




Comprehensive Audit:

1. Name of the Sub-Station: 132/33 kV, Dhaligan Substation.
2. Voltage level: 132/33 kV
3. Owner: ABGCL
4. Date of Audit: 17/11/2021
5. Members of Auditing Team:

Sl.No.	Name	Designation	Organization	Signature
1.	Rajib Das	JE	NERPC	
2.	Bikash kishore Borra	Engineer.	PGCIL.	
3.	Ashim Kumar Nath	Engineer	NERLDC, POSOCO	

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

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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 Yes.	Main 2 Transfer Bus Bar Scheme in 132kV.
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.	
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.	Unhealthy.

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?	Yes.	
15	Whether sufficient lighting is available in the switchyard?	Yes.	
16	DC Supply- Whether two DC sources are available?	Yes	DC source - 2 is in off condition for most of the panels.
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?		
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.	
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. EB status to be provide in DR for proper fault analyse.
2. Earrier switch is in out mode for all 132kV Lines. AR switch is also in out mode. PLE is unhealthy. Same may be rectified.
3. Air conditioning system to be provided in Battery room for VRLA Batteries.
4. Capacity test & Load test to be performed and record should be maintained.
5. Alarm configuration in the list of BEU is found wrong. Same may be rectified.
6. DE Earth Fault delay is not available at site.

7. Presently DE Earth Fault persisting in DE Source-1. Same may be rectified.

DE Source-1

+ve to Earth = 81.7V

-ve to Earth = -13.7V



DE Source-2

+ve to Earth = 53V

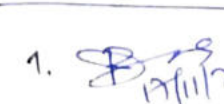

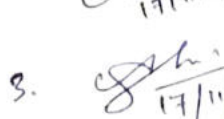
-ve to Earth = 56V.

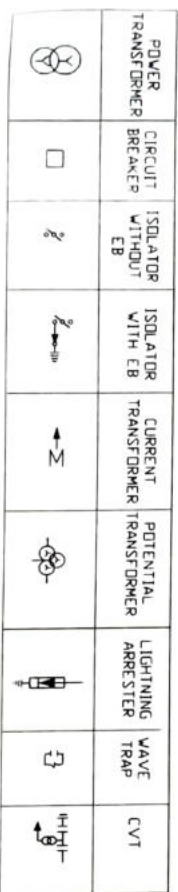
8. The condition of second station transformer is found very poor. The cable termination box door is missing. Same may be arranged for safety of the transformer.
9. Hydrant press is found zero. Same may be check and proper checking of the system to be done.
10. Vegetation growth observed in all over the switchyard. Grass cutting is inadequate amount. Approach road for the switchyard is not proper. Same may be arranged.
11. Scrap/spare should be kept in proper place. It should be removed from the switchyard.
12. 3rd party format to be submitted.
13. Task force format to be submitted.
14. PDHS report to be submitted.

For 132KV Dhaligaon G.S.S.

1.  (RUPITOTI SARMA)
2.  (Bibek Baruti)

For Audit Team

1.  (Rajib Das)
2.  (BIKASH KISHOR BORA)
3.  (ASHIM KUMAR NATH)



SINGLE LINE DIAGRAM OF 132.33 KV, DHALGAON SUBSTATION

Station Name: 132/33kV Dhalgaon GSS Audit Report

Sl No.	Observations/Recommendations during Protection Audit 2013	Status as on 21.09.18 (Attended/Not Attended)	If Not complied, target date of completion
1	All MOCH to be replaced old CB and SA may be replaced	ATTENDED	Replaced in PSDF
2	No of CT cores inadequate, CTs of suitable ratio and accuracy to be provided, old CTs to be replaced if required	NOT ATTENDED	33KV CT WILL BE REPLACED WITHIN MARCH 2019 <i>attended</i>
3	PT, CVT accuracy class not per CEA regulations Old CVT/PT may be replaced if required.	NOT ATTENDED	REQUIRED No. OF CVTS FOR ALL PHASES ARE NOT AVAILABLE <i>attended</i>
4	1 set of Bus PT required for 132 kV level, PT, CVT of suitable accuracy class to be provided PT/CVT may be replaced if required.		<i>not attended</i>
5	2 sets of 110 V battery with charger and 2 sets 48 V telecom battery with charger required	NOT ATTENDED	2 Set 110V battery 1 Set 48V battery WILL BE COMPLETED WITHIN MARCH 2019
6	DG set not available.	NOT ATTENDED	DG SET WILL BE INSTALLED WITHIN MARCH 2019 <i>Installed. 250kVA</i>
7	DR, EL, TSE, BC&PU, SAS, SCADA not available	NOT ATTENDED	WILL BE COMPLETED WITHIN MARCH 2019 <i>Completed</i>
8	Bus PT used for both protection and metering of transformer and lines. Dedicated CVT needed for distance protection	NOT ATTENDED	WILL BE COMPLETED WITHIN MARCH 2019 <i>not attended</i>
9	Protection scheme as per CEA regulations needed for lines, ICT static/EM relay to be replaced by numerical relay	NOT ATTENDED	WILL BE COMPLETED WITHIN MARCH 2019 <i>attended</i>
10	2 sets of numerical relays to replace EM relays used for back up protection required Protection scheme as per CEA regulations for lines, ICT required	NOT ATTENDED	WILL BE COMPLETED WITHIN MARCH 2019 <i>attended</i>
11	telecom link may be provided	NOT ATTENDED	WILL BE COMPLETED WITHIN MARCH 2019 <i>attended</i>
12	No standard maintenance practice Diagnostic tools inadequate, to be provided as per CEA regulations	NOT ATTENDED	DIAGNOSTIC TOOLS NOT AVAILABLE <i>may be enhanced</i>
13	gravel not visible covered with grass. Earthing system needs improvement.	NOT ATTENDED	WILL BE COMPLETED WITHIN MARCH 2019 <i>not attended</i>
14	Earthing system needs improvement	NOT ATTENDED	MAY REFER TO DESIGN SECTION FOR PROPER EARTING SYSTEM <i>not attended</i>
15	No soak pit/oil collecting pit and FF wall between transformers separated by less than 15 m No hydrant system/NIFPS except Cu2 cylinder and sand bucket. Foam type and portable type extinguisher. Fire protection as per CEA recommendation may be provided	NOT ATTENDED	WILL BE COMPLETED UNDER NERPSIP <i>attended</i>

