भारत सरकार Government of India
विद्युत मंत्रालय Ministry of Power
उत्तर पूर्वी क्षेत्रीय विद्युत समिति
North Eastern Regional Power Committee
मेघालया स्टेट हाउसिगं फिनांस को- आपरेटिव सोसायटी लि. बिल्डिगं
Meghalaya State Housing Finance Co-Operative Society Ltd. Building
नांग्रिम हिल्स, शिलोंग - ७९३००३
Nongrim Hills, Shillong – 793003.

ISO 9001:2008

Ph. No: 0364 - 2520050
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Website: www.nerpc.nic.in

No. NERPC/SE (O)/PCC/2014/**2598-633** Dated: October 24, 2014

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 26th PCC Meeting - Reg.

Sir,

The Minutes of the 26th PCC Meeting of NERPC held on 15.10.2014 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 26th PROTECTION COORDINATION SUB-COMMITTEE MEETING OF NERPC

Date : 15/10/2014 (Wednesday)
Time : 14:00 hrs
Venue : "Hotel Nandan", Guwahati.

The List of Participants in the 26th PCC Meeting is attached at **Annexure – I**

Shri B. Lyngkhoi, SE (Operation), NERPC welcomed Shri A.K.Bandyopadhyay, Member Secretary, ERPC & Member Secretary in-charge, NERPC and congratulates him on his promotion to Member Secretary/Chief Engineer. He stated that during his tenure many important issues in the region have been resolved and wished him success in the future. Further, he stated that on 14.10.2014 the System Studies meeting as decided by the Sub-committee was held at NERLDC, Shillong and many of the pending issues of OCC/PCC have been discussed and finalized and the same will be placed to the house for kind information and suggestion if any.

After that Shri A.K. Bandyopadhyay, Member Secretary in-charge, NERPC welcomed all the participants to the 26th PCC meeting and requested all the constituents to actively participate in the meeting so that fruit decision could be taken.

Thereafter, Member Secretary requested Shri B. Lyngkhoi, SE(O), NERPC to take up the agenda item for discussion.

A. CONFIRMATION OF MINUTES

CONFIRMATION OF MINUTES OF 25th MEETING OF PROTECTION SUB-COMMITTEE OF NERPC.

The minutes of 25th meeting of Protection Sub-committee held on 9th September, 2014 at Guwahati were circulated vide letter No. NERPC/SE (O)/OCC/2014/2018-2053 dated 22nd September, 2014.

The sub-committee confirmed the minutes of 25th PCC meeting 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 Implementation of 3-phase Auto Reclosure Scheme in all lines connected to Khandong and Kopili HEP:

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 25th PCC meeting, NEEPCO representatives informed the members that the scheme is agreed in principle but the breakers need replacement. The breakers have been procured accordingly and they are expected to be replaced by December 2014 / January 2015 by obtaining shut down.

It was discussed that charging of any feeder at Khandong through transfer bus is not possible because of lower capacity of main bus conductor. Strengthening of Khandong bus has already been discussed in earlier RPC forum. NEEPCO will intimate the status by next OCC/PCC & expedite thereof.

POWERGRID intimated that meanwhile 3phase auto-reclosure will be implemented for the circuits given below:

1) 132kV Khandong –Khliehriat-II
2) 132kV Kopili-Khandong-II where both end bays are owned by POWERGRID and relays and CBs are suitable for TPAR

Deliberation of the sub-Committee

NEEPCO representative stated that breakers reached the site and maybe expected to be commissioned within one month.

POWERGRID representative stated that: -

1) 132kV Khandong – Khliehriat - II

3 phase auto-reclosure has been implemented.

2) 132kV Khandong – Khliehriat - I

The pre-installation works for implementation of 3 phase auto- recloser scheme are completed.

Regarding enhancement of bus capacity, NEEPCO was requested to intimate the status within a month. Representative of NEEPCO informed that concerned officer was not available, the matter maybe referred to OCC for further deliberation.

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 25th PCC meeting, NEEPCO representatives informed the members that wiring problems are experienced in the above lines. Design cell of NEEPCO has been intimated for rectification of the same and response is awaited. Proposal for implementation of the scheme is to be finalized by Engineering Cell and exact status may be intimated in next OCC / PCC meeting.

DGM, NERTS informed the members that 3-Phase Auto Reclosure scheme with dead line charging at Nirjuli is already implemented.

Deliberation of the sub-Committee

NEEPCO representative stated that the design cell would be visiting the site during November 2014, the scheme would be implemented once clearance is given by design cell. The status will be reviewed in next PCC meeting.

The Sub-committee requested NEEPCO to look into the matter at the earliest as this is a system requirement and status should be spelt out in the next PCC meeting. NEEPCO agreed.

