
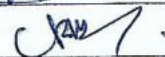
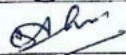


### Comprehensive Audit:

1. Name of the Sub-Station: BAGJHAP GSS
2. Voltage level: 132/33 KV
3. Owner: AEGCL
4. Date of Audit: 15-11-2021
5. Members of Auditing Team: ~~H. Rajib Das,~~

Sl.No.	Name	Designation	Organization	Signature
1.	RAJIB DAS	AE	NERPC	
2.	Bikash Kishor Bora	Engineer.	PGCIL.	
3.	Ashim Kumar Nath	Engineer	NERLDC, POSOCO	

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	DG Set 100 kVA
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	So Main Bus without protection
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	Non-functional
10	Whether existing RTUs are healthy and reporting?	-NA-	
11	Whether existing communication via PLCC or OPGW? If PLCC then healthiness of PLCC panels	Yes	Healthy



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?	Yes	
✓16	DC Supply- Whether two DC sources are available?	Yes	But only 1 in service
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	
✓20	Whether Protection Audit has ever been carried out before? If yes then compliance status of Audit Observations/Recommendations	Yes	partially complied
✓21	Whether all relay settings have been submitted in PDMS? If no, then compliance status	NO	to be furnished
✓22	Whether CTs, PTs/CVTs of sufficient accuracy is present in the station?	Yes	

Any other specific observations/recommendations:

1. ~~NO~~ NO AC in Battery Bank
2. Most of the LA counter in non-working condition
3. Cable Trench are broken. Cables Spread in Switchyard in Open Condition
4. Switchyard illumination panel is not in Standard Condition
5. DC-1 Source charger float mode not working
6. Spare/damaged CB/CT lying idle in Switchyard
7. Test kit not available at Site
8. GPS clock not working

9. RTCC panel of Transformer - I is not working
  10. DG Set fuel is not adequate
  12. PDMS data to be Submitted.
  13. ACDB Connections are in by-pass mode (no. Contact) needs immediate replacement.
  14. Incomplete task Committee format. to be transcribed by email.
- for 132/33 kv BAGJAP GSS for Audit team

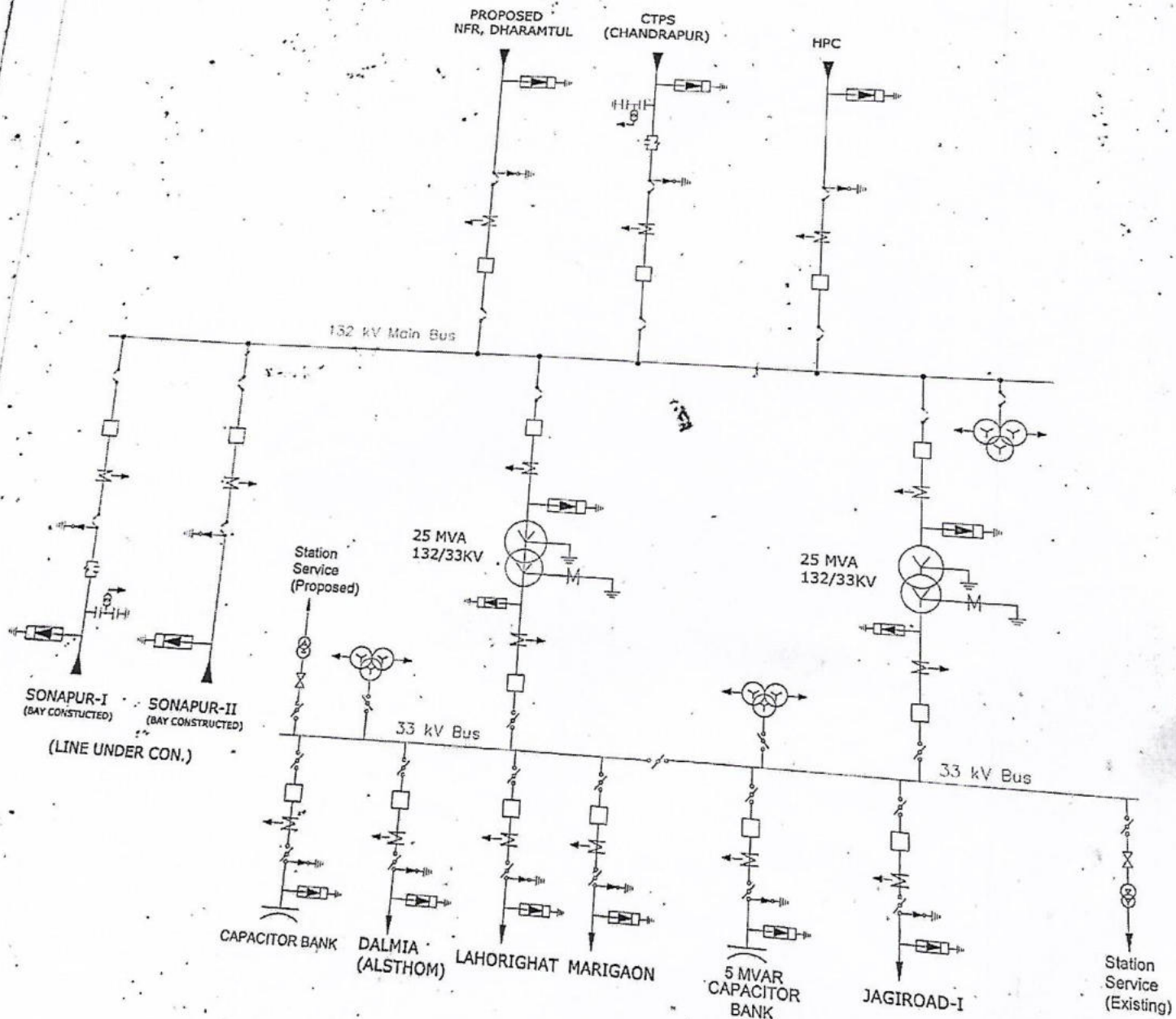
1.

