates, danger plates and phase plates), guys end fittings, guy wire, anchor rods and other transmission & distribution lines hardware.

b) Careful check of alignment of structures and poles.

c) Careful check of leaning of structures & poles and backfilling.

d) Healthiness of the line conductors and their safe clearances from ground, phase to phase and from surrounding structures, trees and buildings etc. throughout the line length.

e) Construction of roads, buildings or other structures near the line.

f) Healthiness of insulators in all respects.

g) Erection of new telephone, telegraph or other lines by other departments near the PESCO lines.

h) Healthiness of cross arms in all respects.

i) Any other defect noted by the patrollers.

8.7 Procedure for Ladder Installation

i) All ladders shall be inspected at regular intervals and maintained to conform to the requirements of applicable standards.

ii) The strength of ladders made of fiberglass epoxy or other synthetic material shall be equal to or exceed that of approved wooden/bamboo ladders.

iii) Portable metal ladders should be grounded before use.

iv) Wooden/bamboo ladders should be given a suitable protective coating such as clear varnish or linseed oil. Metallic paint shall not be used on ladders. A paint which hides the grain shall not be used because it hinders detection of defects.

v) When a ladder has fallen or been struck, it should be carefully examined for possible damage before reuse.

vi) Damaged ladders shall be tagged "DANGEROUS - DO NOT USE" until repaired or cut to shorter length.

vii) All portable ladders shall be securely held in place by tying or by person at the base of ladder.

viii) The base of a ladder should not be placed less than ¼ of its working length from a wall or supporting surface and not farther than ⅓ of the working length unless securely held.

ix) Stepladders shall not be used in a partially opened position.

x) Ladders placed near doors or in passageway shall be protected against being struck by doors or traffic.

xi) The minimum overlap of sections of an extension ladder shall be:

a) On ladders up to 12 meters - 0.9 meter overlap.
b) On ladders 12 to 18 meters - 1.5 meters overlap.

xii) While going up or down a ladder, always face the ladder and use both hands for climbing. Use each rung.

xiii) Use the correct size ladders for the job. Ladders should not be climbed higher than the third rung from the top on straight or extension ladders, the second step from the top on ordinary stepladders.

xiv) Ladders used to gain access to roofs or platforms shall extend at least 1 meter above the roof or platform. xv) Footwear should be free of grease, and/or other slippery substances when climbing or descending a ladder.

xvi) Ladders should not be stored in the area subject to excessive heat or moisture.

8.8 Procedure for Tree Trimming

a) The tree trimming area shall be marked and proper barriers be applied.

b) Branches and limbs shall not be dropped outside the barricaded area on streets, highway and sidewalks.

c) During tree trimming the line should be de-energized and portable temporary grounds be applied.

d) During Tree Trimming, no LM shall be on the pole.

e) All tools shall be raised and lowered by hand-lines in such a way as to avoid touching energized conductors.

f) All tools shall be raised and lowered by hand-lines in such a way as to avoid cutting conductors.

g) Employees working in trees shall always use safety harness, saddle or belt with life line attached in such a way that, if they lose their footing, they will fall away from electric conductors or other hazard.

h) Axes shall not be used aloft when trimming trees.

i) Before cutting down a tree, all limbs shall be cut off for a sufficient height to avoid striking electric conductors. Ropes shall be used to control the direction of the fall when necessary.

j) The trees in the vicinity of any energized lines should be trimmed carefully.

k) For disposal of brush, fire shall not be started in locations where smoke may interfere the traffic on road. Fire shall not be started in locations where the heat may damage power and communication equipment.

8.9 Procedure for Earthing

8.9.1 Procedure for Rod Earthing

a) Make a borehole of 500 mm diameter and 3.5 meters deep or as per the approved design and drawing.

b) A copper rod of 12.5 mm (0.5 in) diameter or 16 mm (0.6 in) diameter of galvanized steel or hollow section 25 mm (1 in) of galvanized iron (GI) pipe of length above 2.5 meter (8.2 ft) are buried upright in the earth manually or with the help of a pneumatic hammer.

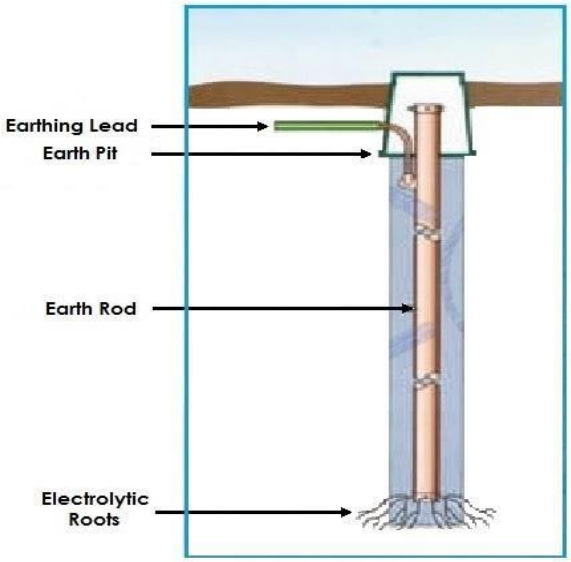
c) Connect the rod with the structure/pole with earthing lead.

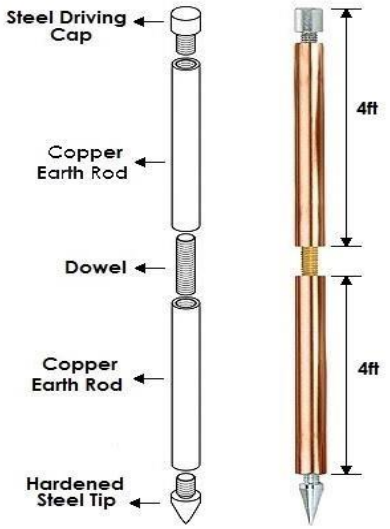
d) Fill the annular space between the electrode and borehole walls with alternating layers of coke or charcoal and common salt.

e) Check the ground resistance, if the ground resistance is not according to the standards i.e. 5 ohms or less, then additional electrodes shall be inserted.

f) To lower ground resistance, insert additional electrode rods and connect them in parallel to lower the resistance. For additional electrodes to be effective, the spacing of additional rods need to be at least equal to the depth of the driven rod. Without proper spacing of the ground electrodes, their spheres of influence will intersect and the resistance will not be lowered.

g) Inspection chamber: Construct brick chamber of size 450 x 450 x 450 mm with 100 mm thick brick walls over a Plain Cement Concrete (PCC) layer. Keep 100 mm of the chamber above ground level. Cover the top with a cast iron (CI) cover.





8.9.2 Procedure for Earthing of Already Installed Structure

a) Bore a hole at a distance of 500 mm from the structure and the depth of the hole should be 400 mm.

b) After digging the hole of 400 mm, insert the earthing rod of length above 2.5 meter into the hole.

c) Connect the rod with the help of earthing lead to the structure.

d) Repeat step d) to g) of section 8.9.1.

8.9.3 Procedure for Earthing of Newly Installed Structure

a) Bore a hole at a distance of 100 mm from the structure and the depth of the hole should be 400 mm.

b) After digging the hole of 400 mm, insert the earthing rod of length above 2.5 meter into the hole.

c) Connect the rod with the help of earthing lead to the structure.

d) Repeat step d) to g) of section 8.9.1.

8.9.4 Procedure for Earthing of Transformer Installed on a Single Structure

a) Bore two holes at a distance of 500 mm and 1000 mm from the structure and the depth of the hole should be 400 mm.

b) After digging the holes of 400 mm, insert the earthing rods of length above 2.5 m into the hole.

c) Connect one rod with the help of earthing lead to the neutral bushing of the transformer and the other rod to the earth terminal of the transformer tank.

d) Repeat step d) to g) of section 8.9.1.

8.9.5 Procedure for Earthing of Transformer Installed on Double Structure

a) Bore two holes at a distance of 100 mm each with the LT side and at a distance of 100 mm from the HT side and the depth of the hole should be 400 mm.

b) After digging the hole of 400 mm, insert the earthing rods of length above 2.5 m into the holes.

c) Connect one rod with the help of earthing lead to the neutral bushing of the transformer, one rod to the earth terminal of the transformer tank and the other rod on HT side be connected with the structure.

d) Repeat step d) to g) of section 8.9.1.

9 USE OF TOOLS, PLANTS, MATERIALS AND CARE IN THEIR STORAGE, LIFTING AND CARRYING

9.1 Power Tools and Machine Tools

a) Before installing a new grinding wheel on a grinder, it shall be given a 'ring' test by supporting it free and tapping lightly with a wood object. If the wheel is not defective, it will give a clear metallic tone.

b) When changing a grinding wheel, make sure that the rated speed of the wheel exceeds the maximum speed of the rotor.

c) Grinding wheels shall be equipped with safety washers or flanges, as the design requires.

d) When starting a grinding wheel, stand to one side out of line of flying particles in case the wheel breaks.

e) Approved eye protection shall be used when using a grinding wheel. Grinding wheels shall also be equipped with approved safety guards.

f) Where tool rests are required they shall be kept adjusted to a maximum of 3.1 mm from the wheel. The tongue guard shall be adjusted to a maximum of 6.35 mm from the wheel. Never adjust a tool rest or tongue guard while the wheel is in motion.

g) Do not grind on the side of a wheel unless the wheel is designed for such use.

h) Electric-driven hand tools shall be equipped with controls that will stop the tool when the operator's hand is removed from the controlling valve or switch.

i) Before drilling through paving, walls or floors, make sure you will not cut into cables, conduits, or pipes.

j) Electric tool cords or extension cords shall not be used for hoisting or lowering tools.

k) Extension cords shall be maintained in safe condition. Worn or frayed cords and broken plugs shall be promptly replaced.

l) Extension cords with exposed metal sockets shall not be used.

m) When operating a drill press, never hold small work in the hands; always use a clamp, jig or vice.

n) When operating machine tools, employees shall wear close fitting clothing and shall not wear dangling sleeves, neckties, loose jewelry, hair long enough to get into moving parts, and other loose personal items. Finger rings should not be worn.

o) Employees shall neither manually adjust or gauge the work or oil a machine tool while it is in motion nor change or shift belts by hand.

p) Keep fingers, waste and rags away from moving work or parts of a machine. Remove chips and cuttings with a brush, hook or piece of wood.

9.2 Hand Tools

a) Employees should use only tools and equipment which are in good condition, and only for the purpose for which they are designed. When proper and safe tools are not available for the work at hand, the employee shall report the fact to the person in-charge.

b) All tools shall be inspected at regular intervals and tools which develop defects while in use should be removed from service, tagged, and not used again until placed in good condition.

c) Impact tools with mushroomed heads such as chisels drills, hammers and wedges should not be used until they have been reconditioned.

d) Hammers, axes, shovels and similar tools shall not be used if the handle is loose, cracked or splintered defective wrenches, such as open-end spanners and adjustable wrenches with spread jaws or pipe wrenches with dull teeth, should not be used as they are likely to slip.

e) Pipe or other extensions shall not be used on a wrench handle to increase the leverage unless the wrench is specifically designed for use of such extension.

f) Metal rules, metal tape lines, or tape lines containing wires shall not be used near electric conductors or equipment.

g) Sharp-edged or pointed tools shall have the edge or point guarded at all times when not in use.

h) Files or other tools with pointed tangs shall be equipped with suitable handles when in use.

9.3 Ladders and Scaffolds

i) All ladders shall be inspected at regular intervals and maintained to conform to the requirements of applicable standards.

ii) The strength of ladders made of fiberglass epoxy or other synthetic material shall be equal to or exceed that of approved wooden/bamboo ladder.

iii) Portable metal ladders should be grounded before use.

iv) Wooden/bamboo ladders should be given a suitable protective coating such as clear varnish or linseed oil. Metallic paint shall not be used on ladders. A paint which hides the grain shall not be used because it hinders detection of defects.

v) When a ladder has fallen or been struck, it should be carefully examined for possible damage before reuse.

vi) Damaged ladders shall be tagged "DANGEROUS - DO NOT USE" until repaired or cut to shorter length.

vii) All portable ladders shall be securely held in place by tying or by person at the base of ladder.

viii) The base of a ladder should not be placed less than ¼ of its working length from a wall or supporting surface and not farther than ⅓ of the working length unless securely held.

ix) Stepladders shall not be used in a partially opened position.

x) Ladders placed near doors or in passageway shall be protected against being struck by doors or traffic.

xi) The minimum overlap of sections of an extension ladder shall be:

a) On ladders up to 12 meters - 0.9 meter overlap.

b) On ladders over 12 meters up to 18 meters - 1.5 meters overlap.

xii) While going up or down a ladder, always face the ladder and use both hands for climbing. Use each rung.

xiii) Use the correct size ladders for the job. Ladders should not be climbed higher than the third rung from the top on straight or extension ladders, the second step from the top on ordinary stepladders.

xiv) Ladders used to gain access to roofs or platforms shall extend at least 1 meter above the roof or platform. xv) Footwear should be free of grease, and/or other slippery substances when climbing or descending a ladder.

xvi) Ladders should not be stored in the area subject to excessive heat or moisture.

xvii) Scaffolds shall be of sound material, securely fastened and be capable of supporting four times the maximum intended load which may be placed on them. Wire synthetic or fiber rope used for scaffold suspension shall be capable of supporting at least six times the maximum intended load.

xviii) Wood planks used in scaffolds should not be less than 25.4 cm wide and 5 cm thick and shall not extend beyond the outer supports more than 31 cm nor less than 16 cm. All scaffold planking shall overlap a minimum of 31 cm or be secured from movement.

xix) Guardrails and toe boards shall be installed on all scaffolds which are 3 meters or more in height, and on all scaffolds immediately adjacent to excavations, deep water, machinery, or other sources of danger.

xx) Where persons are required to work or pass under scaffolds, the scaffolds shall be equipped with a screen between the two boards and guardrail.

xxi) When working from swinging or suspension scaffolds, the following precautions shall be observed;

a) Inspect all ropes, slings, hangers, platforms and other supporting parts before installation and periodically while the scaffold is in use.

b) In addition to required guardrails and toe boards, each worker shall be protected by a safety belt attached to a lifeline secured independently of the scaffold.

c) Never overload a scaffold.

d) Use only bolts and hitches which are in good conditions and properly secured.

e) Always tie the fall lines to the scaffold itself, never to any part of the structures.

f) When using acid or caustic solutions use only treated or protected ropes and takes every precaution to keep the chemical from getting on scaffold ropes.

g) Do not perform welding, burning or open flame work from scaffolds supported by fiber or synthetic rope.

h) Do not jump onto or off scaffolds or climb or slide down suspension ropes.

i) Remove all loose objects from scaffolds when stopping work for the day.

j) Be sure to lash the scaffold to some permanent support so that in case of storm it will not swing violently.

xxii) Slippery conditions on scaffolds shall be eliminated as soon as possible after they occur.

9.4 Painting Works

a) Employees using paints, lacquers or thinners shall avoid inhaling the vapors or getting paint into the mouth. Wash hands carefully before eating.

b) Do not use or go near open flames while wearing clothing contaminated with paint or thinner.

c) Painting rooms or any place where spray painting is being done shall be well ventilated by exhaust systems and protected against all sources of ignition.

d) Smoking, welding, burning or other open flame is prohibited where spray painting is being done.

e) Approved mask and eye protection shall be worn during spray painting.

9.5 Storage

a) The material shall be stored in such a way that its weight is evenly distributed and not top-heavy.

b) All materials stored in tires shall be racked, stacked, blocked, interlocked or otherwise secured to prevent sliding, falling or collapse.

c) Designated aisles and passageways shall be kept clear to provide free and safe movement of material handling equipment or employees.

d) Sand, gravel, lime, cement and other heavy materials shall not be stored above ground level.

e) Poles, pipe, lumber and similar material should be stored on suitable racks and safely blocked to prevent their movement.

f) Poles/structures shall never be stored with cross arms, steps or hardware attached.

g) Poles/structures stored along highways shall be placed in a safe position away from the edge of the roadway, and blocked, if required, to prevent their movement.

h) Barrels, drums and tins shall be stored on end or securely blocked to prevent rolling.

i) Paints, varnish, lacquers and thinners are highly flammable and shall be stored only in designated areas away from all possible sources of ignition.

j) No materials or equipment shall be stored under energized lines, or near energized equipment.

9.6 Manual Lifting and Carrying Loads

a) Employees shall not attempt to lift loads beyond their capabilities.

b) Before attempting to make a lift, the conditions under foot shall be checked to determine soundness, slipperiness and freedom from trip hazards.

c) Free style method of lifting means lifting light loads in a way best suited to the individual's physique against the conventional straight back & bent knees method used for heavier lifts.

d) When lifting or lowering heavy objects, the back should be kept close to vertical and the lifting or lowering done with the leg muscles.

e) Bulky loads should be carried in such a way as to permit a clear view ahead.

f) When two or more workers are lifting or pulling together, one worker shall give the signals for the group.

g) Pipes, conduits, reinforcing rods and other conducting material should not be carried on the shoulders or raised over the head near exposed live electrical equipment/conductors.

h) Hand lines or hoists shall be used for raising or lowering tools and material to another level, which is beyond reach.

9.7 Handling Poles, Towers and Structures etc.

The following safety guidelines shall be considered while handling poles, towers, structures and conductors.

a) When unloading or loading poles/structures, workers shall work at the ends of the poles/structures, wherever possible.

b) Poles/structures placed on piles or racks shall be securely blocked to prevent movement.

c) Poles/structures loaded on trailers or vehicles shall be securely bound together and also to the trailer or vehicle before toeing.

d) Auxiliary safety chains shall be used at all times between truck and trailer being towed

e) Poles/structures being transported along streets & highways shall be plainly marked, at the rear, with red flags by day and lights by night. Regulations, covering the movement of loads upon streets and highways, shall also be observed. Precautions shall be exercised to prevent blocking of roadways or endangering other traffic.

f) When setting or removing poles/structures in energized lines, care shall be taken to keep the pole/structure from coming in contact with live conductor.

g) Pole/structure holes and trenches shall not be left unattended or unguarded in areas, where they present a hazard to the employees or public.

h) All trenches, including pole/structure holes, into which the employees are to enter, shall conform to the guidelines for excavation.

i) To assure the stability of mobile cranes, their work site shall be guarded and leveled for firm foundation.

j) No one shall be permitted to stay under a metal tower, structure, or transformer, which is in the process of erection or assembly, except as required to guide or secure the section being set. The hoist line shall not be detached from the tower or structure section, or transformer, until the section has been adequately secured.

9.8 Personal Protective Equipment (PPE) / Tools and Plants (T&P)

9.8.1. Personal Protective Equipment (PPE)/ Tools & Plants (T&P) shall be in accordance to Hazard/ Risk Category and/or PPE/T&P Assessment study to provide protection from hazardous conditions.

9.8.2. List of approved Stock and Non-Stock Safety items including PPE/ T&P with material description and model number shall be maintained by Safety Directorate and Material Management Department.

9.8.3. Maintain adequate amount of PPE/ T&P inventory at each site.

9.8.4. Identify task specific PPE/ T&P in Task Risk Assessment/ JSA/ Permit to Work.

9.8.5. PPE/T&P shall be stored and maintained in a safe working condition after completion of work.

9.8.6. PPE/ T&P shall include one or more of the following as per safety requirement:

i) Insulated electrical tools.

ii) Non-conductive shoes, safety boots, or overshoes for wet service.

iii) Non-conductive Helmet for Head Protection with strap when working at height above 1.8 meter/confined space. Fully dielectric, no metal parts, non-vented, helmet material polyethylene/ polycarbonate, other plastic materials stabilized against degradation from ultraviolet radiation, 6- or 4-point suspension, adjustable type, helmet intended to reduce the danger of exposure to high voltage electrical conductors.

iv) Insulated Electrical Rubber Hand Gloves and Sleeves, Class 00 (Maximum AC 500V/DC 750V), 0 (Maximum AC 1000V/DC 1500V), 1 (Maximum AC 7500V/DC 11250V), 2 (Maximum AC 17000V/DC 25500V), 3 (Maximum AC 26500V/DC 39750V), 4 (Maximum AC 36000V/DC 54000V) for involved working voltage. Leather gloves shall be worn over insulated rubber gloves to provide the required mechanical protection. The gloves shall not be used when damp. vi) Flame Resistance Clothing Uniform. Arc Flash Kit for Arc Flash Protection such as Category 4 Arc Flash Resistant Suite, Arc Flash Hood Arc-rated Gloves and Arc-rated Fall Protection

while working on high voltages (more than 420 V). Eye protection with non-conductive frames.

vii) Full Face Shield (polycarbonate or similar non-melting type) while working in batteries/ handling chemicals.

viii) Hearing Protection (Noise more than 85dBA).

ix) Full Body Harness with front work positioning belt (positioning lanyard) along with double lanyard for 100% tie shall be used at height more than 6 feet/1.8 meter above the ground when climbing poles, towers and structures including working through mobile elevated aerial platform, man-baskets, man-lift or bucket mounted vehicles. Full Body Harness with front work positioning belt is to allow an employee to be supported on an elevated vertical surface such as a wall or pole and to work with both hands free. Use of a body belt alone for fall arrest is prohibited. Full Body Harness with PVC coated hardware should be used when working in explosive or electrically conductive environment. Anchor the safety harness lanyard on rigged anchorage point at height, having fall clearance safety factor three (03) feet from impact level or ground level.

x) Suspension Trauma Strap especially for work at height for long hours, in case of emergency the worker can stand on his feet on it to prevent trauma till he is rescued.

xi) Use self-retractable lifelines (SRL) when working in elevated areas such as roof top.

xii) Portable rubber insulated floor mat or insulated working support/ blanket or rubber plate or any other non-conductive object such as plywood and High Voltage Detector.

xiii) Insulated Hot Sticks for voltage measurement, operation of disconnection or cutouts, and application of grounding/ earthing, etc.

xiv) Other task specific PPE could be, grounding/ bonding set, air supplied helmet for chemical sprays or grit blasting, PVC Shoes, life line, portable gas detector, particulate masks, half or full-face Respirator (cartridge masks as per MSDS, SCBA, supplied air breathing Apparatus), Bunker Gear, Ear Plugs/Muffs, Rain Coat, PVC Disposable Coverall, Rubber/PVC Apron, fire blanket, Face Shield, Safety Goggle, Welder's Shield, well-fitted gloves (Cut Resistance, Pinch

Resistance, Heat Resistance, Cryogenic, Welder Gloves, Electrical Gloves, Chemical Gloves as per MSDS, Rubber or Plastic acid-resistant chemical gloves with elbow-length gauntlet), portable eye wash, Non-Sparking Tools, flameproof light, explosion proof low voltage (24v) lighting, Aluminized suit for pyrophoric chemical handling, Long boots, Warning Tapes/ Cones, Warning Sign, non-conductive measuring tape/ stick and ruler, Reflective Vest for worker visibility, Lifejacket, etc.

9.8.7. Don't wear gloves/ loose clothes around moving machinery such as drill presses, mills, lathe, grinder, etc.

9.8.8. Workers shall be trained in the adequate use of these PPE.

9.8.9. These PPE should be used at all places as given in the relevant safety instructions.

Personal Protective Equipment/Tools and Plants	**Usage**
Safety Glasses	Protects eyes from injury.
Hard Hat	Protects Head from any impact
Leather Gloves	Protects Rubber Gloves from Damage
Insulating Rubber Gloves	Prevents Electrical Shock
Safety Shoes	Prevent Injury to Foot from any impact
Dungarees, Overall Coat, Apron etc.	Protects body from immediate effects of arc
Cotton Gloves.	Absorb perspiration.
Safety Belt/Parachute Harness.	Protects worker from falling from height to ground
Ear Muff.	Protect worker Hazard from high noise
Ladders.	Safe climbing
Operating Rods.	Safe distance
Insulated Pliers.	Prevents electrical shock
Scaffolding.	Safe platform at height

Potential Testers/Detectors.	Detection of voltage
Portable Temporary Grounds.	Provides isolation
Earth Resistance Testers.	Gives resistance.
Continuity Testers.	Detection of circuits.

9.9 Care of Insulating Protective Equipment

a) All insulating protective equipment shall be of approved material, carefully inspected and properly stored.

b) When not in use, insulating protecting equipment shall be shielded from sunlight, heat, water and oil.

c) Protective equipment shall be visually inspected before its use. In addition, an air test shall be performed on insulating rubber gloves prior to use.

d) Protectors furnished for use with insulating gloves shall be used only with insulating gloves and at no other time.

9.10 Ropes Used in Rigging

Commonly used ropes in rigging; fiber rope and wire rope.

9.10.1 Fiber Rope

Fiber ropes are made from either natural or synthetic fibers. The natural fibers come from plants and include manila, sisal and hemp, while the synthetic fibers include nylon, polypropylene and the polyesters. The strength of these ropes depends on their size, the fiber used and the type of stranding.

9.10.2 Natural Fiber Rope

The most commonly used natural fiber ropes are manila and sisal. However, No.1 grade manila rope is considered most suitable for rigging.

9.10.3 Synthetic Fiber Rope

The most commonly used synthetic fiber ropes are nylon and polypropylene rope. Synthetic fiber ropes are stronger than natural fiber ropes. Nylon has strength about 2.5 times that of manila.

9.11 Safe Working Load (SWL) and Factor of Safety of Manila Ropes

i) Safe Working Load (SWL)

The safe working loads of different types of fiber ropes are generally recommended by the manufacturer. However, the following rules work well for new manila ropes to compute their SWL in pounds when load tables are not available.

- Change the rope diameter into eighths of an inch.
- Square the numerator and multiply by 20.

Example:

a) $\frac{1}{2}$ inch manila rope = $\frac{4}{8}$ inch diameter SWL
= 4 x 4 x 20 = 320 lbs.

b) $\frac{5}{8}$ inch manila rope = $\frac{5}{8}$ inch diameter SWL
= 5 x 5 x 20 = 500 lbs.

c) 1 inch manila rope = $\frac{8}{8}$ inch diameter SWL
= 8 x 8 x 20 = 1280 lbs.

ii) Factor of Safety

Fiber ropes have a factor of safety to account for loading over and above the weight being hoisted and for reduction in capacity due to:-

a) The reduced capacity of the rope below its rated strength due to routine usage, wear, broken fibers, broken yarns, aging, variations in size and quality.

b) Extra loads imposed by acceleration and inertia (starting, stopping, swinging and jerking of the load).

c) Increase in line pull due to friction of the rope passing over sheaves.

d) Inaccuracies in the weight of the load

e) Reduced strength due to bending over sheaves.

f) Reduced strength because of drying out, mildew and rot.

g) Severe strength reductions caused by knots in the rope.

h) Weakened yarns due to ground in dirt and abrasives.

There may be other factors which describe why the safe working loads must never be exceeded. The factor of safety does not give you extra usable capacity. The factor of safety for all fiber ropes is 5 and when used to hoist or support personnel it is 10.

$$SWL = \frac{\text{Breaking Strength}}{\text{Factor of Safety}} \qquad \frac{\text{Breaking Strength}}{5} =$$

For example, a rope rated at 1500 *lbs* breaking strength, will have a safe working load of 300 *lbs*.

$$SWL = \frac{1500\ lbs}{5} = 300\ lbs$$

9.12 Safe Working Load (SWL) and Factor of Safety of a Wire Rope

i) Safe Working Load

The safe working loads of different types of wire ropes are generally recommended by the manufacturer. However, the following rule applies for new wire ropes to compute their SWL, in tons, when load tables are not available.

$SWL = 8d^2$, where d = Rope diameter

Example:

a) $\frac{1}{2}$ inch diameter rope

$SWL = 8 \times (\frac{1}{2})^2 = 2$ tons.

b) $\frac{5}{8}$ inch diameter rope

$SWL = 8 \times (\frac{5}{8})^2 = 3.125$ tons.

c) 1 inch diameter rope

$SWL = 8 \times (1)^2 = 8$ tons.

ii) Factor of Safety

To guard against failure of a wire rope in service, the actual load on the rope should only be a fraction of the breaking load. To account for all the stresses placed on a rope during a hoisting operation and to provide the margin of strength necessary for safe handling of loads and guard against accidents, it is necessary for the rope to have a "Factor of Safety".

$$\text{SWL} = \frac{\text{Breaking Strength}}{\text{Factor of Safety}} \qquad \frac{\text{Breaking Strength}}{5} =$$

For example, if the wire rope catalogue gives the breaking strength of the rope 10 tons, the maximum safe working load will be *2 tons*.

$$\text{SWL} = \frac{10\ tons}{5} = 2\ tons$$

$$\text{Factor of Safety} = \frac{\text{Catalogue Breaking Strength of the rope}}{\text{Maximum Safe Working Load}}$$

For rigging ropes, the minimum acceptable factor of safety is 5, and when used on equipment that is intended to carry personnel, it should be considered 10. Too often the factor of safety is treated as reserve strength and used for additional capacity, but it is not correct. The factor of safety accounts for:

a) Reduced capacity of the rope below its stated breaking strength due to wear, fatigue, corrosion, abuse, and variations in size and quality.

b) End fittings and splices which are not as strong as the rope itself.

c) Extra loads imposed by acceleration and inertia (starting, stopping, swinging and jerking of the load).

d) Increase in line pull (load on the rope) due to frictions of the rope passing over sheaves.

e) Inaccuracies in the weight of the load/rigging.

f) Reduced strength of the rope due to bending over sheaves.

This list of variables is not complete. It is intended to show why a factor of safety is required and why it must never be lowered.

9.13 Care of Ropes and Slings

The quality and strength of ropes can be maintained by taking following precautions; a) Where a rope/sling passes over sharp edges, pads shall be used to protect the fibers against cutting and undue stress.

b) Do not drag the rope on the ground unnecessarily as the dirt damages the fibers.

c) Do not use too small pulley.

d) Do not use pulleys with rough surfaces or broken edges.

e) Do not let the rope slip on the drum of a mechanically or hydraulically driven winch or lie idle on moving drum unnecessarily.

f) Do not place kinked rope under stress.

g) Do not allow rope to unravel, finish the ends.

h) Do not tie knots where splices should be used.

i) Do not allow the rope/sling to become oil-soaked or exposed to acid or corrosive substances.

j) Do not allow the rope to remain dirty or gritty, wash and dry.

k) Do not allow rope/sling to remain exposed to weather and sunlight any longer than necessary. Carefully dry rope when it becomes wet.

l) Do not use excessive heat when drying a wet rope.

m) Do not allow wet rope to freeze in winter.

n) Protect slings from sharp ends.

o) The safe working load as marked on rope/sling shall not be exceeded.

p) Check the sling before use for cuts, burns and scrapes and replace, if defective.

10 SAFETY AT INTERFACE

10.1 Safety at Interface

This section specifies the safety management criteria to be applied by PESCO and all Users of the PESCO's Distribution System and those who interface with it: a) Embedded Generators.

b) Other Distribution Companies with boundaries connected to PESCO Distribution System.

c) Bulk Power Consumers.

