

Comprehensive Audit:

1. Name of the Sub-Station: 220 KV Namrup GSS
2. Voltage level: 220 KV/132 KV
3. Owner: AEGCL
4. Date of Audit: 13.11.2021
5. Members of Auditing Team:

Sl.No.	Name	Designation	Organization	Signature
1	R. Buragohain	Dy. Mousur (E)	NEEPCO	<i>[Signature]</i> 13-11-2021
2.	PINAK NAND	Mgr.	PGLIL	<i>[Signature]</i> 13/11
3	Chitra Bahadur Thapa	Dy Mgr	NERLDC, POSOCO	<i>[Signature]</i> 13/11/21

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

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Observations/Recommendations:		Yes/NO	Remarks
Sl.No.	Parameters		
1	Whether redundant supply for station auxiliaries is available?	Yes	33/0.4 KV, 2X250 KVA SST 250 KVA Dg set
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?	Yes	Main & Transfer Scheme
6	Whether Double Main Arrangement is present in 220kV Station? If yes, whether operational or not?	Yes.	Double Main Cum Transfer Scheme. All feeders connected to Bus 1. Segregation to be done.
7	Whether Bus Bar Protection is available for the 220kV and above station?	Yes	
8	Whether protection relays for emanating lines are operational?	Yes	-
9	Whether time synchronisation facility is available in the Sub-station?	Yes.	-
10	Whether existing RTUs are healthy and reporting?	Yes.	Healthy & Reporting
11	Whether existing communication via PLCC or OPGW? If PLCC then healthiness of PLCC panels	OPGW.	-

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12	In case of OPGW connectivity to the station, whether end equipments are available and functional?	Yes.	-
13	Whether all analog/digital points are reporting in local SCADA?	Yes Partially	* Isolator's indicators not responding as per Annex 1
14	Healthiness of Protection coupler/Coupling device?	Partially Yes	PLCC of 132 kV Sonari feeder unhealthy. To be replaced
15	Whether sufficient lighting is available in the switchyard?	Yes	-
16	DC Supply- Whether two DC sources are available?	Yes	220V DC Source: 2 nos. 48V DC Source: 1 no.
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.	To be procured as per list
19	Whether firefighting provision is available in the station?	No.	Fire fighting arrangement in 220/132 KV, ICTs to be done
20	Whether Protection Audit has ever been carried out before? If yes then compliance status of Audit Observations/Recommendations	Yes	Partially complied. Latest status has per attachment
21	Whether all relay settings have been submitted in PDMS? If no, then compliance status	No.	After SAS upgradation all relays replaced. Settings to be submitted
22	Whether CTs, PTs/CVTs of sufficient accuracy is present in the station?	Partially	Not enclosed. To be replaced with 0.2s accuracy class

Any other specific observations/recommendations:

- 1) Battery Bank-192 not earthed. Earthing to be done
- 2) 66/132 KV, 20 MVA ICT-1 is beyond service life (1982 Make)
20 MVA ICT-2 is out of service permanently. Also, capacity upgradation is required as per CEA standards. Considering present peak generation of NTPS, i.e., 45 MW, and under N-1 criteria, 66/132 KV, 2x50 MVA ICTs to be installed.

13/11/2021

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13/11/2021

Audit Observations / Recommendations of 220/132/66 KV Namrup

- 3) 220/132 KV, 50 MVA ICT-1 is beyond service life (1980 Make)
To be upgraded to minimum 100 MVA ICT for ~~to~~ convey generation evacuation constraint. (NRPP & NTPS)
- 4) 220 KV Bus-segregation to be done.
- 5) Auto-Recloser Scheme in 220 KV and 132 KV to be made operational.
- 6) Scraps to be disposed.
- 7) Jungle cutting to be done.
- 7) Vegetation growth observed in switchyard. to be cleared.
- 8) Cables to be routed through cable trench and properly covered with slabs.

