भारत सरकार Government of India
विद्युत मंत्रालय Ministry of Power
उत्तर पूर्वी क्षेत्रीय विद्युत समिति
North Eastern Regional Power Committee
एन ई आर पी सी कॉम्प्लेक्स, डोंग पारमाओ, लापालाङ, शिल्लोंग-७९३००६, मेघालय
NERPC Complex, Dong Parmaw, Lapalang, Shillong - 793006, Meghalaya

ISO 9001:2008

Ph. No: 0364 - 2534039
Fax No: 0364 - 2534040
Website: www.nerpc.nic.in

No. NERPC/SE (O)/PCC/2015/***3916-51*** Dated: February 06, 2015

To,

1. Managing Director, AEGCL, Bijuli Bhawan, Guwahati – 781 001
2. Managing Director, APDCL, Bijuli Bhawan, Guwahati – 781 001
3. Managing Director, APGCL, Bijuli Bhawan, Guwahati – 781 001
4. Director (Generation), Me. PGCL, Lumjingshai, Short Round Road, Shillong – 793 001
5. Director (Distribution), Me. ECL, Lumjingshai, Short Round Road, Shillong – 793 001
6. Director(Transmission), Me. PTCL, Lumjingshai, Short Round Road, Shillong – 793 001
7. Managing Director, MSPDCL, Electricity Complex, Keishampat, Imphal – 795 001
8. Managing Director, MSPCL, Electricity Complex, Keishampat, Imphal – 795 001
9. CGM, (LDC), SLDC Complex, AEGCL, Kahilipara, Guwahati-781 019
10. Chief Engineer (WE Zone),Department of Power ,Govt. of Arunachal Pradesh, Itanagar- 791111
11. Chief Engineer (EE Zone),Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
12. Chief Engineer (TP&MZ),Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
13. Engineer-in-Chief (P&E), Department of Power, Govt. of Mizoram, Aizawl – 796 001
14. Chief Engineer (P), Department of Power, Govt. of Nagaland, Kohima – 797 001
15. General Manager, TSECL, Agartala – 799 001
16. Group General Manager, NTPC, Bongaigoan Thermal Power Project, P.O. Salakati, Kokrajhar- 783369
17. ED, NERTS, PGCIL, Dongtieh-Lower Nongrah, Lapalang, Shillong -793 006
18. ED (O&M), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong-793003
19. ED (Commercial), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong-793003
20. ED (O&M), NHPC, NHPC Office Complex, Sector-33, Faridabad,Haryana-121003
21. GM (Plant), OTPC, Badarghat Complex, Agartala, Tripura - 799014
22. GM, NERLDC, Dongtieh, Lower Nongrah, Lapalang, Shillong -793 006
23. Member Secretary, ERPC, 14 Golf Club Road, Tollygunge, Kolkata-700033
24. Chief Engineer, GM Division, Central Electricity Authority, New Delhi – 110066

Sub: Minutes of the Special Energy Metering & 29th PCC Meeting - Reg.

Sir,

The Minutes of the Special Meeting on Metering & the 29th PCC Meeting of NERPC held on 22.01.2015 at "Hotel Nandan", Guwahati is enclosed for favour of kind information and necessary action please**.**

Any comments or observations may kindly be communicated at the earliest.

With warm regards,

Encl: As above

भवदीय / Yours faithfully,

बी. लिंगखोइ

बि. लिंगखोइ / B. Lyngkhoi
निदेशक **/ Director/ SE**

Copy to:

1. CGM, AEGCL, Bijuli Bhavan, Guwahati - 781001
2. CGM, APGCL, Bijuli Bhavan, Guwahati - 781001
3. CGM, DISCOM, Bijuli Bhavan, Guwahati - 781001
4. Head of SLDC, Me.ECL, Lumjingshai, Short Round Road, Umjarain, Shillong – 793 022
5. Head of SLDC, Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791 111
6. Head of SLDC, Department of Power, Dimapur, Nagaland
7. Head of SLDC, Electricity Department, Govt. of Manipur, Keishampat, Imphal – 795 001
8. Head of SLDC, Department of Power, Govt. of Mizoram, Aizawl – 796 001
9. Head of SLDC, TSECL, Agartala – 799 001
10. Chief Engineer(Elect), Loktak HEP,Vidyut Vihar, Kom Keirap, Manipur- 795124
11. Addl. GM (EED), NTPC Ltd., Bongaigoan Thermal Power Project, P.O. Salakati, Kokrajhar- 783369
12. DGM (C&M), OTPC, 6th Floor, A-Wing, IFCI Tower -61, Nehru Place, New Delhi – 110019.