Before carrying out any operational, maintenance or construction activity at the interface points, the PESCO and any of the above mentioned party shall jointly agree in writing schedules of any work at interface points specifying the responsibilities for control of equipment and facilities. They shall ensure that only one party responsible for any particular work shall work at any given time. For this purpose, concerned field officer/official of PESCO shall at all times inform the SE concerned in writing and the Circle Safety Inspector at least 48 hours prior to the proposed activity day for the co-ordination of electrical safety, identification of possible hazards and their controls. The principles of control responsibilities and their specifics must be clearly spelled out on prescribed proforma and agreed between all parties.

10.2 Control Documentation

Concerned officer/official of PESCO and the other party shall maintain documentation which shall record all relevant operational events and the co-ordination of relevant safety precautions that have taken place between them for and during work as a permanent record for at least 5 years.

10.3 System Diagrams

Diagrams illustrating sufficient information for control personnel to carry out their duties shall be exchanged by PESCO officers/officials and the other party.

10.4 Communications

A suitable communication system shall be established between PESCO officers and other party to ensure that the control function is carried out in a safe and secure manner. However, where the PESCO officers reasonably decides a backup or

alternative routing of communication, it is necessary to provide for the safe and secure operation, the means shall be agreed between the PESCO and other party. Schedules of telephone numbers/call signs shall be exchanged by PESCO officers/officials and the other party for efficiently enabling the control activities.

The PESCO officers/officials and the other party shall establish 24 hour availability of personnel with suitable authorization where the joint operational requirements demand it.

10.5 Carrying Out Work at Interface Point

a) After meeting all above-mentioned pre-requisites, the ownership, operation and maintenance schedules shall be jointly agreed upon by PESCO and the other party for each location where an operation or interface or joint responsibilities exist.

b) Then all schedules and diagrams shall be maintained by PESCO and the other party and exchanged as necessary to ensure they reflect the current agreements and network configuration.

c) Finally, the work shall be done keeping in view above mentioned formalities and safety precautions.

11 GENERAL MISTAKES/ VIOLATIONS MADE BY LINE STAFF

Accidents do not "just happen". Accidents are the natural result of UNSAFE CONDITIONS OR UNSAFE ACTS, usually a combination of both.

11.1 General Mistakes/Violations

GENERAL MISTAKES/VIOLATIONS made by the line staff, include but not limited to the following;

i) No Risk Assessment before Start of Work

a) No hazard assessment before the start of work.

b) No checking of the line (as PTW is already taken and assume that line is dead).

c) Beeper tester is not used.

ii) Wrong Earthing

a) Not earthing the line due to overconfidence.

b) Start providing temporary earthing without checking the line.

c) Wrong earthing method i.e. to provide earthing with hands.

iii) Overconfidence

a) Working haphazardly with overconfidence.

b) No usage of belt due to over confidence.

c) No consideration of the feedbacks from any other feeder touching/ generators/UPS etc.

iv) Careless Attitude

a) Taking unsafe position or posture such as working on live LT conductors from above instead of below.

b) Sagging on the last span of PC pole without support, stay may uproot and PC pole may collapse (such accidents happened in past).

c) Standing on Transformer without belt.

11.2 Reasons of General Mistakes

a) Procedures are not adopted.

b) Over confidence.

c) Haste.

d) Lack of knowledge of the work/hazards.

e) Lack of knowledge of SOPs.

f) Poor monitoring.

g) Lack of accountability.

11.3 LM Complaint Redressal System

Mental peace is of utmost importance for line staff who works day and night and it is the responsibility of management to create an atmosphere in which the LM is mentally satisfied and at least free of office worries.

Many problems of our LM/ALM associated with their petty issues like TA bill, Medical bill, House rent bill, off day wages, PPE/T&P issues etc. which can be solved by the SDO offices but the LM/ALM have to visit the XEN/SE office to resolve their petty problems. Due to this reason, not only their working hours are spoiled but also they become mentally upset which in turn becomes a potential cause of accidents.

Therefore, PESCO shall establish one window facility at SDO office where the LM/ALM shall submit his problems to be resolved by SDO and XEN. XEN shall conduct progress review meetings of one window operation every month and its report shall be sent to SE and Director Safety on prescribed format.

12 HAZARDS IDENTIFICATION & RISK ASSESSMENT AND EARTHING OF STRUCTURE/PC POLES & TRANSFORMERS

12.0. RISK AND IMPACT ASSESSMENTS

Identification, evaluation & mitigation of HSE risks/impact assessments is an important part of the safety management system. The objective of hazard identification/impact assessment process is to proactively identify, control and manage potential risks to employees, contractors, visitors. General public and impact to natural environment. These include routine & non-routine activities.

Based on the risk rating, appropriate controls and measures shall be put in place to reduce or eliminate these risks. Risk assessments shall be reviewed periodically to incorporate process change to keep abreast of the emerging risks.

12.1. Objectives of Risk Management

The objectives of Risk Management are to prevent;

i) Death and Personal injury.

ii) Asset loss incidents.

iii) The occurrences of breaches of law which might lead to enforcement action and/or prosecution/penalties.

iv) The indirect and direct costs that are associated with accidents.

12.2. Hazard Identification and Risk Assessment

The hazards are defined as potential or harm or all aspects of technology and activity that produces risks. Whilst risk assessment is about deciding who might be harmed and then judging how likely it is something goes wrong, and how serious the consequences could be and how to reduce it to as low a level as possible.

Risk assessment is a formalized process of identifying hazards associated with particular activities/tasks, and to evaluate the effects and estimate hazard or aspects of exposure to these hazards. These are then prioritized, eliminated or controlled and reviewed continuously. PESCO has established and maintained a procedure for hazard identification and risk assessment. (Annexure-12)

12.2.1 List of Hazards

Whenever electrical equipment/electrical machinery/line material are put/fixed/installed in wrong way against SOP, hazards are generated. This list includes major hazards only. Minor hazards list is extensive and is given in hazard identification checklist. (Annexure-12)

Consideration shall be given to the following potential hazards, as applicable:

i) Potential fire and electrical hazards.

ii) Potential hazards that may be encountered from outside sources. **iii)** Hazardous materials identification, handling and storage. **iv)** Potential Hazards above ground level such as fall of a person from height, fall of objects from height, overhead power lines, loose sag, less clearance from the houses/ Buildings/ trees, poles, fuel, chemical, hazardous dust/ fumes, pressure vessels/ boilers and so forth.

v) Potential Hazards on ground level such as electrical wires, electrocution, flash over, patrolling of lines, trimming of trees, hazardous area classification, night time operations, failure of tools, failure of a plant, buildings, possible flood, adverse weather conditions, high wind, fog, rain, lightning or hazards from nearby plants or industry. Hazard created by building, facilities, workplaces, machinery, equipment, vehicles at workplace, tools, utilities, In-coming and Out-going material/ chemicals/ Substances/ product/ waste, hazardous dust/ Fumes routine/ non-routine and emergency activities or natural hazards.

vi) Potential underground hazards such as buried utilities, high water table, building foundations, underground wastewater, unstable soil, chemical/ trash dump area, ash storage, voids in the earth (caves) and underground fuel/ chemical storage and hazardous dust/ fumes.

vii) Hazards related to movement of vehicles (ground settlement and road cracks aspects) from both inside and outside the facility of the licensee.

viii) All identified significant environmental aspects shall be treated and handled in compliance with applicable national and provincial legal requirements.

ix) Site Specific Environmental and Social Management Plan shall be developed and implemented for projects in compliance with the Pakistan Environmental Protection Act 1997 and Pakistan Environmental Assessment Procedures 1997 for the effective management of the environmental impacts that could occur at the projects,

x) For each high-risk hazard, in addition to existing preventive controls recommendation(s) for additional control(s) for high risks to reduce risk levels to As Low as Reasonably Practicable (ALARP) will be suggested.

xi) Risk/ Impact Assessments shall be reviewed by a competent team at least every three (03) years, or in case of a major emergency, or a change in equipment or process, or a chemical or new critical Risk/ Impact identified

during study, or internal/ external audit recommendations, as deemed necessary.

Some typical hazards are:

12.3. Electrical Hazards

i) Line Staff

- Transformer/Structure/Pole not earthed.
- Common neutral earth of transformers.
- Mesh of wires.
- Cracked/tilted structure/pole.
- HT line close to LT.
- HT passing through LT.
- Scattered cables at grids, not laid as per SOP.
- Power and Distribution transformers installed against SOP.

ii) General Public

- Line at not proper clearance as per SOP.
- Weak conductor may breakdown.
- Cracked/tilted structure/pole.
- Leakage current in pole/structure.
- Line not crossing properly over the roads.
- Loose sag.
- Poles/Structures not earthed.

12.4. Hierarchy of Controls

For each hazard/step, develop control measures - risk reduction or hazard elimination measures - following the Hierarchy of Control.

12.5. Earthing of Structures/PC Poles and Transformers

i) All the structures/PC Poles and Transformers shall be earthed;

a) To avoid or minimize the danger of electrocution;

b) To avoid or minimize the danger of fire due to earth leakage of current through undesired path;

c) To ensure that the potential of a current carrying conductor does not rise with respect to the earth than its designed insulation;

d) To protect human lives as well as provide safety to electrical devices and appliances from leakage current;

e) To keep voltage as constant in the healthy phase (If fault occurs on any one phase);

f) To protect PC Poles/Transformer from lighting;

g) To protect the Transformer from burning and damage.

ii) Periodic checking and maintenance of earthing shall be carried out to re-earth the deteriorated/weakened earthing and reconnect the broken/damaged ones to avoid/identify hazards (if any) and address them accordingly.

13 QUALITY ASSURANCE AND QUALITY CONTROL

13.1 Quality

The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.

13.2 Quality Management System

That aspect of the overall management function that determines and implements the quality policy. The following figure shows the steps involved in the quality management system (QMS).

13.3 Quality Control by PD Construction

The erection of new feeders and grids shall be properly checked and erected as per SOP. PD Construction must ensure that all the structures are properly installed along with permanent earthing. He shall apply the steps involved in QMS as applicable.

13.4 Quality Control by SE Civil

All the buildings must be constructed as per SOP and the ratio of material must be monitored to ensure the quality of the building. Stage inspections should be done to ensure the quality of material used in construction of the building. He shall apply the steps involved in QMS as applicable.

13.5 Quality Auditor

All the works shall be done as per SOP and their quality must be ensured by the concerned officer. Safety Directorate shall carry out the audit of all the works after every six (06) months and action shall be recommended against them in case of poor quality management.

14 SAFETY DIRECTIONS FOR GSO AND GSO COLONIES

14.1 General

An electrical substation is a subsidiary station that is part of an electrical generation, transmission, and distribution system. A substation's primary function is to transform voltage from low to high, from high to low and to perform a number of other important functions. Based on their functions, the voltage of power being handled at the substation and the destination to which it is routed is bound to vary. Transmission substations step down high-voltage power and pass it on to distribution substations, where the voltage is further reduced suitably before being supplied to different types of consumers.

Given the core function of substations, the infrastructure they house to handle the job and the electrical hazards that abound in the environment, safety is the key factor needing consideration. The structural design and layout of the substation, daily operations, ongoing maintenance, and the people working at or visiting the facility must be 100% safe at all times.

14.2 Hazards in Substations

A substation has two types of hazards;

i) Electrical ii) Physical

damage by invaders

14.2.1 Electrical Hazards in Substations There's no dearth of electrical hazards in electrical substations. The potential risks are endless and tend to vary based on actual operating conditions and voltage flowing through the facility at any given point in time. Even trained and authorized officials must be fully geared up to face emergencies and take adequate measures to protect themselves from the highest possible risk involved when working on a specific task or equipment.

Electrical conductors/buses installed overhead and capacitor banks, battery rooms, circuit breakers and other equipment at the ground level pose significant threats. While most of the equipment at ground level is usually fenced or locked up to maintain a safe distance and prevent accidental contact, the same may not be applicable to overhead infrastructure. Some of the common hazards that are encountered in substations are;

a) Near Approach to HV conductor

b) Buried Services

c) High Voltage from unusual sources

d) Induced Voltages

e) Transferred Earth Potential

Scattered 11 kV cables on the ground in the switch yard are dangerous for the workers and on road, they create serious hazard. Time line shall be given to lay the cables in trenches as per SOP. This process shall be completed within a grace period of two (02) years. GSO officers/officials shall not take over the grid that does not comply with all safety SOP. SSO In-charge/SDO/XEN/SE shall be held responsible if any new grid or work is taken over with safety hazards.

14.2.2 Physical Damage by Invaders

Grids shall be secured from all types of invasion through:

a) Boundaries shall be intact.

b) Gates are in proper working condition.

c) Guards are performing their duty vigilantly.

d) Guards are well trained and well equipped.

e) Their weapons must be in working condition.

14.3 Inspection of Grid Station Equipment

a) Inspection shall be carried out in accordance with the approved instructions or procedures on prescribed proforma. (Annexure-03)

b) Inspection of grid station equipment shall include the identification and elimination of unsafe conditions availability/condition of personal protective equipment and the emergency service equipment

c) Where an identified hazard cannot be eliminated immediately, steps must be taken to bring it under control by all possible means, such as installing barriers, warning signs etc.

d) Hazards and deficiencies shall be promptly reported to the responsible supervisor.

14.4 Work on or In the Vicinity of Overhead Lines

i) It is necessary that before considering any electrical equipment or conductor as dead or de-energized, it must be properly grounded. To de-energize a line, it is essential to isolate the line from all possible sources of supply in the electrical

network and apply portable temporary grounds on both sides of the working point, as close as possible. All conductors, including the neutral and sky wires, which may be approached and touched during the work, shall be grounded. ii) The workers must use the personal protective equipment such as safety shoes, safety helmet, proper dress, safety gloves and safety belts while working on the overhead lines. The supervisor in-charge of the work must ensure use of personal protective equipment, by the workers and proper de-energization of the lines.

iii) If use of mobile cranes, lifting or hoisting equipment is involved in the work, all the applicable safety measures and precautions must be adopted such as:

a) Temporary grounding of mobile cranes, lifting or hoisting equipment.

b) Observance of safe limits of approach from the adjacent live conductors or equipment.

c) Adoption of correct and safe work procedures.

iv) Work on or in the vicinity of overhead lines or near live electrical equipment shall be assigned to trained and qualified workers. In-experienced workers, working near such equipment, must be carefully supervised. Un-qualified workers shall not be permitted to work in close proximity to such equipment, if there is any chance of their coming into contact with live, moving or hazardous apparatus.

v) No employee shall be permitted to work alone when, in the opinion of the supervisor, the work to be carried out or the location of the work is hazardous.

vi) All the safety measures, pertaining to electrical work activities, shall be considered to carry out the job safely

vii) The minimum safe clearances, from exposed live equipment at the place of work in a grid station, must be observed.

14.5 Identification of Operating Equipment

a) All the equipment, installed at the grid station shall be assigned an identification code and shall be used for switching instructions, reports, log sheet entries and forms etc.

b) Identification codes must not be changed without authorization from the appropriate authority.

14.6 Weather Information

Weather conditions play an important role in operation of the transmission network. Information with regard to electrical, wind, snow and hail storm or any unusual weather condition shall be made available, so that every employee and supervisor may use it in the performing his duties.

14.7 Interference of Animals

Employees shall take proper precautions to prevent dogs, cats, other animals or birds from entering or remaining in the grid stations, to eliminate the chances of their interference in healthy operation of the system.

14.8 Visitors

a) The admission and control of visitors, within the grid station premises, shall be governed by approved local procedure.

b) No visit shall be permitted in control room or operating areas during periods of trouble or stress.

c) All visitors shall use approved personal protective equipment such as safety shoes, helmet, gloves and safety goggles etc.

14.9 Audit Activity for GSO

The following two types of Audit Activity for GSO shall be performed;

a) Internal Audit

b) External Audit

14.9.1 Internal Audit

Internal audit shall be carried out by RE/AET, XEN SS&T and SE GSO by following the frequency given below;

DESIGNATION	NO. OF GRIDS TO BE CHECKED/MONTH
AET	All grid stations under their administrative control
XEN SS&T	5 grid stations/month
SE GSO	2 grid stations/month

They shall check the following points;

a) Security of grid station.

b) Firefighting equipment in control room and switch yard.

c) Position of cables in switch yard.

d) Condition of grass in switch yard.

e) Condition of DC batteries.

f) Installation of name plates on first pole of 11 kV feeders.

g) Maintenance of power transformers and other switch yard equipment.

h) Maintenance of 11 kV Panels and all other hazards in grid station.

14.9.2 External Audit

The Safety Directorate team shall surprisingly visit grid stations to evaluate the performance of GSO staff regarding safety on the prescribed safety proforma. (Annexure-03)

14.10 Safety Instructions for GSO Colonies

i) Animals/Pet dogs shall not be kept in the colonies.

ii) Doors of top roofs of multi-storey apartments shall be kept locked by in-charge of colony/grid SSO in-charge. In case of maintenance of roof etc., it shall be entered in register with detail of work and names of persons allowed to go on roof and grid in-charge will open the lock in his presence.

iii) No luggage etc. shall be kept on roof. iv) No unauthorized person shall be allowed to go on top roof of apartments. v) Kite flying shall not be practiced.

vi) Waste shall be kept in the baskets outside the home. No littering shall be done.

vii) The green areas shall be maintained.

viii) No green area shall be used for any other activity; no construction/parking of vehicles shall be made in the green areas.

ix) No washing of vehicles and motor cycles etc. shall be allowed along/on the roads of colony.

x) No music in the vehicles or in the houses shall be played, disturbing the neighborhoods. Sound of music shall be such that it should not come out of the house or vehicle.

xi) No such activity shall be done by resident/his dependents or guests which is offending and causing trouble for the residents of the colonies.

xii) Any allottee/resident violating these instructions shall be given notice and if he does not comply with the instructions, his allotment shall be cancelled.

xiii) Grid in-charge shall monitor all these activities and immediately report violation of such activities to administrative in-charge of colony, SE GSO and Director Safety.

xiv) Sanctity of "**Chaddar and Chardewari**" shall be strictly maintained.

xv) Plantation shall be done and maintained to ensure beauty of colony and improve environments.

xvi) Senior most officer residing in the colony shall be administrative in-charge for any matters arising due to above or any other disputes among the residents, he shall make efforts to resolve the issues and make his final decision for putting up to SE GSO/Director Safety.

14.11 Requirement for Housekeeping in Operational Premises for Safe Working Conditions

All PESCO premises in the interest of safety, fire prevention and hygiene shall be kept clean and orderly at all times like our own houses. The following instructions should be followed;

1) Walks, aisles, stairways, fire escapes and all other passageways shall be kept clear of all obstructions.

2) Any floor or wall opening shall be guarded with standard railings and toe boards.

Other means of temporary protection may be used only with an observer present.

3) Tools and Plants shall not be placed where they may cause tripping or stumbling hazard, or where they may fall and strike anyone below.

4) Adequate measures shall be taken to overcome slipping hazards which may exist.

5) Nails in boards, such as those removed from scaffolds, forms and packing boxes shall be removed. The boards shall be carefully stacked or stored.

6) Work areas and vehicles shall be neat and orderly at all times.

7) Scrap bins (dust bins) should be provided and used for broken glass, insulators, sheet metal scraps, used pressurized containers and other waste material.

8) Scrap material of salvage value should be properly stored until disposed of.

9) Dirty and oily waste rags shall be deposited in approved metal containers provided for the purpose, and be disposed of as soon as possible to avoid fire hazard.

10) To avoid strain from improper handling of boxes and bundles of office supplies, ledgers, portable filing cases and office machines, lifting should be done with back erect by using more powerful leg muscles.

11) Large boxes or bundles of supplies shall be moved by a hand truck, or unpacked and delivered in smaller parcels. Bulky objects shall not be carried in such a way as to obstruct the view ahead or interfere with free use of handrails on stair ways. Get help where necessary.

12) Conservative shoes should be worn to prevent slipping on floors or tripping on stairways.

13) Water, oil or other liquid spilt on floors presents a dangerous slipping hazard, and shall be cleaned up at once.

14) Loose objects such as matches and pencils shall not be left on stairs or floors.

15) Unprotected extension cords shall not be strung across aisles or walkways where people may slip or fall over them.

16) Desk or file drawers of desk slides shall not be left open.

17) Standing on chairs, boxes and other makeshift supports shall be avoided. Only approved ladders or equipment shall be used to reach the objects overhead.

18) Doors should be opened slowly to avoid striking anyone on the other side.

19) Running in aisles, corridors, and on stairways is prohibited. Use the handrail when going up or down stairways.

20) In walking, particularly at blind corners, employees should always keep to the left.

21) Use extreme care in opening file cabinet drawers. Opening of over-loaded upper drawers, particularly more than one at a time, may slip over the cabinet. Where several tiers of cabinets are used at one location, they shall be fastened together.

22) While using power operated office machines, avoid touching any earthed metal object such as a radiator or water pipe. Defects in the cords or machines shall be reported and promptly repaired.

23) Pins shall not be used to fasten papers together. Use paper clips or stapling machine.

24) Pointed objects, such as uncapped fountain pens, pencils, knives or scissors should not be carried with the point exposed in the pockets, attached to the clothing, or through congested aisles or working areas.

25) Gummed strips of envelopes should be moistened with suitable device, not with the tongue. Avoid opening envelopes with fingers and sliding hands along edges of paper.

26) Except in proper holders, safety-razor blades shall not be used for cutting paper, sharpening pencils or other cutting operations. Do not keep razor blades or other sharp instruments loose in desk drawers.

27) Used pressurized containers, broken glass or other sharp objects shall never be placed in waste baskets, but should be safely wrapped, identified and left beside the waste basket for removal.

28) Keep fingers away from cutting edge of paper cutters. The cutting knife on hand operated cutter shall never be left raised while unsupported; it shall

always be closed when not in use. Machine operated cutter shall be properly guarded to prevent accidental contact with the cutter.

14.12 Security of Grid Station Premises

For the purpose of security of grid station premises the following shall be maintained;

i) Vehicle in/out record and visitor(s) record with Identity Card, Cell Number and Purpose of Visit.

ii) Attendance Register of Security Staff.

iii) The T&P Register of the Security Staff like guns/ammunition

details.

iv) Inspection Register of Security Inspector/Officer of PESCO.

15 ELECTRICAL SAFETY

15.1 General Safety Precautions

Prior to undertaking any electrical work, proper work protection shall be established as necessary in accordance with the Safety Code. All work activities shall comply with the applicable SOP, equipment manufacturer's instructions, safety rules and regulations. In addition to above a safety hazard identification exercise shall be undertaken.

i) Maintenance, repair and construction work on electric circuits or apparatus shall not be done, until the authorized person in-charge of the working party, has received a properly filled permit-to-work from an authorized employee. The existing conditions should be determined so that the work can be performed in a safe manner and is clearly understood by each worker.

ii) All circuits and equipment shall be considered energized at full voltage until deenergized and earthed. Caution notices, duly filled in, shall be placed on all switch-gear and control panels controlling the electrical circuits, tie points, and apparatus, upon which men are about to work. These notices shall be placed by the person in-charge of the circuits or apparatus. The presence of the authorized person in-charge of the working parties shall be essential, when the notices are filled in and signed. To prevent their being torn or dropping off the apparatus or lines guarded, caution notices shall always be placed in the wooden holders. iii) Workers shall not begin work on any equipment unless instructed to do so by the person in-charge. Where instructions are given on telephone or radio, each speaker shall be satisfied of the identity and authority of the other person. iv) On all jobs, a sufficient number of qualified workers should be present to do the work safely. The number of workers required shall be determined by the supervisor assigning the work.

v) Whenever it become necessary to replace a worker or supervisor during a job, such replacement shall be made only after the replacing worker or supervisor has been fully informed of existing conditions.

vi) On any job which, in the opinion of the person in-charge, requires an observer, the person in-charge or a person appointed by him shall act as observer. The observer shall not be engaged in any activity, which the person in-charge considers will interfere with his duty as an observer. vii) When performing work, if a worker finds a condition which is beyond his ability to handle safely, the worker shall call for assistance.

viii) Emergency hazards, where life is in danger, such as fallen wires, may be removed by a worker, using approved tools and protective equipment.

ix) Conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal headgear, or metal frame glasses) shall not be worn where they present an electrical contact hazard with exposed energized electrical conductors or circuit parts.

x) Employee shall not perform housekeeping duties where there is a possibility of contact with energized electrical conductors or circuit parts, unless adequate safeguards (such as insulating equipment or barriers) are provided to prevent contact. Electrically conductive cleaning materials (including conductive solids such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions) shall not be used unless precautions to prevent electrical contact are followed.

xi) Conductive materials, tools, and equipment that are in contact with any part of an employee's body shall be handled in a manner that prevents accidental contact with energized electrical conductors or circuit parts. Such materials and equipment shall include, but are not limited to, long conductive objects, such as ducts, pipes and tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, bull floats, and chains.

xii) Process of Achieving an Electrically Safe Work Condition.

a) Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.

b) After properly interrupting the load current, open the Disconnecting device(s) for each source.

c) Wherever possible, visually verify that all blades of the Disconnecting devices are fully open or that draw out type circuit breakers are withdrawn to the fully Disconnected position.

d) Apply lock and/or tag.

e) Use an adequately rated voltage detectors or voltmeters to test each phase conductor or circuit part to verify they are de-energized. Test each phase conductor or circuit part both phase-to-phase and phase-to-ground. Before and after each test, determine that the voltage detectors or voltmeters is operating satisfactorily.

f) Where the possibility of induced voltages or stored electrical energy exists, ground the phase conductors or circuit parts before touching them.

15.2 Work in Confined Spaces (Underground Chambers)

A work area shall be treated as confined space when, because of its construction, location, contents, or work activity therein, the accumulation of a hazardous gas, vapor, dust, fume or creation of an oxygen-deficient atmosphere may occur. As a common experience, the confined spaces such as basements of power plant buildings and underground main-holes are more pronounced to fire hazards due to accumulation of dangerous gases. So, while working in such areas, due safety precautions should be observed as detailed below:-

i) A confined space shall not be entered, unless there is a way of exiting by means of a man-hole or other clear opening.

ii) A confined space shall not be entered, until all mechanical or electrical sources of potential or dynamic energy are isolated and de-energized, in accordance with requirements.

iii) The atmosphere in a confined space shall be assumed unsafe and shall not be entered, until a competent person evaluates the situation with approved necessary tests. The results of tests shall be recorded and maintained. Evaluation of hazards should include consideration of toxic, flammable or heavier than air gasses, being used or produced in or near the confined space.

iv) A confined space shall not be entered until purging or ventilation to maintain a safe atmosphere has been ensured.

v) Whenever entry is made to a confined space, a qualified and suitably equipped employee shall be stationed at the entrance to render immediate assistance if needed.

vi) Smoking shall not be permitted in a confined space. When it is necessary to use an open flame, heat or sparking device, the work shall not be done until suitable measures are adopted.

vii) If at any time, irritation of eyes, nose or throat, difficulty in breathing or ringing in ears is experienced, all employees shall leave the confined space immediately and shall not return until the atmosphere has been tested and found safe.

viii) Workers shall wait for five minutes before entering, to allow for air exchange. A lifeline (rope) shall be attached to the employees, entering the chamber and two employees shall be stationed for emergency retrieval.

ix) Work shall be undertaken in accordance with the appropriate PTW procedure.

x) Compressed gas cylinders shall not be allowed inside a confined space, where the hot-work is being performed.

xi) Gas welding and cutting equipment shall be pre-tested for leaks prior to entry into a confined space.

xii) Appropriate extinguishers shall be available when hot work is being performed.

xiii) The use of flammable/toxic material shall be avoided, whenever possible and quantities kept to minimum in approved containers, when needed.

15.3 Work in Operational Premises (Substations and Compounds)

All PESCO operational premises such as substations, labs and work- shops etc. shall be kept clean and orderly at all times, like our own houses, by exercising housekeeping activities. Moreover, arrangements must be made to ensure smooth and safe working environment and safe working conditions, for both the routine and emergency jobs, by observing the following measures: -

i) Only the authorized employees shall be allowed to work in control rooms.

ii) Operating diagrams of the system such as single line key diagrams and flow charts shall be made available in the control rooms for ready reference.

iii) The indication lamps and other annunciations must be ensured in healthy working condition, all the time.

15.4 Voltage Level of Different Electrical Apparatus/Equipment

Following are the voltage levels covering the complete range of main and auxiliary apparatus/equipment in PESCO.

1. 24V, 48V, 110V and 220V DC
2. 110V and 230V AC, 50 Hz
3. 415V three phase AC, 50 Hz
4. 11 kV, 33 kV, 66 kV and 132 kV AC, 50 Hz

15.5 Climbing of Poles, Towers and Structures

i) Plan each climbing carefully.

ii) Before climbing poles, ladders, scaffolds, towers or structures they shall be inspected to be sure that they are safe to climb. When there is doubt, they shall not be climbed until made safe by guying or bracing.

iii) Approved body belts, with safety straps or lanyards, shall be worn by employees working on poles, towers or other structures, or in aerial devices.

iv) Wire hook shall not be attached to body belts or safety straps.

v) Body belts, safety straps and lanyards and other personal protective equipment shall be inspected carefully before use to determine that they are in safe working condition.

vi) All ladders shall have a suitable piece of light rope at the top end to tie them to the pole or structure by means of this rope.

vii) Use a ladder whenever possible instead of climbing structures.

viii) Ladders shall not be set up on any moveable object, which may be started while an employee is working from them, unless satisfactory precautions have been taken.

ix) Ladders shall not be set up in a pathway or roadway exposed to traffic, unless an employee is stationed at the foot of the ladder to warn the traffic.

x) Unmanned support alone shall not be relied upon.

xi) Before removing or adding wires, cables or guys to poles, towers or other structures, additional guying or bracing shall be used, where necessary, to take the additional strain. xii) Wooden cross-arm/braces or other pole attachments shall not be relied upon to support a worker's weight.

xii) Workers shall not stay on poles/structures that are being plumbed, straightened.

xiii) All light weight plant and tools, to be used aloft, shall be raised and lowered by means of hand-line and canvas bucket, or other suitable container. xv) Tools and plants shall neither be thrown from the ground to the workers working aloft, nor shall workers throw tools and material down to the ground.

xiv) Taglines and hand-lines, used near energized lines and equipment, shall be of non-conductive material.

xv) Taglines shall be used to control loads being hoisted, where it is necessary to prevent hazards to workers or damage to equipment or material.

xvi) Hand axes shall not be used on overhead work.

xvii) All power tools used in work aloft shall be equipped with approved switches or other control devices.

xviii) Tower, structure members or sections shall be adequately supported, and guyed.

xix) Conductors being installed or removed shall be kept under positive control, to prevent accidental contact with energized lines or equipment. xxii) Conductor, reels and load bearing hardware shall be of adequate strength or capacity, and shall be periodically inspected for defects.

xx) In handling wires on a pole with other energized conductors, shall be raised or lowered with a dry hand-line and extreme care exercised to prevent them from coming in contact with live lines and equipment. xxiv) All wires, after being placed on cross-arms shall be considered energized at full voltage, unless they are positively known to be dead.

xxi) Workers shall not lean on or pass through unprotected wires, and shall protect themselves against the possibility of falling into energized conductors.

xxii) Employees working aloft shall avoid positioning themselves on the supporting cross-arm or directly under a conductor or pulling line, while it is in motion during stringing or removing operations.

xxiii) When workers are engaged in work over or near water and when danger of drowning exists, suitable protection shall be provided.

xxiv) When working along streets or highways, workers shall exercise care to keep hand-lines from blowing into the line of traffic.

xxv) When stringing wires across streets and highways, avoid interference with vehicular traffic or pedestrians. When necessary, signal workers shall be provided.

xxvi) When working at night, portable lights for emergency lighting shall be provided.

