



Bangladesh Power Development Board

**INTEGRATED MANAGEMENT SYSTEM
(BASED ON ISO 9001:2015, ISO 14001:2015 & ISO
45001:2018 STANDARDS)**

PROCEDURE FOR SUBSTATION OPERATION



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1.0 Purpose

To standardize the operation of Grid Sub-Station which stand out as an indispensable component affecting quality, stability and reliability of power system

2.0 Scope

Applies to whole of Integrated Management System of Bangladesh Power Development Board (BPDB).

3.0 Terms & Definition

Definition

None

Abbreviations

BPDB- Bangladesh Power Development Board
MR – Management Representative
SAE - Sub Assistant Engineer
SDE – Sub Divisional Engineer

4.0 Roles and Responsibility

Tasks in Reference Clause nos.	Responsibility
5.1	XEN, SDE, SAE, SBA
5.2, 5.3	XEN/SDE /CS/ SBA/ OS,
5.1, 5.4.1	XEN, SDE, AE, SC, SBA
5.5, 5.5.1, 5.6	SDE/SAE /SBA/CS, Operation people, Security guards/Ansars

5.0 Procedure

5.1 Planning of operation

Preparation of Sub-Station operation plan/ schedule for efficient utilization of resources.

- The prepared monthly operation schedule is checked for error (if any) properly

5.2 Implementation

Schedule Operation encompasses the following:

- Keeping operation records

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- Monitoring the loading of line, bus voltage and equipment (Lines/Transformers)
- Switching operation in cooperation with respective control rooms and grid
- Monitoring the security of the sub station

Monitoring the loading of equipment: Hourly

Log sheet (prescribed) reading

Switching operation is performed in association with grid and control room with instruction/approval of office on duty to facilitate the following tasks

- Implementation of load shedding
- Outage management
- System restoration from tripping/grid failure

Outage management:

- Outage of lines/equipment is required for the implementation of the
 - Schedule/ preventive maintenance
 - Emergency maintenance
- When shutdown of the lines/ equipment is required for maintenance/ development I work, approved shut down through XEN/ SDE is implemented
- The CSI SBA on duty gives clearance to the team leader of the working party
- After obtaining clearance from the team leader of the working party, the CSI SBA on duty will take necessary actions in association with grid in-charge respective control rooms and grid to resume the service of the equipment under shutdown
- The grid in-charge will get permission from OS; SBA lot power restoration
- After energizing the equipment to resume its service, a record is maintained by the CS/ SBA/ SAE on duty in sub-station control room in the shift operation register including
 1. Nature of Work (Scheduled/ Unscheduled maintenance and/or Development work)
 2. Cause of break down (If applicable)
 3. Time required for maintenance / work

5.3 Tripping Management

- In each and every case of tripping, relevant control room, grid and XEN (O&M)/SDE is informed immediately
- In case of Partial Grid Fail or Full Grid Fail, relevant XEN/ SE is informed. NLDC instructions is followed to restore the system from grid failure.

Preparation of Reports

- The SAE prepares monthly energy report and checked by SDE.
- The operation personnel inspect the substation equipment if they, find unusual and prepares the daily reports are checked the SDE/ CS

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- A quarterly summary report of operation is prepared by the SDE

5.4 Operation of Sub-Station Equipment

- Isolator
- Lightning arrester
- Circuit breaker
- Battery and battery charger
- Oil circuit reclosure (OCR)
- Moulded case circuit breaker (MCCB)
- Current transformer
- Voltage transformer
- Control relay & meter panel
- Protective relays
- Other Items

5.4.1 Recording

- The SDE prepare annual reports of performance.
- In case of tripping of the line/equipment, the SDE on duty records all the information regarding tripping of line/equipment with detailed cause, time of tripping, duration of outage/ relay status/flags and will inform the Engineer in Charge immediately
- The SAE/ foreman on duty in grid substation control room put brief note of maintenance work describing the cause and duration of interruption (if any) in, register duly signed by him the SBA/CS on "duty in grid sub-station/ control room will record the switching operations data in a register.
- The effectiveness of the procedure of operation regarding the operation of grid sub-stations followed is evaluated by the management.

Actions are taken on the basis of evaluation by the Management

5.5 Safety & Security

5.5.1 Operating firefighting equipment: If by any means fire breaks out in control room or in the switchyard,

- Operation people operate the fire extinguishers & instantly call the nearest fire brigade office
- Operation people inform the grid in-charge and control room
- The event is recorded in shift diary

Monitoring the security of sub-station: In course of monitoring the security, operation people identify the following

- Lighting, in & around the switchyard boundary wall & control room is adequate.
- Security guards / Ansars are in duty in proper positions

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- Main entrance to the sub-station is well protected as specified.

If any deficiency is observed the SBA/CS on shift immediately informs the SDE and records it in the register

- Safety of both man (maintenance gang) and equipment is considered
- It is ensured that, the equipment is de-energized, isolated from the system, properly grounded (by both Earth Switch & locally) and & safe for working.
- the SDE/SAE on duty in grid sub-station control room will make the maintenance zone marked in association with the team leader of the working party & will give permission for work

In the marked maintenance zone, no person, irrespective of designation, would be allowed to enter, without wearing appropriate protective gears like

- Helmet
- Safety Belt
- Gloves
- Protective Shoes
- Eye protecting Glasses etc.

5.6 Colored Tags

- Colored Tags are used for easy recognition of equipment under maintenance and/or out of operation.
- Colored Tags are used for easy recognition of equipment under maintenance and/or out of operation
- All the personnel working in the control room must have proper knowledge of operating Fire Extinguishers kept both in the control room & in switchyard.
- The effectiveness of the procedure for Substation Operation regarding the operation of grid sub-stations will be evaluated during internal audit.
- Actions will be taken on the basis of evaluation by the Management Review Committee.