The sub-committee noted as above.

A.3 Implementation of islanding scheme in NER

The proposed islanding schemes have been studied and discussed in detail by the system study group on 14.10.2014 at NERLDC, Shillong. The minutes of the meeting along with suggestions are attached at **Annexure A.3**

A.4 Testing of protective relays of downstream system of 132kV Khliehriat (Me.ECL) Sub Station:

All downstream faults of 132kV Khliehriat (Me.ECL) Sub Station gets reflected to 132kV Khliehriat (PG) Sub Station causing greater isolation of system. Hence, it is essential that Me.ECL should carry out testing of downstream Relays at 132kV Khliehriat (Me.ECL) Sub Station and based on the condition of relays further course of action may be decided. In case the relays are found defective POWERGRID will revise the existing relay setting at 132kV Khliehriat (PG) Sub Station in such a way that expedite tripping of both 132kV Khliehriat – Khliehriat Line # 1 & 2 occurs during downstream fault to avoid undesirable isolation of Lines at upstream.

It was decided in the 99th OCC meeting that POWERGRID and Me.ECL will conduct a joint inspection and checking of relays on 25/07/2014 to identify the problems and suggest remedial action.

During 25th PCC meeting, Me.ECL representatives informed the members that relays in NEHU and NEIGRIHMS feeders have been tested. Lumshnong feeder may be tested during proposed shutdown on 24.09.2014.

Further, it was informed that a proposal has been made to identify new site for proper earthing of Khliehriet sub-station. Latest status may be intimated in next PCC.

It was requested to highlight the joint inspection report in next PCC meeting and the same may also be highlighted in CERC hearing.

Further POWERGRID informed that till protection system, switchgear & earthing system are improved, relay setting of Khliehriat (PG)-Khliehriat (Me.ECL) Ckt-1&2 will be minimized along with inter-tripping of both ckts at PG end to avoid reflection of downstream fault of Me.ECL Network in to 132kV NER upstream Grid viz Khandong (NEEPCO) & Khliehriat (PG bus).

Deliberation of the sub-Committee

Me.ECL representative informed that Lumshnong feeder relay has been tested on 09.10.2014 and settings are found correct. Detail report will be submitted once testing of all downstream relays is completed.

DGM, NERTS informed that earthing in Khliehriat (Me.ECL) Sub Station requires lots of improvement to meet the present practices / standard requirements of Earthing. He further informed that the power supply module of Distance Relay of POWERGRID installed at Khliehriat (Me.ECL) Station in 132kV Khliehriat – Khliehriat Line # 1 already burnt twice during lightening due to poor earthing. He opined that unless improvement of earthing is done, the replacement or rectification of relay will not resolve the issues.

Me. PTCL representative stated earthing solution for underground portion is being sought from Meenav group. Me. PTCL was requested to share the reports of the firm in next PCC meeting.

As deliberated and advised in the earlier meetings to seek for funding from PSDF, NLCPR, etc; it was agreed to intimate the issue to higher authorities in CEA, CERC, etc so that funding from Central Govt. may be expedited.

As suggested by Member Secretary I/C NERPC, it was agreed to prioritize the 3rd party audit reports of NERPC so that most important items to be replaced may be identified. The prioritized reports may then be pursued for funding from PSDF.

It was also agreed to form a committee to review and monitor the prioritized reports of 3rd party audit reports of NERPC. The sub-group committee will meet monthly before OCC meeting to review and finalize the prioritized items. The following officers were nominated for the subgroup:

1. Shri Lalrinsanga, NERPC	Convener
2. Shri P.Kanungo, NERTS	Member
3. Shri G.K.Bhuyan, ASSAM	Member
4. Shri H.F Shangpliang, MEGHALAYA	Member
5. Shri B.Goswami, NEEPCO	Member
6. Shri Tapesh Karmakar, OTPC	Member

The sub-Committee noted as above.

A.5 Transmission Availability verification for ISTS elements:

Procedure for calculation of Transmission system availability factor for a month as per CERC Regulation 2014-19.

As per Central Electricity Regulatory Commission (Terms and conditions of Tariff) Regulations, 2014-19 .Transmission System Availability factor for a calendar month (TAFM) w.e.f. 1st April 2014 shall be calculated by the respective transmission licensee, got verified by the concerned RLDC and certified by the Member Secretary, Regional Power Committee of the region concerned separately for each AC and HVDC transmission system.

Deliberation in the 25th PCC, 101st OCC and 22nd CCM Meetings

Planned Outages: -

1) In all cases of outages, RLDC will certify the actual outage period. The outage period will be cross-checked with the approved outage period in OCC forum. All planned outages should be availed by the executing agency as approved in the OCC forum.