15.6 Access to High Voltage Apparatus and Conductors

All circuits and equipment shall be considered energized at full voltage, until deenergized and earthed. Caution notices, duly filled in, shall be placed on all switchgear and control panels controlling the electrical circuits, tie points, and apparatus, upon which men are about to work. These notices shall be placed by the person incharge of the circuits or apparatus. The presence of person in-charge of working parties shall be essential, when the notices are completed and signed. To prevent their being torn or dropping off the apparatus or lines guarded, caution notices shall always be placed in the wooden holders.

15.7 High Voltage Switching Operations

a) No high voltage switching operation shall be performed without instructions of the chief operating office – NPCC/RCC.

b) All operating orders and messages shall be exchanged in accordance with approved procedures of NPCC/RCC.

c) All switching operations shall be reported to the control engineer/shift engineer.

d) Energizing or de-energizing the circuits/equipment through signals/code messages or pre-arranged understanding of certain time intervals is not allowed.

15.8 Use of Voltage/Potential Devices

a) Only voltage testing devices approved by PESCO and in proper working order shall be used when testing electrical circuits.

b) Potential testers shall not be used beyond the voltage limits for which they are designed and used only in accordance with the approved procedure.

15.9 Procedure to Follow When Excavating Near Live Cables

i) Excavation shall be done against approved Permit to Work ii) Excavation of the cable route shall be carried out as per PESCO approved drawings

iii) Contractor/PESCO supervisor to ensure proper risk assessment is done and all hazards identified and control implemented

iv) In case electrical live cable de-energization is not feasible, the suitable protection measures shall be adopted such as, providing a wooden box around the cable, providing protective sleeve for the cable, insulating personnel and equipment from possible electrical contact. Insulation of hand tools. Adopting test trenches excavation method by using hand tools to unveil underground pipes and electrical cables, etc.

v) Proper communication shall be done with local authorities for road closure.

vi) Where there is a likelihood of public, vehicles or equipment falling into an excavation, suitable barriers shall be erected including fencing of the excavation area. Supervision.

vii) Blinking warning lights should be used during dark to mark the limit of the work.

viii) PESCO site staff /contractor shall use all necessary PPE and follows safety precautions at the time of excavation & lying of cable.

ix) Use safety cones, warning tape and place a sign board/warning sign around the execution site. to reduce the chance of the public incident.

x) All trenches and excavation in which employees are exposed to danger from moving material or more than 1.5 meters deep shall be guarded by a shoring system, proper sloping or other equivalent means.

xi) Other hazards, immediately adjacent to a trench or excavation such as trees, boulders, slides, banks or building foundations shall be examined carefully and necessary precautions be taken.

xii) Site conditions such as surface water drainage and vibration from traffic or machinery shall be considered in planning the excavation

xiii) Excavated and other material shall be kept at least 0.75 meter from the edge of any trench or excavation in which employees are required to enter.

xiv) When employees are required to enter in a trench or excavation 1.5 meters deep or more, approved ladders of proper length shall be used.

xv) Before and during an excavation, every effort shall be made to discover the position and prevent unwanted damage to underground installations, such as pipe lines, storage tanks and cables etc. Proper measures shall be taken to protect employees from hazards, resulting from exposed installations.

xvi) Restrict the movement of heavy machinery or vehicles in surrounding of excavated area, to avoid any collapse. xvii) Help from the local utility be

sought to identify if there is any underground line in or near the area of proposed execration.

15.10 Use of Mobile Cranes and Machinery in the Grid Stations or Near Overhead Lines

i) For using a mobile plant or moving a loaded or unloaded crane in close proximity to the live equipment in the grid station or near overhead electric lines, the boom or load shall be lowered sufficiently to provide safe clearances as given below:-

a) Below 50 kV 1.25 meters

b) 50 kV - 230 kV 3 meters

c) Above 230 kV 5 meters

ii) Chain hoists, derricks, cranes and other hoisting equipment shall be inspected at regular intervals.

iii) Any hoisting equipment found defective shall be immediately tagged as unsafe and not used until repaired.

iv) Before the load is lifted, a strain should be taken on the cable and the hitch and slings rechecked.

v) When there is a danger of the load being suddenly released, the hooks shall be snubbed with wire or shackles.

vi) Before operating crane, derrick or other hoisting equipment, the operator shall sound warning and accept only one person's signal to start raising, lowering or swinging load. However, the operator shall stop immediately upon signal from anyone.

vii) When making heavy lifts, outriggers shall be used to prevent overturning. The outrigger shall rest on a secure and firm surface.

viii) Extreme caution shall be taken when working near cables or ropes under tension. The workers should never place themselves within the angle formed by ropes or cables, under tension.

ix) Employees shall familiarize themselves with the proper knots, ties and hitches, safe working loads for ropes, cables, slings and fittings and proper methods of hooking and slinging required in the work.

x) Special care shall be exercised to see that cables, chains, and other hoisting equipment are not unduly stressed by improper use.

xi) Chains shall not be spliced or joined by makeshift means such as open links, bolts, or wire. New links shall be inserted by some competent person.

xii) Wire ropes or cables should not be allowed to kink as it weakens them.

xiii) The rating of hooks, rings, clevises and other fittings used on chains or cables shall exceed the carrying capacity of the chain or cable.

15.11 Methods of Isolation, Discharging and Earthing High Voltage Equipment and Transmission Lines i) Isolation

a) All electrical circuit conductors and circuit parts shall be considered energized until the source(s) of energy is (are) removed. Electrical conductors and circuit parts that have been Disconnected, but not under isolation, tested and grounded (where appropriate) shall not be considered to be in an electrically safe work condition, and safe work practices appropriate for the circuit voltage and energy level shall be used. Isolation requirements shall apply to fixed, permanently installed equipment; to temporarily installed equipment; and to portable equipment.

b) When taking lines or equipment out of service, it shall first be deenergized by an appropriate switching device, such as Disconnect switch/isolator, circuit breaker, fuse or re-closer. For work on equipment, Disconnect switches, on both sides of the equipment, shall be opened. For work on lines, the line shall be disconnected from the system by a visible isolation, from all possible sources of supply.

c) When removing or inserting draw-out type switchgear, it must be ensured that the contacts are in open position and that the fuses in the control circuits have been removed.

d) Disconnect switches, which have been opened, shall be checked visually to ensure that their blades are fully open and their operating mechanism is locked.

e) In situation where it is not possible to lockout or chain off an isolating equipment, isolation may be accomplished by removal of fuses, Disconnection of electrical cables, or physical removal of component of the system supplying energy to the equipment. The point of physical isolation should be identified with hold tag.

f) Up-to-date single-line drawing shall be considered for isolation. When upto-date drawing is not available, the PTW Incharge shall ensure that all sources of energy is identified and isolated.

g) All personnel who are required to actually do the electrical isolation shall wear proper PPE to ensure safe switching Off & On and applying isolation.

h) No individual shall attempt to start, energize, use, or operate a piece of equipment that has been isolated.

i) Isolation is completed only when push button, control interlock or automatic start-up control circuit is tested and shall not energize equipment again.

j) Verification test shall be conducted on each isolating equipment.

k) When the job or task is completed, appropriate tests and visual inspections shall be conducted before electric circuits or equipment are re-energized to verify that all tools, mechanical restraints and electrical jumpers and temporary protective grounding equipment have been removed, so that the circuits and equipment are in a condition to be safely energized.

ii) Discharging and Earthing

a) Maintenance work on electrical equipment at grid stations and transmission lines must be performed when it is isolated and earthed. Earthing is accomplished by installing Portable Temporary Grounds (PTG) on both sides of the equipment to work on.

b) A properly installed PTG provides the following protections, both to the worker as well as to the equipment.

- Positive proof of isolation.
- Drained off induced potential.
- Guard against the danger of accidental energization.
- Surety that non-current carrying metal parts of equipment and structure are at earth potential.

c) Once the PTGs are installed properly, a low resistance ground path is provided around the worker.

d) When applying PTGs, first connect to ground and then to line while for removing PTGs, first remove from line and then from the ground. Insulated stick/rod shall be used for applying and removing the PTGs.

e) When lines or equipment that may get energized from any source rated 230/400 volts or more, have been removed from service to perform work on them, all phases shall be earthed. Before earthing the phases, a check or test for voltage shall be made with approved potential tester.

f) While earthing lines and apparatus, an approved temporary earth rod shall be driven if earth point is not already available. The earth wires shall be connected to the temporary earth rod.

g) The temporary earthing cable shall be flexible stranded conductor, of sufficient current carrying capacity to activate protective devices, without damaging it if accidently energized. Conductor size of cable shall be 2 AWG for distribution system and 4/0 AWG for HV system.

h) A system neutral or an earth wire shall not be opened, until the proposed opening has first been jumpered or bypassed. An earth may be temporarily opened provided proper protection equipment is used.

i) Earth switch, provided with the isolator, shall be operated only under the instructions of NPCC/RCC and before the apparatus is returned for service.

15.12 Procedure for Approaching Live High Voltage Conductors and Their Supporting Insulators

For work in close proximity to live high voltage conductors and insulators supporting them, or in the vicinity of such apparatus, the person in-charge shall discuss with the work crew the hazards of the work and give instructions, regarding the use of any precautions, procedures or protective equipment, necessary to perform the work safely. While working near live high voltage apparatus, proceed as under:-

a) Workers shall not go or take any conductive object within the following approach distances from any exposed energized conductor or equipment

b) While operating manual Disconnect switches, the workers shall use approved PPEs.

c) When erecting metal towers, using mechanical or manual hoisting equipment, adjacent to energized high tension lines, adequate clearances should be maintained or the lines shall be de-energized and earthed.

d) When operating mobile lifting or hoisting equipment, near energized lines or equipment in grid stations, the mobile equipment shall be effectively earthed and an observer designated to assure that proper clearances are maintained.

e) When lifting or hoisting equipment such as a truck crane or a portable aerial frame is being used in close proximity to energized lines or equipment, safe working clearances must be observed. The possible effects of the electric field should be considered when equipment is near voltages of 220 kV and above.

Workers supposed to work near the live equipment shall use insulating protective footwear, in addition to other required protective equipment.

f) When raising or lowering poles/structures in close proximity to energized lines or equipment, all workers shall use insulating protective equipment and dry nonconductive hand-lines.

g) Wire being strung, removed or sagged close to energized lines or equipment shall be considered energized and handled with insulating protective equipment, dry non-conductive hand-lines, barriers or other necessary protective equipment.

15.13 Procedure for Work in Substations and Switching Stations Containing Exposed Live High Voltage Conductors

i) All apparatus, capable of being made dynamically alive or charged, shall be treated as alive, for work in substations and Switching stations, containing exposed live high voltage conductors unless:-

a) The apparatus is isolated and de-energized in accordance with the work protection code or

b) The apparatus is removed physically from all sources of potentials or dynamic energy with no ready means of connections.

ii) No work shall be done on any apparatus without permission of the authority incharge of the equipment.

iii) All the applicable safety rules shall be followed pertaining to the nature of job iv) Work qualification categories such as un-qualified, qualified and specially qualified workers shall be considered while assigning jobs to the work crew.

v) The precautions recommended by the manufacturer of the grid station equipment, should also be considered while working on or handling the equipment.

vi) The equipment safety instructions, given in the training procedure, must also be followed.

15.14 Permit to Work

Permit to work (PTW) means a form of declaration, signed and given by one authorized person to another in-charge of work, to be carried out on any electrical apparatus, aerial line or cable indicating the apparatus or lines made dead and earthed at the sub-station end.

PTW is a legal document of PESCO issued in the name of an authorized person, to perform maintenance work on grid station equipment and transmission lines. A PTW has two copies double side printed; one copy handed over to the person in whose name it is issued and the second left in the PTW book as office copy. The PTW holder will return it back, duly signed to the issuing authority, after doing the work or when he wishes. The station operator cannot make any switching operation on the equipment, under PTW, until cancellation of the PTW.

15.15 Sanctions for Tests

i) All types of testing of grid station equipment, protective relays and transmission lines shall be carried out in accordance with the approved instructions, proper authorization, procedures and SOP. Testing, under work permit, is prohibited if it requires operation of the device guaranteed for another work protection or would energize apparatus isolated for another work protection.

ii) **Responsibilities of Control Engineer/Shift Engineer**

a) The Control Engineer shall develop and issue work program regarding the testing work to be carried out.

b) The Control Engineer shall identify the hazards and unsafe conditions/acts related to the testing job and will brief the person in-charge for elimination of the identified hazards.

c) The Control Engineer shall also identify regarding the repetitive and consecutive nature tests, if involved in the job.

iii) **Responsibilities of Person In-charge of Testing**

a) The person in-charge after having received the work program shall follow the prescribed procedure for obtaining PTW and other safety related rules. He shall also ensure the use of PPEs by all the workers under his charge.

b) The person in-charge shall perform the testing job in accordance with the prescribed work procedures.

c) Deficiencies in the test procedure or any abnormal response of the test equipment shall be reported to the Control Engineer for his notice and advice.

d) The test set shall be used only by the trained and qualified personnel, who recognize potential hazards.

e) Do not work alone on high voltage testing.

f) Do not touch high voltage testing leads while energized.

g) Locate all hazardous potential sources and accessible points before making test connections, as voltage may appear unexpectedly in faulty equipment.

h) While using multi-meter, do not change function switch or range switch while the circuit is energized. A mistake can result into damage to the meter and also an injury to the employee.

i) Do not change lead connections while the test is going on.

j) The test equipment and its accessories must thoroughly be checked for any defect before use.

k) Check the input power switch position (ON/OFF Switch) and connections before applying power to the test equipment.

l) For high voltage testing such as AC or DC Hi-pot, C&DF test, Insulation Resistance test etc., the test equipment shall be self-tested and calibrated. The out-door equipment under test, mainly the bushings, must be thoroughly cleaned before applying high voltage.

m) While using Clip-on Ammeters, take care of its correct range and withstand voltage rating.

n) Manual interlock key of high voltage test equipment should remain in the custody of its user.

o) The safety precautions, recommended by manufacturer of each test equipment, must be followed.

p) Earth resistance testing should not be carried out during rainy weather, winds and dust storms.

q) During high voltage testing such as C&DF test, the employees should stand clear of the bushings and test leads as the body capacitance may influence test results.

r) At the termination of all high voltage tests, the apparatus tested should be properly discharged through grounding switches or by portable temporary grounds.

15.16 Remote and Automatic Controlled Equipment

a) For handling remote and automatic controlled equipment, prescribed procedures by the NCC/RCC should be followed. Workers shall not start the work on any equipment unless instructed to do so by the person in-charge. Each worker shall be satisfied of the identity of the equipment and authority of the other person.

b) Before work is carried out on remote or automatic controlled apparatus, all remote control and automatic features shall be made inoperative and their operating switches shall be tagged.

15.17 Withdrawable Apparatus

When removing or inserting draw-out type switchgear, it shall first be determined that the contacts are in the open position and that the fuses in the control circuit have been removed. When apparatus has been withdrawn from its normal live position, its conductor shall be discharged.

15.18 Bus-Bars, Bus-Bar Spouts and Bus-Bar Connections of Multi-Panel Switch Boards

i) Before doing work on bus-bars and bus-bar spouts, it should be shut down and properly Disconnected from the power source. ii) Keep in mind the identification of the particular apparatus to work upon and back-feeding chances from Potential Transformers. iii) Out-door and overhead tubular bus-bars are not designed to directly climb. Always use scaffold devices and ladders for the purpose.

iv) For out-door and overhead flexible bus-bars, qualified persons shall be allowed to climb and work.

v) Personnel should not climb insulator stacks of bus-bars as there is always possibility that the insulators may be broken in some way i.e. loose caps or pins and hair line cracks etc. Moreover, serious damage can be done to the good insulators by heavy boots, nails or sand on boots.

vi) For cleaning/washing insulators, corrosive solvent should not be used.

vii) Live line washing of bus-bar should be done only under special instructions and by the qualified crew.

viii) PPEs should always be used while using solvents for cleaning/washing the insulators. ix) Hazards in handling and storage of bus-bar insulators must be identified and eliminated.

x) As the security of station bus work depends on the integrity of clamps and connectors, so they must be of proper size and rating.

xi) The isolating arrangements shall be locked.

xii) When practicable the bus bars shall be checked by means of an approved voltage indicator/detector to verify that they are not live.

xiii) Caution notices shall be attached at all points where the bus bars can be made live.

xiv) Danger notices shall be attached where applicable.

15.19 Spouts and Connections of Feeders, Voltage Transformers and Single Panel Bus-Bars

a) Before doing work on feeder spouts, feeders should be identified, shut down and temporarily earthed. Keep in mind the back-feeding chances from distribution transformers.

b) Workers shall not short-circuit the secondary circuits of potential transformers when these are connected on primary side. Keep in mind the back-feeding chances from PTs.

15.20 High Voltage Apparatus and Plants Operated by or Containing Compressed Air, Hydraulic Oil or Gases

When using compressed air, hydraulic oil or gases in electrical equipment either for dielectric purpose or for operating purpose, the air or gas shall be supplied through a moisture accumulator, and an insulating hose with proper nozzle. Goggles shall always be used when cleaning with compressed air. For working on pressurized system, it should be de-pressurized before starting work. All other related safety rules shall be applicable.

15.21 Transformers

i) The application of heat inside a transformer tank for such work as repairing coils shall be treated with all possible cautions and only under certain authority. ii) Any transformer which has been removed from service due to internal trouble may contain poisonous and explosive gases. Therefore, extra care shall be exercised while ventilating it for work.

iii) Tanks containing gasoline or other flammable liquids shall, in addition to being adequately ventilated, be purged by an approved method before any worker is permitted to enter.

iv) Transformers which have been shipped or stored gas-filled must be purged by an approved method before entering in their tanks. Such tanks must be suitably identified.

v) Before starting work on transformers, the possibility of unplanned back-feed, abnormal voltage, or other dangerous conditions shall be eliminated. All transformer windings (HV/LV/MV) shall be earthed as close as possible to the bushing.

vi) Insulated sticks shall be used when operating cutouts and Disconnects that are meant for such operation. Whenever possible, fused cartridges should be installed or removed with fuse sticks or tongs.

vii) Whenever transformers are replaced, new transformer shall be checked for proper voltage before connecting to secondary. Phase sequence must be checked.

viii) Only approved equipment, such as potential transformers voltage detectors, or voltmeters, shall be used in phasing out circuits and transformers and in testing for potential.

ix) Take care while working on slippery surfaces on power transformer top cover.

x) For safe operation of transformers due care must be taken to their loading, voltage regulation and oil/winding temperature rise.

xi) The routine and diagnostic test results should be carefully interpreted. As the values of winding resistance, C&DF an Insulation Resistance (Megger test) etc. vary with temperature, the same should be corrected by applying necessary correction factor (75 °C for winding resistance test and 20 °C for Dissipation Factor) by using the standard formula/table.

xii) Polychlorinated biphenyls (PCBs) are highly toxic to aquatic life and persist in the environment for long periods of time. They can accumulate in food chains and may produce harmful side effects. Polychlorinated biphenyls (PCBs) and PCB-containing equipment, oil and items shall not be introduced at company. Company shall ensure all materials, oil and items introduced at site are certified PCB free. Company shall consult Pakistan Environmental Protection Agency or Provincial Environmental Protection Agency for any suspected PCB materials. In the case that no suitable PCB free materials, oil or items are commercially available, a written approval/waiver shall be obtained from Pakistan Environmental Protection Agency or Provincial Environmental Protection Agency for purchasing, handling, replacement and disposal.

15.21.1 Safety measures to avoid Transformer Explosion

(i) All employees to strictly follow PTW and isolation procedure while installing transformers.
(ii) Transformer installation must be done according to the SOP in terms of their fitness, application of connections, and loading.
(iii) Ensure that the authorized workshops for transformer repair has all of the repair facilities required by NTDC specification # DDS-84-2020, including testing facilities for transformer reliability and integrity.
(iv) Material store to keep a sufficient quantity of serviceable distribution transformers in float for immediate replacement of damaged transformers, as well as to allow authorized workshops sufficient time to repair and test the damaged transformers properly.
(v) The inspection and corrective/preventive maintenance of under-operation transformers, will be strictly done as per the approved SOP.
(vi) Regular testing of distribution transformers will be done to improve their integrity and reliability.
(vii) Material Management Department to ensure that a mandatory requirement is included in the purchase documents to obtain the “Manufacturer Maintenance Manual” having all details of transformer, its periodic inspection, corrective/preventive maintenance, and testing requirements.
(viii) A periodic survey of the loading position of all distribution transformers will be done and subsequent measures, such as augmentation of transformers will be carried out to prevent overloading and breakdowns.

(ix) All substandard rora fuses installed on the transformers under operation shall be replaced with fuses of standard size and rating.

(x) The welding requirements and strengthening of the base plate of a transformer shall be included in the specification including internal and external welding techniques, welder certification, welding inspection, and quality control.

(xi) In order to ensure consumers and workers safety, field management shall ensure that all electrical requirements, safe work practices, and SOPs are well coordinated and implemented at the site.

15.22 High Voltage Static Capacitor Banks

i) All high voltage capacitors whether a single unit or a bank shall be de-energized and grounded at their terminals before starting work.

ii) The discharged time constant of capacitors is given in the name plate data which must be considered to discharge the capacitor for safe working.

15.23 High Voltage Cables

No doubt cables are insulated to withstand the operating voltage with a good factor of safety; still there is a tendency for workers to be misguided about the hazardous aspects while handling high voltage cables. The following safety measures shall be followed while working on power cables in addition to the specific instructions of their manufacturer.

i) Live cables should not be handled unless it is sure they are safe to touch.

ii) Ensure healthy connections of sheath grounding as per the cable laying scheme.

iii) Moving or binding of energized cables can be dangerous and should only be done when specially authorized.

iv) In order to work safely on de-energized open laid or under- ground cables, it must be positively identified, checked as de-energized, tagged, and finely grounded. Phase marking and polarity must be considered while handling cables for new connections, maintenance and testing.

v) Cable man-holes should not be entered without proper safety.

vi) The Hi-pot test voltages for cables are much higher than their operating Voltages. Therefore, it is most important to Disconnect other equipment from the cable and protect such equipment during cable testing.

vii) Hi-pot test should not be performed if the cable has failed in insulation resistance test. It is necessary to perform insulation resistance test on the cable before and after Hi-pot test.

viii) Specific safety instructions pertaining to the types of cable such as XLPE cables, PVC cables, Oil filled cables etc. shall be considered while working on them.

15.24 Circuit Breakers

i) The switching operations of circuit breaker should be preferably carried out from remote. However, if local control is involved, the employees should stand clear from the circuit breakers at sufficient distance to remain safe from the burst porcelain hazards.

ii) Never operate circuit breaker when;

a) There is no oil in the breaker or the oil level is low.

b) There is no SF_6 Gas in the circuit breaker or Gas pressure is below the minimum permissible limit

iii) The spring-charged mechanism of circuit breakers should never be operated without coupling with the circuit breaker.

iv) When SF_6 is used in high voltage switchgear, decomposition products of varying toxicity are formed as a result of electrical discharge and arcs. These products can irritate mucous membranes, the respiratory tract, as well as other unprotected skin surfaces. Personnel must, therefore, observe the following safety measures at all times when working on open switchgear:-

a) Eating, drinking, smoking and storage of food is absolutely prohibited in rooms containing SF_6 systems. This applies particularly to maintenance work when gas compartments are open.

b) Do not touch parts in the vicinity of the insulating gas without proper protective clothing and/or equipment.

c) Do not stir up the powdery decomposition products

d) Make sure the room is well ventilated when working on indoor breakers.

e) Use only the minimum number of personnel absolutely necessary for performing the work.

f) Wash the body thoroughly after completion of work.

g) Appropriate protective respiratory equipment such as a full-face respirator (gas mask) or a respirator plus gas-tight safety glasses should be used.

h) Dust-tight protective suit made of non-woven material (disposable coveralls), rubber gloves or disposable gloves, rubber boots or disposable boots etc. should be used.

i) After work is completed, clean the respirator, safety glasses, rubber boots, and rubber gloves with water. Collect the waste. Dispose of both the waste and the protective covers separately.

j) Pole columns are shipped at a gas gauge pressure of approximately 0.05 MPa (0.5 bar). If handled improperly, the support porcelains may burst and cause damage to persons and property. To minimize the consequences of porcelain breakage, never move the pole columns, if the pressure exceeds the shipping pressure.

v) For safe operation of circuit breakers the routine and diagnostic test results should be carefully interpreted. Open/close timing values and contact resistance values should not exceed the allowable tolerance values. vi) While filling and checking SF_6 gas pressure, the gauge pressure reading should be corrected as 20 °C by using the standard formula/table.

vii) While filling SF_6 gas purge the hose pipes with SF_6 gas into atmosphere to remove any air from the hose pipe to avoid the chances of undue contamination of gas in the circuit breaker.

15.25 DC Station Batteries

i) While working on batteries, PPEs such as rubber gloves, apron and goggles should be worn.

ii) Tools being used should be insulated. iii) If acid touches the body, flush thoroughly with water and seek medical service. iv) Do not work on battery, while it is on equalizing charge or gassing heavily. v) Before entering battery room, put the exhaust fan ON.

vi) There should be no sparks, smoking or open flames in battery room.

vii) While preparing electrolyte for lead acid battery, always add acid to water. Never add water to acid.

viii) For safe operation of station batteries, due care must be given not to exceed the electrolyte temperature more than 45 °C, while charging and discharging the battery.

ix) For routine and diagnostic testing/checking different test values, such as AG Capacity Test, Impedance test and specific gravity measurements, due care must be given while interpreting the test results. Temperature correction factors must be applied to AH Capacity Test result and specific gravity test result.

15.26 Disconnect Switches/Isolators

i) The operation of any switches shall be performed, with the knowledge and consent of the controlling authority, except in the case of emergency.

ii) The order to operate shall be exercised in accordance with the requirement of the work, protection code and approved instructions/procedures.

iii) Portable ground gradient control mats shall be used for the operation of switches.

iv) The ground connections of the operating mechanism shall be examined, before each operation, to make sure that the connection is intact.

v) All switches to be operated shall be properly identified and checked according to sequence of operation. After the operation, all phases/poles shall be checked to ensure that they are in the desired position.

vi) Isolators/Disconnect switches shall not be used to interrupt load currents in any case.

vii) The open position of the circuit breaker, in series with a Disconnect switch, must be confirmed before operating the Disconnecting switch. viii) If a Disconnecting switch has been closed wrongly, it shall not be opened unless it is sure that no dangerous arc will occur upon its opening.

ix) If a Disconnecting switch has been opened wrongly, it shall not be closed without ensuring safe operation. If it is obvious that the switch is being opened in error and the arc is not yet broken, the switch shall be closed immediately.

x) Switches used for interrupting current shall not be operated in a hesitating manner. They shall be closed by using sufficient force to make a full contact of blades with one movement and shall be opened with a quick and firm movement.

xi) Only approved switch-sticks, in good condition, shall be used for the operation of switches.

xii) Employees involved in the energizing or synchronizing of the lines must follow approved instructions/ procedures.

xiii) Neutral ground switches or connections shall not be opened under load.

15.27 Instrument Transformers (CTs, PTs and CVTs)

i) Body ground of instrument transformers shall not be Disconnected or disturbed during its normal service. All instrument transformer secondary circuits should also be connected to ground.

ii) Spare cores of secondary windings of current transformers (CTs) should not be left open-circuit. Short-circuit the spare cores at the terminals in the secondary terminal box.

iii) No current transformer should be left with its secondary circuit open. If done so it will pose a serious hazard to the personnel and will also endanger the winding insulation. Thus the secondary winding should always be short circuited before Disconnecting the burden.

iv) The secondary circuit of the potential transformers (PTs) shall not be short circuited, when these are connected on primary side.

15.28 Safety Precautions for Testing High Voltage Apparatus

In addition to the conventional safety measures for testing high voltage apparatus i.e. de-energization, isolation, having proper work authority/procedure, use of PPEs, safe limits of approach etc. the below mentioned safety precautions must be followed.

i) All high voltage testing including Hi-pot tests (AC/DC), power frequency, impulse voltage withstand tests, impulse voltage withstand tests, high current tests etc. shall be conducted in accordance with approved work procedures.

ii) The voltage, current test values and time durations should be in accordance with the factory test values/relevant IEC standard. iii) Limitation of test voltage values for new and repaired high voltage apparatus should be considered as and when applicable.

iv) Do not work alone on high voltage testing.

v) Do not touch high voltage testing leads while energized.

vi) Locate all hazardous potential sources and accessible points before making test connections as voltage may appear unexpectedly in faulty equipment.

vii) For high voltage testing such as AC or DC Hi-pot, C&DF test, Insulation Resistance test etc. the test equipment shall be self-tested and calibrated. The out-door equipment under test mainly the bushings must be thoroughly cleaned before applying high voltage.

viii) Manual interlock key of high voltage test equipment should remain in the custody of its user. ix) The safety precautions recommended by manufacturer of each test equipment must be followed.

x) During high voltage testing such as C&DF test, the employees should stand clear of the bushings and test leads as the body capacitance may influence test results.

xi) For correct interpretation of test results, temperature compensation multiplying factors must be considered as and when applicable.

xii) At the termination of all high voltage tests, the apparatus tested should be properly discharged through grounding switches or by portable temporary grounds.

15.29 High Voltage Overhead Dead Lines or Partially Dead Multiple Circuit Lines – Single or Multiple Circuits – With All Conductors Dead or One Circuit Live

To work on de-energized overhead lines in close proximity to the energized overhead lines, whether single or multiple circuits, only trained and qualified workers should be allowed to work. For taking lines out of system, follow the prescribed procedure. For climbing poles, towers and structures, follow the prescribed instructions.

15.30 Voltage Regulators

i) Voltage regulators shall be placed in the neutral position & the control circuit put off before they are by-passed.

ii) In grid station, voltage regulators may be routed on pads, platforms or steel bases to achieve a safe minimum height to live parts. iii) On distribution feeders, regulators may be mounted above ground on platforms or directly on poles, depending on their size.

iv) By pass arrester and line-to-ground lightning arresters shall be mounted at the voltage regulator terminals for safety from high voltage surges.

v) Regulators must be by-passed on the neutral positions only. Bypassing at any other tap positions causes an extremely high circulating current in the series winding and may damage/destroy, or completely blow up the regulator.

vi) When placing a regulator on the line, the operation of three switches i.e. source switch, load switch and bypass switch shall be carried out as per operation manual.

vii) To take the regulator out of service, the operation of these switches shall again be as per operation manual.

viii) Certain single – phase regulator connections may be unsafe & as such three basic phenomena i.e. 3rd harmonic, system line surge and line faults shall be considered as per manual.

ix) The usual application of a regulator is to boost the voltage. Consequently, care must be taken in establishing its location, since its action is to boost the voltage received at the point where it is installed.