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Station Name: 220 kV Namrup Substation Audit Report

Sl. No.	Recommendations during Protection Audit 2013	Status as on 06.08.18 (Attended/Not Attended)	If Not complied, target date of completion	Remarks
1	Old MOCB type CBs may be replaced, if required.	Attended		1 set of 66 kV & 1 set of 132 kV MOCB can be replaced after the replacement of 66/132 kV Auto Tr. no - 2 which is in faulty conditions.
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		
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.	Not Attended	31-12-2019	CT replaced
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.	Not Attended	31-12-2019	PT/CVT replaced
5	Two sets of batteries (220 V) with associated chargers needed	Attended		
6	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	31-12-2019	132 kV Line CVT ratio mismatch & 220 kV NRPP feeder CVT ratio mismatch
7	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	31-12-2019	Completed
8	Required FF provision has to be made as per CEA's regulations.	Not Attended		FF protection is not available for 220/132 kV Auto Tr. no - 1 & 2 and 132/33 kV Power Tr.
9	Earthing system needs improvement	Not Attended		
10	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.	Available with Testing testing		
11	Busbar and LBB protection not available	Not Attended	31-12-2019	Completed

* * In 132 kV side line CVT is being used for distance protection
 * * 220 kV side NTPS & Mariani line CVT is being used for distance protection.
 220 kV NRPP line CVT is problem. So protection kept on bus PT

Arunojit Ghosh
 13/11/2021

Resident Engineer
 220 kV Grid Substation
 AEGCL, NTPS, Namrup

13/11/2021

Sl. No.	Observations during Protection Audit 2017	Status as on 06.08.18 (Attended/Not Attended)		If Not Attended, Target date of completion
1	Relay setting as per RK task force to be implemented	Attended		
2	Vegetation clearance required at switchyard	Not Attended	31-12-2019	attended
3	2 DC sources(not redundant-1 for 132kV,other for 220 kV feeder).DC earth fault present in both.both 48 V battery bank faulty	Attended		
4	GPS system not installed.	Not Attended	31-12-2019	attended
5	Old surger arresters and MOCB need replacement.Surge counter not available at switchyard	Attended		
6	Bus bar protection for 220 kV not available	Not Attended	31-12-2019	attended

Substation Engineer
13/11/2021

[Signature]
13/11/2021

Resident Engineer
220 kV Grid Substation
AEGCL, NTPS, Namrup

Isolators indicators not responding.

① 89 AE { ~~Related~~
② 89 B { 220/132 kV 50 MVA }

③ 89 T {
④ 89 A { 132 kV TBE }

⑤ 89 T (Lakma feeder — Transfer bus)
⑥ 89 T (Sonari feeder — Transfer bus)
⑦ 89 T (Bordubi feeder — Transfer bus)

⑧ 89 LE (132/33 31.5 MVA)

⑨ 89 LE (132/66 kV 20 MVA III)

⑩ 89 B (220/132 kV 100 MVA)

⑪ 89 PTA (132 kV Bus PT)

⑫ 89 A (66 kV BVFCL I)

CT ratio/CT & PT ACCURACY DETAILS OF 220 kV GSS,AEGCL,NTPS, NAMRUP as on 20/10/2021

Accuracy Details/Ratio of CT

Transformers

Sl No	Name of transformers	Voltage level	Accuracy class	Available CT ratio	Connected CT ratio
1	20 MVA Auto-Transformer-1	132 kV	0.5/5P/PS/PS	600/300/150/1	300/1
		66 kV	1.0FS<5/5P10/PS	600/300/1-1/0.577	300/1
3	20 MVA Auto-Transformer-3	132 kV	0.5/5P/PS/PS	600/300/150/1	150/1
		66 kV	0.5/5P//PS	300/150/1	300/1
4	31.5 MVA Power Transformer	132 kV	1.0/5P/PS & 1.0FS<5/5P10/PS	300-150-150/1-1-0.577	150/1
		33 kV	0.5/5P/PS	1200/600/1-1-1	600/1
5	50 MVA Auto-Transformer-1	220 kV	1.0/5P/PS/PS	500/250/1	500/1
		132 kV	1.0/5P/PS	500/250/1	250/1
6	100 MVA Auto-Transformer-	220 kV	0.5/5P/PS/PS/PS	800/600/300/1	300/1
		132 kV	0.5/5P/PS/PS	600/300/1	600/1