2) Any deferment from approved outage hours and approved outage days may be intimated by the agency to NERPC with a copy to NERLDC, justifying the reason of deferment. The deferred hours/ days without proper justification will be deducted from the availability period.

Emergency Outages: -

1) Outages beyond the control of the agency when RPC nor RLDC could not be informed earlier and immediate remedial actions are required.
2) Outages planned in OCC forum but are of emergency in nature like tower in danger, CBs need immediate replacement, etc. However, the agency has to intimate RPC with a copy to RLDC.
3) Outages that cannot be delayed till next OCC forum for proper approval.
4) However, the agency has to intimate RLDC with the reason of outage for all the above cases which may be approved in OCC forum.

Transient Outages: -

1) Outages that are of transient in nature due to lightning, mal-operation of relays, etc.
2) Transient Earth Fault, Auto-reclosure, phase-to-phase fault, etc.
3) Outages due to infringements.
4) However, the agency has to intimate RLDC with the reason of outage for all the above cases which may be approved in OCC forum.

Outages due to others: -

1) Outages due to fault in the downstream protection.
2) Outages as per direction of RLDC for desired system condition.
3) Outages due force majeure / Acts of God.
4) However, the agency has to intimate RLDC with the reason of outage for all the above cases which may be approved in OCC forum.

Force Majeure: -

1) Act of God including lightning, drought, fire and explosion, earthquake, volcanic eruption, landslide, flood, cyclone, typhoon, tornado, geological surprises, or exceptionally adverse weather conditions which are in excess of the statistical measures for the last hundred years; or
2) Any act of war, invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot, insurrection, terrorist or military action; or

3) Industry wide strikes and labour disturbances having a nationwide impact in India;

4) However, the agency has to intimate RLDC with the reason of outage for all the above cases which may be approved in OCC forum.

Conditions given in SoR: -

1) Only 2 trippings per annum allowed for each AC system, additional 12 hours may be added for each tripping in case of trippings more than 2 in a year.

2) Further in case of outage of a transmission element affecting evacuation of power from a generating station outage hours shall be multiplied by a factor of **2.**

Further suggestions of PCC/ OCC: -

1) In case of force majeure due to lightning, the agency may send DR waveform to RLDC/ RPC for further studies.

2) Option of installing lightning mapping was suggested.

3) NERTS was requested to give presentation in next OCC to highlight the DR waveform nature so that same can be used for certification.

4) Two trippings per year is allowed for each AC system.

5) In case of trippings attributable to other agency, system study group may find out the cause of tripping; only tripping attributable to the concerned agency may be considered for 2 trippings per annum.

6) In case of trippings affecting evacuation of power from a generating station, the same may be reviewed in next OCC/ PCC to finalize: -

   a) Whether lines directly connected to the station should be considered? Or
   b) Lines not directly connected to the station but also affecting the generation should also be considered?

Further, sub-committee discussed the issue for understanding of trippings of line due to lightening.

DGM, POWERGRID informed that the lightening phenomenon can be understood by some of the methods below:

(a) DR Record

(b) Installation of Lightning mapping equipment

(c) Enquiring whether condition of particular locality.

The sub-committee requested POWERGRID to give presentation in next OCC of lightning phenomenon and also to have better understanding of all the issues before finalization. POWERGRID agreed.

Commercial Sub-committee agreed to the suggestions of PCC/ OCC forum and further decided that: -

1. Outages certified by NERLDC till finalization of the procedure may be treated as provisional and same will be revised once the certification procedure is finalized.

2. Certificates issued by NERPC are provisional only and final certificate will be issued after due verification from NERLDC as per the procedures finalized. NETC may approach NERPC for provisional certification till the same is finalized.

3. Agencies will make necessary adjustments in the bills once final certificate is issued by NERPC.

Deliberation of the sub-Committee

DGM, NERTS gave a presentation explaining the different waveforms recorded during infringements, lightning, etc.

Further, DGM (MO), NERLDC gave a presentation regarding steps to be taken for the purpose of verification of transmission system availability which are as follows:-

1. Submission of outage data of the month to NERLDC by the transmission licensee pertaining to previous month (say data of January shall be submitted by February)

2. Verification of duration of outage by NERLDC after receiving outage data of the month from the transmission licensee for verification of reasons of outage and ascertaining whether outage is attributable to transmission licensee or others (say by 1st week of March).

3. Simultaneously place the data in next OCC of NERPC for identifying the outages which caused generator backing down (say by 1st week of March)
4. Outcome/decision of PCC meeting and OCC meeting shall be intimated to NERLDC within a week after the meeting (say by 15th March)
5. NERLDC will verify and submit the data to NERPC Secretariat (say by 25th March)

The Sub-Committee requested all the constituents to go through the above suggestions and give comments if any improvement is required.