15.31 High Voltage Overhead Live-line Work

15.31.1 Authorization Requirements

Live-Line work shall only be performed where practicable and necessary to avoid interruption in the system. The work shall be performed by specially trained crews in accordance with the Live-Line Work Manuals. Necessary approval of the competent authority shall be obtained as per prevailing procedure to carry out live-line work after obtaining "HOLD OFF" from the concerned grid station shift in-charge.

15.31.2 Live-line Tools and Equipment and Arrangements for Keeping Them in Good Condition 1) List of Live-Line Tools and Equipment

a) Complete package of T&P (hand tools and machine tools).
b) Extension ladder fiber.
c) Adjustable strain pole.
d) Conductive shoes.
e) Conductive suit (Socks, gloves, trousers, shirt etc.)
f) Capstan hoist.
g) Trunnion nut.
h) Trunnion ratchet wrench.
i) Strain link stick.
j) Hot-end suspension yoke.
k) Cotter key pusher.
l) Shepherd hook.
m) Strain pole carrier
n) Moisture eater.
o) Abrasive cleaning pad.
p) Hot-stick wiping cloth.
q) Cargo boom.
r) Hot-stick tester.
s) Hi-test insulator tester.
t) Generator 5 KW.
u) Live-line rope.

2) Care and Storage of Live-line Tools and Equipment

Since the safety of live-line tools depends upon the electrical insulation and mechanical condition of the tools, great care shall be taken to ensure their proper storage and maintenance as mentioned below.

a) Live-line tools shall not be altered or repaired except by those authorized to do so.

b) The tools such as conducting suit, rope, sticks etc. shall be inspected regularly to check cracks etc. by the supervisor or a qualified employee delegated to such a duty. Auxiliary equipment, such as blocks, shall be included in this inspection and shall be maintained in good condition.

c) Insulating quality of sticks must be maintained. Maintenance of insulation shall not be attempted in the field except for touch-up of minor scratches

d) Special attention shall be given to the channel for the operating rod of the tie cutter and clamp stick. It must always be kept thoroughly clean and dry.

e) Live-line tools shall not be left lying on the ground where they might absorb moisture or otherwise be subject to misuse.

f) Live-line tools shall not be dropped from aloft, but shall be raised and lowered by means of hand-line.

g) Live-line tools shall be carried and stored only in an approved container and kept in a dry location. The rubber supports and seals of these containers shall be maintained in good condition at all times.

h) Live-line tools shall be tested and inspected by TSG department.

i) Live-line tools shall securely pack. Material and tools, which are not part of the set, shall not be carried in live- line tool trailers or boxes unless special provisions are made, so that the live-line tools do not get damaged.

3) Care and Use of Live-line Rope

a) The rope is adequate for a working load of 1500 lb. (682 kg). However, the working load is limited by the rating of the block to a maximum of 1000 lb. (454 kg).

b) The rope is to be used with a Sherman and Reilly GTA-358 block, with safety hook and swivel eye. This assembly permits a maximum working load of 1000 lb. (454 kg).

c) A tarpaulin shall be spread on the ground at the work site to prevent the rope from contacting the ground and picking up contamination or moisture.

d) Clean gloves shall be used to handle the rope and the rope blocks must be kept clean. Care must be taken to prevent pick up dirt.

e) The rope is not to be used in rain or foggy weather. If these conditions develop while work is in progress, the rope must be removed from the line as soon as possible. A second dry rope can be used, if required, to complete the work when weather conditions improve.

f) There shall be two live-line ropes on the job so that a second rope is available if the first one gets wet.

g) It is recommended that when splicing a rope, four full tucks be taken, followed by two further tucks using two-third of the rope yarns in the strand, and finally two more tucks using one-third of the yarns.

15.32 General Requirements for Work on Dead Low Voltage Apparatus and Lines

i) No work shall be done on lines or equipment, where Load Dispatch Centre's or Operator's clearance is required, until clearance has been obtained to proceed in accordance with existing operating procedures.

ii) When taking lines or equipment, out of service, requiring the Load Dispatch Centre's clearance, it shall first be de-energized by an appropriate switching device, such as Disconnect, interrupter, circuit breaker, fuse or re-closer. For work on equipment, isolating Disconnecting switches on both sides of the equipment shall be opened. For work on lines, the line shall be Disconnected from the electric circuit by a visible Disconnecting means and any other possible source of energy including customer owned generating facilities.

iii) When lines not under control of Load Dispatch Centre are taken out of service, the fuses, if any, shall be removed from their holders and the line properly tagged at all possible source points. If the line is controlled by an automatic breaker, it shall be opened, made inoperative and tagged. The Disconnecting device, if any, shall be opened and tagged.

iv) When removing or inserting draw-out type switchgear, it shall first be determined that the contacts are in the open position and that the fuses in the control circuit have been removed.

v) Disconnects and air breaks which have been opened shall be checked visually to be sure that all blades are in full open position, and when equipped with locks, they shall be locked open. The motor mechanism of motor operated switches shall be Disconnected from the switch or the motor circuit shall be opened. vi) When lines or equipment that may become energized from any source rated 230/400 volts or more, have been removed from service, to perform work on them, all phases shall be earthed. Before earthing the phases, a check or test for voltage shall be made. Earths may be removed for

equipment testing purposes. Work on the equipment, not associated with test, shall be stopped until earths are replaced.

vii) Whenever possible, an earth shall be placed at the point of work. When earthing at the point of work creates congestion and is a hazard to workers, earths shall be placed on each side as near as possible to where the work is being performed viii) When earthing lines and apparatus, an approved temporary earth rod shall be driven, preferably 6 meters away from any area, where anyone is likely to be. The earth wires shall be connected to the temporary earth rod.

ix) When earthing lines or equipment, the earthing cable shall be connected at the earth end first and to the equipment last. When removed, the earthing cable shall be Disconnected from the equipment first and from the earth last. Insulated tools shall be used for making and removing the connection to lines or equipment.

x) The temporary earthing cable shall be flexible-stranded conductor of sufficient current carrying capacity to activate protective devices without damaging cable, but not less than 36 sq.mm aluminum or copper equivalent. They shall be equipped at both ends with clamps that apply firm pressure, one of the clamps being of a type that can be applied with live line tools. xi) On metal structures, conductors shall be considered as bonded together and earthed when each is separately earthed to the structure.

xii) A system neutral or an earth wire shall not be opened until the proposed opening has first been jumpered or by-passed. An earth may be temporarily opened provided proper protective equipment is used.

xiii) Earths under the control of the Load Dispatch Centers shall be removed only under their instructions and before the apparatus is returned to service.

xiv) All workers shall be a safe distance away from conductors and equipment on which work is done, and all tools, plants and earths removed from the job before giving up the Load Dispatch Centre's or Grid Stations Operator's clearance.

15.33 Additional Precautions for Work on Dead Low Voltage Cables

i) Before making an opening in or removing a part of the sheath or sleeve of cable, the line shall be grounded, at the first possible grounding point, on each side of the work location

ii) When a high tension cable is to be cut, a short section of the shielding, if any, completely around the cable shall be removed and tests made with two stethoscopes or other approved testing devices to determine whether or not the

cable is de-energized. If no Indication of a live cable is obtained, the employee may proceed with the work.

iii) When opening a joint or splice in a high tension cable, the sleeve of the joint shall be cut completely around near the wipes and the cut lengthwise and removed from the joint. No effort shall be made to remove the compound. The employee shall then test over each conductor with two stethoscopes or other approved testing devices. If no indication of a live cable is obtained, he shall remove the compound. If shielding tope is then encountered, it shall be removed and another test over each conductor shall be carried out with two stethoscopes or other approved testing devices. If no indication of a live cable is obtained, he shall cut through the joint until the saw touches one of the conductors. Before sawing further, a stethoscope test shall be made on the blade of the saw. iv) When cutting or opening joints on low tension cables, the same procedure as outlined above, for high tension cables, shall be followed, except in testing. To determine whether the conductor is energized, the insulation shall be cut away to the conductor and tests made with an approved tester. On multiple conductor cables, only one conductor shall be cut at a time and tests made on at least two conductors, before proceeding with work.

15.34 Additional Precautions for Work on Dead Low Voltage Overhead Lines

i) Approved body belts with safety straps or lanyards shall be worn by employees working on poles, towers or other structures, or in aerial devices.

ii) Wire hooks shall not be attached to body belts or safety straps.

iii) Body belts, safety straps and lanyards shall be inspected before use each day to determine they are in safe working condition.

iv) Before climbing poles, ladders, scaffolds, towers or structures, they shall be inspected to be sure that they are safe to climb. When there is doubt, they shall not be climbed until made safe by guying or bracing.

v) All ladders shall have a suitable piece of light rope at the top end, and they shall always be tied to the pole or other structure by means of this rope.

vi) No ladder used on a pole/structure shall reach above the lowest cross arm, and sufficient clearance shall be obtained to allow line work to be done from the cross arm. One's head and shoulders shall not project above the line worked upon. Under no circumstances shall an employee stand or sit on a cross arm, when live low tension (LT) or high tension (HT) lines are above or below him. vii) Ladders shall not be set up on any moveable object, which may be started while an employee is working from them, unless satisfactory precautions are taken.

viii) Ladders shall not be set up in a pathway or roadway exposed to traffic, unless an employee is stationed at the foot of the ladder to warn the traffic.

ix) Unmanned pole or beam alone shall not be relied upon to support a pole/structure, while a worker is on it.

x) Before removing or adding wires, cables or guys to poles, towers or other structures, additional guying or bracing shall be used, where necessary, to take the additional strain.

xi) Safety straps, on the lineman's belt, shall not be placed above the cross arm when it is at the top of the pole.

xii) Cross arm braces or other pole attachments shall not be relied upon to support a worker's weight. xiii) Workers shall not climb on poles/structures that are being plumbed, straightened or tamped.

xiii) All light weight tools & plants, to be used aloft, shall be raised and lowered by means of hand line and canvas bucket, or other suitable container. xv) Tools and plants shall not be thrown from the ground to workers working aloft, nor shall workers throw tools and material from above to the ground.

xiv) Taglines and hand lines, used near energized lines and equipment, shall be of non-conductive material.

xv) Hand axes shall not be used on overhead work.

xvi) All power tools used in work aloft shall be equipped with approved switches or other control devices.

xvii) Towers/structures members or sections shall be adequately supported, and guyed.

xviii) Conductor, being installed or removed, shall be kept under positive control, to prevent accidental contact with energized lines or equipment. xxi) Conductor, reels and load bearing hardware shall be of adequate strength or capacity, and shall be periodically inspected for defects. xxii) All wires, after being placed on cross arm shall be considered energized at full voltage unless they are positively known to be dead.

xxiii) In handling wires on a pole, with other energized conductors, shall be raised or lowered with a dry hand line and extreme care exercised to prevent them from coming in contact with live lines and equipment.

xxiv) Workers shall not lean on or pass through unprotected wires, and shall protect themselves against the possibility of falling into energized conductors.

xxv) Employees working aloft shall avoid positioning themselves on the supporting cross arm or directly under a conductor or puling line while it is in motion, during stringing or removing operation.

xxvi) When workers are engaged in work over or near water and when danger of drowning exists, suitable protection shall be provided. xxvii) When working along streets or highways, workers shall exercise care to keep hand lines from blowing into the line of traffic.

xxvii) When stringing wires across streets and highways, avoid interference with vehicular traffic or pedestrians. When necessary, signal workers shall be provided.

xxviii) When working at night, portable lights for emergency lighting shall be provided.

15.35 Precautions for Work on Live Low Voltage Apparatus and Overhead Lines

i) Live overhead lines up to 5000 volts, phase to phase or phase to ground shall be worked with rubber gloves and other rubber protective equipment. All live and grounded conductors which a man can possibly come in contact except the one on which he is working shall be covered with rubber protective equipment; they shall be installed from the underside to the nearest conductor first. Wearing two pairs of rubber gloves does not increase protection.

ii) Normally, at least two linemen should be on the job when work is done on live overhead lines. Experience shows that one lineman using proper methods plus approved tools, adequate lighting, protective devices and working alone can perform safely such jobs as the following:

a) Routine open or close manually operated Disconnects.

b) Replace primary fuses and those in safely built out lying substations and distribution transformers.

c) Replace street lamps.

d) Emergency clearing of street lighting and primary wire opens.

e) Remove small and medium tree limbs.

iii) Experience shows that following safety rules must be observed while working on poles and structures.

a) Do not stand on or touch unnecessarily - messengers, telephone lines or cables, transformers cases, ground wires or guy wires.

b) Safety strops should pass around the poles as low as possible, never above the top cross arm. Always make sure that snaps are properly engaged.

c) Use material bags to raise and lower all small material and tools (Except those in loops on the belt). Do not throw material up or down poles or structure.

d) Make sure that tools and material cannot fall from the pole or structure.

e) Handle installed lighting circuits, docks and regulators only with rubber gloves.

f) Use protective devices when they are necessary. Line equipment may be hot because of a distant contact.

g) Know the voltage of the line being worked; if in doubt find out.

h) Do not trust your weight on span wires, guy wires, pins or braces.

i) Do not rely on weather-proofing as insulation.

j) Before climbing any structure, satisfy yourself that it is strong enough to sustain your weight.

k) If performing work on a distribution transformer in service, assume that the transformer is energized from the secondary and work it accordingly until by test the transformer is proved to be de-energized.

l) Do not lean over or crowd through unprotected wires.

m) Do not work above live, unprotected primary.

15.36 Safeguarding Manholes, Vaults and Other Working Areas

i) Warning devices, barriers, barricades guard rails shall be placed to adequately protect the public and employees before manhole covers or gratings are removed of other work operations are begun, and they shall not be removed until the manhole covers or gratings are replaced.

ii) While work is in progress in a manhole, an employee shall be stationed on the surface in the immediate vicinity of the opening, when deemed necessary,

iii) Trucks, tool carts and other equipment shall be so placed as to present the least impediment hazard to traffic consistent with a safe working area for the employees. If possible, trucks or equipment shall be placed between the working area and oncoming traffic.

iv) Where soil or other conditions are such that there is any danger of a cave-in, the sidewalls of the excavations shall be adequately shored.

v) All dirt removed (ram trenches and other excavations shall be applied at least 18 inches from the edge of the excavations, preferably on the side next to traffic.

15.37 Entering Manholes/Vaults

i) Manhole and service-box covers shall always be removed and replaced by means of approved hooks or hoists.

ii) A blow torch or other open flame shall never be used to melt ice around a manhole or vault cover.

iii) Where there is evidence of flammable poisonous gases, the manhole or vault shall be purged before it entered by forcing a current of fresh air into the enclosure. While work is in progress; periodic checks shall be made to determine if gas is accumulating. If it is so, purging shall be continued. (Caution: When using a blower it shall be so placed that it will not pick up and re-circulate the flammable or poisonous gases back in to the manhole or vault). iv) If, in an emergency, it becomes necessary for an employee to enter a manhole or vault where gas is present, he shall use an approved gas mask and a safety belt to which there is attached a life line attended by another employee stationed at the manhole or vault opening.

v) If there is any question regarding the flammability of a liquid found in a manhole or vault, it shall be tested by on approved method. If the liquid is found to be flammable, it shall be removed before other work is performed

vi) A ladder shall always be used in entering or leaving a manhole or vault. Climbing into or out of manholes or vaults by stepping on cables or hangers is forbidden.

vii) Upon first entering a manhole or vault, the employee shall make a careful inspection for unsafe conditions such as cracks or other defects in the roof, walls, floor, ducts and sumps and for evidence of sheath cracks and leaks in the cables and points. Presence of warning signs and tags should also be observed. Any unsafe condition found shall be reported to the proper supervisor immediately.

15.38 Identification

Before any work is done on a cable, it shall be identified and confirmed to be dead by on approved method. If there is any doubt, work shall not be started until it is checked identified and confined to be dead by the proper authority.

15.39 Work on Energized Cables

i) All underground cables and apparatus carrying current at voltages above 415 volts shall be de-energized before work done on the conductor, or before the cables are cut into or spliced.

ii) Before any work is done an energized cable, other cables and all grounded equipment with which contact can be made shall be covered with rubber blankets or approved insulating shields.

iii) Because of the characteristics of a low voltage network system, when work is performed on cables or apparatus carrying less than 415 volts, employees shall take extra precautions in the use, of necessary rubber protective equipment, in

observing adequate clearance and using proper tools in order to prevent short circuits.

iv) Employees shall wear rubber gloves with leather protectors and stand on rubber mats of insulated stools while cutting into and removing sheathing or sleeves and while testing an energized cable.

v) After removing a section of lead sheath 01 sleeve on an energized cable, the lead on each side of the opening shall be covered with Insulating tape for a distance of at least 9 inches.

vi) When cutting an energized multiple conductor cable, a piece of fiber or wood shall be placed between the conductor being cut and the other conductors and cut shall be made directly over the shield.

vii) Immediately after each conductor of an energized multiple conductor cable is out in two, the ends shall be insulated before another conductor is cut. During the course of the work, only one un-insulated conductor shall be exposed at any one time.

15.40 Work on De-Energized Cables

i) Before making an opening in or removing a part of the sheath or sleeve of cable, the line shall be grounded at the first possible grounding point on each side of the work location.

ii) When a high tension cable is to be cut, a short section of the shielding (if any) completely around the cable shall be removed and tests shall be made with two stethoscopes or other approved testing devices to determine whether or not the cable is de-energized. If no indication of a live cable is obtained, the employee may proceed with the work.

iii) When opening a joint or splice in a high tension cable, the sleeve of the joint shall be cut completely around near the wipes and the lengthwise cut shall be removed from the joint. No effort shall be made to remove the compound. The employee shall then test over each conductor with two stethoscopes or other approved testing devices. If no Indication of a live cable is obtained, he shall remove the compound. If shielding is then encountered, it shall be removed and another test over each conductor with two stethoscopes or other approved testing devices shall be made. If no indication of a live cable is then obtained, he shall cut through the joint until the saw touches one of the conductors. Before sawing further, a stethoscope test shall be made on the blade of the saw.

iv) When cutting or opening joints on low tension cables, the same procedure as outlined above for high tension cables, shall be followed, except in testing. To determine whether the conductor is energized, the insulation shall be stripped

of the conductor and tests shall be made with an approved tester. On multiple conductor cables, only one conductor shall be tested at a time and before proceeding with work tests shall made on at least two conductors.

15.41 Pulling Cables

i) Employees shall not handle pull-wires or pulling-lines within reaching distance of blocks, sheaves, which drums and take up reels.

ii) Employees shall not remain in a manhole or vault during pulling operations involving heavy pulling strains unless they can take a position clear of the pulling line.

15.42 Precautions for Work on Live Low Voltage Overhead Lines

Nominal Voltage	**Approved Equipment**	
Phase to Phase	**Insulating Gloves & Protective Footwear**	**Insulated Working Support**
400 V	Required	-
11,000 V	Required	Required
Up to 33,000 V	Required	Required

When erecting metal towers using mechanical or manual hoisting equipment adjacent to energized high tension lines, the lines shall be de-energized and earthed or the clearances specified in 22.5 shall be maintained.

15.43 Precautions for Work on Live Low Voltage Cables

i) Personal protective equipment should be worn by the staffs that have to perform work.

ii) Grounding/earthing of the transformers should be checked.

iii) Goggles must be worn to avoid any kind of electrical flash.

iv) Special precautionary measures should be adopted while working in cloudy/rough seasons.

15.44. Testing of Low Voltage Apparatus

i) All types of testing f low voltage apparatus and circuits shall be carried out in accordance with the approved instructions, proper authorization, SOPs and other approved procedures, as applicable. Testing under work permit is prohibited, if it requires operation of the device, guaranteed for another work protection, or would energize apparatus, isolated for another work protection.

ii) The PTW should be issued by authorized employee after approval from competent authority, so that testing works can be performed in a safe manner. iii) The testing area shall be properly safe guarded & the persons operating test equipment should be well trained to ensure the safety of the personnel and integrity & security of the system

iv) Only voltage testing devices approved by PESCO and in proper working order shall be used when testing electrical apparatus and circuits.

v) Potential testers shall not be used beyond the voltage limits for which they are designed.

16 FIRE SAFETY

16.1 Requirements and Arrangement of Fire Protection

Fire prevention requirements of PESCO properties shall be governed by local PESCO firefighting provisions, specific instructions of the equipment manufacturers, government and municipal by-laws. All fire hazardous areas such as Battery Rooms, Oil Stores, and Welding Shops etc. shall be kept under strict vigilance to prevent the possible fire outbreak activities.

16.1.1 Requirements of Fire Protection

i) All fire exits shall be properly marked and kept clear.

ii) All fire protection and firefighting equipment such as fire extinguishers, sand buckets, fire doors and dampers, exit lighting etc., shall be maintained in proper operating condition. Sand/water buckets shall be kept filled. Recharge and return fire extinguishers and fire buckets to their position as soon as possible after use. iii) Never use a fire bucket, fire hose or fire sand for any purpose other than firefighting.

iii) Good housekeeping shall be practiced in all buildings and vehicles to prevent the accumulation of flammable and/or combustible material.

iv) Flammable liquids shall be kept in approved cans and identified by proper labels vi) Open flames and smoking are prohibited in all areas where flammable liquids or gases are stored or being used. Such areas shall be pasted with appropriate warning signs.

v) Avoid use of matches or open flames. Prevent electric sparks in areas where combustible gas may exist such as gas-filled electrical equipment, or in manholes, vaults, battery rooms, in proximity to batteries, transformer or oil circuit breaker tanks etc. viii) Never use defective electrical equipment, which can cause short circuits or arcing during use.

vi) Never wear defective protective clothing.

vii) Never enter a smoke-filled compartment or building without breathing apparatus and an attendant standing by.

viii) Never leave idle electrical equipment without Disconnecting it or switching off at the main.

ix) Never throw a lighted match or cigarette end away. Put it in proper receptacle.

x) Never interfere with the wiring and fittings of the equipment.

16.1.2 Arrangements of Fire Protection

i) All employees shall be familiar with the location and proper use of fire extinguishers in their work area.

ii) To extinguish fire, following measures be adopted strictly;

a) For ordinary combustible material such as paper, rubber, textile, wood or rubbish, use approved Type "A" extinguisher.

b) For gasoline, oil, petrol, alcohol, grease or other liquids, use approved Type "B" extinguisher.

c) For burning gases, acetylene, propane, butane, methane etc. use only approved Type "C" extinguisher.

d) For combustible light metals such as lithium, sodium, magnesium, calcium etc. use approved type "D" extinguisher.

e) For electrical plant fires, use only approved Type "E" extinguisher.

iii) Fire doors and dampers shall be identified and shall never be tied, blocked the open position, or otherwise made inoperative.

iv) Access to fire extinguishers and other fire protective equipment shall not be obstructed.

v) Each PESCO vehicle shall be equipped with an approved fire extinguisher. It shall be the duty of the driver of the vehicle to ensure that such extinguishers are in good condition and are refilled immediately after use.

vi) At grid stations, offices and other buildings suitable fire and smoke protection systems should be installed.

vii) Use of fire resistant or fire retarding materials shall be encouraged.

viii) On main and costly equipment at grid stations such as power transformers, automatic fire detection and water sprinkling system should be installed. ix) In order to reduce the danger to life and assets, to the minimum, an emergency plan should be prepared and ensure its availability and updating of knowledge/training of the employees. It will be most appropriate, if emergency fire protection and rescue rehearsals/drills are exercised at regular intervals

x) Fire and smoke detectors should be checked/tested at regular intervals to ensure their correct functioning.

xi) Indication bulbs of fire/smoke detection system must always be kept in order.

16.2 Working with Vessels Containing Oil or Flammable Liquid

A wide variety of materials whether liquid or gases commonly used in GSO systems which possess toxic and explosive properties. Such materials should be handled carefully to avoid damages to workers and public property. These may consist of;

i) Cleaning solvents.

ii) DC battery electrolytes (acids and alkalis).

iii) Adhesive compounds.

iv) Gases - Acetylene, SF_6, Hydrogen, Nitrogen, Oxygen etc.

v) Insulating oil - mineral or synthetic oil.

vi) The general safety guidelines for handling such materials are:

a) For general cleaning purposes, the only approved solvents shall be used.

b) The use of Carbon Tetra Chloride (CTC) and benzene for cleaning purposes is strictly prohibited.

c) Smoking, open flames, welding or any source of potential ignition shall not be permitted in close vicinity to the storage area of explosive gases and liquids.

d) Adequate ventilation must be provided to avoid inhalation of toxic vapors and fumes.

e) Suitable eye protection, gloves, clothing must be used to avoid contact with acids and other poisonous materials.

f) Containers and bottles having dangerous gases and liquids shall be clearly marked and labeled.

g) Liquids, solids and gases having POPs (Persistent Organic Pollutants) shall be handled and disposed in accordance with the special rules and regulations.

h) Firefighting equipment shall be intact.

16.3 Access to and Work in Fire Protected Area

For access to and work in fire protected area, qualified and trained workers shall be allowed to work. All safety precautions already described in section 15.1 & 16.1 shall be applicable. Automatic CO_2 or other chemical fire extinguishers shall be made inoperative and the equipment put on manual control before access to or execution of work in any enclosure. A caution notice to this effect shall be attached and recorded in PTW. The automatic control shall be restored after withdrawal of workers from the protected enclosure.

16.4 Important Telephone Numbers

Telephone numbers in case of emergency are attached at Annexure-13.

17 TRANSPORTATION SAFETY

17.1 General Instructions

i) It is the responsibility of employees, who drive PESCO vehicles, to know and obey all laws, covering the territory in which they live and work and to be familiar with and abide by the rules and policy, relating to the operation of PESCO vehicles. Employees shall be personally responsible for all fines and other penalties imposed upon them.

ii) Vehicles should be kept in good working condition and operated in a safe and courteous manner. Before operating PESCO vehicles, drivers shall make sure that the vehicles are in proper operating condition. Any unsafe condition of the vehicles should be reported and corrected before use.

iii) No employee shall drive PESCO vehicles upon a public road unless he has proper license in his possession. Supervisors shall not permit an unqualified employee to drive any vehicle for PESCO.

iv) Before filling the fuel tank, the engine shall always be turned off and the hose nozzle shall be kept in contact with the fuel tank to avoid static sparks. Smoking and open flames shall not be permitted while fueling of vehicles. Overfilling of fuel tanks should be avoided.

17.2 Driving

i) PESCO vehicles shall be operated within the legal speed limit at all times and at lower speeds, where conditions warrant.

ii) Seat belts, when provided, shall be used by drivers and passengers in PESCO cars and trucks, whenever they are in motion on a public or private road. iii) Upon the approach of an emergency vehicle, such as ambulance, rescue vehicle, police car or fire-fighting equipment, pull to the left side of the street or highway and stop until the emergency vehicle has passed.

iv) Do not follow another vehicle too close or at speed so fast that you cannot stop. Allow a distance of at least one car length for each 16 kilometers per hour of car speed.

v) The vehicles driven after dark shall not be driven at a speed that prevents stopping within the distance clearly illuminated by the headlights.

vi) Use low head light beam when approaching a car from the opposite direction and when following within 150 meters of a vehicle going in the same direction. vii) Do not attempt to overtake any vehicle unless you can see

enough ahead to be sure that you can overtake safely. Proper horn/signals shall be given to warn the

driver of the vehicle being overtaken. Use proper indicators to warn other drivers of your intention.

viii) Do not drive to the right of road center, when approaching the crest of a hill, an intersection, railroad crossing or curve or where a full view of the roadway ahead is obstructed for any other reason.

ix) Before crossing railroad tracks, the driver of the vehicle shall reduce speed, observe crossing guards/gates and take all precautions necessary to determine that it is safe to cross. Before crossing always be sure there is sufficient space on the opposite side of the tracks to receive the vehicle and never change gears while crossing the tracks.

x) Defensive driving shall be practiced by all PESCO drivers. They shall not insist for right of way, but shall make every effort to avoid an accident.

xi) Pedestrians should be given all possible considerations of the right of way at all times. Horn/warning signals shall be used.

xii) Backing should be avoided where possible. When required to back a vehicle, the driver shall take all precautions, necessary to ensure a safe operation. Where vision is not clear, the driver shall walk around the vehicle to check the obstacles and clearances or position another worker to give directions.

17.3 Parking

i) Use care in parking vehicles to avoid accidents or damage to property. All traffic laws shall be obeyed.

ii) Where the job requires that a truck be parked on the travelled portion of a street or highway or within 1 meter thereto, four way flasher lights should first be used, to allow time for placing or pickup of other warning devices. Warning signs, flashers or flags by day and night, and approved reflectors or flares by night should be posted not less than 60 meters ahead of and behind the vehicle in open areas, but may be close to the vehicle in built up areas.

iii) When it is necessary to park a vehicle with the engine running, some windows should be left open to provide adequate ventilation.

iv) Do not leave engine running in an enclosed area.

v) When parking on a grade slope, place vehicle in gear, set hand brake, or block the vehicle so it cannot accidentally roll.

vi) To change a tyre or make other necessary repairs along the highway, pull off the side of the road as far as possible. Vehicle flasher lights, if provided, shall

be used and a man placed each way from the vehicle to warn the public and traffic.

vii) Before leaving a parked vehicle in an unsecured location, the ignition key shall be removed to prevent theft or unauthorized starting of the vehicle.

viii) If vehicle doors must be opened on road side, use extreme care to see that no other vehicle is near.

ix) Before moving a parked vehicle, look in front and rear to make sure that persons and objects are out of the way.

x) Before pulling out of parking space into traffic lane, make sure that you have plenty of room to do so safely.

17.4 Operation of Trucks and Trailers

i) Before moving a truck, it should be carefully inspected to see that all operating controls for mechanized equipment are in proper position, material is properly loaded and that all workers are safely aboard. It is the responsibility of the driver to see that all employees, who are not riding in the cab of the vehicle, are properly seated in the cargo area with their backs to the cab.

ii) Loading of vehicles should not exceed their rated capacity, and objects should not be permitted to extend beyond the sides.

iii) Where objects extend more than one meter beyond the rear of the truck, the projecting end shall be marked with a red flag during day and a red light or reflectors during night. iv) The driver shall not permit more than two persons in the front seat for the safe operation of the vehicle.

v) Trailers, while being towed, shall be securely coupled to the truck and also joined by auxiliary chains or cables. Safety chains shall be of sufficient strength and so attached as to safely control the load, in case the coupling device fails. Where required, trailers shall be equipped with brakes and brake lights.

vi) Trailers, while being towed, shall be marked with red flags in the daytime and red lights or reflectors at night. These warnings should be placed at the extreme end of the trailer load and at such intervals as the length of the load warrants. vii) On vehicles equipped with outriggers for stability, the operator shall make sure that no one gets injured when outriggers are lowered. Outriggers shall be placed on a firm surface or cribbing shall be used.

