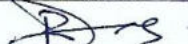

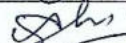


✓

- Barnagar GSS

Sl.No.	Name	Designation	Organization	Signature
1.	Rajib Das	AE	NERPC	
2.	Bikash Kishor Borra	Engineer.	PGEIL	
3.	Asim Kumar Nath	Engineer	NERLDC, POSOL	

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

[illegible]

Observations/Recommendations:

Sl.No.	Parameters	Yes/NO	Remarks
1	Whether redundant supply for station auxiliaries is available?	Yes.	
2	Whether SCADA system is present?	Yes.	
3	Whether SAS has been implemented? If no, whether panels are SAS compliant?	Yes.	
4	Whether protection relays for transformers/ICTs/reactors are operational?	Yes.	
5	Whether reliability by way of Bus-Bar scheme is present in 132kV station?	No.	Single bus bar scheme.
6	Whether Double Main Arrangement is present in 220kV Station? If yes, whether operational or not?	NA	
7	Whether Bus Bar Protection is available for the 220kV and above station?	NA	
8	Whether protection relays for emanating lines are operational?	Yes	
9	Whether time synchronisation facility is available in the Sub-station?	Yes.	Time sync error persisting in all IEDs.
10	Whether existing RTUs are healthy and reporting?	NA	
11	Whether existing communication via PLCC or OPGW? If PLCC then healthiness of PLCC panels	PLCC.	PLCC unhealthy for one line.

12	In case of OPGW connectivity to the station, whether end equipments are available and functional?	NA	
13	Whether all analog/digital points are reporting in local SCADA?	Yes.	
14	Healthiness of Protection coupler/Coupling device?	NA	
15	Whether sufficient lighting is available in the switchyard?	No	May be enhanced.
16	DC Supply- Whether two DC sources are available?	Yes.	
17	Earthing System in the switchyard: Whether as per IS?	Yes.	
18	List of diagnostic tools, testing equipments etc. and whether are present in sufficient quantity?	No	
19	Whether firefighting provision is available in the station?	Yes. No.	Fire protection for x ^r required.
20	Whether Protection Audit has ever been carried out before? If yes then compliance status of Audit Observations/Recommendations	Yes.	
21	Whether all relay settings have been submitted in PDMS? If no, then compliance status	No.	
22	Whether CTs, PTs/CVTs of sufficient accuracy is present in the station?	Yes.	

Any other specific observations/recommendations:

1. Breaker status not available in disturbance record, same may be complied for better analyzing fault.
2. CB Trouble alarm persisting in 33KV Barpeta Town Feeder. Same may be rectified.
3. Time sync error found in IEDs. Same may be rectified.
4. PLE fail alarm persisting in Rangia Bay. Same may be rectified.
5. Auto reclose switches are in non-auto mode. Same may be rectified and should be kept as per required.

6. DE Earth fault persisting in both the DE sources. Same may be rectified as soon as possible.

DE Source-1

+ve to Earth = 12V
-ve to Earth = -120V

DE Source-2

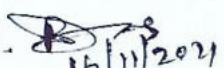

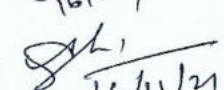
+ve to Earth = 118V
-ve to earth = 0V.