A.6 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 25th PCC meeting, SE(O) stated that SLD of sub-stations, switching & power stations is one of the requisite information relating to preparation of DPR for R&U scheme for funding from PSDF and he mentioned that the revised formats as desired by NLDC/ CEA have been circulated to all the beneficiaries and requested them to furnish the updated status by 15th September 2014 so that the same may be pursued with NLDC/ CEA. He requested all the constituents to submit the DPR to NLDC and CEA with a copy to NERPC at the earliest.

AEGCL informed that Single Line Diagrams (SLDs) of some sub-stations in which the equipments required to be replaced may take some time. However, they assured that the same will be prepared and sent as early as possible. Further, AEGCL informed that DPR for R&U scheme has already sent by them to NLDC & CEA with a copy to NERPC.

Meghalaya & Nagaland have assured that the DPR for above scheme will be sent within one week.

Further, 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.

Deliberation of the sub-Committee

The Sub-committee is of the opinion that constituents are trying their best to improve the system as recommended by Enquiry Committee.

It was agreed that the sub-group members will meet to finalize the priorities and prepare the reply as filed by NERLDC before next CERC hearing.

The sub-committee noted as above.

A.7 Issues related to Grid Disturbances/ Incidences as per CEA Standards, 2010, tripping of multiple elements, reduction of TTC due to tripping of critical elements:

The following numbers of Grid Disturbances occurred during the period w.e.f 01st September, 2014 to 21st September, 2014:-

SN	Control Area	Number of Grid Disturbance
1	Palatana	2
2	AGBPP	1
3	AGTPP	
4	Ranganadi	
5	Kopili 1	
6	Khandong	
7	Doyang	
8	Loktak	
9	Assam	8
10	Manipur	2
11	Meghalaya	1
12	Mizoram	
13	Nagaland	3
14	Tripura	

This is for information to the members.

A.8 Grid Disturbance during July, 2014:

On 25.07.14 at 05:14:18.820 Hr, 400 kV Balipara – Ranganadi II line tripped (Balipara: Directional E/F with 1922 msec delay, DT receive & Ranganadi: Carrier receive, Overvoltage protection), at 05:14:15.920 Hr, 400 kV Balipara – Ranganadi I line tripped from Ranganadi end only (Balipara : Tie CB tripped, Main CB did not trip & Ranganadi : DP, Z1, R-E). The 400 kV Balipara – Ranganadi I line was Hand Tripped from Balipara later.

Due to tripping of above lines, power supply to Ziro & Itanagar areas of Arunachal Pradesh & Gohpur area of Assam disrupted.

At 05:14:24.800 Hr, 220 kV Samaguri – Balipara line tripped (Samaguri – DP, Z1, B-E & Balipara – No tripping), at 05:14:25.107 Hr, 400 kV Misa – Balipara II line tripped (Misa – Directional E/F with 1800 msec delay & Balipara – No tripping) & at 05:14:25.186 Hr 400 kV Misa – Balipara I line tripped (Misa – DT received & Balipara – Overvoltage protection).

Due to tripping of 400 kV Misa – Balipara D/C lines & 220 kV Samaguri – Balipara S/C line, Southern part of NER Grid (NER Grid except Ziro, Itanagar & Khupi areas of Arunachal Pradesh & Gohpur, Depota & Dhaligaon area of Assam) was connected with rest of NER Grid through narrow corridor 220 kV BTPS – Agia line.

After tripping of above elements, at 05:14:27.585 Hr, 220/132 kV, 2x50 MVA ICT at Balipara tripped, which led to disruption of power supply in Depota area of Assam & Khupi area of Arunachal Pradesh.

At around 05:21 Hr, **220 kV Azara – Sarusajai D/C lines** & 220 kV Azara – Boko and 220 kV Boko – Sarusajai S/C tripped. Due to tripping of these elements, Southern part of NER Grid separated from rest of NER Grid. Frequency of the Southern part of NER Grid shot upto 51.15 Hz (as per PMU).

At 05:34:10.880 Hr, Southern part of NER Grid collapsed due to load generation mismatch.

Load Loss: 1384 MW & Generation Loss: 1564 MW

During 25th PCC meeting, the sub-Committee requested NERLDC to give presentation with remedial measure in next PCC after carrying out system studies based on the inputs given during the meeting to identify the root causes and to suggest remedial measures pertaining to grid disturbance on 25.07.14. The process may be followed for future cases of grid disturbances.

Deliberation of the sub-Committee

NERLDC representative gave a detail presentation after carrying out system studies based on the inputs received from constituents and suggested remedial measures pertaining to grid disturbance on 25.07.14.