Transmission Lines

Sl No	Name of transformers	Voltage level	Accuracy class	Available CT ratio	Connected CT ratio
1	220 kV Mariani	220 kV	0.2/5P/PS/PS	800/400/200/1	800/1
2	220 kV Tinsukia	220 kV	0.2/5P/PS/PS	800/400/200/1	800/1
3	220 kV NRPP	220 kV	0.2/5P/PS/PS	800/400/200/1	800/1
4	220 kV Bus- Coupler	220 kV	1.0/5P/PS/PS/PS	800-400-200/1-1-1-1-1	800/1
5	132 kV Bordubi	132 kV	0.5/5P/PS	600/300/1	600/1
6	132 kV Sonari	132 kV	0.5/5P/PS	600/300/1	600/1
7	132 kV Lakwa	132 kV	0.5/5P/PS	600/300/1	600/1
8	132 kV Bus- Coupler	132 kV	0.5/5P/PS/PS	600-300/1-1-1-1	600/1
9	66 kV BVFCL-1	66 kV	0.5/5P/PS	400-200/1-1-1	400/1
10	66 kV BVFCL-2	66 kV	0.5/5P/PS	400-200/1-1-1	400/1

Accuracy Details of PT

Sl No	Name of transformers	Voltage level	Accuracy class	Available PT ratio	Connected PT ratio
1	220 kV Main Bus	220 kV	0.5/3P		
2	220 kV Main/ Transfer Bus	220 kV	0.5/3P		
3	132 kV Main Bus	132 kV	0.5/3P		

Test report of Transformer

Test Date: 25.01.2021
Location: Namrup
Description: 20MVA Trafo-3

1. Tan Delta measurement

Test Voltage: 10kV
Test frequency: 50Hz

Transformer Oil temperature: 40°C
Ambient Temperature: 24°C

Power Transformer

	Capacitance (nF)	% Dissipation factor	
		Measured	Corrected @20°C
HV winding- Tertiary winding	4.4188	1.57	1.019
HV winding - Earth	4.9319	1.13	0.733
Tertiary winding - Earth	4.4175	1.5	0.974

HV Bushing

Phase	Capacitance (pF)	% Dissipation factor	
		Measured	Corrected @20°C
R	248.8	0.187	0.188
Y	217.19	0.281	0.282
B	211.28	0.268	0.27

2. Insulation Resistance measurement:

Test Voltage: 10kV

	IR
HV winding- Tertiary winding	5
HV winding - Earth	1
Tertiary winding - Earth	3

All values in GΩ

3. Winding Resistance measurement

HV Winding

Tap No.	R-N	Y-N	B-N
13(Running Tap)	2968	2958	2976

All values in mΩ

LV winding

r-n	y-n	b-n
1327	1321	1333

All values in mΩ

Remarks: The tan delta values of windings are not satisfactory. The oil filtration of the transformer is recommended.

Tested By

Anganijoti Bishain

Deputy Manager
T&C Div, AEGCL, Tinsukia

Witnessed By

Ladha

Assistant Manager
T&C Div, AEGCL, Tinsukia

Test report of Transformer

18.12.2020
Namrup
50MVA 220/132kV Trafo

Test Date:
Location:
Description:

1. Tan Delta measurement

Test Voltage: 10kV
Test frequency: 50Hz

Transformer Oil temperature: 35°C
Ambient Temperature: 20°C

Power Transformer

	Capacitance (nF)	% Dissipation factor	
		Measured	Corrected @20°C
HV winding- LV winding	3.1299	0.866	0.78
HV winding - Earth	5.0878	1.39	1.25
LV winding - Earth	9.2443	0.725	0.665

HV Bushing

Phase	Capacitance (pF)	% Dissipation factor	
		Measured	Corrected @20°C
R	230.9	0.203	0.203
Y	233.51	0.321	0.321
B	232.61	0.235	0.235

LV Bushing

Phase	Capacitance (pF)	% Dissipation factor	
		Measured	Corrected @20°C
R	203.59	0.243	0.243
Y	208.77	0.275	0.275
B	201.88	0.242	0.242