5.7 Environmental Aspect, Impact & Controls

Any activity at the plant, whether it is carried out for ensuring quality of service or meeting requirement of the interested parties, there will be some environmental aspects associated with it. It is a requirement of the IMS of BPDB to identify those environmental aspects, evaluate their impact and determine necessary controls.

While carrying out the activities and operation, the employees of BPDB need to exercise appropriate and predetermined controls so as to prevent or mitigate any adverse impact that may be associated with the activity or the process.

Some examples of environmental aspects associated with the Procedure for Substation Operation are as below:

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SI Nos.	Aspect	Impact	Controls
1.	Usage of electricity to cool transformers	GHG Source	1. Ensure all machines are working efficiently
2.	Lubricating oil hydraulic fluids, coolants, solvents and cleaning agent's disposal	soil pollution	1. Follow the waste management plan
3.	Solid Waste (wires, plastics)	Soil / Water Pollution	1. Follow the waste management plan
4.	Discarding of Rare Earth Metals	Depletion of Resource	1. Follow the waste management plan
5.	Chemical Cleaning Agent	Soil / Water Pollution	1. Work and dispose as per the chemical disposal plan 2. Provide Necessary Training
6.	Rejection of Refrigerant	Depletes Ozone layer	1. Use the latest eco-friendly air-conditioner
7.	Paper Use	Natural Resource Depletion	Avoid printing e-mail and drafts (display documents on screen rather than printing out a paper copy) § Archive electronically
8.	Lighting	Natural Resource Depletion	Using day lightings § Unnecessary lights should be switched off
9.	Empty Packs	Waste Generation	Segregate properly and deliver to the central admin department
10.	Effluent from toilet use	Water Pollution	Dispose to Municipal discharge connection for adequate disposal
11.	Battery Disposal	Soil / Water Pollution	1. Follow the waste management plan
12.	Capacitors Disposal	Soil / Water Pollution	1. Follow the waste management plan

The table above provides examples only. The IMS team of each site needs to identify the aspect impact and controls related to specific activities and ensures that

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the environmental performance of the organization is effectively maintained. For this purpose, the procedure “Environmental Aspect Impact Assessment Procedure” is to be followed and forms “Environmental Aspect Impact Register” is to be filled up by the IMS team.

5.8 OHS Hazard, Risk & Controls

Any activity at the plant, whether it is carried out for ensuring quality of service or meeting requirement of the interested parties, there will be some occupational hazards with it related to the occupational health and safety (OHS) to the workers and employees. It is a requirement of the IMS of BPDB to identify those OHS hazards and determine necessary controls.

While carrying out the activities and operation, the employees of BPDB need to exercise appropriate and predetermined controls so as to prevent or mitigate any adverse consequence that may be associated with the activity or the process.

Some examples of OHS hazards and with the Procedure for Substation Operation are as below:

SI Nos.	OHS Hazard	Controls
1.	Slipping due to water spillage on floors	1. Maintain adequate housekeeping. 2. Maintain signage if there is any spill.
2.	dropping / falling object	1. Maintain adequate PPE (e.g. Helmet) whilst at worksite
3.	Electric shock / Electric Arc	1. Ensure a Permit to Work is issued as per guidance before personnel is sent for work 2. Maintain LOTO Procedure 3. Maintain adequate PPE whilst at worksite
4.	Fire / Explosion at worksite	1. Follow the 'Prevention of Fire and Explosion' Procedure
5.	Heat Stress	1. Ensure Heat Stress Training for all the employees 2. Ensure a good work plan
6.	Getting Stuck in moving / Rotating Parts	1. Ensure protocols are maintained, such as not leave loose long hair, or loose long dress 2. Proper signage 3. Maintain barrier / mark area so that when personnel enter that zone, he/she is obliged to take adequate precautions
7.	Chemical Spillage / Burn	1. Provide Necessary Training

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		2. Maintain adequate PPE whilst at worksite 3. Ensure good House Keeping
8.	Burn from contact with hot surface	1. Use of Guards to ensure contact can't be made directly 2. Provide Caution Sign 3. Maintain adequate PPE whilst at worksite
9.	Fumes and gases	1. Maintain adequate PPE whilst at worksite 2. Ensure a Permit to Work is issued as per guidance before personnel is sent for work
10.	Light from welding	1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite 3. Proper Supervision
11.	Unhygienic work environment e.g. canteen, toilet etc.	1. Maintain adequate housekeeping.
12.	Cuts from Material Handling / movement	1. Maintain Material handling Procedure 2. Ensure a Permit to Work is issued as per guidance before personnel is sent for work
13.	Poor Visibility due to improper lighting	1. Maintain adequate housekeeping. 2. Installing adequate Lighting
14.	Lifting heavy objects	1. Maintain Material handling Procedure 2. Ensure a Permit to Work is issued as per guidance before personnel is sent for work
15.	Dusty environment	1. Ensure adequate housekeeping

The table above provides examples only. The IMS team of each site needs to identify the OHS hazards and necessary controls related to specific activities and ensures that the environmental performance of the organization is effectively maintained. For this, the procedure Hazard Identification and Risk Assessment Procedure is to be followed and Hazard Identification and Risk Assessment Register is to be filled up by the IMS team.

6.0 References

- a) "Manual for Operation & Maintenance of Distribution System" Volume-I and Volume-II
- b) Operation schedule

7.0 Appendix

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8.0 Revision History

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