NERLDC had submitted Report on Grid Disturbance in NER on 25.07.14 to PCC forum. NERLDC had informed that Report on Grid Disturbance in NER on 25.07.14 was prepared based on available details till preparation of the report and had also informed that some data/information are required for preparation of complete report of Grid Disturbance in NER on 25.07.14. It was decided that these data/information are to be furnished by the concerned constituents at the earliest.

The Sub-committee requested NERLDC to communicate the above suggestions to all the constituents for remedial measures and the same is enclosed herewith in **Annexure – A.8.**

The sub-Committee noted as above.

A.9 Major Events in North-Eastern Regional Grid:

NERLDC informed that there was no major Grid Disturbances occurred in NER during September, 2014.

The sub-Committee noted as above.

List of multiple tripping of elements and tripping of important elements in North-Eastern Regional Grid during the period w.e.f. 01st September, 2014 to 21st September, 2014 are sent to the constituents through e-mail (Letters for Furnishing Event information on weekly basis are being sent to the power utilities of NER by e-mail w.e.f 13th January, 2014). ***Annexure A.9***

Constituents are requested to furnish details of tripping reported in the letters to NERLDC through e-mail.

Deliberation in the Meeting

Constituents are requested to provide data for DR/EL/FL and other major observation to NERLDC for analysis.

The sub-Committee noted as above.

A.10 Sensitive generator protection setting at Palatana:

DGM, NERTS informed that Pallatana is tripping due to tripping of one circuit of Silchar-Byrnihat line even though the other circuit still remains for evacuation. Such sensitive tripping is to be prevented as it results in unnecessary loss of generation.

During 25th PCC meeting, OTPC was requested to submit the setting of generator protection in next PCC so that the same may be prevented in future.

Deliberation of the sub-Committee

OTPC representative informed that relay setting at Palatana has been corrected and problem of tripping of generating unit due to tripping of line is resolved.

The sub-Committee noted as above.

A.11 Protection setting at Haflong sub-station - AEGCL agenda:

DGM, AEGCL informed that due to fault in downstream of Haflong (33 kV side), Haflong (PG) trips which needs to be rectified.

During 25th PCC meeting, POWERGRID informed that they already furnished revised setting to AEGCL for further review.

It was agreed that NERTS will help in modifying the relay of Haflong downstream feeders. AEGCL was requested to co-ordinate with NERTS for rectification of the same.

Deliberation of the sub-Committee

DGM, AEGCL representative stated required modification of relay setting at Haflong (PG) was implemented.

The sub-Committee noted as above.

B.1 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 in the Meeting

The Sub-committee suggested to refer the issue to OCC Sub-committee.

B.2 Removal of Obsolete DPR Type THR-3 and SSRR3V from 132kV Jiribam (PG) and 132kV Imphal (PG) Feeder:

As per the existing practice, the protection scheme for 132kV Lines is Single Main and Backup Protection. During March'14 NHPC has already installed Numerical DPR Type P442 of M/S Alstom Make in 132kV Jiribam (PG) and 132kV Imphal (PG) feeders. However, the obsolete DPRs viz. THR-3 and SSRR3V of 132kV Jiribam (PG) and 132kV Imphal (PG) feeders have not been disconnected from the scheme which is unsafe so far as reliable protection is concerned considering the probability of mal-operation of the obsolete relays. There are instances of undesirable tripping of 132kV Jiribam (PG) – Loktak Line on account of mal-operation of old DPR at Loktak HEP. NHPC should disconnect the Old and Obsolete DPRs immediately.

Deliberation in the Meeting

The Sub-committee suggested to refer the issue to OCC Sub-committee.

B.3 Rectification of CT Switching relays of 220kV Bus Bar Protection Scheme at 400/220kV Balipara Sub Station by AEGCL:

The 220kV Bus Bar Protection Scheme at 400/220kV Balipara Sub Station operated on 28.09.2014 during operation of Bus Transfer Scheme. On investigation it was found that the CT Switching Relay contact of 50MVA ICT Bay was not operating for Zone – B. Matter was referred to AEGCL for necessary rectification.

Deliberation in the Meeting

AEGCL representative informed that approval for procurement of VAJH-11 relay from M/s Areva is awaited. The same may be expected to be installed by end of October'14.

The sub-Committee noted as above.

Date and Venue of next PCC

It is proposed to hold the 27th PCC meeting of NERPC on second week of November, 2014. The exact venue will be intimated in due course.