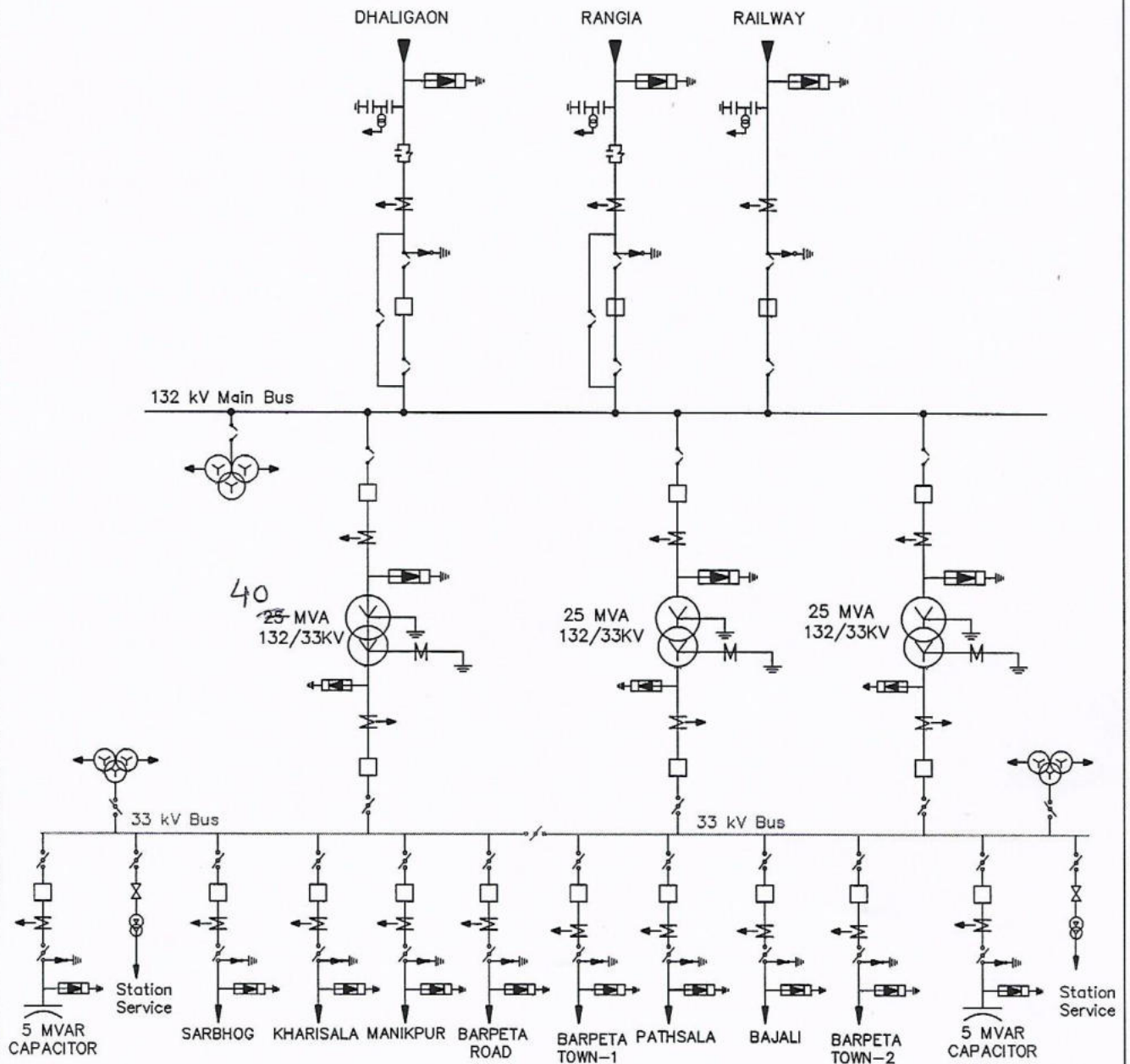
7. No DE Earth fault relay available at site.
8. LA foundation in line feeders are found ~~now~~ in middle of the Bay. As per protection of the Bay LAs are should be at the first position of a Bay.
9. Vegetation growth observed in all over the switchyard. Grassellings are not in adequate amount.
10. Door lock of MOH box in Transformer is not in proper condition.
11. Oil leakage observed in Transformer-1.
12. Faulty LA counters should be replaced in Transformer-1 LV side Bay.
13. Spare/Scrap items are found in switchyard. Same may be stored in proper place.
14. Cable laying should be in proper condition. Some cables are found laying over cable trench.
15. Fire ^{fighting} protection for absent for all transformers.
16. Bay marking/Phase marking to be done immediately.
17. Anti-corrosion painting require in some structures.
18. 3rd Party Protection format to be submitted.
19. R.K. Task force format to be submitted.
20. PDMS data to be submitted.