1. ~~Dag~~ (RAJIB DAS)  
15/11/21

2. ~~C/BD~~ (BIKASH KISHOR)  
15/11/21 BORA

3. ~~ashu~~ (Ashim Kumar Datta)  
15/11/21

Baghap 4SS





Sl. No.	Recommendations during Protection Audit 2013	Status as on 06.08.18 (Attended/Not Attended)	If Not complied, target date of completion
1	1 set of 132 kV B/C bay required		
2	Old SF6 type CBS may be replaced, if required.	Replaced	Replaced
3	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.	Some of the SAs need to be replaced	Gapless
4	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.	Some of the CTs Need to be replaced	Some of the CTs needs replacement
5	PT/CVT's 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.	As per regulation	As per regulation
6	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.	2 sets of 110 v and 1 set of 48 volts available at present	2 set of 110 v 1 set of 48 v
7	DG set of suitable capacity may be provided.	Not provided yet	100kVA
8	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	Will be completed under PSDF scheme	Yes
9	3 sets of numerical relay required. 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.	Implemented under PSDF scheme	Implemented
10	Required FF provision has to be made as per CEA's regulations.	Installation of Centrally operated fire Protection system under progress	N.O. fire hydrant even working
11	Earthing system needs improvement	Earthing system is good and will be improved further	Yes
12	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 yet provided	Not yet provided



## 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					
		Voltage Ratio test for transformer					
		Magnetising current test					
		Magnetic balance test					
		Insulation Resistance (IR) Measurement					
		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)					
		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					✓
		Dynamic Contact Resistance Measurement (DCRM)					✓
		Operating timing of CB (Opening Time, Closing time, CO)					
		Operating timing of Pre Insertion Resistor (Pre-insertion time)					
		Capacitance & Tandelta measurement for Grading capacitors					
		Healthiness of Trip Coil (TC) & Closing Coil (CC)					
		Healthiness of Operating Mechanism					
		Dew point measurement of SF6 gas					
		Check of various earthing connections					
		Any other test (Please mention)					
3	Isolator / Disconnectors	Static Contact Resistance Measurement					✓
		Healthiness of Operating Mechanism					
		Checking of Interlocks with CB, Earthing switches etc.					
		Check of various earthing connections					
		Any other test (Please mention)					
4	Current Transformer(CT)	Capacitance & Tandelta Measurement			✓		✓
		Insulation Resistance (IR) Measurement					
	Current Transformer(CT)	Measurement of secondary winding resistance					



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



# 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	Y
2	Oil Collecting pit for transformer / reactors	Y
3	CO2 and sand buckets	Y
4	Foam type fire extinguisher	Y
5	Portable type fire extinguisher	Y
6	Hydrant Type	Y
7	High Velocity Water Spray (HVWS) System	Y
8	Nitrogen Injection Based Fire Protection System (NIFPS)	Y
9	Both HVWS system & NIFPS	Y
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)	Y
	(b) Only Gravels	
	(c) Gravels are visible	
	(d) Gravels coverd with grass / soil	
13	Operation of On Load Tap Changer (OLTC)	Y
	(a) As and when required	
	(b) Never operated	
14	Operation of Off Load Tap Changer	Y
	(a) As and when required	
	(b) Never operated	
15	DG Set	Y
	If Yes, Rating (Nos., Voltage level, KVA capacity)	1000KVA

# 14B. AVAILABILITY OF VARIOUS DIAGNOSTIC TOOLS

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