2. Winding Resistance measurement

HV Winding

Tap No.	R-N	Y-N	B-N
15	3927	3913	3911

All values in mΩ

LV winding

r-n	y-n	b-n
2255	2248	2242

All values in mΩ

Tested By

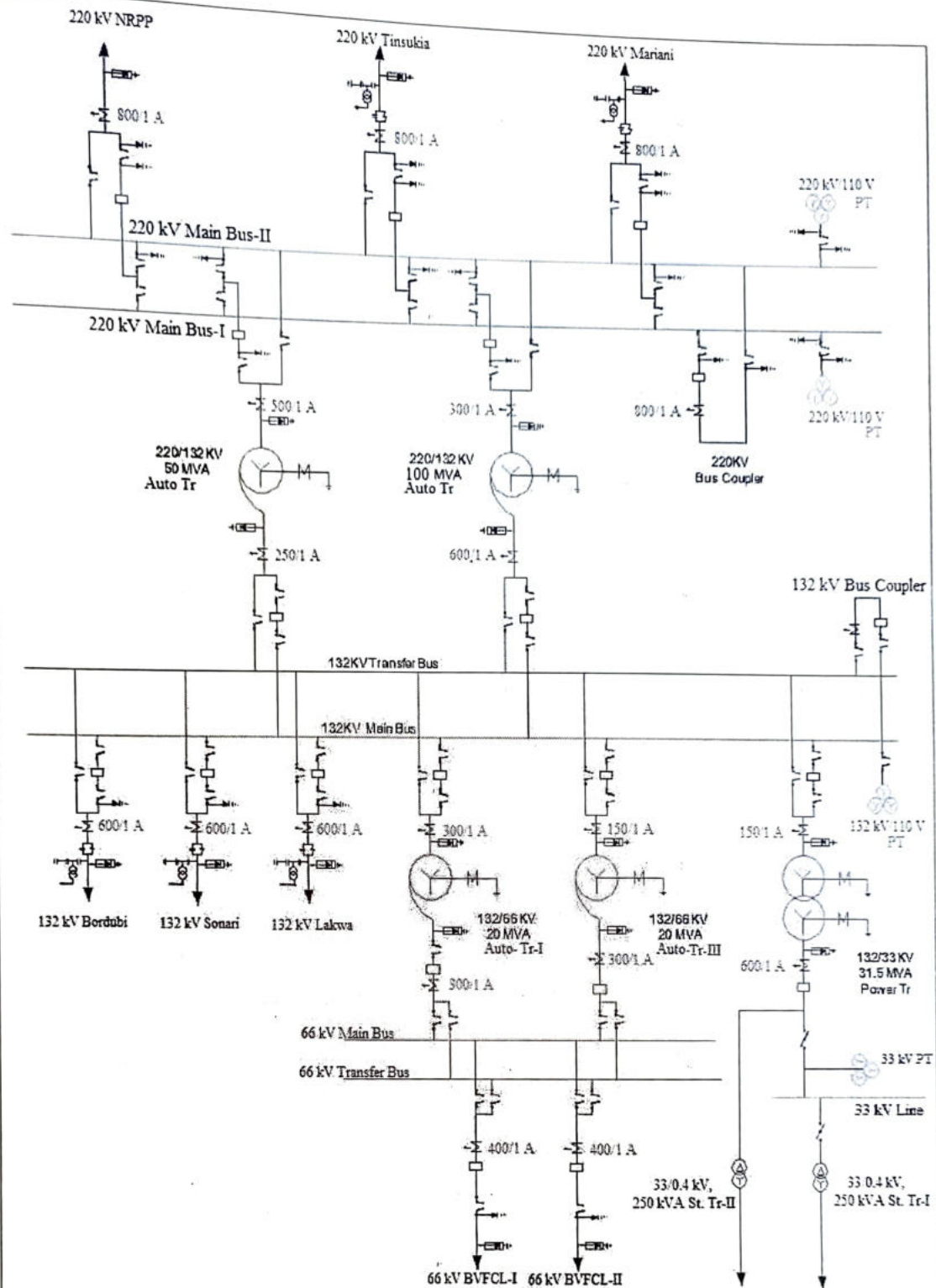
Anganyoti Sphairin

Deputy Manager
T&C Div, AEGCL, Tinsukia

Witnessed By

Ladha

Assistant Manager
T&C Div, AEGCL, Tinsukia



Equipment Legends:

Auto Transformer	Capacitive Voltage Tr.	Bus PT Set
	Isolator with E/S	Wave Trap
Power Transformer	Circuit Breaker	Lightning Arrestor
	Isolator without E/S	Current Transformer



**Assam Electricity Grid
Corporation Limited**

Single Line Diagram of 220/132/66/33 kV Grid Substation,
AEGCL, NTPS, Namrup

**220/132/66/33 kV Grid Substation, AEGCL,
NTPS, Namrup**

Date: 16/06/2021

Prepared by: R.E, 220 kV GSS, Namrup