वी. लिंगारेड्डि

निदेशक / **Director/ SE**

North Eastern Regional Power Committee

MINUTES OF THE 29th PROTECTION COORDINATION SUB-COMMITTEE MEETING OF NERPC

Date : 22/01/2015 (Thursday)
Time : 10:00 hrs
Venue : "Hotel Nandan", Guwahati.

The List of Participants in the 29th PCC Meeting is attached at **Annexure – I**

Shri P.K. Mishra, Member Secretary, NERPC welcomed all the participants to the 29th PCC meeting. He stated that after the Grid Disturbances occurred on 30th & 31st July, 2012 the protection Sub-committee is very important and hence constituents should actively participate in this meeting so that necessary prevention & correction can be taken care so that such incidences can be avoided. He also stated that he will take up the matter with respective organizations so that all constituents should be present in the meeting for fruitful deliberation.

Thereafter, Member Secretary I/C requested Sh. B. Lyngkhoi, Director/SE(O) to take up the agenda items for discussion.

A. CONFIRMATION OF MINUTES

CONFIRMATION OF MINUTES OF 28th MEETING OF PROTECTION SUB-COMMITTEE OF NERPC.

The minutes of 28th meeting of Protection Sub-committee held on 5th December, 2014 at Dimapur were circulated vide letter No. NERPC/SE (O)/PCC/2014/3255-3290 dated 15th December, 2014.

The Sub-Committee confirmed the minutes of 28th PCCM of NERPC as No observations or comments were received from the constituents

I T E M S F O R D I S C U S S I O N

A.1 <u>Implementation of 3-phase Auto Reclosure Scheme in all lines connected to Khandong and Kopili HEP</u>:

For reliable operation of Power system it is required to implement 3-Phase Auto Reclosure Scheme in all the 132kV lines connected to Kopili and Khandong HEP of NEEPCO. The lists of such lines are:

a) 132kV Khliehriat – Khandong # 1
b) 132kV Khliehriat – Khandong # 2
c) 132kV Haflong – Khandong
d) 132kV Kopili – Khandong # 1
e) 132kV Kopili – Khandong # 2

During 28th PCC meeting, NEEPCO representative stated that 3-phase auto-reclosure scheme is expected to be implemented by December 2014 in the following line: -

a) 132kV Khliehriat –Khandong #1
b) 132kV Khandong – Haflong
c) 132kV Kopili – Khandong # 1

DGM, NERTS informed that 3-Phase auto-reclosure scheme is already implemented in132kV Kopili – Khandong # 2.

<u>Deliberation of the sub-Committee</u>

Sr. Manager, NEEPCO informed that 3phase auto-reclosure scheme is already implemented in132kV Khliehriat – Khandong # 1. Regarding 132kV Khandong–Halflong & 132 kV Kopili-Khandong # 1 the scheme will be implemented by February, 2015 on arrival of the service Engineer for Relay. Moreover, he requested NERTS to extend possible assistance for successful implementation of the scheme. NERTS agreed.

The sub-committee noted as above.

A.2 Implementation of 3-Phase Auto Reclosure scheme of Radially fed 132kV Lines connected to Ranganadi HEP:

At present, the power flows to Nirjuli, Gohpur and Ziro radially from Ranganadi HEP and any transient fault in line causes undesirable outages. Hence, to avoid outages during transient fault it is essential to implement 3- Phase Dead Line charging of following 132kV Lines.

a) 132kV Ranganadi – Nirjuli Line (Dead Line Charging at RHEP)
b) 132kV Nirjuli – Gohpur Line (Dead Line Charging at Nirjuli)
c) 132kV Ranganadi – Ziro Line (Dead Line Charging at RHEP)

During the 27th PCC meeting, NEEPCO representative stated that drawings for implementing Auto-reclosure schemes in the above lines been finalized. Joint meeting with ED (O&M) and Design cell is expected by 18th November, 2014 for clearance and the same may be expected to be implemented by November, 2014.

