
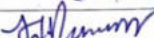





## Preliminary Report

1. Name of the Sub-Station/Generating Station: Lakshmi, BTFS, AEGCL
2. Voltage level: 220/132/33 KV
3. Owner: AEGCL
4. Date of Audit: 31/01/24
5. Members of Auditing Team: Ashwin

Sl.No.	Name	Designation	Organization	Signature
1	Ashim Ghoswami	AD-II	NERPC	
2	J. D. BHAMMA	AD-1	NERPC	
3.	Utpal Das	AM	NERLDC, GRID-INDIA	
4.	Thasemep. Jamir	J.E	DoP, Nagaland.	
5.	Hemant K. Kerketta	Manager	POWER GRID	

6. Representatives of the Sub-station/Generating Station assisting the auditing team:

[illegible]

*[Signature]*  
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31/9/14

Ray  
31-01-2014

31/01/24

22/31/01/2021

3/10/24  
AM, NERLDC  
31/01/24

Due 3/16/14  
(POWERGRID)

## Observations/Recommendations:

### 1. Check list

Parameters	Yes/NO	Remarks
Whether redundant supply for station auxiliaries is available?	Yes.	DB (350 kVA) available.
Whether SCADA system is present?	Yes.	Healthy.
Whether Governor/AVR and associated panels for each units in healthy condition?	No/NA	.
Whether two separate DC sources provided for Main I and Main II protection ?	220V → Yes. 48V → No.	D/C E/F <sup>meter</sup> <del>not</del> available in zone 1 in 220V DC.
Whether protection relays for generating transformers/ICTs are operational?	Yes.	
Whether protection relays for emanating lines are operational?	Yes.	
Whether time synchronisation facility is available in the Sub-station?	Yes.	
Whether existing RTUs are healthy and reporting?	<del>Yes</del> N/A	Substation SCADA based. RTU not applicable.
Whether existing communication via PLCC or OPGW? If PLCC then healthiness of PLCC panels	Both.	
* In case of OPGW connectivity to the station, whether <u>end equipments</u> are available and functional?	Yes.	

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Healthiness of Protection coupler/Coupling device?	Yes	
Tie-breaker healthiness	N/A	
Bus-coupler healthiness	Yes	
Whether sufficient lighting is available in the switchyard?	No	No light in switchyard. Proper lighting required. (GM/OEM).
Whether remote operation of MIV is possible?	<del>Yes</del> No	
* Whether online/offline diagnostic tools are available for monitoring generator healthiness?	N/A	
DC Supply- Whether two DC sources are available?	220V → Yes 48V → No	
Earthing System in the switchyard: Whether as per IS?	No issues found in earthing.	Design drawing not available to verify.
List of diagnostic tools, testing equipments etc. and whether are present in sufficient quantity?	Yes	
Whether firefighting provision is available in the station?	Yes	NIFPS, Fire extinguisher, Fire wall.

2. Review of existing settings at substation and recommendations- All existing settings collected in PDF format shall be examined thoroughly. Any recommendations shall be communicated after thorough analysis.

\* 3. Recommendation of last protection checking and validation (status of work and pending issues if any)-

4. Disturbance Recorder out available for last 6 tripping's (Y/N) and recommended action- Yes

5. Chronic reason of tripping, if any-

Lightning and vegetation.

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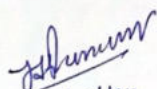
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6. Major non-conformity/deficiency observed -

7. Any other specific observations/recommendations:

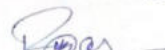
- Fire fighting equipment not available at 1 building level
- fire detector not installed in building.



  
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AM, NERLDC  
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31.01.2024.



पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड  
(भारत सरकार का उद्यम)  
POWER GRID CORPORATION OF INDIA LIMITED  
(A Government of India Enterprise)

Ref No. : NERTS/NERPC/218

Date : 11.09.2023

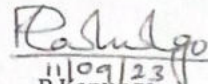
To  
The Member Secretary  
NERPC, Shillong

Sub : Submission of SOP and Draft Physical Audit Inspection Report for 3<sup>rd</sup> party protection audit

Sir

With reference to the discussion held on 59<sup>th</sup> Protection Sub-Committee Meeting held at NERPC Conference Hall Shillong on 29.08.2023, the SOP and Draft Physical Audit Inspection Report for 3<sup>rd</sup> party protection audit to be carried out is enclosed alongwith for review and finalization for further distribution to concerned utilities for needful implementation at the earliest.