	Observations/Recommendations during Protection Audit 2017	Status as on 21.09.18	If Not complied, target date of completion
1	S/S earthing not proper. Earth strips are rusted, Double plated earthing not available for S/S equipments	NOT ATTENDED	MAY REFER TO DESIGN SECTION FOR PROPER EARTING SYSTEM <i>attended</i>
2	Line CVT not available in all phases. Voltage input for distance protection of all 132 kV lines	NOT ATTENDED	REQUIRED No. OF CVTS FOR ALL PHASES ARE NOT AVAILABLE <i>not attended</i>
3	Relay setting to be reviewed as per Rasmakrishna task force recommendation	ATTENDED	
4	Auto recloser is not available in all the lines	NOT ATTENDED	NOT APPLICABLE <i>In off Consider</i>
5	Two independent DC system not available, positive to earth fault is present in 110 V Dc source, redundant trip relays are not available for all elements	NOT ATTENDED	WILL BE COMPLETED WITHIN MARCH 2019 <i>2 Set 110V Dc Source</i>
6	Proper bay marking, phase identification marking required	ATTENDED	
7	Fire fighting system not available for 2* 25 MVA, 132/33 transformers	NOT ATTENDED	<i>Installed for new Transformer</i>
8	DG set not available, to be commissioned under R&M works funded from PSDF as informed by AEGCL. Reliability of auxiliary supplies needs to be reviewed	NOT ATTENDED	WILL BE COMPLETED WITHIN MARCH 2019
9	GPS not installed. Relays not time synced. Stand alone event logger not available	NOT ATTENDED	<i>attended</i>
	Common recommendation		

Dhaligaon

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)			Y		
		Capacitance & Tandelta Measurement for			Y		
		(a) Winding			Y		
		(b) Bushing			Y		
		Break Down Voltage (BDV) Test for oil			Y		
		Dissolved Gas Analysis(DGA)			Y		
		Sweep Frequency Response Analysis(SFRA)			Y		
		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			Y		
		Healthiness of Operating Mechanism			Y		
		Checking of Interlocks with CB, Earthing switches etc.					Not test-
		Check of various earthing connections			Y		
		Any other test (Please mention)					

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

4	Current Transformer(CT)	Capacitance & Tandelta Measurement			Y		
		Insulation Resistance (IR) Measurement			Y		
	Current Transformer(CT)	Measurement of secondary winding resistance			Y		
		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					Notes
		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				

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

13	Insulator	Punnture 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

Sl. No.	DIAGNOSTIC TOOLS	Avail-ability	If Yes (i.e. if Available)	
		(Y/N)	Make	Model
1	Winding resistance meter	N		
2	Transformer Voltage Ratio test meter	N		
3	Insulation Resistance (IR) tester	Y	Megger	
	(a) 5 kV			
	(b) 10 kV			
4	Capacitance & Tan delta Measurement Instrument	N		
	(a) Automatic			
	(b) Manual			
5	Break Down Voltage (BDV) Test kit for oil	Y	Megger	
6	Dissolved Gas Analyser	N		
7	Sweep Frequency Response Analysis (SFRA) test kit	N		
8	Partial Discharge (PD) Measuring Instrument	N		
9	CB operational Analyser	N		
10	DCRM test kit	N		
11	SF6 Gas leakage detector	Y	EPS	
12	Dew point measuring instrument	N		
13	SF6 Gas Handling Plant (for Evacuation, filling, filtering of gas)	N		
14	Static Contact Resistance Measuring instrument	N		
15	Leakage Current Meter (LCM)	N		
16	Earth Tester	Y	Matson	
17	Automatic Realy test kit			
18	Thermovision camera for detection of hot spots	Y	Fluke	
19	Thermal Scanner (for Transformer / Reactor)	N		
20	Transmission line Response Analyser	Y	Tanm	
21	Puncture 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			
	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	Y
2	Oil Collecting pit for transformer / reactors	N
3	CO2 and sand buckets	N
4	Foam type fire extinguisher	Y
5	Portable type fire extinguisher	Y
6	Hydrant Type	Y
7	High Velocity Water Spray (HVWS) System	N
8	Nitrogen Injection Based Fire Protection System (NIFPS)	Y
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	Yes.
	If Yes, Rating (Nos., Voltage level, KVA capacity)	250 KVA

or No.