POWERGRID informed that 3P Dead Line Charging of 132kV Nirjuli – Gohpur Line at Nirjuli has already been implemented.

During 28th PCC meeting, NEEPCO representative again informed that the work will be started once the design cell clears the drawing.

DGM, NERTS stated that no major work is required for the scheme, only some minor wiring has to be done, hence, the issue of approving the drawing from design cell may not be required. Regarding the item “b” above, he suggested that the issue may be finalized jointly by NERLDC, NERPC, NERTS & NEEPCO during the next Standing Committee Meeting scheduled on 13th December, 2014. Member Secretary I/C, NERPC also suggested accordingly.

Deliberation of the sub-Committee

DGM, NERTS informed that the work at 132 kV Nirjuli-Gohpur has already been completed. Regarding 132 kV Ranganadi-Nirjuli & 132 kV Ranganadi- Ziro relay testing will be carried out by 15.02.2015 and the work is likely to be completed by February, 2015.

The sub-committee noted as above.

A.3 Implementation of the recommendations of the Protection Audit:

As per para no 27 of CERC order in Petition No. 220/MP/2012 on 21.02.14,the deficiencies, if any, in Category-A (the deficiencies which can be corrected without any procurement) shall be rectified by the concerned STU and CTU within 2 months of issue of the order and compliance report in this regard shall be submitted to NERPC. **All deficiencies of Category-B (deficiencies involving procurement of equipment) shall be rectified within 6 months of issue of the order**. In this regard, reasons of non-availability of fund or delay in procurement process shall not be accepted. The procurement and implementation is to be completed by each STU using their own fund which can be reimbursed through a common request of funding through PSDF forwarded through NERPC as per procedure recently approved by Government of India.

During 26th PCC meeting, DGM, POWERGRID informed that issue of implementation of Bus Bar protection system at Dimapur S/S as recommended under category-B has already been taken up. Target Completion : January, 2015

After detailed deliberation, it was agreed that check list may be prepared by NERPC/NERLDC as per protection audit and the same shall be reviewed in every PCC/OCC meetings about the status of progress.

Deliberation of the sub-Committee

SE(O), NERPC informed that check list for above protection has been prepared by NERPC & NERLDC separately. The same is enclosed at **Annexure – A.3 (I&II)** respectively.

DGM, NERTS stated that since both the format are prepared based on the suggestions given by Task Force, constituents can compare both the formats and see that only one format can be combined by taking due care as per task force suggestions.

The sub-committee requested all the constituents to go through the above formats and furnish the data as per format given and also any suggestions may be provided in case if any.

A.4 Implementation of Auto Reclosure Scheme in 132kV Jiribam (PG) - Loktak and 132kV Imphal (PG) – Loktak Line:

The external Auto Reclose Relay Type VARM and MGA are already obsolete and without service support from OEM. At Loktak HEP, the AR Relay Type VARM and MGA of 132kV Jiribam (PG) and 132kV Imphal (PG) are not tested since 2008 and so healthiness could not be ensured. Further, during March'14 NHPC has installed Numerical DPR Type P442 of M/S Alstom Make in the said feeders. Further, the Old / Obsolete CBs are already replaced with SF6 CB. Hence, Auto Reclosure Scheme may be implemented in 132kV Jiribam (PG) - Loktak and 132kV Imphal (PG) – Loktak Line immediately by activating internal Auto Reclosure of Numerical DPR to avoid use of obsolete Auto Reclose Relay Type VARM and MGA.

Deliberation of the sub-Committee

NHPC representative stated that procurement of control cable is has already been done and the SPAR will be implemented within February, 2015.

The sub-committee noted as above.

A.5 Standardization of Disturbance Recorder Channels:

Disturbance Recorders on Transmission elements are necessary for post disturbance analysis, and identification & rectification of any protection mal-operation. As per CBIP's manual on Protection of Generators, GT, Transformers and Networks, it is recommended to have minimum 8(eight) analog signals and 16(sixteen) binary signals per bay or circuit. Also, it should have a minimum of 5 sec of total recording time, minimum pre-fault recording time of 100 msec and minimum post-fault recording time of 1000 msec.