Regards

  
11/09/23  
P. Kanungo  
CGM, NERTS

Encl : (i) Annexure-I - (SOP)  
(ii) Annexure-II - (Draft Physical Audit Inspection Report)


Copy to : (i) S.M.Aimol, Director, NERPC  
(ii) A. Mallick, CGM (I/C), NERLDC



SOP for protection audit


1. Circulation of all formats for self audit to all concerned utilities/stations.
2. Submission of self-audit reports to NERLDC/NERPC by concerned utilities/stations.
3. Physical audit of stations by 3<sup>rd</sup> party.
4. Preparation of audit reports by the 3<sup>rd</sup> party audit team immediately after completion of audit & submitting it to the station.
5. Submission of audit report to NERPC.

  
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3<sup>rd</sup> party  
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## Annexure-II

## Draft Physical Audit Inspection Report

## SUBSTATION

### Transformers:

- ✓ a. Check oil level – Main Tank, OLTC & Bushings (if applicable) → *Little low.*
- ✓ b. Check Silica Gel condition – *Poor*
- ✓ c. Check operations of fans – *Poor, fans missing.*
- ✓ d. Check alarms of RTCC panel → *checked.*
- ✓ e. Check Online DGA condition (if installed) → *Installed & healthy.*

2. Reactors:  $\rightarrow$  N/A

- Check oil level – Main Tank, Bushings (if applicable)
- Check Silica Gel condition
- Check Online DGA condition (if installed)

## 3. СТ.

- CT:
- ✓ a. Check oil leakage - No oil leakage
  - ✓ b. Check MB internal conditions - Poor
  - ✓ c. Check star point - double earthing to be avoided. → Yes avoid it
  - d. Check plugging of all holes in MB. → Poor

1. CVT :

- CVT:
- ✓ a. Check oil leakage - *No oil leakage*
  - ✓ b. Check MB internal conditions - *Poor*
  - ✓ c. Check star point - double earthing to be avoided. *Yes avoided.*
  - ✓ d. Check LMU condition & cabling to PLCC panels (if available)
  - ✓ e. Check plugging of all holes in MB. *needs maintenance.*
- 1 numbering*

5. Surge Arrester :


- a. Erath pit numbering along with <sup>done</sup> previous earth resistance measurement & next <sup>to</sup> due date to be marked.
- b. Surge counters to be checked for healthiness (mA reading to be available in surge counter).  
 ↳ All surge counters to be replaced.


6. Switchyard :


- ✓ a. Cable trench covers to be available in good condition — *Not good.*
- ✓ b. Check availability of proper illumination in switchyard. — *No illumination.*
- ✓ c. Gravel spreading to be available in switchyard — *Yes*
- ✓ d. Switchyard to be free of any vegetation growth. — *No; vegetation problem exists.*
- ✓ e. Bay naming plates to be available — *Not. Not visible.*
- ✓ f. All equipments to be marked for proper identification baywise. — *Not remarked at all.*

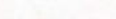
7. DG :


7. DG:

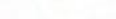
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- ✓ a. Auto Run feature to be checked. - *Auto Run available. Operate manual.*
- ✓ b. Diesel consumption record to be available. - *Available.*
- ✓ c. Check DG exhaust pipe height as per norms.
- ✓ d. Check for DG oil leakage. - *No oil leakage.*

#### 8. PLCC :

- a. Availability for all 132kV & above feeders to be checked.
- b. Pending alarms to be checked.
- c. Gain level (AGC) to be checked.

#### 9. Circuit Breaker :

- ✓ a. SF6 gas pressure to be checked.
- ✓ b. SF6 gas consumption record to be maintained. - *No specific record maintained.*
- ✓ c. Leakage from pneumatic CB to be checked.
- ✓ d. Operation counters to be checked for healthiness.
- ✓ e. Any pending alarms to be checked for CB in CRP/SAS.

AM.

Isolators in 132 kv side need to be replaced.

- ✓ 10. Isolator & earth switches : → *33kv spare isolators not available.*
  - a. Check MB for cleanliness & plugging of all holes. - *MB's maintenance*
  - b. Operating handles to be available. - *Yes.*
  - c. Proper demarcation of earth switches to be done. - *Demarcation not available*

#### 11. SCADA :

- ✓ a. Availability of GPS. (*GPS time synced*)
- ✓ b. Availability of functional ACs for control room & relay kiosks. → *AC non funct in battery n*
- ✓ c. Time Sync to be checked.
- ✓ d. Remove any feeder protection relay from SCADA ring by disconnecting the fibre. Relay should get disconnected from SCADA ring in NMS & alarms to be recorded in event list. → *checked.*
- ✓ e. Check for any persisting alarms of SCADA.
- ✓ f. Simulate AR block alarm in case PLCC fail/Carrier Out condition. → *removed as per NERDC recommendation*