17.5 Operation of Forklift Trucks

i) Only lift trucks, authorized for such use, shall be operated in hazardous atmospheres or handle loads of hazardous liquids or gases.

ii) Unauthorized modifications of lift trucks, affecting their capacity or safe operation, shall not be permitted.

iii) Only trained and tested personnel shall operate power-operated lift trucks. Lift trucks shall be operated at speeds which are safe for existing conditions. iv) Drivers shall approach blind corners cautiously and sound the horn.

iv) If the load being carried obstructs forward view, the driver shall drive the load behind him (in reverse).

v) Loads shall be picked up near the center of their weight and should be hauled with the load tilted back to avoid pitching forward in case of sudden stop. vii) Loose material shall be secured to prevent shifting or toppling while in motion.

vi) Employees shall not be lifted from one elevation to another by a forklift truck unless it is equipped with proper controls and approved platform with railing and toe boards, securely fastened to the forks. ix) No person shall be allowed to stand or pass under the elevated portion of any forklift truck, whether it is loaded or empty.

vii) When not in use, the forks or platform shall be in the lowered position.

viii) When leaving a lift truck, the forks or platform shall be fully lowered, the controls shall be neutralized, power shut off, brakes set and the key or connector plug removed. If parked on a slope, the wheels shall be blocked.

ix) Stunt driving or horseplay, such as driving up to anyone standing in front of a fixed object, shall not be permitted. xiii) When travelling upgrade or downgrade in excess of 10 percent, loaded trucks shall be driven with the load upgrade.

x) Brakes shall be set and wheel blocks shall be in place to prevent movement of trucks, trailers or railroad cars, while being boarded by lift trucks. Uncoupled semitrailers may require fixed jacks to prevent upending. xv) Only approved dock boards or bridge plates of adequate capacity shall be used, and they shall be properly secured before they are driven over.

xi) Power-operated lift trucks shall be inspected periodically. Any defect or unsafe condition found during inspections or use shall be promptly reported.

17.6 Dealing with Traffic Accident

i) Do not become involved in an argument as to who was responsible for an accident.

ii) Do not lose your temper: try to be courteous and helpful.

iii) Do not admit responsibility or offer to make any kind of settlement. Representatives of PESCO or the insurance company will handle this.

iv) The following instructions should be observed, in the order given if possible, when you are involved in a traffic accident.

a) Stop – Never leave the scene of an accident without stopping to identify yourself and render such assistance as possible.

b) Turn on four-way flasher, if provided, and set out flags or flares to warn traffic.

c) Assist injured persons, giving immediate attention to severe bleeding. Do not move seriously injured persons, unless necessary for their protection. Send for doctor and ambulance, if necessary.

d) When requested by a law enforcement officer, give your name, address, PESCO job description and show your driving license to the other party.

e) Obtain the name, address and license number of the other driver, car registration number, and names of car owner and insurance company.

f) Record name and badge number of any Police Officer present.

g) Notify your supervisor, and also submit a written or oral report about the incident. If fire extinguisher or first-aid kit has been used, report this fact to your supervisor.

18 FIRST AID AND RESCUE PROCEDURES

18.1 General Instructions

Procedures outlined in this section are intended only to give a general knowledge of safe and effective methods of applying first aid for certain types of injuries.

i) Keep the injured person lying down in a comfortable position, head level with the body, until you know that the injury is serious.

ii) Look for discharge of blood, stoppage of breathing, signs of poisoning, burns, fractures and dislocations. REMEMBER that serious bleeding, stoppage of breathing, and internal poisoning must be treated immediately in that order before anything else is done.

iii) Send someone to call a physician or ambulance.

iv) Never give water or liquid to an unconscious person. v) Keep onlookers away from the injured person.

vi) Do not let the victim see the injury. vii) Make the victim comfortable and cheerful, if possible.

viii) Keep the victim warm, but maintain normal body temperature ix) Keep calm and do not be hurried into moving the injured person unless absolutely necessary.

18.2 Hemorrhage (Bleeding)

i) With all serious arterial bleeding, think first of pressure and all a doctor.

ii) Most external bleeding can be controlled by placing a compress over the wound and bandaging snugly. Then, if needed, apply firm pressure with the hand directly over the bandage until bleeding stops. Elevation of the injured part is helpful.

iii) For especially quick action, in some cases you can use your fingers or the heel of your hand to press the supplying vein against an underlying bone. Such pressure may diminish but does not stop the bleeding entirely. Meanwhile, prepare to apply pressure directly over the wound as described above.

iv) There are only two points on each side of the body where pressure against the supplying vessel is of occasional practical use:

a) Pressure on the inner half of the arm midway between the elbow and armpit, compresses the main vein against the bone and diminish bleeding in upper extremity below the point of pressure, and

b) Pressure applied just below the groin on the front, inner half of the thigh compresses the main vein against the underlying pelvic bone. If considerable force is applied, bleeding should be diminished in the extremity below the point of pressure.

v) Use of Tourniquet: Use of tourniquet is discouraged as it has always dangerous side effects therefore, should be used only for severe, life threatening hemorrhage that cannot be controlled by other means.

vi) If a tourniquet is essentially needed, it should be placed above and close to the wound. It should be tight enough to control bleeding, but not tight enough to injure the muscular substance, soft part, body skin and bone. Once applied, it should not be released except at the hospital, where the patient should be taken as soon as possible. If a tourniquet is applied, a note, indicating the time it was applied and its location shall be attached to the victim.

18.3 Internal Hemorrhage

(i) If the bleeding is from the lungs, the blood will be bright red and frothy, and will be coughed up. If the bleeding is from the stomach, the blood will look like coffee grounds and is vomited.

(ii) Send or call a doctor at once. Keep the victims lying on his back as flat as possible. Turn the head to one side for vomiting or coughing. Keep the victim perfectly quiet. Move victim only when absolutely necessary and then keep the victim in a lying position. Keep the victim warm and reassured.

18.4 Nose Bleeding

(i) Have the patient sit up with the head thrown slightly back him for breathing through the mouth. Loosen collar and anything tight around the neck.

(ii) Apply cold, wet compresses over the nose, pressing the nostril on the bleeding side firmly against the middle partition often stops the bleeding and provides opportunity for a clot to form. Pressure must usually be applied at least four to five minutes to be effective. The victim should remain quiet.

(iii) If these measures do not stop the bleeding in a few minutes, a doctor is needed at once. Meanwhile, gently pack a narrow strip of sterile gauze of lint back (not up) into the nostril, leaving the end outside so that it can be easily removed.

18.5 Sunstroke, Heatstroke and Heat Exhaustion

i) Sunstroke and heatstroke have the common symptoms but the cause may be slightly different. Sunstroke results from excessive direct exposure to the sun rays, while exhaustion is caused either by direct exposure to the sun rays or by indoor heat.

ii) Symptoms and treatment are entirely different for sunstroke or heatstroke, and heat exhaustion as indicated below:-

Sunstroke and Heatstroke	Heat Exhaustion
Cause: Exposure to heat, particularly sun rays. **Symptoms:** Red face; hot, dry skin; no sweating; strong rapid pulse; very high temperature; headache; usually unconscious. **Treatment:** Call a doctor; lay victim with head elevated; cool body with bath or cold applications; do not give stimulants.	**Cause:** Exposure to heat, either sun rays or indoor. **Symptoms:** Pale face; cool, moist skin; profuse sweating; weak pulse; temperature near normal, often faint **Treatment:** Keep victim's head low; give salt solution, 1 teaspoon full per glass of water, medical care

18.6 Fainting

Have victim lie flat with head low. If this is not feasible at the moment, have victim lower the head between the knees. Loosen tight clothing around neck. Keep victim lying down until recovery seems assured. Usually the victim regains consciousness in a short time. If victim does not awake, cover victim and call a doctor.

18.7 Fractures (Broken Bones)

i) If a fracture is suspected, treat it as such. Keep the broken ends from moving. Keep the adjacent joints from moving. If they bend, the muscles act against the fractured bone, causing motion, give first aid for shock. If the fracture is compound, treat for hemorrhage. (A fracture is considered compound fracture when the broken bones have separated and cut into the surrounding skin causing bleeding under the skin or out through the skin).

ii) Do not move victim unless absolutely necessary. Call a doctor. If necessary to move the victim, always apply splints before moving. Handle the victim carefully to prevent sharp ends of bones cutting through the flesh.

18.8 Transportation of Victims

i) Do not be hurried into moving an injured person. Always be careful in handling and transporting the injured. Improper methods frequently increase severity of injury and may even cause death. Acquaint yourself with the various safe carrier careful and efficient methods of transporting.

ii) For stretcher cases, three persons are necessary to place victim properly on stretcher- one person to lift the head and shoulders, second to lift the hips, the third to lift the legs. Place stretcher alongside the victims, helpers should kneel on one knee at side of victims away from the stretcher, and simultaneously lift victim first to their bended knees, then gently onto stretcher.

18.9 Wounds

i) For small wounds not bleeding severely, apply mild antiseptic, allow drying, and then covering with sterile gauze-compress or lint. Until healing is completed, observe wound for any sign of inflammation or infection, in such case consult a doctor immediately.

ii) Puncture wounds are more likely to become infected than open wounds for several reasons, such as;

a) Puncture wounds usually do not bleed freely, and hence do not clean themselves;

b) They are difficult to clean out;

c) Air cannot get to the wound. Lack of air greatly favors growth of certain germs, particularly the one causing tetanus or lockjaw.

iii) First aid for a puncture wound is to encourage bleeding by mild pressure. Always see a doctor, who will not only treat the wound itself but often give tetanus antitoxin.

18.10 Splinters or Foreign Substances in Body

If foreign body is near skin surface it can be picked out after applying antiseptic to skin. Use sterilized forceps or pincers, sterilized needle, or the sterilized point of a knife blade to remove splinters, etc. After foreign body has been removed, induce some bleeding by gentle pressure above the wound. After bleeding has stopped, apply a sterilize compress. If foreign body is deeply buried, apply a sterilize compress, and take victim to a doctor.

18.11 Animal Bites

Severe infection may follow the bite of any animal, but dog bites are the most common. Special danger from animal bites is the possibility of rabies, or hydrophobia. Rabies is always fatal when symptoms develop, but can usually be prevented by the prompt immunizing method known as Pasteur treatment. It is very important that anyone bitten by an animal receives prompt medical advice. Animal bites on the face and head are especially dangerous. Consult a doctor immediately.

For first aid, wash the bite thoroughly to remove saliva, using a gauze compress and a thick solution of soap and water to scrub the wound; then rinse it with clean running water. Apply a mild antiseptic, allow to dry and cover with a sterilize gauze compress.

Always consult a doctor at once.

18.12 Snake Bites

Poisonous or non-poisonous, a snake bite should have medical attention. A snakebite victim should be taken to a hospital as quickly as possible, even in case when snakebite is only suspected.

i) Get the victim to a hospital as quickly as possible. Meanwhile, take the following general first aid measures:

   a) Keep the victim as calm as possible, preferably lying down.

   b) Keep the victim from moving around

   c) If a hospital can be reached within 4 or 5 hours and no symptom develop, this is all that is necessary.

ii) If mild to moderate symptoms develop, apply a constricting band from 5 to 10 cm above the bite but not around a joint (i.e. elbow knee, wrist or ankle) and not around the head, neck, or trunk. The band should be from 2 to 4 cm wide, not thin like a rubber hand. The band should be snug, but loose enough to slip on finger underneath. Be alert to watch swelling; loosen the band if it becomes too tight, but do not remove it. To ensure that blood flow has not been stopped, periodically check the pulse in the extremity beyond the bite.

iii) If sever symptoms develop, incisions and suction should be performed immediately. Apply constricting band, if not already done, and make a cut in the skin with a sharp sterilized blade through the fang mark(s). Cuts should be no deeper than just through the skin and should be 2 cm long, extending over the suspected venom deposit point (because a snake strikes downward, the deposit point usually lower than the fang mark). Cuts should be made along the long axis of the limb. Do not make cross cut incisions; do not make cuts on the head, neck or trunk. Suction should be applied with a suction cup for 30 minutes. If a suction cup is not available, use the mouth. There is a little risk to the rescuer, who uses his mouth, but it is recommended that the venom not be swallowed and that the mouth be rinsed.

iv) If the hospital is not near (cannot be reached within 4 to 5 hours)

   a) Continue try to obtain professional care by transportation of the victim or by communication with a rescue service.

   b) If no symptoms develop, continue trying to reach the hospital and give the general first aid as described above.

c) If any symptom develops, apply a constricting band and perform incisions and suction immediately, as described above.

v) Other considerations

a) **Shock:** Keep the victim lying down and comfortable, maintain body temperature.

b) **Breathing and heartbeat:** If breathing stops, give mouth-to-mouth resuscitation. If breathing stops and there is no pulse, cardiopulmonary resuscitation (CPR) should be performed by those trained to do so.

c) **Identifying the snake:** If the snake can be killed without risk or delay, it should be brought with care, to the hospital for identification.

d) **Cleaning the bitten area:** The bitten area may be washed with soap and water and blotted dry with sterilize gauze. Dressings and bandages can be applied, but only for a short period of time.

e) **Cold therapy:** Cold compresses, ice, dry ice, chemical ice packs, spray refrigerants, and other methods of cold therapy are NOT recommended in the first aid treatment of snakebite.

f) **Medicine to relieve pain:** Non- aspirin pain relievers can be given to the victim for relief of pain. DO NOT give alcohol, sedatives, aspirin, or other medications.

g) **Snakebite kits:** Keep a kit accessible for all outings in snake-infested or primitive areas. vi) Symptoms;

a) Mild to moderate symptoms include mild swelling or discoloration and mild to moderate pain at the wound site with tingling sensations, rapid pulse, weakness, dimness of vision, nausea, vomiting, and shortness of breath.

b) Severe symptoms include rapid swelling and numbness, followed by severe pain at the wound site. Other effects include pinpoint pupils, twitching, slurred speech, shock, convulsions, paralysis, unconsciousness, and no breathing or pulse.

18.13 Electrical Burns

Electrical burns occur:-

i) When current passes through the body, tissues starts burning or destroying. It makes a third degree burn which may be smaller on the surface than underneath and is slow to heal.

ii) Flash burns may occur when current flashes to ground or phase to phase. Flash burns to the skin are usually not deep, usually first or second degree. Electrical burns should be treated the same as thermal burns.

iii) Flash burns to the eyes may not show at once but sometime later. In first aid for flash burns of the eye, light should be excluded by using a moist compress held lightly in place with a bandage. Eye burns should have a doctor's attention as soon as possible.

18.14 Eye Injuries

i) Loose particles may be removed from the eye with the corner of a clean bandage or handkerchief. If the particle cannot be removed easily, consult a doctor.

ii) Foreign particles imbedded in the eye should be left for a doctor. Never violate this rule, otherwise permanent damage or blindness may result. iii) In case of serious eye injury or if there is difficulty in removing a foreign particle, simply apply a clean pad or compress, and see a doctor.

iv) Chemical in the eye should be washed out immediately with large quantities of water and see a doctor.

18.15 Sprains and Strains

i) Sprains are partial or complete tears of ligaments caused by violent stretching or twisting of a joint.

ii) First aid for sprains consists of elevating the injured part and cold applications. If the sprain is severe, the part should not be used until a doctor examines it. The difference between a sprain and a fracture at the joint, which may occur together, is often difficult to determine. If in doubt, treat the injury as a fracture. iii) A strain is a muscle or tendon injury resulting from severe exertion, such as lifting from improper position, lifting too heavy a load, and quick wrenches. iv) For first aid for strain, resting the injured muscle is necessary. Heat applied in any convenient way provides relief from pain. Gentle rubbing of the part stimulates circulation and may help. Always rub upward on the part because this helps the return of blood in the veins. A little massage may help to loosen up the muscles.

18.16 Bruises

i) A bruise is caused by a blow, which breaks the small blood vessels in the tissues just under the skin.

ii) Ice or cloths wrung out of very cold water, if applied immediately, help to prevent discoloration, minimize the swelling and relieve pain.

18.17 Frostbite

i) Frostbite is more likely to occur during a high cold wind, which takes heat from the body rapidly. Usually considerable pain exists if the hands or feet are frosted. But cheeks, nose or ears often are not painful and victim may not be aware of their condition until someone tells him. Frosted areas become a dead grayish white because of ice frozen in tissues.

ii) Rubbing frozen parts is not proper treatment. Rubbing with snow is particularly bad. Massage will bruise frozen tissue and may result in gangrene. Until victim can be brought indoors, frozen part should be covered with woolen cloth or clothing, and victim should be made warm with blankets or extra clothing. As soon as possible, the victim should be brought into a warm room and given warm drink. Handle frozen part gently. It should be thawed by immersing momentarily in lukewarm (not hot) water. Hot water bottles or heating pad should not be used. After frostbitten toes and fingers are thawed, they should be exercised.

18.18 Heimlich Maneuver

i) The Heimlich maneuver was developed by Dr. Henry Heimlich, to help victims of food choking where medical assistance is not available. ii) Important Don'ts to consider;

a) Do not mistake food choking for a heart attack.

b) Do not try to give artificial respiration before blocked food is removed from windpipe.

c) Do not wait for an ambulance or doctor.

d) Do not offer water to choking victims.

e) Do not slap choking adults or adolescents on the back. However, a small child can be held upside down and slapped sharply between the shoulder blades to dislodge the food.

iii) Procedure to follow;

a) **Victim Standing or Sitting**

1) Stand behind victim and wrap your arms around victim's waist.

2) Allow victim's head, arms and upper body to hang forward. 3) Grasp your fist with other hand.

4) Place fist against victim's abdomen below rib cage, slightly above navel.

5) With quick upward thrust, press your fist forcefully into the victim's abdomen.

6) Repeat several times if necessary.

b) **Victim Alone**

If you choke on food and are alone you should attempt to perform the Heimlich maneuver on yourself by pressing your fist upward into the abdomen.

18.19 Method of Pole Top Rescue

i) Each crew or team of workers shall have at least one dry bamboo stick, at least 2 meters in length, at each job site. The strength of stick shall be proved, by applying a strain, to withstand the weight of a man. While wearing all personal insulating protective equipment, use the stick to separate the person from the source of energy. If there is knowledge of the energy supply and it can be Disconnected immediately, this shall be done first.

ii) The primary concern should be to get the victim lowered as quickly as possible – seconds count. All efforts should be directed to any safe means of lowering the victim without dropping him or making electrical contact.

iii) Each worker should learn and practice all methods of pole top rescue so as to be prepared to use the method or combination of methods best suited to the circumstances he may find. The following methods are examples which are considered safe and fast, if practiced and performed correctly. Other methods and variations should not be eliminated from consideration if they meet the requirements.

a) **Method-1**

One quick and effective method of lowering victim from pole is as under:- 1) Pass line over cross arm (not through pulley).

2) With three meters or more of working end, run end of line under one arm of victim and across the back to and through the D-shape ring of the lineman's belt.

3) Continue line across the victim's waist and through the opposite Dring.

4) Bring line up across back forming a figure 'X'.

5) Bring line forward under other arm and secure with bowline knot. It is not important how short the bowline is tied.

6) Unfasten victim's safety strap and lower him to ground.

b) **Method-2**

An alternate method which does not make use of the victim's climbing equipment may be found desirable in some cases, especially where only one rescuer is available.

1) Pass line over cross arm.
2) Working from either in front of or behind victim, take end of line around victim chest, under arms and make a half hitch leaving sufficient line for rest of tie (about 2 ½ to 3 meters).
3) Place line between victim's legs making a complete wrap around both legs and return end of line between legs.
4) Attach end of line to main rope in back with bowline knot.
5) Unfasten victim's belt and lower him to ground.

c) **Method-3**

Another method which may be found effective and time saving in some cases:

1) Pass hand-line over cross arm.
2) Run single end of spare safety strap through victim's D- rings. 3) Run single end through loop of safety strap.
4) Slide victim's belt under arm pits.
5) Snap end of safety strap to hand line.
6) Unfasten victim's safety strap. 7) Lower him from pole.
8) Where extra safety strap is not available, the hand line is run through both D-rings, tied with a bowline knot and the body belt slide up under the victim's arm pits.

18.20 Artificial Respiration

Knowledge and constant practice of the common techniques of artificial respiration is important, because delay in commencing the same could be fatal. Artificial respiration should be applied at the earliest possible moment, following electrical shock or drowning, as an early application offers the best hope of saving the life of the victim. Following are the recommended methods of artificial respiration. i) Direct methods

a) Mouth to mouth

b) Mouth to nose

c) Mouth to mouth and nose

d) Mouth to stomach

ii) Indirect methods

a) Sylvester method (chest pressure – arm lift method).
b) Holger – Nielsen method (back pressure – arm lift method).
c) Schafer method.

19 COMPENSATION PROCEDURE

19.1 Who Are Entitled to Compensation?

i) The LM/ALM who is authorized to work on the line and meet with accident.

ii) Some time it has been noticed that LM/ALM are doing work on PESCO system but in case of accident, they are shown as working unauthorized on following grounds:

a) No complaint was entered in the complaint register.

b) The work was being done without knowledge/permission of LS/SDO.

c) Working on private transformer.

d) The ALM was not authorized, etc.

Explanation

i) The public complaints remain unattended for days hence due to failure of the company in attending public complaints, the public contacts the LMs/ALMs at their own and complaints are attended and it is a practice which is in the knowledge of XEN/SDO/LS. In such failure of management, Distribution Company cannot be absolved of its responsibilities. Such accidents of LMs are due to failure of XEN and SDO to;

a) Timely attend public complaints.

b) No check on the LMs/ALMs.

ii) As presently there is no proper Complaint Management System. The LMs/ALMs (especially in rural areas) are doing complaint duties around/near their resident villages. It is also in the knowledge of LSs/SDOs and there is verbal approval of same SDOs/LSs however, when accident happens the LM/ALM is proved to be working unauthorized. Company is doing its efforts to stop such practices which ultimately result in accidents. Hence the LMs/ALMs emoluments shall not be stopped in such cases. Only following things should be established prior to giving the emoluments (till proper Complaint Management System is established and becomes functional). a) He was working in his own sub-divisional jurisdiction.

b) He was doing some work i.e. Maintenance of system/complaints.

19.2 Compensation to Employees

19.2.1 Compensation of Fatal Accident

The Accident shall be reported (preliminary report) on prescribed proforma to XEN and Director Safety. The compensation process shall be started simultaneously on the same day by SDO.

i) SDO shall send all the required documents to XEN with covering letter and check list on the same day not later than 24 hours with list and amount of emoluments to be paid.

ii) XEN and accountant shall process the case immediately and the case with check list shall be sent to concerned higher office for approval/allocation of money. iii) Manager finance shall approve/allocate the demand with in one day of receiving the demand. In case of shortage of any documents, Manager Finance shall immediately acquire the same from concerned XEN to fulfill the requirements with copy to CEO. XEN shall provide the required documents on the same day. iv) XEN and accountant both shall be responsible for payment of all dues within one week and action shall be initiated against them in case of delay of more than 07 working days.

v) Director Safety shall report such delay to HR Director and shall get approval to issue charge sheet to XEN and accountant.

19.2.2 Compensation of Non-fatal Accident

i) The case of compensation shall be initiated by SDO and sent to XEN with covering letter and check list.

ii) Percentage disability shall be established through medical board.

iii) XEN shall write for assessment to medical board within 07 days of the accident.

iv) The medical report shall be obtained within 15 days of accident and after getting the report, the case shall be sent to Manager Finance. The case shall be approved by Manager Finance within 02 days of receiving the case. In case of shortage of any documents, Manager Finance shall immediately contact concerned XEN to fulfill the requirements through WHATSAPP and Phone call with copy to CEO. XEN shall provide the required documents on the same day.

v) XEN and accountant both shall be responsible for payment of all dues within one week and action shall be initiated against them in case of delay of more than 07 working days.

vi) Director Safety shall report such delay to HR Director and shall get approval to issue charge sheet to XEN and accountant.

19.2.3 Compensation Package

i) The assistance package for families of employees who die in service or are 100% incapacitated due to Fatal/Non-fatal accidents. (Annexure-08)

ii) The compensation package for families of government employees who die in service according to Government of Pakistan shall also be in vogue and applicable. (Annexure-09)

19.3 Responsibilities for Payment of Compensation

19.3.1 Responsibilities of XEN

i) He shall ensure the maintenance of the record of families of all employees, their address, heirs, nominees and their contact numbers under his division.

ii) He shall ensure timely payment of all the emoluments to heirs of the deceased employee.

iii) He shall be responsible for payment of all dues within one week, failing which action shall be initiated against him.

19.3.2 Responsibilities of SDO

i) He shall ensure the maintenance of the record of families of all employees, their address, heirs, nominees and their contact numbers under his sub- division.

ii) He shall ensure timely payment of all the emoluments to heirs of the deceased employee.

iii) He shall be responsible to process the case for payment of all dues on the same day of accident, failing which action shall be initiated against him in case of delay of more than 02 working days.

19.3.3 Responsibilities of SDC (Sub-divisional Clerk)

i) He shall maintain the record of details of families of all employees, address, heirs, nominees and contact numbers of his sub-division.

ii) He shall prepare the case for payment of all dues on the same day of accident and get it proceeded from SDO, failing which action shall be initiated against him in case of delay of more than 02 working days.

19.3.4 Responsibilities of Divisional Accountant

i) He shall prepare the case for payment of all dues on the same day of receiving the documents from concerned office and get it proceeded from XEN, failing which action shall be initiated against him in case of delay of more than 02 working days.

19.4 Compensation to General Public

a) Whenever PESCO is held or proven responsible for the fatality or injury of a public person, the company shall give compensation to next of kin/ bereaved family in an amount equivalent to the amount given to its own employees in case of work-related fatal/non-fatal accident.
b) The company shall provide employment/job for an adult family member (nextof-kin) in order to reduce the financial constraints on the bereaved family that has lost its bread earner, with the condition that the next-of-kin must possess the eligibility for the post.
c) Next of kin is defined as a person's closest living relatives/ legal heirs through blood, marriage, or legal relationships. The line of inheritance begins with victim's spouse “widow”. If the victim's spouse “widow” is not available, then the victim's legitimate children (son and unmarried daughter), if both spouse “widow” and legitimate children are not available then the victim's legitimate parents. When the victim has no spouse “widow”, legitimate children, or legitimate parents, and he is the sole bread earner for his unmarried legitimate sisters and brothers, then his sisters and brothers shall be considered next of kin.

19.5 Compensation in Case of Animals(s)/Loss to Public Property

Whenever there is an accident that involves the animal(s)/property loss to general public, the genuine claims of the legal heirs of the animal(s)/property of the affected families shall be compensated adequately by PESCO as per policy. (Annexure-11)

20 SUBMISSION TO NEPRA MAINTENANCE RECORD AND ITS ONWARD

20.0 Documents and Record Management.

An HSE Documents and Record system shall be developed and implemented in order to ensure the effective control of documented HSE information. The control of all types of documents created, used and maintained shall include document creation, identification, numbering, revision, concurrence, approval, issuance, distribution, accessibility/ access control, change control, cancellation and periodic review.

The document control and record management procedure shall address following key areas:

a. Purpose
b. Definitions
c. Requirements
d. Responsibilities.
e. System documents
f. External documents.
g. Document preparation
h. Numbering of documents
i. Controlled documents
j. Document changes, reviews and revisions
k. Document distribution
l. Obsolete documents
m. Disposal of document
n. Records management

Note: - Fiscal Year from July to June 30, will be followed for HSE data and record.

20.1 Maintenance of Record at Sub-Division Level

At sub-division level, following record shall be maintained:

(i) PTW Register
(ii) Hazard Register
(iii) Hotspot Register
(iv) Near miss Accident Register
(v) T&P Register
(vi) SJO Register
(vii) Quality of Work Register

(viii) Number of Challans issued Register
(ix) Fatal/non-fatal Accidents
(x) Safety Call Register
(xi) Safety Walk-Around Register
(xii) Attendance Register
(xiii) Complaint Register
(xiv) Safety Precaution Talk Register
(xv) LM/ALM wise Accident Profile
(xvi) Record of disciplinary actions/inquiry against LM/ALM
(xvii) Fire incident Records
(xviii) Road side Accidents
(xix) Public Accidents Record
(xx) Animal Accidents Record

20.2 Maintenance of Record at Division Level

All record maintained at Sub-divisional level shall be compiled at division level for onward submission to circle office. In addition to this following record shall also be maintained at division level:

(i) Safety seminars conducted at Division level
(ii) Safety Calls made by XEN
(iii) Safety Walk-Arounds conducted by XEN
(iv) Number of Challans issued by XEN
(v) Record of disciplinary actions/inquiries against LM/ALM
(vi) Sub-division wise Accident Profile
(vii) LM wise Accident Profile
(viii) LS wise Accident Profile
ix) SDO wise Accident Profile

20.3 Maintenance of Record at Circle Level

All record maintained at Divisional level shall be compiled at circle level for onward submission to Chief Engineer and Director Safety Office. In addition to this following record shall also be maintained at circle level:

(i) Safety Seminars conducted at circle level
(ii) Safety Calls made by SE
(iii) Safety Walk-Arounds conducted by SE
(iv) Number of Challans issued by SE
(v) Record of disciplinary actions/inquiries against LS/LM/ALM
(vi) Division wise Accident Profile
(vii) LS wise Accident Profile
(viii) SDO wise Accident Profile
(ix) XEN wise Accident Profile

20.4 Maintenance of Record at Safety Directorate

All record maintained at circle level shall be compiled at Safety Directorate for onward submission to CEO, and NEPRA as and when required. In addition to this accident profile of all officers/officials shall be maintained and record of disciplinary cases/inquiries shall also be maintained and updated on regular basis.