****

Annexure-I

List of Participants in the 26th PCC Meetings held on 15/10/2014

SN	Name & Designation	Organization	Contact No.
1.	Sh. Nangkong Perme, EE	Ar. Pradesh	09436288643
2.	Sh. G.K.Bhuyan, AGM(Protection), AEGCL	Assam	09854015601
3.	Sh. Shanti Kumar Singh, DGM, MSPCL	Manipur	09436022381
4.	Sh. S. Sanjeet Singh, Manager, MSPCL	Manipur	09856140818
5.	Sh. S. Saha, Asst. Engineer	Meghalaya	09436112798
6.	Sh. P.S. Nonglong, Asst. Engineer	Meghalaya	09774247457
7.	Sh. A. Jakhalu, EE (Trans)	Nagaland	09436002696
8.	Sh. Lalduhawma, EE, SLDC	Mizoram	09436144113
9.	Sh. Peter V.L. Malsawma, AE, SLDC	Mizoram	08974287650
10.	Sh. U. Debbarma, DGM	Tripura	09436462848
11.	Sh. D. Pal, Sr. Manager	Tripura	09436500244
12.	Sh. Amaresh Mallick, DGM (SO II)	NERLDC	09436302720
13.	Sh. R. Chakraborti, Engineer	NERLDC	09402507543
14.	Sh. Tanya Taji, Sr. Manager	NEEPCO	09436042053
15.	Sh. A. Patir, G.M (O&M)	NERTS (PGCIL)	09436302529
16.	Sh. P. Kanungo, DGM (OS)	NERTS (PGCIL)	09436302823
17.	Sh. T. Karmakar, AM	OTPC	
18.	Sh. A.K. Bandyopadhya, MS	NERPC	9433068333
19.	Sh. B. Lyngkhoi, Director/S.E(O)	NERPC	09436163419
20.	Sh. Lalrinsanga, A.S/EE	NERPC	09436161886
21.	Sh. S.M. Jha, Dy. Director/EE	NERPC	08731845175
22.	Sh. D.K. Bauri, Dy. Director/EE	ERPC	09883617236

North Eastern Regional Power Committee

ANNEXURE –A.3

MINUTES OF THE 2nd SYSTEM STUDY SUB-COMMITTEE MEETING OF NERPC

Date : 14/10/2014 (Tueesday)
Time : 11:00 hrs
Venue : "NERLDC Conference Hall", Shillong.

The List of Participants in the 2nd SSC Meeting is attached at **Annexure – I**

Shri B. Lyngkhoi, SE (Operation), NERPC welcomed all the participants to the 2nd System Study Committee meeting. He stated that the PCC/OCC Sub-committees have requested NERPC Secretariat to conduct a system study meeting to discuss and finalize many of the important issues for the benefit of the region. He requested all the constituents to actively participate in the discussion for fruitful outcome of the meeting.

Thereafter, the agenda were taken up.

ITEMS FOR DISCUSSION

A.1 Reverse Power flow in Azara SS in case of outage of Pallatana:

NERLDC gave a presentation and 3 different cases have been shown by considering different load scenarios of NER. The loading and limitations of different elements were also depicted. The different cases are shown below: -

Case - I:

Load - 1988 MW
Generation - 1348 MW
Reverse Flow - 60 MW
Salakati - BTPS Line loading - 200 MW

Case -II:

Load - 1988 MW
Generation - 1340 MW
Reverse Flow - 68 MW
Salakati - BTPS Line loading - 205 MW

This case needs attention as Salakati - BTPS is preferably required to be loaded less than 200 MW.

Case -III:

Load - 1988 MW
Generation - 1280 MW
Reverse Flow - 86 MW
Salakati - BTPS Line loading - 216 MW

Assam has to reduce the load as Salakati - BTPS Line is overloaded.

After detailed deliberation, it was decided to allow reverse power flow through Azara sub-station as below:-

1) ***If the flow is above 45-50 MW, relay at Azara should operate accordingly with 5 minutes time delay.***
2) ***If the flow is above, 50 MW, the reverse power relay at Azara should operate instantaneously.***

AEGCL agreed to implement the required settings at the earliest and the status would be intimated accordingly.

The sub-committee noted as above.

A.2 Load relief enhancement of Pallatana SPS:

NERLDC gave a presentation about load relief enhancement of Palatana SPS. The following points were proposed: -

1. Lumshnong – Khliehriat will be disconnected and Lumshnong will be fed from Panchgram

Once Palatana trips, then Lumshnong S/s will be tripped and a load relief of 15 MW may be expected.

2. Dharmanagar - P.K. Bari will remain disconnected and Dharmanagar & Dullavcherra will be fed from Silchar S/S radially.

Once Palatana trips, then 132kV Sichar-Dullavcherra feeder will be tripped at Silchar End through SPS and relief of 14 MW load can be achieved.

The change in wiring pattern may be examined by NERTS for implementing tripping from Silchar side.

The above suggestions may be reviewed by system study committee as and when required.

The sub-committee noted as above.