#### 12. Protection :

- ✓ a. Check Line Diff Relay Installation completion (if applicable).
- ✓ b. Check whether Line Diff function is in service (if OPGW is available between terminal ends) → *PGW pending.*
- ✓ c. Check DR triggered for time sync.
- ✓ d. AR to be implemented for all 132kV lines & above → *BTPS-Dhaluagan I & II only AR active.*
- ✓ e. Check for any pending bus bar block alarm.
- ✓ f. Check all relays are in ON condition.
- ✓ g. Check for any non functional/damaged electromechanical relays still in service. → *N/A.*
- ✓ h. Lamp Test for mimic panel. → *N/A*

Installation in progress

#### 13. Battery & battery charger :

- ✓ a. Battery voltage (+ve to E & -ve to E) - check for any earth fault. → *No earth fault checked.*
- ✓ b. Battery bank voltage drop test to be carried out by switching off ac supply (To be discussed for possibility)

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- ✓ c. AC to be installed if VRLA batteries are used. → NO AC
- ✓ d. Battery earth fault relay to be installed in DCDB. → checked
- ✓ e. Check earth fault relay settings (3mA & instantaneous).
- ✓ f. Check all LEDs of battery charger are in working condition.

#### ✓ 14. Fire Fighting :

- ✓ a. Availability of functional fire fighting system for Xmers & Reactors.
- ✓ b. Availability of updated refilled fire fighting cylinders. 16 nos. available.
- ✓ c. Availability of fire fighting system for control room.
- ✓ d. Check fire fighting alarms (if possible) → smoke detector & alarms not available.

#### ✓ 15. GIS :

- a. Check AHU system is functional or not.
- b. SF6 gas consumption record to be maintained.
- c. GIS hall to be clean & free of dust.

#### ✓ 16. Safety :

- ✓ a. Prevailing safety procedure to be recorded.
- ✓ b. First aid kit to be available. - 'yes'
- ✓ c. All safety PPEs to be available. - 'yes'
- ✓ d. Emergency contact details to be available in control room. - 'yes'

#### ✓ 17. Test kits :

- ✓ a. List of testing kits to be available as per norms. - 'yes'
- ✓ b. Calibration of all kits to be updated. → calibration report if required.

### TRANSMISSION LINE

#### ✓ 1. Visual inspection :

- ✓ a. Vegetation growth on tower body. - Lot of vegetation.
- ✓ b. ROW corridor to be free from vegetation growth.
- ✓ c. Check for any tower shape abnormalities - like bending etc. - No abnormality found
- ✓ d. Check for any visible member missing. - No member missing.

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## Bay - NTPC-II

- Surge Arrestor - Counter healthy.  
- Arrestor healthy.  
- Separate earth pit not available.

Switchyard - CVT: - Rusted GB. (Painting needed)  
- No name plates.  
- Separate earth pit not available.  
Separate CVT cores to be used for main 1, main 2 & busbar.

CT: - Name plate not visible // single strand wiring.  
- No oil leakage.  
- MB internal condition good.

Multi strand cable not available for MB wiring.

Isolation: - No deterioration of ES. No markings.

xx Cable dressing in switchyard

CB: - Name plate proper.

## ② Bay: NTPC-I

LA: - Counter totally rusted.  
- Discharge current healthy.  
- Counter OK.

CT: - No oil leakage.  
- Name plate not visible.  
- Live tank CT.

## ③ Bay: Powergrid-II (Recently upgraded).

LA: - Counter OK.  
- Discharge current OK.

CVT: - OK.

Wave traps: - OK.  
- LRAU OK.  
- MB hole filling.

## ④ Bay: PG-I (same).

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⑤ Bay: Rangla-II

LA: - Counter too high position.  
- Discharge OK.  
- Counter OK.

CVT: - Name plates misplaced.  
Aggr. BTPS plates placed.  
- No oil leakage.  
- Double earthing OK.  
- LMU OK.  
- Holes plugged.

CT: - Line tank  
- No oil leakage  
- Earthing OK  
- Single as well as multi stream.  
- MB rusting.

Transfer isolator: - Tandem type  
- OK.

Isolator: - Gang operated.  
- Operating handle OK.  
- Earthswitch OK.  
- MB OK. / Earthing broken in last gang isolator.

Breaker: - SF6 gas operated.  
- 40 KA/3 sec.  
- Pressure OK.

Fault → 20KA/1 sec.