For 132kV Barnagar GSS.

- ① R (Rajib Kumar Mondal)
- ② R (Bibek Baruti)

For Audit Team

1.  16/11/2021 (Rajib Das)
2.  16/11/21 (BIKASH KISHOR BORA)
3.  16/11/21 (ASHIM KUMAR NATH)



EQUIPMENT LEGENDS

POWER TRANSFORMER	CIRCUIT BREAKER	ISOLATOR WITHOUT EB	ISOLATOR WITH EB	CURRENT TRANSFORMER	POTENTIAL TRANSFORMER	LIGHTNING ARRESTER	WAVE TROP	CVT	GROUND



ASSAM ELECTRICITY GRID CORPORATION LIMITED

BARNAGAR 132/33KV SUBSTATION

SINGLE LINE DIAGRAM OF 132/33 KV, BARNAGAR SUBSTATION

DRAWING NUMBER: AEGCL/BARNAGAR/SLD/3

Sheet: 1 OF 1

14A.PERIODICITY OF MAINTENANCE OF SUBSTATION EQUIPMENT / TRANSMISSION LINE COMPONENTS/ELEMENTS

Sl. No.	Equipment	Tests being conducted	Preiodicity of Tests being conducted (Put "Y" under appropriate column)				
			3 months	6 months	1 year	> 1 year	No test is being done
1	Transformer / Reactor	Winding resistance measurement			Y		
		Voltage Ratio test for transformer			Y		
		Magnetising current test			Y		
		Magnetic balance test			Y		
		Insulation Resistance (IR) Measurement			Y		
		Polarisation Index (PI)					
		Capacitance & Tandelta Measurement for					
		(a) Winding			Y		
		(b) Bushing			Y		
		Break Down Voltage (BDV) Test for oil			Y		
		Dissolved Gas Analysis(DGA)			Y		
		Sweep Frequency Response Analysis(SFRA)					Not test
		Partial Discharge (PD) Measurement					
		Degree of Polymerisation (DP) for cellulose insulation					
		Furan Analysis					
		Vibration Measurement for reactors					
		Check of various earthing connections					
		Any other test (Please mention)					
2	Circuit Breaker (CB)	Static Contact Resistance Measurement			Y		
		Dynamic Contact Resistance Measurement (DCRM)					Not test
		Operating timing of CB (Opening Time, Closing time, CO)			Y		
		Operating timing of Pre Insertion Resistor (Pre-insertion time)					
		Capacitance & Tandelta measurement for Grading capacitors					
		Healthiness of Trip Coil (TC) & Closing Coil (CC)			Y		
		Healthiness of Operating Mechanism			Y		
		Dew point measurement of SF6 gas					Not test
		Check of various earthing connections					
		Any other test (Please mention)					
3	Isolator / Disconnectors	Static Contact Resistance Measurement					Not test
		Healthiness of Operating Mechanism			Y		
		Checking of Interlocks with CB, Earthing switches etc.					Not test
		Check of various earthing connections					
		Any other test (Please mention)					
4	Current Transformer(CT)	Capacitance & Tandelta Measurement			Y		
		Insulation Resistance (IR) Measurement			Y		
	Current Transformer(CT)	Measurement of secondary winding resistance			Y		