As per Sl No A7 of MOM of 28th PCCM of NERPC, the forum requested NERTS to help NERLDC to finalize the DR Channels and NERLDC will present the same in next PCC Meeting

The Channels at 400 kV lines may be selected as per followings:-

Analog Channel: I_R, I_Y, I_B, I_N, V_{RN}, V_{YN}, V_{BN}, V_{OD}

Digital Channel: Main 1 Carrier receive, **Main 1 Trip**, Line O/V Stage I/Stage II, **Reactor Fault Trip**, Stub Protection Optd., **Main II Trip**, Main II Carrier Receive**, Direct Trip CH A/B**, CB I Status R PH, **CB I Status Y PH**, CB I Status B PH, **CB II**

Status R PH, CB II Status Y PH, **CB II Status B PH**, Bus Bar trip, Main**/Tie CB LBB Optd.,** DEF

The Channels at 220 kV lines may be selected as per followings:-

Analog Channel: I_R, I_Y, I_B, I_N, V_{RN}, V_{YN}, V_{BN}, V_{OD}

Digital Channel: Main 1 Carrier receive, **Main 1 Trip**, Stub Protection Optd., **Main CB Status R PH**, Main CB Status Y PH, **Main CB Status B PH**, TBC CB Status R PH, **TBC CB Status Y PH**, TBC CB B PH, **Bus Bar trip**, Main/TBC CB LBB Optd., **DEF**

The Channels at 132 kV lines may be selected as per followings:-
Analog Channel: I_R, I_Y, I_B, I_N, V_{RN}, V_{YN}, V_{BN}, V_{OD}

Digital Channel: Main 1 Carrier receive, **Main 1 Trip**, Stub Protection Optd., **Main CB Status R PH**, Main CB Status Y PH, **Main CB Status B PH**, BC CB Status R PH, **BC CB Status Y PH**, BC CB B PH, **E/F** & O/C)

Deliberation in the Meeting

DGM, NERTS informed that standardization of channels will be done jointly with NERLDC in line with POWERGRID's practice at the earliest.

The Sub-committee noted as above.

A.6 System Protection System (SPS):

Due to commissioning of 400 kV Silchar-Azara S/C, System Protection Schemes (SPS) associated with tripping of Palatana needs to be modified.

SPS 3 (Tripping of 400 kV Silchar- Byrnihat line (with generation from OTPC's plant at Palatana)) and **SPS 4 (Tripping of 400 KV Silchar –Byrnihat line (without generation from OTPC's plant at Palatana))** need to be modified to include 400 kV Silchar-Azara tripping case.

During 28th PCC meeting, DGM, NERTS informed that the necessary modification of SPS – 3 & SPS – 4 will done by December 2014.

Deliberation in the Meeting

DGM, NERTS informed that above modification of SPS - #3 & #4 has already been completed.

DGM, OTPC requested NERTS to furnish the schematic wiring for future reference. NERTS agreed.

The sub-committee noted as above.

A.7 Issues related to protection and relay setting co-ordination:

As per section 5.2.l of IEGC, provision of protections and relay settings shall be co-ordinated periodically throughout the Regional Grid, as per plan to be separately finalized by the Protection sub-committee of the RPC.

It has been observed that number of multiple elements tripping increases. It is required to review Protection and relay setting co-ordination to minimize multiple elements tripping.

During 28th PCC meeting of NERPC, PRDC have given presentation on Protection Database on Transmission System (Protection Management System). The forum may procure Protection System Data Base Software for this purpose.

Members agreed to send the details of bus fault level and back-up relay settings for 132 kV and 220 kV lines. The data will further be reviewed by PCC forum for finalizing the protection schemes.

Deliberation in the Meeting:

DGM, NERLDC stated that Protection System Data Base Software is very much required and requested NERPC to explore in the matter.

The Sub-committee requested NERPC to find out from other RPCs about the status and the performance of the software if any and also to explore if funding from PSDF can be arranged for procurement of the software. The same shall be reviewed again in next PCC meeting.

A.8 Implementation of activities as decided in joint meeting amongst NERLDC, NERPC & constituents of NER on 29.12.2014:

A meeting was held at NERLDC between NERPC, NERLDC and constituents of NER as per directive of Hon'ble CERC in response to Petition No. 113/MP/2014 on 29.12.14:

The constituents of NER agreed upon the following:

a. Testing of all existing relays and schemes within 2 months by all constituents to assess the healthiness of existing protective relays.

b. Review of relay settings based on history of tripping.

c. Availability of Distance Protection scheme.

d. Attempts would be made to avoid any tripping on account of vegetation growth, which is frequent in NER.

e. Single Phase / Three phase Auto Reclose Scheme of transmission lines of voltage level 132 kV and above under List of Important Grid Elements of NER are to be adopted, wherever available. The status of implementation will be monitored in monthly OCC/PCC meetings.