21 NON-COMPLIANCE WITH THE PROVISION OF SAFETY SOP AND INQUIRY PROCEDURE

21.1 Non-compliance with the Provision of Safety SOP

The provisions of this manual shall apply to all the employees at work and the contractors working for PESCO. Corrective/Preventive actions are initiated by Corporate Safety team during audits, inspections, surveys, etc. when detected. Noncompliances are raised due to the following points:

i) Deviation from the safety policy, procedures, instructions, objectives and targets.
ii) Non-compliance to legal, regulatory, or other requirements, or increased risk resulting from non-compliance.
iii) Safety performance falling below a specified level or target.
iv) Incidents that impact human life and environment.
v) Non-conformance identified during a regulatory, customer or third-party audit.
vi) Significant processes are monitored for their impact on product quality and environmental aspects, and corrections are made when appropriate.
vii) When a significant process does not conform to its control limits, it is evaluated for its effect on product quality and the environment. If it is determined there is an impact, the product is controlled as per the nonconforming materials process. viii) All the employees of PESCO at work and the contractors working for PESCO shall comply with this manual. The requisite level of compliance with this Manual shall be made a part of the contract between a contractor and PESCO. In case a contractor is found to be in breach of this Manual, his contract shall be liable to immediate termination.
viii) Industrial labor standards shall be adopted.
ix) If any employee is found indulged in non-compliance, he shall be dealt in accordance with the procedure as laid down in this manual. (Annexure-05)

21.2 Inquiry Procedure

i) Upon any report/information with evidence of non-compliance of safety SOP, a preliminary report shall be sent to Chief Executive by Director Safety within 07 days.
ii) Charge sheet shall be issued within one week after preliminary report.
iii) Final inquiry shall be done in a manner as laid down in this manual. (Annexure-05)

22 DATA BASE OF POWER SAFETY AND OPERATION & MAINTENANCE CHARTS

22.1 Conversion Factors Commonly Used

Weight/mans

1 ton	=	1000 kg
1 kg	=	2.204 Pound (lb)
1 lb	=	0.453 kg

Length

1 micron (μ)	=	1 micro meter = 10^{-6} m
1 inch	=	2.54 cm
1 mm	=	0.039 inch
1 foot (ft)	=	0.305 m
1 meter (m)	=	3.280 ft
1 m	=	39.37 inch
1 mile	=	1.609 km

Force & moment of force/torque

1 kg	=	9.806 Newton (N)
1 N	=	0.102 kg
1 lb	=	4.448 N
1 N	=	0.224 lb
1 ft.lb	=	1.355 Nm
1 Nm	=	0.749 ft.lb
1 kgm	=	9.806 Nm
1 Nm	=	0.102 kgm
1 kgm	=	7.336 ft.lb
1 ft.lb	=	0.138 kgm

Pressure

Atmosphere (standard)	=	101.325 kPa = 14.7 psi
Gauge pressure	=	Actual pressure + Atmosphere pressure
1 bar	=	100 kPa = 0.1 MPa
1 kPa	=	10 mbar
1 MPa	=	10 bar
1 bar	=	14.5 psi = 1.02 kg/cm^2
1 psi	=	0.07 kg/cm^2
1 kg/cm^2	=	14.21 psi
1 Torr	=	133.328 Pa = 1.33 mbar
1 Pascal (Pa)	=	0.0075 Torr
1 kPa	=	7.5 m Torr
1 mbar	=	0.75 Torr
1 psi	=	6.894 kPa
1 kPa	=	0.145 psi
1 kg/cm^2	=	98.066 kPa
1 kPa	=	0.010 kg/cm
1 kg/litre	=	10.1 lb/gallon
1 lb/gallon	=	0.099 kg/litre
1 atm	=	29.98 inch of Hg at 20 °C
14.9 psi	=	76 cm of Hg at at 20 °C
1 Torr	=	1 mm Hg at 20 °C
Vacuum	=	negative (-)ve pressure < 1 atm

Temperature

i) $°C = (°F - 32) \times \frac{5}{9}$

ii) $°F = (°C \times \frac{9}{5}) + 32$

22.2 Strength and Weight of Materials

Weight of Materials Based on Volume			
Material	**Approx. Weight lbs per Cubic Foot**	**Material**	**Approx. Weight lbs per Cubic Foot**
Metals		**Timber, Air Dry**	
Aluminum	165	Cedar	22
Brass	535	Fir, Douglas seasoned	34
Bronze	500	Fir, Douglas unseasoned	40
Copper	560	Fir, Douglas wet	50
Iron	480	Fir, Douglas glue laminated	34
Lead	710	Hemlock	30
Steel	490	Pine	30
Tin	460	Popular	30
		Spruce	28
Masonry		**Liquids**	
Ashlar masonry	140-160	Alcohol (pure)	49
Brick masonry soft	110	Gasoline	42
Brick masonry common (about 3 tons/thousand)	125	Oils	58
		Water	62
Brick masonry pressed	140	**Earth**	
		Earth (wet)	100
Clay the masonry (average)	60	Earth (dry, about 250 lbs. per cubic yd)	75
Rubble masonry	130-155	Sand & gravel (wet)	120
Concrete, cinder, haydite	100-110	Sand & gravel (dry)	105
Concrete (slag)	130	River sand (about 3240 lbs. per cubic yd)	120
Concrete (stone)	144		

Weight of Materials Based on Volume			
Material	**Approx. Weight lbs per Cubic Foot**	**Material**	**Approx. Weight lbs per Cubic Foot**
Concrete (stone reinforced, 450 lbs per cubic yd)	150	**Various building materials**	
Ice & Snow		Cement (portland loose)	94
Ice	56	Cement (portland set)	183
Snow (dry, fresh, fallen)	12-25	Lime, gypsum (loose)	53-64
Snow (dry, packed)	125	Mortar, cement lime (set)	103
Snow (wet)	?	Crushed rock (about 2565 lbs per cubic yd)	90-110
Miscellaneous	80		
Asphalt	75		
Tar	160		
Glass paper	60		

22.3 Safe Working Load (SWL) of New Fiber Ropes of 3-Strand Ropes with Factor of Safety = 5

Nominal Rope Diameter (inch)	Manila Rope (SWL) (lbs)	Nylon Rope (SWL) (lbs)
$\frac{3}{16}$	100	200
$\frac{1}{4}$	120	300
$\frac{5}{18}$	200	500
$\frac{3}{8}$	270	700
$\frac{1}{2}$	500	1250
$\frac{7}{8}$	1540	3800
1	1800	4800
$1\frac{1}{8}$	2400	6300
$1\frac{1}{4}$	2700	7200
$1\frac{1}{2}$	3700	10200
$1\frac{5}{8}$	4500	12400
$1\frac{3}{4}$	5300	15000
2	6200	17900

23 FIRE SAFETY

23.1 Classification of Fire and Fire Extinguishers

23.1.1 Different Classes of Fire

Fire Class	Description
A	Solid matters such as wood, rubber, paper textiles etc.
B	Liquid combustible material such as petrol, oils, alcohol, grease, ether etc.
C	Burning gases, acetylene, propane, butane, methane etc.
D	Combustible light metals such as lithium, sodium, magnesium, calcium etc.
E	Fire on electrical plants.

23.1.2 Fire Extinction

In order to extinguish fire, the following substances are generally used:

(i) Water-spray, jet, steam and fog

(ii) Foam

(iii) Carbon dioxide

(iv) Halogenated Hydro-carbons

(v) Dry chemicals

23.1.3 Types of Fire Extinguishers

i) Water type (soda acid) sodium bicarbonate solution.

ii) Water type (gas press) CO_2 cartridge.

iii) Foam type (chemical) sodium bicarbonate plus aluminum sulphate solution.

iv) CO_2 type.

v) Dry chemical (sodium bicarbonate, mono ammonium phosphate, potassium chloride, potassium bicarbonate).

v) Dry power (sodium chloride, graphite base powers) for metals fires only.

vi) Halon (BCF or BTM) green 1301 & 1211.

24 GENERAL SAFETY PRACTICES

24.1 Safe Limits of Approach for Workers While Working in Vicinity of Live Electrical Apparatus

i) **For Unqualified Workers**

Nominal Phase to Phase Voltage (Volts)	Limits of Approach
750 to 150,000	3.05 m (10 ft)
150,001 to 250,000	3.58 m (15 ft)
250,001 to 550,000	6.10 m (20 ft)

ii) **For Qualified Workers**

Nominal Phase to Phase Voltage (Volts)	Limits of Approach
750 to 15,000	0.92 m (3 ft)
15,001 to 50,000	1.22 m (4 ft)
50,001 to 150,000	1.53 m (5 ft)
150,001 to 250,000	2.14 m (7 ft)
250,001 to 550,000	3.66 m (12 ft)

iii) **For Specially Qualified Workers**

Nominal Phase to Phase Voltage (Volts)	Limits of Approach
750 to 15,000	0.31 m (1 ft)
15,001 to 50,000	0.46 m (1.5 ft)
50,001 to 150,000	0.92 m (3 ft)
150,001 to 250,000	1.22 m (4 ft)
250,001 to 550,000	2.75 m (9 ft)

24.2 Safe Limits of Approach for Mobile Cranes While Working in Vicinity of Live Electrical Apparatus

i) **For Cranes and Power Shovels**

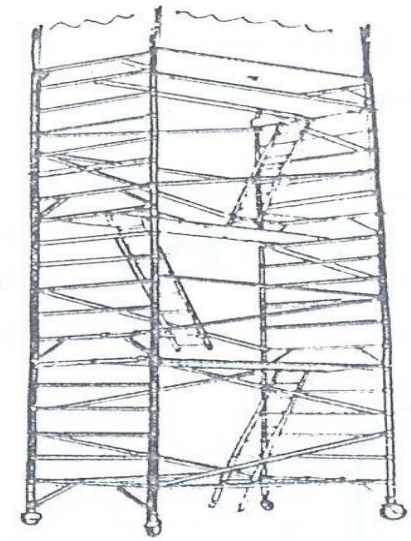
Nominal Phase to Phase Voltage (Volts)	Limits of Approach
750 to 15,000	3.05 m (10 ft)
15,001 to 50,000	3.05 m (10 ft)
50,001 to 150,000	3.05 m (10 ft)

150,001 to 250,000	4.58 m (15 ft)
250,001 to 550,000	6.10 m (20 ft)

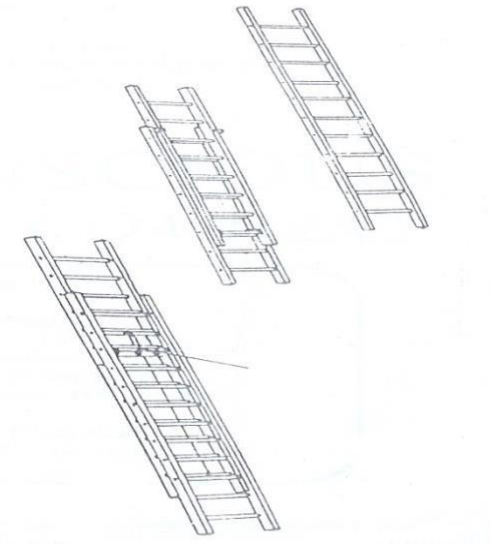
ii) **For Aerial Frames and Ladders**

Nominal Phase to Phase Voltage (Volts)	Limits of Approach
750 to 15,000	0.92 m (3 ft)
15,001 to 50,000	1.22 m (4 ft)
50,001 to 150,000	2.44 m (8 ft)
150,001 to 250,000	3.05 m (10 ft)
250,001 to 550,000	4.58 m (15 ft)

24.3 Ladders and Scaffoldings

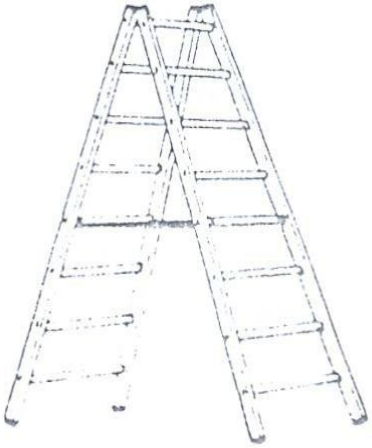


Scaffolding



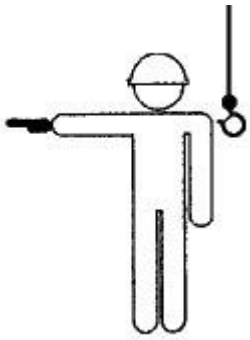
Insulated Extension Ladder

Combination Straight/Step Ladder



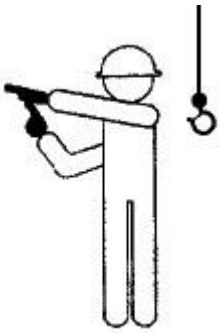
Step Ladder

24.4 Standard Hand Signals for Crane Operation



Stop

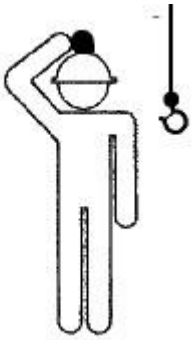
Dog Everything



Move Slowly

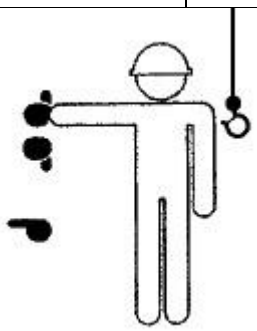
Hoist

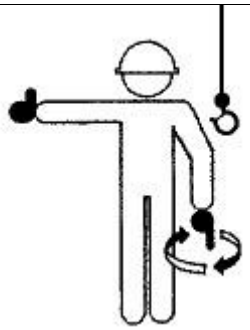
Lower



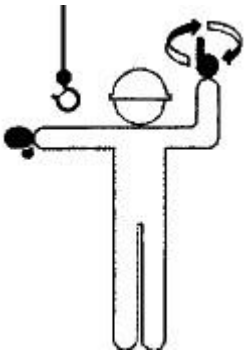
Use Main Hoist

Use Auxiliary Hoist

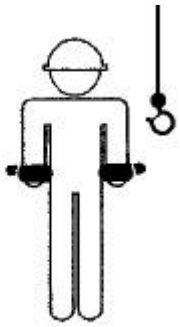




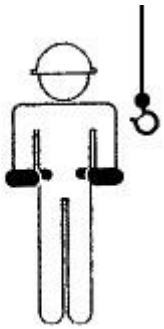
Raise Boom, Lower Boom, Raise the Boom and Swing Lower the Load



Lower the Boom and Raise the Load

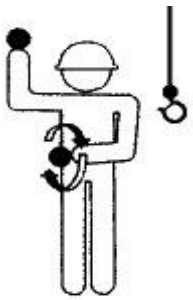


Extend Boom



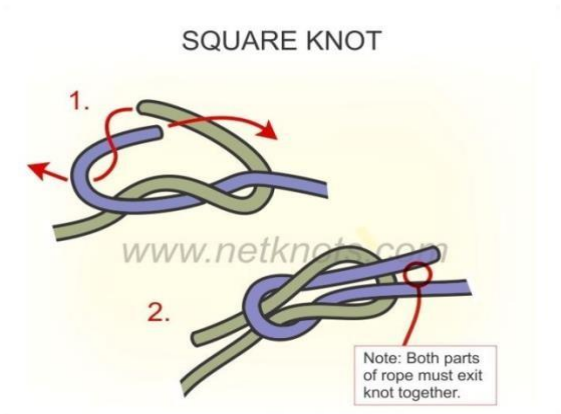
Retract Boom

Travel (Both Tracks)

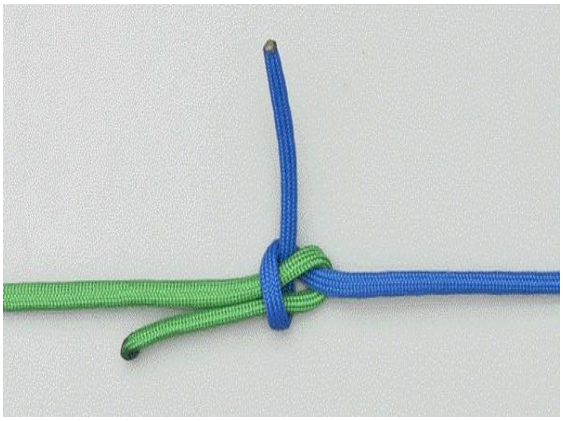


Travel (One Track)

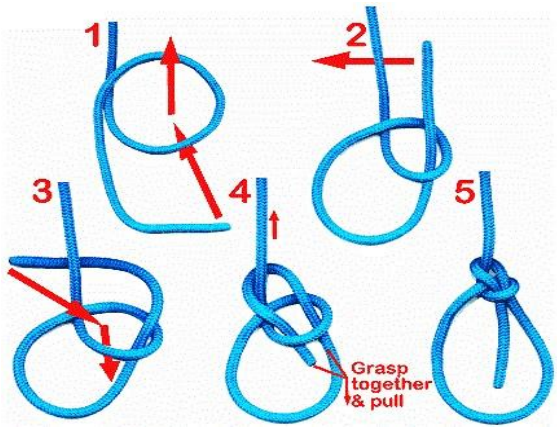
24.5 Fiber Rope Knots and Hitches



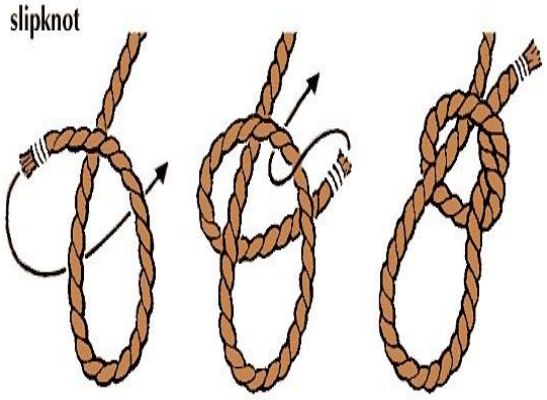
Reef or Weaver Knot
for joining two ropes of same Size



Sheet Bend or Weaver Knot
for joining ropes of different size

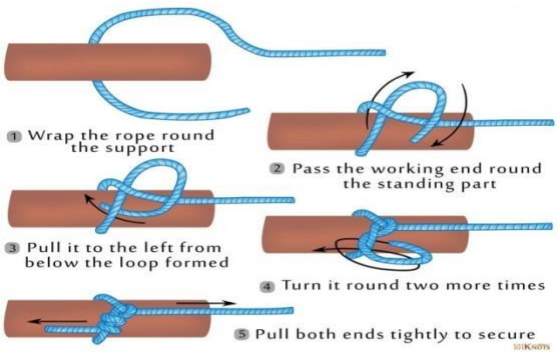


Bowline Knot - a Universal Knot



Running Bowline - Slipknot

Overhand Knot for joining two ropes



Timber Hitch for steady loads only

25 HSE AND TRAFFIC SIGNAGE

25.1 HSE Signs

25.2 Purpose

The purpose of this section is to provide guidelines based on world recognized standards as well as best industry practices to ensure that all safety signs, sign boards, tags and other hazard communication methods at PESCO and its administered location are homogenized and according to world class standards.

25.3 Scope

This section shall apply to all Safety Signs, sign boards, Tags and other hazard communication methods at all PESCO administered locations and infrastructures PESCO believes that all hazards should be clearly identified, and proper actions shall be taken to prevent any human interaction with these hazards.

25.4 Type of Signs

a. Prohibition/ Danger Sign

A sign prohibiting behavior likely to increase or cause danger (e.g. "no access for unauthorized persons"). Danger signs shall be used only where an immediate hazard exists. Danger signs shall have red as the predominating color for the upper panel; black outline on the borders; and a white lower panel for additional sign wording. Intrinsic features:

1) Round shape.
2) Black pictogram on white background, red edging and diagonal line (the red part to take up at least 35% of the area of the sign).

b. Warning/ Caution Sign

A sign giving warning of a hazard or danger. Caution signs shall be used only to warn against potential hazards or to caution against unsafe practices. The standard color of the background shall be yellow; and the panel, black with yellow letters. Any letters used against the yellow background shall be black. Intrinsic features:

1) Triangular shape
2) Black pictogram on a yellow background with black edging (the yellow part to take up at least 50% of the area of the sign)

c. Notice and Mandatory Sign

A sign prescribing specific behavior (e.g. eye protection must be worn"). Notice sign must be square in shape with a blue background and message written in white.

Mandatory Sign Intrinsic features:

1) Round shape
2) 2. White pictogram on a blue background (the blue part to take up at least 50% of the area of the sign).

d. Emergency Escape Sign

A sign giving information on emergency exits, first aid, or rescue facilities. i.e. emergency exit/ escape route. Escape signs, when required, shall be lettered in legible red letters, not less than 6 inches high, on a white field and the principal stroke of the letters shall be at least three-fourths inch in width.

Intrinsic feature; rectangular or square shape.

e. Safety Instruction Signs

Safety instruction signs, when used, shall be white with green upper panel with white letters to convey the principal message. Any additional wording on the sign shall be black letters on the white background (see accompanying figure).

f. Directional Signs

Directional signs, other than automotive traffic signs specified in the paragraph below, shall be white with a black panel and a white directional symbol. Any additional wording on the sign shall be black letters on the white background.

g. Traffic Signs

Construction areas shall be posted with legible traffic signs at points of hazard. All traffic control signs, or devices used for protection of construction workers shall conform to American National Standards Institute ANSI D6.1-1971, Manual on Uniform Traffic Control Devices for Streets and Highways

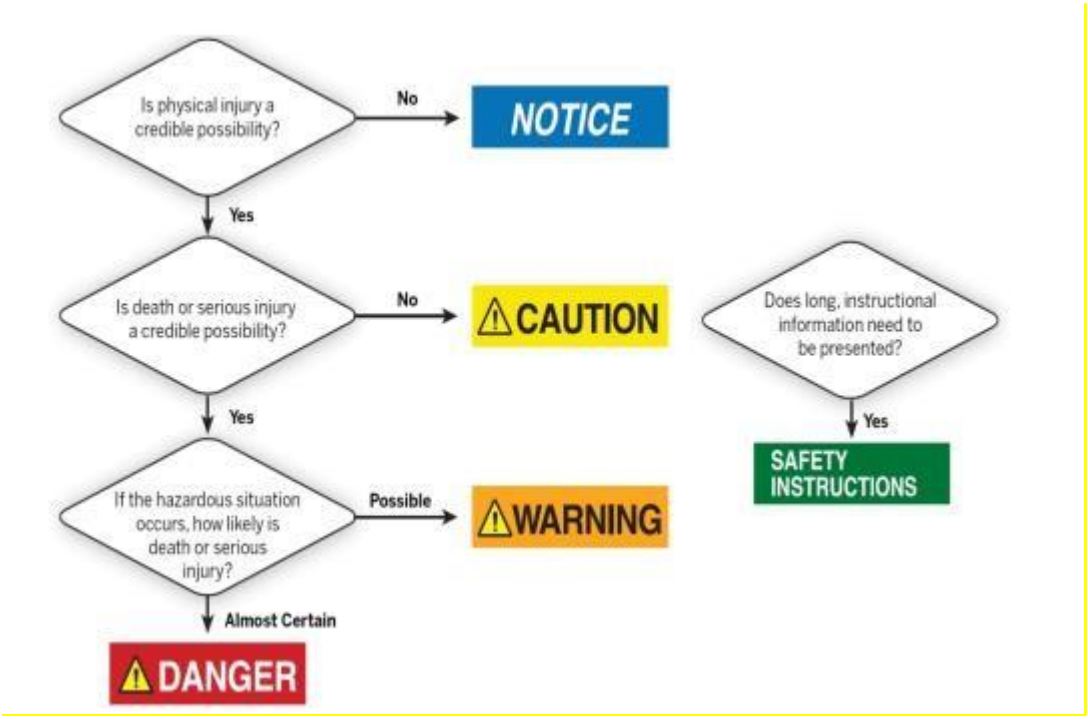
h. Fire Safety Sign

Provides information on the identification or location of firefighting equipment or gives warning in case of fire.

Intrinsic features:

1) Rectangular or square shape.
2) White pictogram on a red background (the red part to take up at least 50% of the area of the sign).

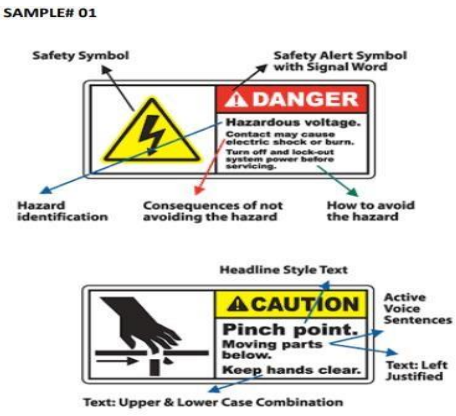
25.5 How to select a sign to match risk level



25.6 Design Specifications

SAFETY SIGNS FORMAT

The safety alert symbol shall precede the signal word. The base of the safety alert symbol shall be on the same horizontal line as the base of the letters of the signal word. The height of the safety alert symbol shall be equal to or exceed the signal word in letter height. For safety tags, signal word panel shall be located near top of the tag, above message panel. Following are the standard formats of safety signs / tags/ boards.



25.7 Road and Traffic Signs

25.7.1 Warning Signs

Speed Breaker

Road Dips

Uneven Road

Slippery

Narrow Bridge Ahead

Danger Ahead

25.7.2 Regulatory Signs

Roundabout Ahead

Give Way

Traffic Signal Ahead

Lane Control

Keep Left

Keep Right

25.7.3 Mandatory Signs

Stop

No Entry

Road Closed

Overtaking Prohibited

Audible Warning

U-Turn Prohibited

Right Turn Prohibited

One Way Road

U-Turn

Four Way Stop

No Parking

Speed Limit 50 km per hour

26 ASSET INTEGRITY MANAGEMENT

26 ASSET INTEGRITY MANAGEMENT

PESCO believes that a comprehensive Asset Integrity program is necessary to ensure that the systems integrity is maintained throughout the life of equipment and facility. Asset Integrity program shall comprise of following tests, inspections, & procedures:

(i) Equipment tests and inspections
(ii) Predictive and preventive maintenance.
(iii) Reliability engineering
(iv) Maintenance procedures
(v) Quality control procedures
(vi) Training and performance of maintenance personnel

26.2 Purpose

The purpose of the program is to ensure that equipment, instruments, devices, and systems remain in good physical condition and to avoid degradation due to mechanically, chemically, biologically, excessive vibration or corrosion.

26.1 Scope

The scope of program shall include new as well as existing Grids, equipment and apparatus for inspection and quality control applied during the construction and maintenance activities'

26.3 Process

Various areas under consideration will be:

i) Inspection and quality control shall address scope, minimum requirements, types and intervals, essential for equipment, instruments, devices, and systems whose deterioration and failure may adversely affect overall efficiency, and to assure safety, reliability and integrity of the system with reliable and efficient safe operation.
ii) Preventive Maintenance Plans shall be scheduled based on inspection outcomes for each critical system/ equipment to increase their availability by reducing downtime caused by failure.
iii) Safety critical protection devices, instrumentation, interlocks, protection relays, breakers, controls, safety relief valves, F&G detection system, software and components that are the last lines of defense and whose failure will result in a significant incident shall be reviewed to identify and establish a list.

iv) PESCO Management of Change (MOC) Committee shall review and approve any change, modification, addition or deletion of safety critical protection devices, instrumentation, interlocks, protection relays, breakers, controls, software, components and its list.

v) Each department shall develop appropriate procedures for testing of equipment, frequency of testing, acceptable limits and passing criteria of the tests of safety critical protection devices, instrumentation, interlocks, protection relays, breakers, controls, software and components.

vi) Safety critical protection devices, instrumentation, interlocks, protection relays, breakers, controls, software and components shall be bypassed, isolated or taken out of service only for specified reasons such as repair and planned tests/ inspections, with formal documented approval for minimum possible time, and the work on these components shall continue uninterrupted till the system is back as normal on-line.

27 MANAGEMENT OF CHANGE

27.2 Purpose

As changes whether to or within the documented process safety information package may potentially lead to an unsafe condition and/or incident, therefore, all changes must go through an appropriate review and authorization before being implemented, for which a Management of Change (MOC) committee shall be established to manage and control the permanent or temporary changes in plant or facility during design, construction and operation effectively through an established system.

27.1 Scope

Distribution networks, transmission and Grids are initially designed as per standard engineering practices and legal requirements, however during its lifetime there may be changes to the documented (e.g., hazard of material, equipment design basis & process design basis) can invalidate the initial hazard evaluations. Similarly, the subtle or temporary changes can lead to catastrophic events. Therefore, these changes must be made in such a manner that safety, integrity of the plant, other facilities and environment is not compromised.

27.2 Process

MOC Committee/ Team shall periodically review and approve any change, modification, addition or deletion. MOC program shall also ensure that any change "Not in Kind" shall have safeguards in place to eliminate the possibility of hazards introduction as a result of changes to technology, operations, utilities, parameters, trips, set points, chemicals and plant and equipment.

28 TASK RISK ASSESSMENT/JOB SAFETY ANALYSIS

28.1 Purpose

The purpose of a Task Risk Assessment (TRA)/ Job Safety Analysis (JSA) or Job Hazard Analysis (JHA) to identify all known hazards, eliminate them or apply controls to bring it within ALARP.

28.1 Scope

The scope of TRA/JSA/JHA shall cover all activities that are not covered by a standard operating procedure such as projects, modifications, repairs & maintenance, testing, inspection and turnaround in the existing operational facilities.

28.1 Process

The job plan or method statement shall be developed, agreed by site In-charge, permit to work issuer and receiver.

a. Conditions warranting a TRA/JSA/JHA shall be conducted for tasks:

i) Where the hazards and control measures need to be formally assessed.
ii) That have the potential for a serious incident.
iii) That have a history of incidents or near misses.
iv) That are not covered by a standard operating procedure or work instruction
v) That are Non-Routine Tasks or tasks that are being carried out in unusual or new circumstances.
vi) Tasks that are relatively complex.

b. Typical examples of the jobs requiring TRA/JSA are:

(i) Confined Space Entry
(ii) Cutting or Welding
(iii) High risk activities involving crane lifts such as use of crane suspended man baskets, tandem lifts, night-time lifts, limited access situations, near overhead power lines, etc.
(iv) High risk material handling such as heavy product containers.
(v) Activities on pressure vessels, piping, or equipment that could not be depressurized.

(vi) Activities involving use of new and/or potentially hazardous equipment, such as grit blasting, chemical cleaning, and high-pressure hydro-jetting.

(vii) Activities where a person is required to use any fall arrest system, safety harness/ safety net.

(viii) Activities involving multi-disciplinary groups on the same apparatus/ Equipment or location.

(ix) Simultaneous project works in the plants.

(x) Work involving electrical equipment and testing activities (repair, maintenance, troubleshooting or testing on electrical circuits, components, or systems,

(xi) Switching devices such as circuit breakers etc.).

29 EMERGENCY MANAGEMENT SYSTEM

29.1 Purpose

A comprehensive Emergency Management System to reduce losses caused by emergencies shall be developed and implemented by Safety Directorate throughout PESCO. The purpose of this system is to ensure that effective incident readiness and response plans are in place to limit and control the consequences of incident. The key elements of this EMS will be:

(i) Witten procedure
(ii) Emergency response equipment
(iii) Training
(iv) Mock drills

29.2 Effectiveness

The effectiveness of this system shall be achieved by:

(i) Correctly identifying emergencies
(ii) Suggesting effective mitigation measures
(iii) Developing workable plans
(iv) Acquiring and maintain appropriate equipment
(v) Conducting realistic trainings
(vi) Conducting announced and unannounced mock drills
(vii) Drawing conclusions from practice and continually improving the system

29.2 Considerations

Various considerations to be kept in mind while developing and implementing the Emergency Management System are:

(i) Highlight and address the mitigation, preparation, response and recovery of emergency scenarios, specific to PESCO operations, its risks and uncontrolled significant aspects.
(ii) Effect of incidents caused by neighbors or effect of incidents caused by PESCO on its neighbors, both shall be considered.
(iii) Employees shall be properly trained in handling emergencies and its record shall be maintained.
(iv) Emergency handling equipment shall be made available at site.
(v) The emergency handling equipment shall be properly maintained and routinely inspected.