14A.PERIODICITY OF MAINTENANCE OF SUBSTATION EQUIPMENT / TRANSMISSION LINE COMPONENTS/ELEMENTS

		Partial Discharge (PD) measurement					
		Check of various earthing connections					
		Any other test (Please mention)					
5	Potential	Capacitance & Tandelta Measurement					
		Insulation Resistance (IR) Measurement					
		Partial Discharge (PD) measurement					
		Check of various earthing connections					
		Any other test (Please mention)					
6	Capacitive Voltage Transformer (CVT)	Capacitance & Tandelta Measurement			Y		
		Insulation Resistance (IR) Measurement			Y		
		Secondary Voltage Measurement			Y		
		Partial Discharge (PD) measurement					
		Check of various earthing connections					
		Any other test (Please mention)					
7	Surge Arrester (SA)	3rd Harmonic Leakage Current Measurement				Y	
		Capacitance Measurement					Notes
		Insulation Resistance (IR) Measurement			Y		
		Check of various earthing connections					
		Any other test (Please mention)					
8	Relays	Functional tests of each Protection relay			Y		
		Operating timings			Y		
		Testing of DR/EL with TSE			Y		
9	PLCC system	Checking of PLCC system					Notes
10	Battery	Measurement of specific gravity of electrolyte (for flooded battery)	Y				
		Topping of battery using Demineralized / Distilled water (for flooded battery)	Y				
		Open Circuit Voltage of Cells Tests			Y		
		Capacity test					Notes
		Checking of earth fault due to leakage (for flooded battery)					
11	Earthing	Resistance of Earth mat			Y		
12	Hot Spot	Infrared scanning					
		(a) Inside switch yard / substation (for clamps , connectors etc.)	Y				
		(b) Transmission lines (Clamps, connectors, Jumpers etc.)	Y				
13	Insulator	Punncture Insulator Detection					
		Cleaning of Porcelain / Glass insulators					
		(a) Normal washing					
		(b) Hotline washing					
14	Tower	Tower footing resistance measurement					

14B. AVAILABILITY OF VARIOUS DIAGNOSTIC TOOLS (MRT, Dharguon).

Sl. No.	DIAGNOSTIC TOOLS	Avail-ability	If Yes (i.e. if Available)	
		(Y/N)	Make	Model
1	Winding resistance meter	Y	DV POWERS	
2	Transformer Voltage Ratio test meter	Y	SCOPE	
3	Insulation Resistance (IR) tester			
	(a) 5 kV	Y	SONEL	
	(b) 10 kV	Y	SONEL	
4	Capacitance & Tandelta Measurement Instrument			
	(a) Automatic	Y	HAEFLY	
	(b) Manual			
5	Break Down Voltage (BDV)Test kit for oil	Y	BEACON	
6	Dissolved Gas Analyser	Y	MYRKOS & MORGAN SCHAFER	
7	Sweep Frequency Response Analysis(SFRA) test kit	Y	HAEFLY	
8	Partial Discharge (PD) Measuring Instrument			
9	CB operational Analyser			
10	DCRM test kit	Y	SCOPE	
11	SF6 Gas leakage detector	Y	HENAN RELATIONS	
12	Dew point measuring instrument	Y	HENAN RELATIONS	
13	SF6 Gas Hanndling Plant (for Evacuation, filling, filtering of gas)			
14	Static Contact Resistance Measuring instrument	Y	SCOPE	
15	Leakage Current Meter (LCM)	Y	BEACON	
16	Earth Tester	Y	FLUKE	
17	Automatic Realy test kit	Y	OMICRON	
18	Thermovision camera for detection of hot spots			
19	Thermal Scanner (for Transformer / Reactor)	Y	FLUKE	
20	Transmission line Response Analyser	Y	FLUKE	
21	Punncture Insulator Detector (PID)	N		
22	On line Partial Discharge (PD) monitoring of GIS	N		
	If Yes			
	(a) Using Ultra High Frequency (UHF) technique			
	(b) Using Acoustic technique			
22	Any On line diagnostic tools	N		
	If Yes, List the instruments			
	(a)			
	(b)			
	(c)			