Deliberation in the Meeting:

The Sub-committee requested all the constituents to furnish latest status of the above activities by 15.02.2015 so that report on latest status of the above activities can be submitted on 26.02.2015 before Hon'ble CERC.

A.9 Furnishing of Event Logger (EL) & Disturbance Recorder (DR) output of event:

As per section 5.2.r of IEGC, information/data including Disturbance Recorder & Event Logger output is to be sent to NERLDC **within 24 hrs** of occurrence of any event.

The DR files (Comtrade format), EL files, Sequential Event Recorder outputs and any other protection related information may be sent to nerldcprotection@gmail.com

Also as per section 5.9.6 of IEGC, written report of any events by constituents is to be sent to NERLDC with the following details:-

Time and Date of Event, **Location**, Plant and/or equipment directly involved, **Description and cause of event**, Antecedent conditions of Load and Generation including frequency, **voltage and the flows in the affected area at the time of tripping including weather condition prior to the event**, Duration of interruption and Demand and/or generation (in MW and MWh) interrupted, **all relevant system data including copies of records of all recording instruments**

including Disturbance Recorder, Event Logger, DAS etc, Sequence of tripping with time, **Details of Relay Flags**.

DR & EL outputs of the following events have not been received after the joint meeting of NERPC, NERLDC and all constituents of NER held on 29.12.14 is as Follows :

1. 132 kV Dimapur – Kohima line at Dimapur (PG) – occurred at 1330 Hr on 02.01.15

Deliberation in the Meeting:

The Sub-committee decided that all information/data including Disturbance Recorder & Event Logger output (if activated) should be sent to NERLDC within 24 hrs of occurrence of any event. NERLDC may kindly intimate NERPC in case of non-compliance so that necessary action can be taken up with Competent Authority.

A.10 Grid Incidences during December, 2014:

The following numbers of Grid Disturbances (GD) occurred during the period **w.e.f 24th November, 2014 to 31st December, 2014** :-

Sl No	Control Area	Grid Disturbance in nos	
		24th Nov (till 31st Dec)	Jan'14 to Dec'14(till 31st)
1	Palatana	0	8
2	AGBPP	0	6
3	AGTPP	0	10
4	Ranganadi	0	1
5	Kopili	0	2
6	Khandong	0	5
7	Doyang	0	2
8	Loktak	0	6
9	Arunachal Pradesh	1	16
10	Assam	1	41
11	Manipur	0	49
12	Meghalaya	1	17
13	Mizoram	0	14
14	Nagaland	0	22
15	Tripura	0	15

Sl No	Category of GD	Grid Disturbance in nos	
		Nov'24 (till 31st Dec)	Jan'14 to Dec'14(till 31st)
1	GD 1	2	121
2	GD 2	0	14
3	GD 3	0	2
4	GD 4	0	3
5	GD 5	0	2
	Total	**2**	**142**

Deliberation in the Meeting:

This is for information to the members. Remedial actions are to taken by the concerned power utilities of NER.

A.11 Root Cause analysis of tripping of multiple elements:

i. At **0117 Hrs on 15.12.14**, 132 kV Khliehriat (PG)- Khliehriat II **(Khliehriat(PG) : DP, ZIII, R-Y-B & Khliehriat : No tripping)**, 132 kV NEHU-NEIGRIHMS **(Tripped on Distance Protection)**, 132 kV NEIGRIHMS- Khliehriat **(NEIGRIHMS : DP, ZI, R-Y-B & Khliehriat : DP, ZII, R-Y-B)** and 132 kV Lumshnong-Khliehriat **(Lumshnong : DP, ZI, R-Y-B & Khliehriat : DP, ZII, R-Y-B)** lines tripped.

Due to tripping of these elements, there was Load loss of 41 MW in Meghalaya.

Category as per CEA Standards: GD-I

Analysis of events:

It was suspected that fault was in 132 kV NEHU - NEIGRHIMS line. 132 kV Lumshnong- Khliehriat line supplies radial loads in Lumshnong area of Meghalaya. It is not clear from the relay flags.