⑥ Bay: Rangla-I

LA: - Discharge OK  
- Counter OK.  
- Earthing OK.  
- Earth pit vegetation & maintenance poor.

CVT: - Dead tank  
- Name plate OK.  
- MB OK.  
- B-phase CVT missing. (Not installed).

CT: - No oil leakage  
- Earthing OK.  
- Name plate OK.  
- MB etc. rusting.

Breaker: OK.

Isolator: MB completely rusted.

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Bay: Agra-II

(3)

LA:- Surge Counter missing in B phase  
- Discharge current too high. (Beyond normal)  
- Earthing OK.

CVT- Dead tank.  
- MB not secured properly.  
Balls missing.  
- Earthing OK.

CT - Dead tank.  
- MB rusted.  
- Name plate not visible.

Isolation- Double body earthing } gang iso <sup>before</sup> ~~after~~ CB.  
missing in A-phase.

Breaker- MB no earthing.

ICT-2 (Bhel)

- Pumps OK.

→ WTE → Fan-66°C  
Pump-72°C } Alarm-80°C  
Trip-93°C

→ OTI → Alarm-80°C

→ MB not clean properly.

→ NIFPS - Nitrogen pressure low (90 kg/cm<sup>2</sup> in online)  
- Meter not functioning for pressure.


→ No cell leakage

→ Helium gel OK.


→ Breather from overhead tank sealed. Not visible.

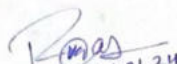
→ Conservator oil level low.

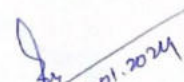
  
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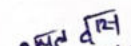
  
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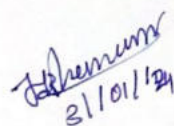
  
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## ICT - I

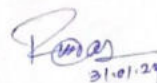
- ① LA counter not working. R (R & T bad).
- ② 5 fans missing.
- ③ silica gel condition poor.
- ④ Minor oil leakage.
- ⑤ Neutral double put earthing not available. Single put only.
- ⑥ MB condition poor.
- ⑦ OTI → Alarm  $75^{\circ}\text{C}$   
Current temp →  $48^{\circ}\text{C}$   
| Fan →  $62^{\circ}\text{C}$   
Pump →  $74^{\circ}\text{C}$
- ⑧ WTI → Alarm  $93^{\circ}\text{C}$   
Current temp →  $48^{\circ}\text{C}$
- ⑨ NIFPS condition poor.  
Conduct not clean.

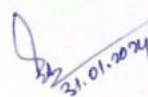
  
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# 32 KV Bays

## Bay- Dhaligaon-2

LA- Discharge meter not working } 4KV, SICA  
 - Counter OK.  
 - Name plate OK.  
 - Earthing OK.

CVT - Dead tank  
 - No oil leakage  
 - Earthing OK.  
 - MB maintenance poor, rusted.  
 - 4100/6600/8800 PF.

CT- Live tank  
 - Earthing OK.

Wave trap- 2 $\phi$  system (X & B)  
 - LDR not found  
 - LRU found.

Tandem Isolator- Handle operation box rusted } Transfer Isolator  
 - Earthing OK.

Grang Isolator- ~~Ham~~ Order already placed for day  
 ↳ Total unit should be changed.

Breaker- Earthing OK.

\* Isolator units should be changed for Dhaligaon-2

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② Dhaliagan | Kobrajha

CB → MB cover

LA → Discharge current high (Y & B)

→ Zero discharge current in R.

★ Surge Arrestors → proper check in all bays  
necessary  
- Meet counters are not working.

\* Jumper missing in transfer Bus. Transfer Bus  
not functional in 132 kv system.

132/33 kv Trafo

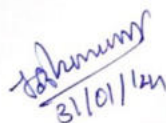
① Silica Gel not functional.

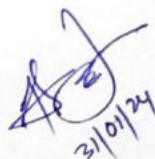
② No oil leakage.


③ Fans missing (3 nos)

④ WTR -  
OTR -

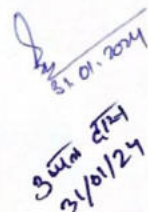
  
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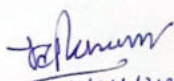
  
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- ① Manpower
- ② Lighting.
- ③ No spare 33 kv isolators.
- ④ Multi-strand cable is required for replacement of existing single core-cables used in CT and other terminal equipments.
- ⑤ Spare CT, CB, CVT is not available in the switchyard.

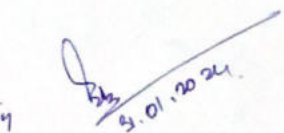
  
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