14C. VARIOUS PROVISION IN SUBSTATION / SWITCHYARD

Sl. No.	VARIOUS PROVISION	Availability
		(Y/N)
1	Soak Pit for transformer / reactors of 10MVA and above rating or with oil capacity more than 2000ltrs	N
2	Oil Collecting pit for transformer / reactors	N
3	CO2 and sand buckets	Y
4	Foam type fire extinguisher	Y
5	Portable type fire extinguisher	Y
6	Hydrant Type	N
7	High Velocity Water Spray (HVWS) System	N
8	Nitrogen Injection Based Fire Protection System (NIFPS)	N
9	Both HVWS system & NIFPS	N
10	Fire Fighting wall between Transformers (if distance between transformers < 15m)	Y
11	Direct Lightning Protection	
	(a) Using Over Head Ground Wire(OHGW)	Y
	(b) Using Spikes	
	(c) Using Lightning Masts(LMs)	
	(d) Combination of OHGW + LM	
	(e)Combination of OHGW + Spikes	
12	Condition of Earthing System	
	(a) Gravels Spread ove Pre-Stressed Concrete (PCC)	
	(b) Only Gravels	
	(c) Gravels are visible	
	(d) Gravels coverd with grass / soil	Y
13	Operation of On Load Tap Changer (OLTC)	
	(a) As and when required	Y
	(b) Never operated	
14	Operation of Off Load Tap Changer	
	(a) As and when required	
	(b) Never operated	
15	DG Set	Y
	If Yes, Rating (Nos., Voltage level, KVA capacity)	01 No. 100KVA

Station Name: 132/33kV Barnagar GSS Audit Report

SL No.	Reccomendations during Protection Audit 2013	Status as on 06.08.18 (Attended/Not Attended)	If Not complied, target date of completion	Remarks
	Mt switching scheme may be implemented at 132 kV			
1	Old SF6 type CBs may be replaced, if required.	Attended		
2	The old gapped type SA, if exists, need to be replaced by heavy duty station class, gapless type surge arrester of suitable rating. The healthiness of old Gapless Surge Arrester need to be ensured, and may be replaced, if required.	Attended		Attended but another 9 nos. of 132 KV SA need to be replaced
3	No. of CT cores are not adequate. CT accuracy class is not as per CEA's regulations, CT ratio is not suitable for bus bar protection. CTs of suitable ratios (if bus bar protection is to be provided) and accuracy class need to be provided. The healthiness of old CTs need to be ensured and may be replaced, if required.	Attended		132 KV CT attended. 33 KV CT will be attended under PSDF
4	PT/CVTs accuracy class is not as per CEA regulation. PT/CVTs of suitable accuracy class need to be provided. The healthiness of old PT/CVTs need to be ensured and may be replaced, if required.	Attended		132 KV PT attended. 33 KV PT will be attended under PSDF
5	Two sets of batteries (110V) with associated chargers for station DC supply and two sets of batteries (48V) with associated chargers for reliable communication system shall be in place as per CEA's regulations.	Attended		
6	DG set of suitable capacity may be provided.	Not attended		Will be done under PSDF
7	The bus PT / CVT is being used for both protection and metering of transformer and lines. Dedicated line CVT may be used for distance protection	Not attended	CVT proposed to be commissioned within 6 months.	Will be done under PSDF

↓
not attended

to transfer
uses bus cvt

replaced

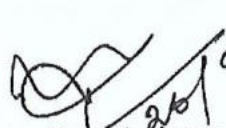
attended
for 33kv

attended

1 set
48V

attended

8	Protection scheme as per CEA's regulations need to be provided for lines, ICT, EM/static relays to be replaced by Numerical relays complying to IEC 61850 protocol. DR, EL and TSE need to be provided. BC&PU and SAS may be provided. Telecommunication link may be established for communication and protection purpose.	Not attended	proposed to be commissioned within 6 months.	Will be under → Insulated for 132 kV
9	Required FF provision has to be made as per CEA's regulations.	Not attended		not attended
1	Earthing system needs improvement	Not attended		Will be under attended
11	The modern diagnostic tools including relay test kit need to be procured to assess healthiness of transmission line and various substation equipment/material including protective relays. Minimum diagnostic tools are to be provided as per CEA's regulations.	Not attended		not available


 Resident Engineer
 132KV Barnagar Grid Sub-Station
 AEGCL, Sorbhog