Deliberation in the Meeting:

Meghalaya informed that the problem is due to earth fault at Khliehriat end of Me.ECL and the problem has been resolved.

DGM, NERTS also suggested that relay setting may be checked by Me. PTCL and if required the same has to be carried out for supply to radial loads.

The Sub-committee requested NERLDC to monitor the same and bring to PCC forum if the same is repeating again.

Additional Agenda:

1. DGM, NERLDC informed that many trippings have occurred in Manipur power system, he requested the forum to suggest in the matter.

   The Sub-committee has requested NERPC, NERLDC & NERTS to visit Manipur and have a joint inspection/discussion to find out the root cause of tripping.

2. DGM, NERTS informed that recently one 63 MVAR Reactor at Byrnihat has gone faulty and sent for repairing. He suggested that one spare reactor of same capacity which is kept at Balipara can be used till repairing of faulty reactor at Byrnihat is completed.

DGM, NERLDC also reiterated that reactor at Byrnihat is very much required to keep the problem of high voltage and Meghalaya should take up the matter with NERTS at the earliest.

SE, SLDC requested NERPC to write letter to Director, Me. PTCL so that the spare reactor available at Balipara can be utilized immediately for safe and secure of the grid. NERPC agreed.

DGM, POWERGRID further, stated that, DGA of Transformers & Reactors are required to be carried out on 6 monthly basis and oil parameters on yearly basis along with measurement of Capacitance & Tan δ of bushing on yearly basis & winding on 4 yearly basis as a preventive measures for detection of any incipient faults in advance for corrective measures. Such practice will prevent failure of Transformers & Reactors and insisted Me.ECL to carry out immediately said tests for 2 Nos of 315 MVA 400/220 kV ICTs at Byrnihat those are already in service since 2013.

The Sub-committee requested all the constituents to carry out the DGA test regularly to prevent unnecessary failure of equipments.

Date and Venue of next PCC

It is proposed to hold the 30th PCC meeting of NERPC on 23rd February, 2015. The exact venue will be intimated in due course.

****

Annexure-I

List of Participants in the 29th PCC Meetings held on 22/01/2015

SN	Name & Designation	Organization	Contact No.
	No Representative	**Ar. Pradesh**	
1.	Sh. Karuna Sarma, AGM (E)	Assam	09435013532
2.	Sh. Ashutosh Bhattacharjee, Dy. Mgr	Assam	09435332928
	No Representative	**Manipur**	
3.	Sh. Somen Saha, AE, Me. PTCL	Meghalaya	09436112798
4.	Sh. A.G. Tham, AE, Me. PTCL	Meghalaya	09774664034
	No Representative	**Mizoram**	
5.	Sh. A. Jakhalu, EE(T), DMR	Nagaland	09436002696
	No Representative	**Tripura**	
6.	Sh. A. Mallick, DGM	NERLDC	09436302720
7.	Sh. Bhaskar Goswami, Sr. Manager (O&M)	NEEPCO	09436163983
8.	Sh. J. Bhattacharyya, AGM (O&M)	NTPC	09435720036
9.	Sh. R.C. Kisku, Dy. Mgr. (E)	NHPC	09436894861
10.	Sh. P. Kanungo, DGM (OS)	NERTS	09436302823
11.	Sh. T.P. Pandey, DGM (O&M)	OTPC	08794718423
12.	Sh. T. Karmakar, AM (E)	OTPC	09435239314
13.	Sh. P.K. Mishra, Member Secretary	NERPC	09968380242
14.	Sh. B. Lyngkhoi, Director/SE (O)	NERPC	09436163419
15.	Sh. S.M. Jha, DD/EE	NERPC	08731845175

3RD PARTY PROTECTION AUDIT - 2015

GENERAL INFORMATION

01. Name of Sub Station :
02. Owner of The Sub Station :
03. Date of first commissioning :
04. Type of Bus Switching Scheme :
05. Whether SLD collected or Not : Refer Annexure – I

AUDIT TEAM

SN	Name	Organisation	Date of Audit	Signature
1.				
2.				
3.				