A.3 Pallatana SPS:

Special Protection Schemes associated with tripping of Palatana were considered and the following points were decided by OCC/PCC:

Case 1: Tripping of generating unit of OTPC at Pallatana

Case 2: Tripping of 400 kV D/C Palatana- Silchar line (with generation from OTPC's plant at Palatana)

Case 4: Tripping of 400 KV Silchar – Byrnihat line (without generation from OTPC's plant at Palatana)

The status as given by POWERGRID and OTPC is given below:

a) Case I & IV have already been implemented.

b) Case II has also been implemented (by default)

The sub-committee noted as above.

Case 3: Tripping of 400 kV Silchar-Byrnihat line (with generation from OTPC's plant at Palatana)

Regarding Case 3, the Sub-committee requested OTPC to reduce the generation to 200 MW to survive in case of tripping of above line. This is not only to survive the machine but also to reduce the restoration time of the machine.

OTPC agreed to pursue with BHEL to complete the GTG/STG setting soon.

It was also agreed that NERTS will make Silchar - Azara and Silchar - Byrnihat in series, the necessary changes in wiring will be done by NERTS.

A.4 Implementation of Islanding Scheme in NER:

During the 94thOCC meeting, the committee had decided the following islanding scheme and associated frequencies levels for creation of islands in NER:

SN	Islanding Scheme	Lines required to be opened	UFR Location	Implementing Agency
1	**ISLAND AT 48.80 Hz with 5 Sec delay:** Island comprising of generating units of AGBPP (Gas), NTPS (Gas) & LTPS (Gas) and loads of Upper Assam system & Deomali area (Ar. Pradesh) **[Total Generation: 380-400MW and load: 200MW (off peak)-300MW (peak)]**	(a) 220 kV New Mariani (PG) – AGBPP	UFR-1 [At New Mariani (PG)]	**PGCIL**
		(b) 220 kV Mariani – Misa	UFR-2 [At Mariani, Samaguri of AEGCL]	**AEGCL**
		(c) 220 kV Mariani – Samaguri		
		(d) 132 kV Mokokchung – Mariani		
		(e) 132 kV Dimapur (PG) – Bokajan	UFR-3 [At Dimapur (PG)]	**PGCIL**
		(f) Generators to be desynchronized for reduction of generation [if Generation > Load in the islanded pocket]		
		(g) De-synchronization / isolation of one GT and one ST from each of two modules of AGBPP, which are in operation, leading to reduction of generation of about 80-90 MW [i.e each module will contribute to reduction of about 40-45 MW (GT:30MW+ST:15MW)].	At AGBPP [UFRs of line bays & Generator to be used]	**NEEPCO**

		(h) Lines required to be opened for load shedding of 30MW (off-peak) and 50MW (peak) [if load > generation in the islanded pocket]		
		(i) 132kV Tinsukia – Ledo S/C line (at 48.7Hz instantaneous).	UFR [At Tinsukia]	**AEGCL**
		(j) 66kV Tinsukia – Rupai S/C line (at 48.6Hz instantaneous)		**AEGCL**
		(k) 132kV Jorhat – Bokakhat line (at 48.5Hz instantaneous)	UFR [At Jorahat / Bokakhat]	**AEGCL**
2	**<u>ISLAND AT 48.50 Hz with 5 Sec delay :</u>** Island comprising of generating units of AGTPP (Gas), generating units at Baramura (Gas), Rokhia (Gas) & Gumati (Hydro) and loads of Tripura system & Dullavcherra area (Assam) **[Total Generation: 150-160MW and load: 110MW (off-peak) &170-180MW (peak)]**	132 kV Palatana – Udaipur	UFR-1 [At Palatana]	**OTPC**
		132 kV Palatana – Surjamani Nagar		
		132 kV Silchar – Dullavcherra	UFR-2 [At Silchar]	**PGCIL**
		132 kV AGTPP – Kumarghat	UFR-3 [At Kumarghat]	**PGCIL**
		132 kV P K Bari – Kumarghat		
3	**<u>ISLAND AT 47.90 Hz:</u>** Isolation of NER from NEW grid at ER-NER boundary with rest of the generation and load of NER	To be decided after system study		

Deliberation of the Committee

1. ISLAND AT 48.80 Hz with 5 Sec delay:

A. POWERGRID, NERTS has to implement the revised time setting of UFR from existing 5 Secs to 500 ms for the following lines:

a) 220 kV New Mariani (PG) – AGBPP, at New Mariani (PG)

DGM, NERTS informed that the UFR & Relay setting of the same with 500 ms delayed has already been implemented.