(vi) Designated employees/ contractors shall be properly trained in the use of firefighting equipment.
(vii) Only trained employees/ contractors having appropriate PPE shall respond to an incident, other employees/ contractors shall follow the evacuation plan.
(viii) Employees/ contractors in the affected area shall stop the assigned job in a safe manner (conduct emergency shutdown/ isolation of operating equipment), if it is safe to do so as per SOP/ work instruction.
(ix) They shall evacuate the affected area and proceed to the designated safe assembly point.
(x) All employees/ contractors after hearing emergency alarm should gather at the assembly point and wait for further instructions.
(xi) Assembly area shall be at least 100 feet away from Hazardous Area.
(xii) Employees or contractor's employee shall stop and turn off their vehicle/ Heavy equipment and park in a safe manner till the "All Clear" is announced. Don't block exit routes and routes for emergency responders.
(xiii) Mock drill (announced/ unannounced) of the on-site EMS shall be conducted at least once every three (03) months.
(xiv) Emergency Drills shall be conducted after coordination with local authorities.
(xv) Record of each drill shall be retained for period of one fiscal year.
(xvi) The results of each mock drill shall be evaluated and used for improvement of the emergency management system.

30 COMPLIANCE TO THE LEGAL AND OTHER REQUIREMENTS

30.1 Purpose

In order to ensure legal and regulatory compliance in a systemic way, a compliance register for national, provincial and other legal requirements as applicable regarding Health, Safety and Environment HSE rules and regulations will be prepared and maintained by Safety Directorate.

30.2 Reference Documents

The legal register shall be prepared as per NEPRA format and reviewed from time to time to ensure its Updation. The legal register shall include (whichever are applicable) but not limited to the following:

- Power Safety Code for licensees Jun, 2021
- Electricity Act 1910,
- Factories Act 1934,
- The Petroleum Act 1934,
- Electricity Rules 1937,
- Gas Cylinder Rules 1940,
- Civil Defense Rules 1951,
- West Pakistan Factories Canteen Rules 1959,
- The Workmen Compensation Act 1923 and Rules 1961,
- The West Pakistan Hazardous Occupation Rules 1963,
- Civil Defense Ordinance 1987,
- Pakistan Environmental Protection Act 1997,
- Pakistan Environmental Assessment Procedures 1997,
- Environmental Sampling Rules 2001,
- National Environmental Quality Standards November 26, 2010,
- Boilers & Pressure Vessel Ordinance 2002,
- Mineral and Industrial Gases Safety Rules 2010,
- Explosives Rules 2010,
- Hazardous Substance rules 2014,
- Building Code of Pakistan Fire Safety Provision 2016, - Provincial legal requirements.

31 SAFETY MANUAL REVIEW AND UPDATE

31.1 Objective

To establish a method whereby the PESCO Safety Manual can be uniformly updated when changes in federal, provincial, or local standards occur or as required to fulfill the needs of a healthy safety management system.

31.2 Safety Manual Review and Update Committee

PESCO has established a committee to review and update the Safety Manual as per the procedure in place.

31.3 Procedure

i) Minor / editing mistakes in the PESCO Safety Manual will be corrected by the Dy Director Safety Directorate Document Control by signing and dating the respective change area and sending the amended page(s) through a memo / correspondence to the copy holders on the relevant distribution list with instructions to destroy the obsolete page(s).

ii) Record of distribution of amended pages(s) will be maintained by Assistant Director Safety Directorate with receiving signatures and dates on the master copy or accompanying memo/correspondence.

iii) A copy of the amended page(s) will be kept by the Assistant Director Safety Directorate accordingly.

iv) To facilitate necessary dialogue and recommendations for proposed revisions to the Safety Manual (Manual), the Safety Manual Review and Update Committee (Committee) shall appoint a Subcommittee.

a) This Subcommittee shall be comprised of the Director Safety, who shall be Chairman of said Subcommittee and one (01) member nominated by Operation Director, Chief Engineer (O&M) dist. Chief Engineer (O&M) T&G, Chief Engineer Development, Chief Engineer (P&E) and DG HR serving on the Committee.

b) The Director Safety shall convene meetings of the Subcommittee as frequently as is necessary to have dialogue concerning proposed revisions to the Manual and having had such, make recommendations for revisions to the Manual to the Committee.

c) An individual shall be so designated to take the minutes of said meetings, and document any such recommendations.

d) The Director Safety shall submit written copies of any recommendations for revisions to the Manual to all members of the Committee at least ten (10) days prior to any of their quarterly meetings for their consideration and appropriate action.

v) All proposed revisions to the Manual shall be submitted in written form detailing the proposed revisions. Any and all proposed revisions must be signed by the author of the proposal.

a) Written proposed revisions to the Manual from stakeholders shall be submitted to the Director Safety then forwarded to all members of the Subcommittee for appropriate review and recommendations.

b) Written proposed revisions to the Manual initiated by the Director Safety and/or staff shall be submitted to all members of the Subcommittee for appropriate review and recommendations.

c) The Director Safety shall submit written copies of any proposed revisions to the Manual to all members of the Subcommittee at least ten (10) days prior to any of their scheduled meetings for their consideration and appropriate action.

23.4 Responsibility

i) The Committee shall be responsible for appointment of the Subcommittee, taking appropriate action on their recommendations for revisions to the Manual, and directing the Director Safety to update the Manual as needed to meet any revisions necessitated by changes in federal, provincial, or local standards. The Manual will be revised at one-year intervals (i.e., 2020 Version, 2021 Version, etc.). Revisions for the upcoming version of the Manual, along with comment periods for the proposed revisions, shall be completed during one year preceding the new version.

ii) The Subcommittee shall be responsible for meeting to consider proposed revisions to the Manual and for making recommendations to the Committee as to the content of necessary revisions to the Manual.

iii) The Director Safety shall be responsible for apprising the committee of changes in federal, provincial, or local standards that would necessitate a revision in the Manual, forwarding proposed revisions to the Manual to the Subcommittee, and scheduling appropriate meetings for review, forwarding the recommendations of the Subcommittee to the Committee, and ensuring that the Manual is updated as directed by the Committee.

ANNEXURES

Safety Precaution Talk Form — **ANNEXURE - 01**

Peshawar Electric Supply Company
SAFETY PRECAUTION TALK (SPT) FORM

Division:	**Date:**	**Time:**
NAME OF TEAM MEMBERS	**DESCRIPTION OF WORK**	
1.	1.	
2.	2.	
3.	3.	
4.	4.	
5.	5.	
HAZARDS IDENTIFIED	**CONTROLS**	
1.	1.	
2.	2.	
3.	3.	
4.	4.	
5.	5.	

NOTE:
Before starting each job, the employee in-charge shall conduct a job briefing with the employees involved. The briefing shall cover such subjects as hazards associated with the job, work procedures involved, special precautions, energy source controls, personal protective equipment requirements, and the information of PTW.
In case of work on damaged transformer replacement or on the 11 kV line, the LS/Supervisor shall accompany the gang. He shall conduct site survey and also take PTW and ensure all safety precautions according to the site situation including line isolation and earthing and safety PTW on other feeders etc.

Certificate of Gang

Our on duty LS/Supervisor has given us proper job briefing in the office and also provided us the official Vehicle with driver, Ladder, All PPE and T&P for performing the job as per identified controls. Our gang will also conduct similar verbal Safety Precaution talk (SPT) at work site and in case of any unidentified hazard or confusion we will immediately contact our supervisor.

Name of LM: ……. **Name of ALM#1:** …….

Signature: …….. **Signature…**…….

Name of Vehicle Driver: …….. **Name of ALM#2: ……**

Signature: …… **Signature:** ……

Official Vehicle#: ……

Meeting Conducted and Certificate Issued

I have given proper job briefing as above (Hazards and Controls), official Vehicle with driver, ladder, all PPE and T&P for performing the job as per identified controls. In case of work on damage transformer replacement or on 11 kV line or information of any unidentified hazard, I shall personally accompany the gang and for obtaining PTW and getting the work done under my own supervision.

Name of LS/Supervisor: ……

Designation: …….....

Signature: …….....

External Audit Proforma for Sub-Divisions **ANNEXURE - 02**

Peshawar Electric Supply Company
SUB-DIVISION SAFETY CHECKING REPORT

CHECKING OFFICER: **Date:**

S.N	Description	Items	Status
1	Hot Spot Register	Number of entries	
		Date of last entry	
2	Near Miss Accident Register	Number of entries	
		Date of last entry	
3	PTW Register	Number of entries	
		Date of last entry	
4	PTW Taken	Number of 11 kV faults during last 30 days.	
		Number of PTWs taken for 11 kV faults during last 30 days.	
		%age of PTWs taken from above two rows	
		Number of faults on HT/LT side of transformers during last 30 days.	
		Number of PTWs taken for HT/LT faults of transformer(s) works during last 30 days.	
		%age of PTWs taken from above two rows	
		Number of new transformer(s) installed in LT proposals/new connection/augmentation.	
		Number of PTWs taken for installation of transformer(s) during last 30 days.	
		%age of PTWs taken from above two rows	
5	SPT Form	Number of times gangs went to site.	
		Number of forms filled.	
6	Hazard Register	Number of entries	
		Date of last entry	
7	Patrol Book	Name of feeder	
		Name of LS	
		Number of entries	
		Date of last entry	
8	Safety Walk-Arounds	Number of Safety Walk-Arounds conducted during last 30 days	

9	Safety Call	Number of Safety Calls made during last 30 days	
10	Morning Assembly	Yes/No	
11	PTW Flexes	Displayed/Not displayed	
12	Earthing Flexes	Displayed/Not displayed	
13	Name Plates of Feeders on Poles/Structures	Feeder Name	
		Number of structure/poles checked.	
		Number of structure/poles with name plates.	
		Precise location of area checked from with reference number.	
		Precise location of area checked to with reference number.	
14	Independent Transformer Installed (Position & Hazards)	Reference number	
		Location	
		HT droppers passing through LT of general duty transformer/HT is proper	
		Any other hazard	
15	Trolley Transformer Hazards	D-set installed/Not installed	
		Cross arm installed/Not installed.	
		Cable/Insulated conductor installed.	
		Whether the insulated conductor/cable installed properly with cross arm.	
		Transformer jumpers at LT/HT bushings Ok/Not Ok	
16	Trolley Transformer	Total Number of trolleys	
		Number of empty trolleys	
17	Earthing Sets	Number of sets available/Not available	
		Total drawn from store up till now.	
		Working/Not working	
18	Checking of Staff at Site	Work entered in complaint/maintenance register	
		Location of staff with reference number (if applicable) Nature of work	
		Safety SOP followed/Not followed (i.e. PPE used, earthing done etc.)	
19	Emergency Lights in Vehicles	Installed/Not installed	
		Working/Not working	
20	Torches	Number of torches available	
		Number of torches working	

External Audit Proforma for Grid Station **ANNEXURE - 03**

Peshawar Electric Supply Company
GRID STATION SAFETY CHECKING REPORT

PROFORMA GSO (SAFETY) – I

CHECKING OFFICER: **Date:**

Sr. No.	Description	Items	Status
1	**Hazard Register**	Number of entries	
		Date of last entry	
2	**Fire Fighting Equipment**		
a	**Sand Buckets**	Total number of sanctioned buckets (Copy attached)	
		Number of available buckets	
		Number of buckets unfilled	
		Number of buckets in faulty condition	
b	**Fire Extinguishers CO_2**	Total number of sanctioned extinguishers (Copy attached)	
		Number of available extinguishers	
		Date of last refill	
		Date of expiry	
		Number of extinguishers expired	
		Number of extinguishers unfilled	
		Total number of extinguishers in working condition	
		Total number of extinguishers in faulty condition	
c	**Fire Extinguishers Foam Type**	Total number of sanctioned extinguishers (Copy attached)	
		Number of available extinguishers	
		Date of last refill	
		Date of expiry	
		Number of extinguishers expired	

Sr. No.	Description	Items	Status
		Number of extinguishers unfilled	
		Total number of extinguishers in working condition	
		Total number of extinguishers in faulty condition	
d	Fire Extinguishers Dry Powder	Total number of sanctioned extinguishers (Copy attached)	
		Number of available extinguishers	
		Date of last refill	
		Date of expiry	
		Number of extinguishers expired	
		Number of extinguishers unfilled	
		Total number of extinguishers in working condition	
		Total number of extinguishers in faulty condition	
3	First Pole Hazards	Total number of feeders	
		Number of feeders with insulation kit OK	
		Number of feeders with insulation kit Not OK	
		Number of feeders touching/ crossing other feeders	
		Any other hazard	
4	Name Plate on First Pole of Feeder	Total number of feeders	
		Number of feeders with name plate	
		Number of feeders without name plate	
5	Cable Condition in Switch Yard	Number of cables in trench	
		Number of cables on ground	
		Number of cables buried on surface	
6	Grass Condition in Switch Yard	OK/ Not OK (If Not OK specify size i.e. 4", 8", 12")	
7	Oil Leakage in Power Transformer	Yes/No (If Yes specify leakage point of transformer)	

Sr. No.	Description	Items	Status
8	Silica Gel Condition	Total number of transformers	
		Number of transformers with bluish Silica Gel	
		Number of transformers with pinkish Silica Gel	
9	Routine Tests Carried Out	Yes (specify date and test(s) carried out)	
		No (specify test(s) pending with date from)	
10	Earth Test Carried Out	Yes (specify date)	
		No (specify date pending from)	
11	Exhaust Fan in Battery Room	Working/Not working	
12	Grid Security Staff Checking		
a	In/Out Register	Maintained/not maintained No. outsiders visiting with record	
b	Attendance Register		
c	T&P Register	Guns/Ammunition Status	
d	Inspection Register	Inspection done by the Security Inspector/Officer	

Accident Profile Proforma

ANNEXURE - 04

Peshawar Electric Supply Company
ACCIDENT PROFILE PROFORMA

CHECKING OFFICER: **Date:**

Sr. No.	Description			
1	Date of accident			
2	Sub-division			
3	Name			
4	Father name			
5	Designation			
6	Inquiry finalize			
7	Guilty found	1. [name & designation]		
		2. [name & designation]		
		3. [name & designation]		
8	Punishment given details			
9	Date			
10	Compensation to heirs	1. Pension ☐ 2. GLI ☐ 3. Double GLI ☐	Amount	Date paid
11	Prepared/checked by	Name & designation of checking officer Signature		

Disciplinary Action **ANNEXURE - 05**

Action shall be initiated against an employee who breaches service discipline or instructions issued from time to time.

(i) Inquiry Procedure

(a) A letter of explanation (LOE) shall be issued to the accused employee and is allowed to submit his reply within a period of not more than 14 days from the day LOE has been communicated to him and will also require the accused to state at the same time in his written explanation reply whether he desires to be heard in person.

(b) If the competent authority is satisfied with the reply of LOE by the accused employee, then LOE may be withdrawn.

(c) If the reply of explanation provided by accused employee is not satisfactory then a final show cause notice shall be issued to the accused employee and is allowed to submit his reply within 07 days from the day of show cause notice has been communicated to him and will also require the accused to state at the same time in his written reply whether he desires to be heard in person.

(d) If the reply provided by accused employee is satisfactory then competent authority may close the case or otherwise give him minor or major penalty.

(ii) Minor & Major Penalties

Minor Penalty	1. Warning 2. Censure 3. Stoppage of increment
Major Penalty	1. Reduction to a lower post or time scale reduction 2. Compulsory retirement 3. Termination from service

(iii) Competent Authorities

Sr. No.	Basic Pay Scale of the Employee	Competent Authority	Appellate Authority
1	BPS - 1 to BPS – 7	Concerned Assistant Manager	Concerned Deputy Manager
2	BPS - 8 to BPS - 11	Concerned Deputy Manager	Concerned Manager
3	BPS - 12 to BPS - 16	Concerned Manager	Concerned Chief Engineer
4	BPS – 17	Chief Engineer	Operation Director
5	BPS – 18	Operation Director	Chief Executive Officer
6	BPS – 19	Chief Executive Officer	Board of Directors
7	BPS – 20	Chief Executive Officer	Board of Directors
8	Directors/Functional Heads	Chief Executive Officer	Board of Directors

PTW (Permit to Work) Specimen **ANNEXURE - 06**

Peshawar Electric Supply Company

PERMIT TO WORK

Job/Work Location: _____

Job/ Work Description: _____

It is safe to work on the following apparatus which is dead, isolated from all live conductors, and is earthed. All other parts are dangerous.

Job briefing done with all involved person including discussion of any job related hazards.

State below exactly the apparatus on which it is safe to work:

1. _____
2. _____
3. _____
4. _____

State below exactly at what point(s) the apparatus is connected to earth ?

1. _____
2. _____
3. _____
4. _____

State below which personal protective equipment is used?

1. _____
2. _____
3. _____
4. _____

Signature: _____

Designation: _____

Date: _____

Time: _____ (Hrs)

PTO

(Back side of PTW Form)

RECEIPT OF CLEARANCE

This form after being signed for the work to proceed must be retained by the authorized person in-charge of the work until the work is suspended or completed.

I hereby declare that I am the authorized person in-charge of work, for which the apparatus mentioned hereon has been made dead. It is safe to work on the following apparatus which is dead, isolated from all live conductors, and is earthed.

Signature: _____ Designation: _____
(Authorized person in-charge of work)

Date: _____ Time: _____ (Hrs)

RETURN OF CLEARANCE

The apparatus mentioned hereon must not be again made live until this Form has been signed and returned by the authorized person in-charge of the work. In case where more than one Permit-to-Work has been issued for the same apparatus, it must not be again made live until all forms have been signed and returned by all the authorized persons in-charge of the work.

I hereby declare that housekeeping is conducted, isolation removed, and all men under my charge have been withdrawn and warned that it is no longer safe to work on the apparatus specified in this Form, and that gear, tools, temporary earth connections are all clear, leaving that portion of the apparatus upon which my men have been working ready for placing into commission.

Signature: _____ Designation: _____
(Authorized person)

Date: _____ Time: _____ (Hrs)

CANCELLATION OF PTW

I hereby declare this Form cancelled

Signature: _____ Designation: _____
(Authorized person)

Date: _____ Time: _____ (Hrs)

Note: This Form, duly completed, must be kept for record at least for three months by the Resident Engineer (RE)/Assistant Engineer (AE)/Assistant Manager (AM) as per instructions.

SJO (Sundry Job Order) Specimen **ANNEXURE - 07**

Peshawar Electric Supply Company

SUNDRY JOB ORDER

Line Superintendent _____

Please execute the following work and on completion report below:

Description of Work _____

Estimate No. _____

Name of Work _____

Allocation _____

……Sub-Divisional Officer……Date……..……

……..

Report

Date Started……Date Finished……

Performed by……

"Meter card/cards has/have been duly completed by me and kept with the meter/meters in the presence of consumer or his representative Mr. ……
on date……." …….

(Consumer's Signature)*

……Line Superintendent……Date……..……

……..

Charge

Above charge entered in sundry charges and allowances register (If charge is to be recovered from consumer).

By……Sub-Divisional Clerk……..Date……..

……..

* If work is on account of consumer.

Compensation in Case of Accident to Employee **ANNEXURE - 08**

The assistance package for families of employees who die in service or are 100% incapacitated due to fatal/non-fatal accidents is as under;

i) Ex-gratia grant of Rs. 4.0 million to the families of those employees who die due to fatal accident or are 100% incapacitated/ disabled (non-fatal accident) with immediate effect.

ii) Retention of house or payment of rent of hired house for five (5) years or till the date of retirement of deceased whichever is more.

iii) Employment to one child or widow for posts in BPS-1 to BPS-15 without advertisement according to qualification.

iv) To ensure providing best medical treatment in country to the employee incapacitated in accident (amputation of hands, legs, etc.) and replacement of amputated limbs with best possible available limbs.

v) Free education to all children of the deceased / 100% incapacitated employees up to graduation (all fields of graduation) in any public government educational institution including expenses of tuition fee, books, related material, living allowance, etc., subject to production of verification certificate from the Head of Institution.

vi) Grant of Welfare Fund to the family of the deceased employee, as per entitlement.

vii) Marriage grant amounting to 400,000/- (Rupees four lac each) on the marriage of two (2) children of the deceased / 100% incapacitated employees.

viii) 100% free electricity units, as per their entitlement, to the family of deceased / 100% incapacitated employees till superannuation. After superannuation electricity units will be reduced to 50% similar to the employees retired in ordinary manner.

Assistance Package for Families of Employees Who Die in Service — ANNEXURE - 09

The said package is applicable, mutatis, mutandis, for families of employees, who die in service, as under;

<table>
<tr><th>Item</th><th>In Service Death</th><th>Security Related Deaths</th></tr>
<tr><td>Lump Sum Grant</td><td>Up to Rs. 3.0 million according to following scales:-<table><tr><th>BPS</th><th>Amount</th></tr><tr><td>1–4</td><td>Rs. 600,000</td></tr><tr><td>5–10</td><td>Rs. 900,000</td></tr><tr><td>11–15</td><td>Rs. 1,200,000</td></tr><tr><td>16–17</td><td>Rs. 1,500,000</td></tr><tr><td>18–19</td><td>Rs. 2,400,000</td></tr><tr><td>20 & above</td><td>Rs. 3,000,000</td></tr></table></td><td>a. Up to Rs. 10 million according to following scales:-<table><tr><th>BPS</th><th>Amount</th></tr><tr><td>1–16</td><td>Rs. 3 Million</td></tr><tr><td>17</td><td>Rs. 5 Million</td></tr><tr><td>18–19</td><td>Rs. 9 Million</td></tr><tr><td>20 & above</td><td>Rs. 10 Million</td></tr></table>b. Rs. 700,000/- to the officers/ officials incapacitated and released from service for having become invalid as a result of injury in encounters/ bomb blasts/ riots, watch and ward duty or terrorist activity.</td></tr>
<tr><td>Pension</td><td>100% pension to the families of deceased employees as per their length of service and last pay drawn. In case of less than 10 years' service of the deceased employees' rate of minimum 10 years' service will be applicable.</td><td>100% pension to the families of deceased employees as per their length of service and last pay drawn. In case of less than 10 years' service of the deceased employees' rate of minimum 10 years' service will be applicable.</td></tr>
<tr><td>Accommodation</td><td>Retention of official accommodation or payment of rent of hired house till the age of superannuation.</td><td>Retention of official accommodation or payment of rent of hired house till the age of superannuation.</td></tr>
<tr><td>Education</td><td>Free education to all the children of the deceased employees upto graduation in any public/government educational institution including expenses of tuition fee, books related material and living allowance etc.</td><td>Free education to all the children of the deceased employees upto graduation in any public/government educational institution including expenses of tuition fee, books related material and living allowance etc.</td></tr>
<tr><td>Allotment of Plot</td><td>Payment of lump sum grant in lieu of plot subject to the condition that no plot had been allotted in the past, as per scale given below:-<table><tr><th>BPS</th><th>Amount</th></tr><tr><td>1–8</td><td>Rs. 2 Million</td></tr><tr><td>9–16</td><td>Rs. 5 Million</td></tr><tr><td>17 & above</td><td>Rs. 7 Million</td></tr></table></td><td>Payment of lump sum grant in lieu of plot subject to the condition that no plot had been allotted in the past, as per scale given below:-<table><tr><th>BPS</th><th>Amount</th></tr><tr><td>1–8</td><td>Rs. 2 Million</td></tr><tr><td>9–16</td><td>Rs. 5 Million</td></tr><tr><td>17 & above</td><td>Rs. 7 Million</td></tr></table></td></tr>
</table>

Item	In Service Death	Security Related Deaths
Employment	Employment for posts in BS-01 to BS-15 on two years contract without advertisement. Provided further that in-case of the deceased employee is survived by two or more widows and/or children from these widows, right of contract shall be decided in the following manner and order:- a. the first widow or child (18 years or above in age) from the first widow as soon as he/she attains age of 18 years but he/she has to exercise the option within the time period (one year from date of death) failing that: b. the right to contract appointment shall stand transferred to the second widow or to a child (18 years or above in age) from the second widow or to a child (18 years or above in age) from the second widow or to a child or a minor child from the second widow as soon as he/she attains age of 18 years but he/she has to exercise the option within two years of death. c. If an eligible child is not available, the widow of a deceased employee who expires/expired on or after 13.06.2006 while in service shall be offered employment on the same basis as a child of the deceased employee would have been offered employment. d. Exception from prescribed Grade/Division of educational qualification of widow while considering for the above-said category. e. General relaxation shall be available to the widow in the upper age limit up to 45 years. f. The authority competent for relaxation of the upper age limit of a widow up to 50 years shall rest with BOD of the PESCO on a case to case basis	Employment for posts in BS-01 to BS-15 on two years contract without advertisement. Provided further that in-case of the deceased employee is survived by two or more widows and/or children from these widows, right of contract shall be decided in the following manner and order:- a. the first widow or child (18 years or above in age) from the first widow as soon as he/she attains age of 18 years but he/she has to exercise the option within the time period (one year from date of death) failing that: b. the right to contract appointment shall stand transferred to the second widow or to a child (18 years or above in age) from the second widow or to a child (18 years or above in age) from the second widow or to a child or a minor child from the second widow as soon as he/she attains age of 18 years but he/she has to exercise the option within two years of death. c. If an eligible child is not available, the widow of a deceased employee who expires/expired on or after 13.06.2006 while in service shall be offered employment on the same basis as a child of the deceased employee would have been offered employment. d. Exception from prescribed Grade/Division of educational qualification of widow while considering for the above-said category. e. General relaxation shall be available to the widow in the upper age limit up to 45 years. f. The authority competent for relaxation of the upper age limit of a widow up to 50 years shall rest with BOD of the PESCO on a case to case basis

Item	In Service Death	Security Related Deaths
Marriage Grant	Marriage grant amounting to Rs. 8 lac on wedding of one daughter may be granted to family of deceased employees.	Marriage grant amounting to Rs. 8 lac on wedding of one daughter may be granted to family of deceased employees.
Health	Free health facilities as per their entitlement during service	Free health facilities as per their entitlement during service
House Building Advance	In case of advance against salaries sanctioned by the competent authority, the unpaid balance to be waived off as per prevailing procedure.	In case of advance against salaries sanctioned by the competent authority, the unpaid balance to be waived off as per prevailing procedure.
Nomination of an Officer as Council	An officer of BS-17 or BS-18 may be nominated by respective office as Council who will be responsible for finalization/provision of all the facilities under the package, to the families of employees who die in service within one month of the incident.	An officer of BS-17 or BS-18 may be nominated by respective office as Council who will be responsible for finalization/provision of all the facilities under the package, to the families of employees who die in service within one month of the incident.
Special Lump Sum Grant from Welfare Fund	Nil	A special lump sum grant from Welfare Fund ranging from Rs. 200,000 to Rs. 500,000/- according to following scales:-

Sr. #	BPS	Lump Sum Grant
1	1–10	Rs. 200,000
2	11–16	Rs. 300,000
3	17–19	Rs. 400,000
4	20 & above	Rs. 500,000

<table>
<tr><th>Item</th><th>In Service Death</th><th>Security Related Deaths</th></tr>
<tr><td>Monthly Welfare Grant</td><td>
<table>
<tr><th rowspan="2">Sr. #</th><th colspan="2">Pay Slabs</th><th rowspan="2">Grant</th></tr>
<tr><th>Minimum</th><th>Maximum</th></tr>
<tr><td>1</td><td>Up to</td><td>5000</td><td>4000</td></tr>
<tr><td>2</td><td>5001</td><td>5500</td><td>4150</td></tr>
<tr><td>3</td><td>5501</td><td>6000</td><td>4300</td></tr>
<tr><td>4</td><td>6001</td><td>6500</td><td>4450</td></tr>
<tr><td>5</td><td>6501</td><td>7000</td><td>4600</td></tr>
<tr><td>6</td><td>7001</td><td>7500</td><td>4750</td></tr>
<tr><td>7</td><td>7501</td><td>8000</td><td>4900</td></tr>
<tr><td>8</td><td>8001</td><td>8500</td><td>5050</td></tr>
<tr><td>9</td><td>8501</td><td>9000</td><td>5200</td></tr>
<tr><td>10</td><td>9001</td><td>9500</td><td>5350</td></tr>
<tr><td>11</td><td>9501</td><td>11000</td><td>5600</td></tr>
<tr><td>12</td><td>11001</td><td>13000</td><td>5900</td></tr>
<tr><td>13</td><td>13001</td><td>15000</td><td>6200</td></tr>
<tr><td>14</td><td>15001</td><td>17000</td><td>6500</td></tr>
<tr><td>15</td><td>17001</td><td>19000</td><td>6800</td></tr>
<tr><td>16</td><td>19001</td><td>21000</td><td>7100</td></tr>
<tr><td>17</td><td>21001</td><td>23000</td><td>7400</td></tr>
<tr><td>18</td><td>23001</td><td>25000</td><td>7700</td></tr>
<tr><td>19</td><td>25001</td><td>27000</td><td>8000</td></tr>
<tr><td>20</td><td>27001</td><td>29000</td><td>8300</td></tr>
<tr><td>21</td><td>29001</td><td>31000</td><td>8600</td></tr>
<tr><td>22</td><td>31001</td><td>33000</td><td>8900</td></tr>
<tr><td>23</td><td>33001</td><td>35000</td><td>9200</td></tr>
<tr><td>24</td><td>35001</td><td>37000</td><td>9500</td></tr>
<tr><td>25</td><td>37001</td><td>39000</td><td>9800</td></tr>
<tr><td>26</td><td>39001 & above</td><td></td><td>10100</td></tr>
</table>
</td><td>
<table>
<tr><th rowspan="2">Sr. #</th><th colspan="2">Pay Slabs</th><th rowspan="2">Grant</th></tr>
<tr><th>Minimum</th><th>Maximum</th></tr>
<tr><td>1</td><td>Up to</td><td>5000</td><td>8000</td></tr>
<tr><td>2</td><td>5001</td><td>5500</td><td>8300</td></tr>
<tr><td>3</td><td>5501</td><td>6000</td><td>8600</td></tr>
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<tr><td>7</td><td>7501</td><td>8000</td><td>9800</td></tr>
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<tr><td>9</td><td>8501</td><td>9000</td><td>10400</td></tr>
<tr><td>10</td><td>9001</td><td>9500</td><td>10700</td></tr>
<tr><td>11</td><td>9501</td><td>11000</td><td>11200</td></tr>
<tr><td>12</td><td>11001</td><td>13000</td><td>11800</td></tr>
<tr><td>13</td><td>13001</td><td>15000</td><td>12400</td></tr>
<tr><td>14</td><td>15001</td><td>17000</td><td>13000</td></tr>
<tr><td>15</td><td>17001</td><td>19000</td><td>13600</td></tr>
<tr><td>16</td><td>19001</td><td>21000</td><td>14200</td></tr>
<tr><td>17</td><td>21001</td><td>23000</td><td>14800</td></tr>
<tr><td>18</td><td>23001</td><td>25000</td><td>15400</td></tr>
<tr><td>19</td><td>25001</td><td>27000</td><td>16000</td></tr>
<tr><td>20</td><td>27001</td><td>29000</td><td>16600</td></tr>
<tr><td>21</td><td>29001</td><td>31000</td><td>17200</td></tr>
<tr><td>22</td><td>31001</td><td>33000</td><td>17800</td></tr>
<tr><td>23</td><td>33001</td><td>35000</td><td>18400</td></tr>
<tr><td>24</td><td>35001</td><td>37000</td><td>19000</td></tr>
<tr><td>25</td><td>37001</td><td>39000</td><td>19600</td></tr>
<tr><td>26</td><td>39001 & above</td><td></td><td>20200</td></tr>
</table>
</td></tr>
<tr><td>Prerequisite for facilitation of family of deceased Employees</td><td>In case of in service death of an employee, the following pre-requisites must immediately be fulfilled by the concerned office so that the family of the deceased employee may be facilitated without any delay:-
a. Immediate submission of family pension case.
b. Application for Anticipatory Pension (80% of total pension).
Besides, as a pro-active approach respective offices must observe the following
practices regarding their employees:-
a. Up to date list of family members of each employee for pension purpose be maintained beforehand.</td><td>In case of in service death (security related) of an employee, the following pre-requisites must immediately be fulfilled by the concerned office so that the family of the deceased employee may be facilitated without any delay:-
a. Immediate submission of family pension case.
b. Application for Anticipatory Pension (80% of total pension).
Besides, as a pro-active approach respective offices must observe the following practices regarding their employees:-
a. Up to date list of family members of each employee for pension purpose be maintained beforehand.</td></tr>
</table>

Item	In Service Death	Security Related Deaths
Prerequisite for facilitation of family of deceased Employees	b. Nomination for Employees Provident Fund must be ensured for each employee in his/her life.	b. Nomination for Employees Provident Fund must be ensured for each employee in his/her life.
EP Fund	Only payable amount of EP Fund shall be paid to the family of deceased employee.	Only payable amount of EP Fund shall be paid to the family of deceased employee.