LIST OF AUXILIARIES

SN	Code	Name / Description	DOC
1	DC-1	220/110V Battery Bank - 1	
2	DC-2	220/110V Battery Bank - 2	
3	DC-3	48V Battery Bank - 1	
4	DC-3	48V Battery Bank - 1	
5	AC-1	---KVA, ***/****KV Transformer	
6	AC-2	---KVA, ***/****KV Transformer	
7	DG-1	___KVA DG Set	
8	DG-2	___KVA DG Set	

LIST OF ELEMENTS

SN	Name / Description	DOC
1	Bay 1: _____	
2	Bay 2: _____	
3	Transformer 1 : _____	
4	Transformer 1 : _____	
5	Reactor 1: _____	
6	Reactor 2: _____	
7	Line 1: _____	
8	Line 2: _____	
9	Etc ……	

1.0 AUXILIARIES

1.1 DC Sources

SN	Description	DC – 1	DC – 2	DC – 3	DC – 4
1	Checking Cleanliness Battery cell terminals and application of petroleum jelly, if required				
2	No. of Cells Per Bank				
3	Capacity				
4	Electrolyte Level				
5	Sample Checking of Sp. Gravity				
6	Healthiness of Charger				
7	Measurement ofVoltage with				
	(a) Charger ON				
	(b) Charger OFF				
8	Positive to Earth			NA	NA
9	Negative to Earth			NA	NA
10	Healthiness EF Relay			NA	NA
11	Discharge Test Capacity				
12	Checking of tightness of VRLA Battery and dusting/ cleaning.				
13	Servicing of Air Conditioners for VRLA Batteries.				

1.2 AC Supply

SN	Description	AC – 1	AC – 2
1	Source of supply		
2	Reliability of Supply		
3	Average trippings per month		

1.3 DG Set

SN	Description	DG – 1	DG – 2
1	Make		
2	Rating		
3	Weather on Auto or Manual		
4	Fuel Level		
5	Average Hrs. Run / Month		

2.0 COMMON EQUIPMENTS / ITEMS

SN	Description	Status
1	**Bus Bar Protection**	
(a)	Bus Voltage	
(b)	Make & Model of Bus Bar relay	
(c)	Status of Healthiness	
(d)	Date of Stability Test	
(e)	Remarks (if any)	
2	**Event Logger**	
(a)	Make & Model	
(b)	Status of Healthiness	
(c)	Remarks (if any)	
3	**Time Synchroniser**	
(a)	Make & Model	
(b)	Status of Healthiness	
(c)	Remarks (if any)	
4	**Annunciation Scheme**	
(a)	Healthiness Annunciation	
(b)	Healthiness Hooter	
(c)	Remarks (if any)	
5	**Fire Alarm System**	
(a)	Availability	
(b)	Healthiness	
(c)	Remarks (if any)	
6	**Fire Fighting System**	

SN	Description	Status
(a)	Availability	
(b)	Healthiness	
(c)	Remarks (if any)	
7	**Earthing System**	
(a)	Earth Resistivity Value	
(b)	No. of Pits	Available / Required
(c)	Remarks (if any)	
8	**Switchyard Gravelling**	
(a)	Availability	
(b)	Remarks (if any)	

3.0 BAY

3.1 Bay 1: _____

(a) Lightning Arrestor

SN	Description	Status		
		R-Φ	Y-Φ	B-Φ
1	Make			
2	Rating			
3	Type			
4	Year Commissioning			
5	Last THRC Test & Values			

(b) Capacitive Voltage Transformer

SN	Description	Core	Status		
			R-Φ	Y-Φ	B-Φ
1	Make	All			
2	Rating	All			
3	Type	All			
4	Year of Comm	All			
5	Adopted Ratio	Core 1			
		Core 2			

		Core 3			
6	Ratio Measured	Core 1			
		Core 2			
		Core 3			
7	Error Calculated	Core 1			
		Core 2			
		Core 3			
8	Date of Testing	All			

(c) Current Transformer

SN	Description	Core	Status		
			R-Φ	R-Φ	R-Φ
1	Make	All			
2	Rating	All			
3	Type	All			
4	Year of Comm.	All			
5	Adopted Ratio	Core 1			
		Core 2			
		Core 3			
		Core 4			
		Core 5			
6	Ratio Measured	Core 1			
		Core 2			
		Core 3			
		Core 4			
		Core 5			
7	Error Calculated	Core 1			
		Core 2			
		Core 3			
		Core 4			
		Core 5			
8	Date of Testing	All			

(d) Circuit Breaker

SN	Description	Status

1	Make				
2	Rating				
3	Type				
4	Duty Cycle				
5	No. of Trip & Close Coils	Trip Coil =		Close Coil =	
6	Timing Date & Value	Date:	C =	O =	CO =
7	Healthiness of CB				
8	**LBB Protection**				
(a)	Type				
(b)	Make & Model				
(c)	Healthiness				
(d)	Date of Last Testing				
(e)	Setting				

4.0 TRANSFORMERS

4.1 Transformer – 1

SN	Description	Status
1	Make	
2	Rating	
3	Year of Manufacture	
4	Year of Commissioning	
5	Type of Cooling	
6	Type of Earthing	
7	Date of last DGA	
8	Date of last Oil Parameter	
9	Date of last Tan∂& C	
10	Oil Level	
11	Oil Leakage	
12	Rusting / Painting	
13	**Differential Protection**	

SN	Description	Status
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Stability Test	
(e)	Setting	
14	**REF Protection**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Stability Test	
(e)	Setting	
15	**Over Flux Protection**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Last Test	
(e)	Setting	
16	**Back Up O/C Protection**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Last Test	
(e)	Setting	
17	**Back Up E/F Protection**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Last Test	
(e)	Setting	
18	**Healthiness Status**	
(a)	Buchholz Relay	
(b)	PRV	

SN	Description	Status
(c)	OTI	
(d)	WTI	
(e)	MOG	
(f)	Oil Surge Protection	

5.0 REACTORS

5.1 Reactor – 1:

SN	Description	Status
1	Make	
2	Rating	
3	Year of Manufacture	
4	Year of Commissioning	
5	Type of Cooling	
6	Type of Earthing	
7	Date of last DGA	
8	Date of last Oil Parameter	
9	Date of last Tan∂& C	
10	Oil Level	
11	Oil Leakage	
12	Rusting / Painting	
13	**Differential Protection**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Stability Test	
(e)	Setting	
14	**REF Protection**	
(a)	Type	
(b)	Make & Model	

SN	Description	Status
(c)	Healthiness	
(d)	Date of Stability Test	
(e)	Setting	
15	**Back Up Impedance**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Last Test	
(e)	Setting	
18	**Healthiness Status**	
(a)	Buchholz Relay	
(b)	PRV	
(c)	OTI	
(d)	WTI	
(e)	MOG	

6.0 TRANSMISSION LINE

6.1 Line – 1:

SN	Description	Status
1	Line Name	
2	Voltage	
3	Length	
4	Type of Conductor	
5	Line Configuration	
6	R1 (Ω/Km/Ph.)	
7	X1(Ω/Km/Ph.)	
8	R0 (Ω/Km/Ph.)	
9	X0 (Ω/Km/Ph.)	
10	R0M (Ω/Km/Ph.)	
11	X0M (Ω/Km/Ph.)	

SN	Description	Status
12	No. of Tripping / Year	
13	Infringement Clearance	
14	**Main – 1 Protection**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Last Testing	
(e)	Zone 1 Setting	
(f)	Zone 2 Setting	
(g)	Zone 3 Setting	
(h)	Zone 3 Reverse Setting	
(i)	DEF Setting	
15	**Main – 2 Protection**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Last Testing	
(e)	Zone 1 Setting	
(f)	Zone 2 Setting	
(g)	Zone 3 Setting	
(h)	Zone 3 Reverse Setting	
(i)	DEF Setting	
16	**Back Up O/C Protection**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Last Testing	
(e)	Setting	PS/TS:
17	**Back Up E/F Protection**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	

SN	Description	Status
(d)	Date of Last Testing	
(e)	Setting	PS/TS:
18	**Over Voltage Stage 1**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Last Testing	
(e)	Setting	
19	**Over Voltage Stage 2**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Date of Last Testing	
(e)	Setting	
20	**PLCC & Prot. Coupler**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness of Carrier	
(d)	Date of Last Testing	
21	**Auto Reclosure Scheme**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	
(d)	Selected Mode	
(e)	Setting	
(f)	Date of Last Testing	
22	**Disturbance Recorder**	
(a)	Type	
(b)	Make & Model	
(c)	Healthiness	