Note:

1) A death will be deemed to be a 'Security Related Death' if it occurs due to a terrorist act or while combating or confronting the terrorist(s).
2) Relevant rules and policies stand amended to the above effect.

Compensation Policy in Case of Public Accidents **ANNEXURE - 10**

1) PESCO feels the social and moral obligation that whenever a public person(s) meet with fatal/non-fatal accident due to PESCO distribution network, the victim families/victim(s) shall be compensated adequately.

2) Salient features of the compensation policy to different categories i.e., fatal/nonfatal and major/minor disability are as under;

a) **CASH COMPENSATION**

Sr. No.	Amount	Category	Remarks
(1)	As per para 19.4 of chapter 19.		
(2)	Rs. 500,000/-	To private individual in case of accident resulting in a major disability.	Major / minor disability to be determined by M.S WAPDA/CMH/ Government Hospital/Doctor of DHQ or higher category of Government Hospital.
(3)	Rs. 300,000/-	To private individual in case of accident resulting in a minor disability.	

b) **AFFORDING EDUCATIONAL EXPENSES**

If the individual who meets with non-fatal accident resulting in a major disability is a minor and is also a student, PESCO will bear all expenses incurred on his/her education upto matric as per actual expenses for which documentary evidence of the relevant institute and of books / note books, uniform will be provided.

c) **PAYMENT PEROID**

Payment of the compensation will be made within fifteen (15) days of the happening of the incident and the same will not be delayed for want of receipt of inquiry report of the incident.

d) **COMPETENCY**

The Circle SEs are competent to approve the payments after confirming that the incident has taken place in actual and the same should be reported to Head of HR & Admin Department in each and every case.

Compensation Policy in Case of Animal(s)/Loss to Public Property **ANNEXURE - 11**

1) PESCO overhead system is prone to accident(s) that cause human as well as animals and property loss to general public. To compensate the genuine claims of the legal heirs of the animal(s)/property without intervention of the court and to avoid unnecessary litigation expenditures to PESCO, the affected families shall be compensated adequately.

2) The policy shall apply in such cases, where it is established after the inquiry that there was no fault of the consumer(s) in occurrence of accident(s).

3) The incident/accident reporting and investigation shall be carried out as per Section 7 of this Manual to compensate animal(s)/loss to public property. Compensation shall be made as per 'Market Value' in this regard.

4) Compensation amount shall be paid by concerned Deputy Manager/XEN.

Note: An affidavit on the non-judicial Stamp Paper duly attested by the Oath Commissioner shall be obtained from the legal heirs to the affect that they shall not go the Court of Law after receiving the compensation.

Hazard Identification and Risk Assessment — ANNEXURE - 12

Risk Assessment Process

Risk Assessment Process is a structured process where the hazards associated with each step of a job are identified, rated and control measures put into place to minimize the risk to personnel, environment and property.

Risk Assessment Process may be based on work instructions or temporary work instructions, or could build on a previously completed Risk Assessments (issue as new revision of the previous Risk Assessment.

Risk Assessment is a team process - all members of the team who will be working on a job, plus others with related experience or expertise, should be involved and should actively contribute.

1. Draw a diagram/Picture of the job to be carried out.
2. List the job steps - on a whiteboard if available. These should be active steps conducted at the job site.
3. List alternatives to the overall task. These will be used if any hazard cannot be acceptably controlled.
4. For each job step, list hazards - prompted by the Hazard Identification Checklist.

Hazard Identification Checklist

List of Energy Release Source/ Situations that may not be well controlled and could result in risk/ Things that could go wrong.

1. **Mechanical**
   - Be struck by anything - impact injury
   - Be caught in, on or between anything
   - Strike against anything
   - Be drawn in to machine
   - Be struck by ejected material/ fluid
   - Vibration
   - Equipment condition (damaged/ worn)
2. **Kinetic/ Vehicle**
   - Be struck by a vehicle (Vehicle certificate required?)
   - Be struck by moving object
   - Vehicle striking equipment, rollover, vehicle poor condition Equipment Safeguarding
3. **Access**
   - Slips, trips and falls
   - Falling or moving objects Obstruction or projection
   - Confined spaces (CSE Certificate required?)
   - High Access/Scaffolding (Certificate required?)
4. **Handling/ Lifting**
   - Strain/ overexertion, non-standard equipment, non-certified
5. **Electricity**
   - Electrocution, ignition source, Improper earthing
   - Equipment condition and suitability, Tools suited for task (insulated)
6. **Chemicals/ Wastes**
   - Toxic/ poison/ chemical burns Irritant (e.g. insulation materials)
   - Sensitizing
   - Corrosive
   - Explosive/ flammable/ fire
   - Carcinogen
   - Acute (immediate) & Chronic (long term) effects
7. **Fire & Explosion**
   - Pressure – large uncontrolled release of material
   - Loss of pressure – extreme cold

8. Particles/ Dust/ Fumes/ Gases
Inhalation
Ingestion
Abrasion of skin or eye

9. Radiation
Ionizing
Non-ionizing
(Radiography Certificate required?)

10. Biological
Bacterial/ Viral/ Fungal
(contamination/ infection)

11. Environmental
Noise – hearing damage, poor communication
Vibration
Light
Humidity
Ventilation
Temperature – burns, dehydration, hot or cold Climate
Pressure/vacuum

12. Organizational
Poor maintenance Lack of supervision
Lack of training
Lack of information
Inadequate monitoring arrangements
Poor operator/machine interface
Non-standard isolation

13. The Individual
Individual not suited to work Long hours (sufficient breaks/ rest periods?)
High work rate
Can the employee hurt a fellow employee? Training, supervision

14. Pollution of the Environment Water
Air
Land

Waste/ rubbish
Fuel/ oil/ chemical spills

15. Damage to Equipment

16. Snakes, Scorpions, insects

Hierarchy of Control
For each hazard/ step, develop control measures - risk reduction or hazard elimination measures - following the Hierarchy of Control:

The general Hierarchy of Control Measures, to be used in order, is:
1. Elimination/ Substitution (removal of the hazard/ use alternative methods)
2. Engineering Control (containment, shielding)
3. Training and Procedures (administrative controls)
4. Personal Protective Equipment (to protect the individual) In more detail, the Hierarchy of Control is as follows:

1) Elimination/Substitution
Elimination or substitution requires a radical rethink of the job to determine if there is an entirely different way of doing it. Start by defining the goal of the job (i.e. the result) and then explore new ways at accomplishing it. For example:

- New tools
- New materials (i.e. chemicals, etc.)
- New machinery (i.e. plant and equipment)
- New methods

2) Engineering Controls

Engineering controls means physically modifying plant, equipment or tools. For example:

- Improved maintenance; for example, preventive maintenance schedule to prevent failure;
- Reduction at source of noise or vibration through various known engineering controls;
- Isolating or enclosing the hazard; for example, fume cupboards, barriers, lag surfaces, machine guards, etc.;
- Use of ventilation to remove fumes and dusts;
- Use of mechanical aids to minimize manual handling injuries;
- Installation of an alarm or trip system or other safety device.

3) Administrative Controls

Administrative controls involve changing the work instruction so as to reduce risk by limiting the exposure of an employee to the hazard. For example:

- Organize work schedules to minimize the number of employees exposed to hazards.
- Restrict employees from hazardous areas if their job does not require them to be there.
- Increase the separation between the employees and the hazard.
- Such controls should be indicated on the work instruction as caution notes adjacent to the relevant steps.

4) Personal Protective Equipment

Personal protective equipment should be used only when other measures have not been able to protect the employee against the hazard or risk of exposure to the hazard. Where personal protective equipment is used, ensure that it fits the employee correctly; training is provided in its need and use, and that the equipment is maintained and serviced regularly. (Examples: Use of chemical resistant suite /Face shield during chemical handling)

Important Telephone Numbers

ANNEXURE - 13

Sr. No.	Designation/Entity Name	Phone Number
1	Chief Executive Officer	091-9211990 / 091-9212550
2	GM Technical/Commercial	091-9210538
3	Company Secretary	091-9210226
4	Director General (HR)	091-9211997
5	DG (Admn &Services)	091-9210983
6	T&MPP	091-9212230
7	Public Relation Officer	091-9212013
8	Confidential Section	091-9212002
9	Chief Operation Officer	091-9211996
10	Chief Commercial Officer	091-9212019
11	Chief Engr (O&M) T&G	091-9223056
12	Chief Engr: O&M (Distn:)	091-9211991
13	CE Development PMU	091-9211757
14	Audit Section	091-9212030
15	Director Finance	091-9212925
16	PESCO Complaint Cell	091-9212010 / 091-9213919
17	Material Management	091-9211994
18	Manager (S&I)	091-9212328
19	Director Safety	091-9212016
20	Manager L&L	091-9211992
21	DM Security	091-9210916
22	Xen RTC Charsadda	091-9220057
23	Power Distribution Center	091-9223001 / 091-9223004 / 091-9223060
24	WAPDA Hospital Peshawar	091-9212461
25	WAPDA Hospital Tarbella DAM	0995-350019
26	Edhi	091-2214575
27	Fire brigade	091-2563317
28	Police	091-9212222
29	Bomb Disposal Squad	091-9212111
30	Rescue 1122	091-9222484

GLOSSARY (Definitions and Abbreviations) — ANNEXURE - 14

Accident: An undesired event giving rise to death, ill health, injury, damage or other loss.

Apparatus: Means, all electrical devices such as machines, transformers, capacitors, regulators, re-closers, switchgear, electric transmission and distribution lines, underground cables and fittings, which are used for the generation, transmission, distribution and utilization of electrical energy.

Approved used in this manual means, approved by PESCO.

Arc Flash Hazard: A dangerous condition associated with the possible release of energy caused by an electric arc.

Arc Flash Suit: A complete arc-rated clothing and equipment system that covers the entire body, except for the hands and feet. An arc flash suit may include pants or overalls, a jacket or a coverall, and a beekeeper-type hood fitted with a face shield.

Audit: Systematic examination to determine whether activities and related results conform to planned arrangements and whether these arrangements are implemented effectively and are suitable for achieving the organization's policy and objectives.

Auditor: Person with the competence to conduct an audit.

Authorized Person means, a person who is authorized to perform the duties pertaining to his employment, the authorization being by an officer of PESCO, empowered for that purpose.

Bare means, not covered with insulating material.

Barricade is a temporary obstruction, such as a rope or fence, erected to limit the distance the public can approach to a protected area.

Barrier is a temporary non-conducting obstacle, which is placed to limit the distance, workers can reach or approach to anything, which is at a different electrical potential from them.

Bonding is the process of electrically connecting conductive objects together to bring them to the same electric potential.

Bonding Cable provides electrical connection between two objects. A bonding cable does not have to be insulated and shall be at least 95 sq. mm copper conductor. A bonding cable is expected to carry fault current for the length of time of normal isolation.

Bonding Conductor means, any metallic path interconnecting metallic parts or conductors. A bonding conductor is used to bring metallic parts to the same potential, or to achieve a desired distribution of current within the grounding system, and to reduce interference on communication circuits.

Calibration: To adjust and/or determine either;

The response or reading of an instrument relative to a standard (e.g. primary, secondary, or tertiary) or to a series of conventionally true values.

Carbon: An element, common on the Earth and an essential building block of most known organic life. Used in the energy industry as shorthand for carbon dioxide, a greenhouse gas.

Carbon dioxide*:* A colorless, odorless gas, atmospheric emissions of which contribute significantly to climate change.

Carbon footprint*:* The level of greenhouse gas emissions a person, group or object is responsible for over its lifetime. Measured in grams of carbon dioxide-equivalent per kilowatt-hour of electricity generated (gCO_2e/kWh) when applied to electricity generation.

Carcinogen: A chemical, physical or biological agent that can cause cancer in humans or animals.

Caution Notice means, a notice attached to dead electrical apparatus to prevent such equipment being made live.

Circuit means, an electrical circuit forming a system or a branch of a system.

Climate change: A sustained alteration of the Earth's weather patterns over a long period of time.

Communication: Any inquiry (e.g., question, concern, or suggestion) or response to an internal or external inquiry related to environmental activities or the EMS.

Competence: The ability to perform a particular job in compliance with performance standards.

Competent Person is qualified because of his/her knowledge, training and experience to organizes the work and its performance; is familiar with the provisions of the relevant rules and the regulations that apply to the work; and has knowledge of any potential or actual danger to health or safety in the workplace.

Conductor means, a body or substance, which offers a low resistance to the passage of an electric current, and is arranged to be electrically connected to a system.

Confined Space: A space in which a hazardous gas, vapor, dust or fume may collect or in which oxygen may be used up because of the construction of the space, its location, contents, or the work activity carried out in it. It is an area which is not designed for continuous human occupancy and has limited opening for entry, exits or ventilation.

Continual Improvement: Process of enhancing the Safety Management System, to achieve improvements in overall health, safety, environment & quality performances, in line with the organization's Safety Policy.

Contractor: A seller of goods or services who is a party to management and operating contract or other type of contract with Company to perform work directly related to activities at Company owned or leased facilities.

Controls: Measures designed to eliminate or reduce hazards or hazardous exposures. Examples include: engineering controls, administrative controls, personal protective equipment. Hazards can be controlled at the source, along the path to the worker, or at the worker.

Corrective action: Action to eliminate the cause of a detected non-conformity.

Counterpoise is a conductor or system of conductors, arranged beneath the line, located on, above, or most frequently below the surface of the earth, and connected to the footings of the towers poles supporting the lines. A counterpoise is used to reduce the ground surge impedance of the structure footing and/or to provide an additional return path to the in-feed station for ground fault current.

Danger means danger to health or danger to life or limb from shock, burn, or other injury to persons.

Danger Notice means, a notice attached to a live electrical apparatus, calling attention to the danger of touching or interfering with such apparatus.

Dead means de-energized and earthed.

De-energized means, Disconnected from all sources of electricity.

Distribution network: The system of high and low-voltage power lines used to carry electricity via substations to homes and businesses.

Document: Information and its supporting medium, which can be paper, magnetic, electronic or web based.

Earth means, the conducting mass of the earth or of any conductor, in direct electrical connection with earth.

Earthed means, connected to earth in such a manner as will ensure, at all times, an immediate discharge of electrical energy.

Earth Connection means, a metallic conductor for connecting electrical equipment to earth.

Earth Mesh means, a network of a copper conductor, buried in the earth and connected with earth mass through earth electrodes, to control step and touch potential and to provide easy earth connection to the equipment.

Earth System means, an electrical system in which all the conductors are earthed.

Electrical Energy: Energy derived from the flow of electrons.

Electrical Insulation means, any non-conducting material that provides adequate electric strength to withstand the electrical stresses existing between objects at different potentials.

Electrical Hazard: A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

Electrical Safety: Recognizing hazards associated with the use of electrical energy and taking precautions so that hazards do not cause injury or death.

Electrically Safe Work Condition: A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded if determined necessary.

Electricity: Electrical energy generated in power stations and delivered to homes and businesses via transmission and distribution grids.

Emergency Plan: Detailed procedures for responding to an emergency, such as a fire or explosion, a chemical spill, or an uncontrolled release of energy. An emergency plan is necessary to keep order and minimize the effects of the disaster.

Emissions: The release of gases from a process. Most often used in the energy industry to refer to emissions of greenhouse gases from electricity generation.

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 the suspended objects (gravitational).

Engineering Controls: A category of hazard control that uses physical/engineering methods to eliminate or minimize the hazard. Examples of engineering controls include: ventilation, isolation, elimination, enclosure, substitution and design of the workplace or equipment.

Environment: Surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelations.

Environmental Aspect: Element of an organization's activities or products or services that can interact with the environment.

Environmental Impact: Any change to the environment weather adverse or beneficial, wholly or partially resulting from organizations environmental aspects.

Environmental Objective: Overall environmental goal, arising from the environmental policy, that an organization sets itself to achieve, and which is quantified where applicable.

Environmental Performance: Measureable results of the EMS, related to an organization's control of its environmental aspects, based on its environmental policy, objectives and targets.

Environmental Target: Detailed performance requirement, quantified where practicable, applicable to the company or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.

Environmental Management System (EMS): The part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the Environmental policy.

Environmental Management System (EMS) Audit: A systematic and documented verification process of objectively obtaining and evaluating evidence to determine whether a company's EMS conforms to the EMS audit criteria set by the company, and for communication of the results of this process to management.

Explosive: A substance, mixture or compound that can produce an explosion.

Exposure: The measurement of time during which the subject is at risk from a hazard.

First Aid: The skilled application of accepted principles of treatment on the occurrence of an accident or in the case of sudden illness, using facilities and materials available at the time.

- To sustain life;
- To prevent deterioration in an existing condition; and
- To promote recovery.

The most important areas of first aid treatment are:

- Restoration of breathing (resuscitation);
- Control of bleeding; and
- Prevention of collapse.

Flame Resistant Clothing: FRC is used to minimize burn injury during short term and emergency exposure to flame or electric arc. The primary function of FRC is to eliminate or reduce the effects of burning clothing in contact with the skin.

Grid*:* When applied to electricity systems: a system for delivering electricity from power stations to homes and businesses.

Grounding: Electrical connection of one or more conductive objects to the earth through the use of metal grounding rods or other devices.

Ground-Fault Circuit Interrupter (GFCI). A device intended for the protection of personnel that functions to de-energize a circuit or portion.

Guarding: Use of any device or combination of devices designed to keep any part of a worker's body out of the danger zone of a machine during its operating cycle. This usually involves guarding the point of operation, guarding power transmission components by fixed enclosures, and/or protecting the operator and nearby workers from flying fragments.

Hazard: Source of situation with a potential for harm in terms of quality, injury or ill health, damage to the workplace environment, or a combination of these.

Hazard Identification: Process of recognizing that a hazard exists and defining its characteristics.

Hazardous Energy: Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or any other energy that, if not controlled, could cause injury to personnel or damage to property. Electrical hazards are present when conductors or components that may be electrically energized could cause injury to personnel or damage to property.

Mechanical hazards are present when the unexpected start-up of the system, equipment, or machine, or the release of stored energy while adjusting, maintaining, or servicing systems, equipment, or machines could cause injury to personnel or damage to property.

Hazardous Material: Any substance that may produce adverse health and/or safety effects to people or the environment.

Health: The World Health Organization has defined health as more than just the absence of disease. Rather, it is a state of complete physical, mental and social well-being**.**

Heatstroke: A potentially deadly condition in which over-exposure to a very hot environment breaks down the body's ability to control its temperature and cool itself sufficiently. The body temperature rises to a very high (deadly) level.

High Tension or H.T means, a voltage in a system normally operating above 400/230 volts, where the electrical energy is used.

Hot or Live (or alive) means, electrically energized as distinguished from "dead" or "deenergized".

Housekeeping: Maintaining the working environment in a tidy manner so that, in particular, access and movement is not hindered**.**

Ill Health: Identifiable, adverse physical or mental condition arising from and/or made worse by a work activity and/or work-related situation.

Incident: Work related event(s) in which an injury or ill Health (regardless of severity) or fatality or loss of product quality occurred or could have occurred.

Industrial Hygiene: A science that deals with the anticipation, recognition, evaluation, and control of hazards in the workplace. These hazards may cause sickness, harm to employee health, discomfort, and inefficient performance on the job. Also known as occupational hygiene.

Insulated is a term used to describe a device or medium, isolated from earth, or other potential by an insulating material. However, it shall not be considered safe to touch unless proper personal insulating protective equipment is used or apparatus or line is made dead.

Insulated Working Support or Insulated Tool is a support or tool insulated from earth or other potential by an insulating material.

Insulating is a term used to describe a device or medium made from an insulating material, having the required electrical insulation.

Insulating Gloves means, rubber gloves to be worn with leather protectors.

Insulating Gloves Method of working is performing work when workers wear insulating protective equipment, as insulation between themselves and energized equipment, on which work is being performed. Not to advocate "Hot Work".

Insulating Protective Equipment is protective equipment made of rubber or other approved insulating material, used during work on energized lines or equipment.

Insulator is a non-conducting support that provides physical separation between equipment that may be at different potentials.

Internal Audit: Systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the safety management system audit criteria set by the organization. (In many cases, particularly in smaller organizations, independence can be demonstrated by the freedom from responsibility for the activity being audited.

Job Description: A short document which sets out an employee's authority and responsibilities in the job, who he reports to, and who reports to him; what his duties are and the qualifications necessary to perform those duties**.**

Legal Requirement: Anything that is demanded of a person or organization by statute, regulation, common law, or by-law.

Low Tension or L.T means, a voltage in a system normally operating at 400/230 volts, where the electrical energy is used.

Near – Miss: An undesired event that had the potential to become an incident or an accident. An event where given a slight shift in time or distance, injury, ill-health or damage easily could have occurred, but did not happen this time.

Noise: Unwanted sound that can lead to hearing loss or stress or interfere with the ability to hear other sounds or to communicate.

Nominal Voltage of circuit or system is the rated voltage, assigned for convenient designation, between phase conductors of a three-phase line, or the two conductors of a single-phase line, whether or not one of the conductors is earthed.

Nonconformance (or Nonconformity): Any activity or practice that does not support or is counter to the environmental policy or any EMS document or is in violation of an applicable state or federal environmental regulation or permit.

Operational Control: A practice or procedure that is conducted to ensure that activities are in line with the environmental policy, and objectives and targets. The result of "operational control" is that impact to the environment is minimized and compliance with applicable regulatory requirements is demonstrated.

Organization: Company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration.

Note: For organizations with more than one operating unit, a single operating unit may be defined as an organization.

Performance: Measurable results of the Safety Management System, related to the organization's control of Health, Safety, Quality and Environment risks, based on its safety policy and objectives.

Permit to work (PTW) means, a form of declaration, signed and given by one authorized person to another in-charge of work, to be carried out on any electrical apparatus, aerial line or cable for the purpose of making known to such later person, exactly what apparatus or lines are made dead, and earthed at the sub-station end.

Permit to Work (System): A formal written system used to control certain types of work which are identified as hazardous. It is also a means of communication between site/installation management, supervisors and operators and those who carry out the work. Essential features of a Permit to Work are:

- Clear identification of who may authorize particular jobs (and any limits to their authority) and who is responsible for specifying the necessary precautions.
- Training and instruction in the issue and use of permits.
- Monitoring and auditing to ensure that the system works as intended.

Personal Protective Equipment (PPE):

Personal Protective Equipment (PPE) refers to items typically worn by a worker to provide protection during work from hazardous electrical conditions. PPE shall be stored and maintained in a safe working condition after completion of work.

Depending on the job task to be performed, PPE for the electric power industry generally includes:

- Non-conductive Shoes, boots, or overshoes for wet service
- Non-conductive Head Protection with strap when working at height above 1.8 meter/confined space

- Electrical Hand Gloves for wet service
- Sleeves for wet service
- Electrical Hand Gloves for dry service
- Sleeves for dry service
- Flame Resistance Clothing
- Arc Flash Resistant Suite, Arc Flash Hood Arc-rated Gloves
- Eye protection with non-conductive frames
- Full Face Shield (polycarbonate or similar non-melting type)
- Hearing Protection

Additional PPE, such as fall protection, respirators, chemical-resistant or cut-resistant gloves, may be required, depending on the results of the hazard assessment

In addition to PPE, electric power workers often use Insulating Protective Equipment (IPE), such as line hoses, rubber hoods, rubber blankets, and insulating live-line tools (for example, hot sticks, or switch sticks) for protection.

Potential is the degree of electrification at a point in an electric circuit, with respect to some other point of reference, such as earth.

Prevention of Pollution: Use of processes, practices, materials or products that avoid, reduce or control pollution, which may include recycling, treatment, process changes, control mechanisms, efficient use of resources and material substitution.

Note: The potential benefits of prevention of pollution include the reduction of adverse environmental impacts, improved efficiency and reduced costs.

Preventive Action: Action to eliminate the cause of a potential nonconformity.

Preventive Maintenance: Maintenance carried out before the unit or system fails to ensure its continued reliability and safe operation.

Procedure: A specified way to carry out an activity or a result-oriented process.

Quality: The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.

Quality Management: That aspect of the overall management function that determines and implements the quality policy.

Record: Document stating results achieved or providing evidence of activities performed.

Responsibility: Those actions, activities or assets for which a person is held liable and for which he alone must account.

Risk: Combination of the likelihood and consequences of a specified hazardous event occurring.

Risk assessment: Overall process of estimating the magnitude of risk and deciding whether or not the risk is tolerable or a careful consideration by competent people of the hazards associated with a task. The potential effect of each hazard, how severe it might be and the likelihood of it occurring, should be considered to determine the effort required to make the work site as safe as reasonably practicable considering an standard evaluating criteria.

Root Cause: The real or underlying cause(s) of an event. Distinguished from immediate cause(s) which are usually quite apparent.

Safety: Freedom from unacceptable risk of harm.

Shall means, mandatory.

Should means recommended.

Standard: A guideline, rule, principle, or model that is used to compare, measure or judge performance, quality, quantity, etc.

Stations Ground Potential Rise: The Potential rise, with respect to remote earth, produced by that portion of fault current that flows through the station ground resistance.

Step Voltage The potential difference between two points, one meter apart, on the earth's surface in the direction of maximum potential gradient.

Stored Energy: Hazardous energy that can continue to exist after equipment is isolated (e.g., the hazardous energy contained in springs, flywheels, pressurized fluids or gases, capacitors, or gravity).

Source of Injury or Illness: The object, substance, exposure, or body motion that directly caused a workplace injury or illness (for example, boxes, powered hand tools, acids, lead, cold, running, walking)**.**

System means, an electrical system in which all the conductors and apparatus are electrically connected, to a common source of voltage.

Training: The process of imparting specific skills and understanding to undertake defined tasks.

Transmission network: The system of high-voltage power lines used to carry electricity from power stations to local distribution stations.

Touch Voltage means, potential difference between a grounded metallic structure, that can be touched, and a point one meter away on the earth's surface. **Toxic:** Harmful or poisonous.

Toxic Substance: Any substance that can cause acute or chronic effects to a person or is suspected to cause disease or injury under certain conditions.

Underground Electrical Lines and Equipment: Before excavation starts, and where there exists a reasonable possibility of contacting electrical lines or equipment, the job in-charge shall take the necessary steps to contact the appropriate owners or authorities to identify and mark the location of the electrical lines or equipment. When it has been determined that a reasonable possibility for contacting electrical lines or equipment exists, a hazard analysis shall be performed to identify the appropriate safe work practices that shall be used during the excavation.

Unsafe act: Any act that deviates from a generally recognized safe way or specified method of doing a job and increases the potential for an accident. Waste any material, (solid, liquid or gas), which is introduced into the work location as a product of the work, but which fulfils no further useful purpose, at that location.

Use of energy means, the conversion of electrical energy into mechanical or chemical energy, heat or light, for the purpose of providing mechanical energy, electrolysis, heat or light.

Ventilation: The supplying and exhausting of air at the same time to an enclosed machine, room, or an entire building.

Vibration: The back and forth motion of an object (for example, tool, machinery or other piece of equipment) that occurs in a predictable pattern or manner. Over-exposure to vibration can harm a part of the body (for example, the fingers) or it can affect the whole body.

Voltage is a measure of the difference in electrical potential, between two points, in an electric circuit.

Waste Management: A system to achieve reduction, re-use, reclamation, recycling and responsible disposal of materials.

Work Place: Any physical location in which work related activities are performed under the control of the organization.

Working Clearance is the minimum distance, that workers shall approach anything, that is at a different potential from them.

Working Space is the amount of room, required for live conductors, to perform a job safely.

AD	Assistant Director
AM	Assistant Manager
AET	Assistant Engineer Technical
ALM	Assistant Lineman

AWG	American Wire Gauge
C&DF	Capacitance and Dissipation Factor
CEO	Chief Executive Officer
CT	Current Transformer
CTC	Circle Training Centre
CVT	Capacitor Voltage Transformer
DM	Deputy Manager
DD	Deputy Director
DDT	Deputy Director Technical
EHS	Environment, Health and Safety
EMS	Environmental Management System
EPA	Environmental Protection Agency
GSC	Grid System Construction
GSO	Grid System Operation
HOD	Head of Department
HR	Human Resource
HT	High Tension
HQ	Headquarters
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
PESCO	Peshawar Electric Supply Company
LM	Lineman
LOE	Letter of Explanation
LS	Line Superintendent

LT	Low Tension
MoE-PD	Ministry of Energy - Power Division
NEPRA	National Electric Power Regulatory Authority
NPCC	National Power Control Centre
OD	Operation Director
OHSAS	Occupational Health and Safety Assessment Series
PD	Project Director
PDC	Power Distribution Centre
PPE	Personal Protective Equipment
PT	Potential Transformer
PTG	Portable Temporary Ground
PTW	Permit to Work
RCC	Regional Control Centre
RE	Resident Engineer
RTC	Regional Training Centre
SDO	Sub-Divisional Officer
SE	Superintending Engineer
SJO	Sundry Job Order
SMS	Safety Management System
SOP	Standard Operating Procedure
SPT	Safety Precaution Talk
SSO	Sub-Station Operator
T&G	Transmission and Grids
T&P	Tools and Plants
XEN	Executive Engineer

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