B. AEGCL has to implement the revised time setting of UFR from existing 5 Sec to 500 ms for the following lines:

b) 220 kV Mariani – Misa, at Mariani

Assam informed that the UFR & Relay setting of the same with 500 ms delayed has already been implemented at both ends.

c) 220 kV Mariani – Samaguri, at Samaguri

Assam informed that the UFR & Relay setting of the same with 500 ms delayed has already been implemented at Samaguri end.

d) 132 kV Dimapur (PG) – Bokajan, at Dimapur (PG)

The UFR & Relay setting of the same with 500 ms delayed has already been implemented at Dimapur end.

e) 132 kV Mokokchung – Mariani, at Mariani

Assam informed that the line is normally in open condition and out of service- the question of setting does not arise.

C. NEEPCO has to implement the revised time setting of UFR from existing 5 Sec to 500 ms for the following generation:

f) Generators to be desynchronized for reduction of generation [if Generation Load in the islanded pocket]

g) De-synchronization / isolation of one GT and one ST from each of two modules of AGBPP, which are in operation, leading to reduction of generation of about 80-90 MW [i.e each module will contribute to reduction of about 40-45 MW (GT:30MW+ST:15MW)]

The scheme is proposed to be implemented at AGBPP utilizing UFRs of line bays & Generator.

NEEPCO informed the above scheme has already been implemented.

D. Lines required to be opened for load shedding of 30MW (off-peak) and 50MW (peak) [if load > generation in the islanded pocket]

h) 132kV Tinsukia – Ledo S/C line (at 48.7Hz instantaneous) at Tinsukia

i) 66kV Tinsukia – Rupai S/C line (at 48.6Hz instantaneous) at Tinsukia

j) 132kV Jorhat – Bokakhat line (at 48.5Hz instantaneous) at Jorhat/Bokakhat

Assam informed that they agree to implement the above scheme if require and at the same time request NERLDC to conduct a system study and suggest the settings for above lines.

The Sub-committee is of the opinion that the above lines may not be required for implementation at present- and if necessary, the same will be reviewed again.

In view of the above, the Islanding Scheme No.1 is now taken as completed.

2. ISLAND AT 48.50 Hz with 5 Sec delay :

Island comprising of generating units of AGTPP (Gas), generating units at Baramura (Gas), Rokhia (Gas) & Gumati (Hydro) and loads of Tripura system & Dullavcherra area (Assam)

[Total Generation: 150-160MW and load: 110MW (off-peak) &170-180MW (peak)]

A. POWERGRID, NERTS has to implement the revised time setting of UFR from existing 5 Sec to 500 ms for the following lines:

(a) 132 kV Silchar – Dullavcherra, at Silchar

Since the above line has already been considered in Pallatana SPS scheme, the Sub-committee agreed to drop from the proposal scheme.

(b) 132 kV P.K. Bari – Kumarghat, at Kumarghat
(c) 132 kV AGTPP – Kumarghat, at Kumarghat

DGM, NERTS informed that the UFR & Relay setting of the same with 500 ms delayed has already been implemented at Kumarghat end.

A. OTPC has to implement the revised time setting of UFR from existing 5 Sec to 500 ms for the following lines:

(d) 132 kV Palatana – Udaipur, at Pallatana
(e) 132 kV Palatana – Surjamani Nagar, at Pallatana

OTPC agreed to complete the above scheme by October, 2014.

3. ISLAND AT 47.90 Hz:

Isolation of NER from NEW grid at ER-NER boundary with rest of the generation and load of NER.

After detail deliberation, it was agreed that the case may be dropped for the time being and if necessary the same will be reviewed later.

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Annexure-I

List of Participants in the 2nd SCC Meetings held on 14/10/2014

SN	Name & Designation	Organization	Contact No.
1.	Sh. B. Lyngkhoi, S.E (O)	NERPC	09436163419
2.	Sh. Lalrinsanga, A.S	NERPC	09436161886
3.	Sh. J.K.Baishya, AGM	AEGCL	09435041494
4.	Sh. K. Sarma, AGM	AEGCL	09435013532
5.	Sh. G.K.Bhuyan, AGM	AEGCL	09854015601
6.	Sh. F.Kharshing, SE, SLDC	MeECL	09863066960
7.	Sh. T.Gidon, EE, SLDC	MeECL	09774479956
8.	Sh. A. Patir, GM	NERTS	09436302529
9.	Sh. P.Kanungo, DGM (OS)	NERTS	09436302823
10.	Sh. Bhaskar Goswami, Sr. Mgr	NEEPCO	09436163283
11.	Sh. Tapash Karmakar, AM	OTPC	09435239314
12.	Sh. N. R. Paul, DGM (SO-I)	NERLDC	09436302723
13.	Sh. P.P.Bandyopadhyay, DGM	NERLDC	09436302725
14.	Sh. Sanjeet Kumar Singh, ET	NERLDC	09532411656
15.	Sh. Rahul Chakraborty	NERLDC	09402507543

25th July 2014 at 05:14:15 Hrs

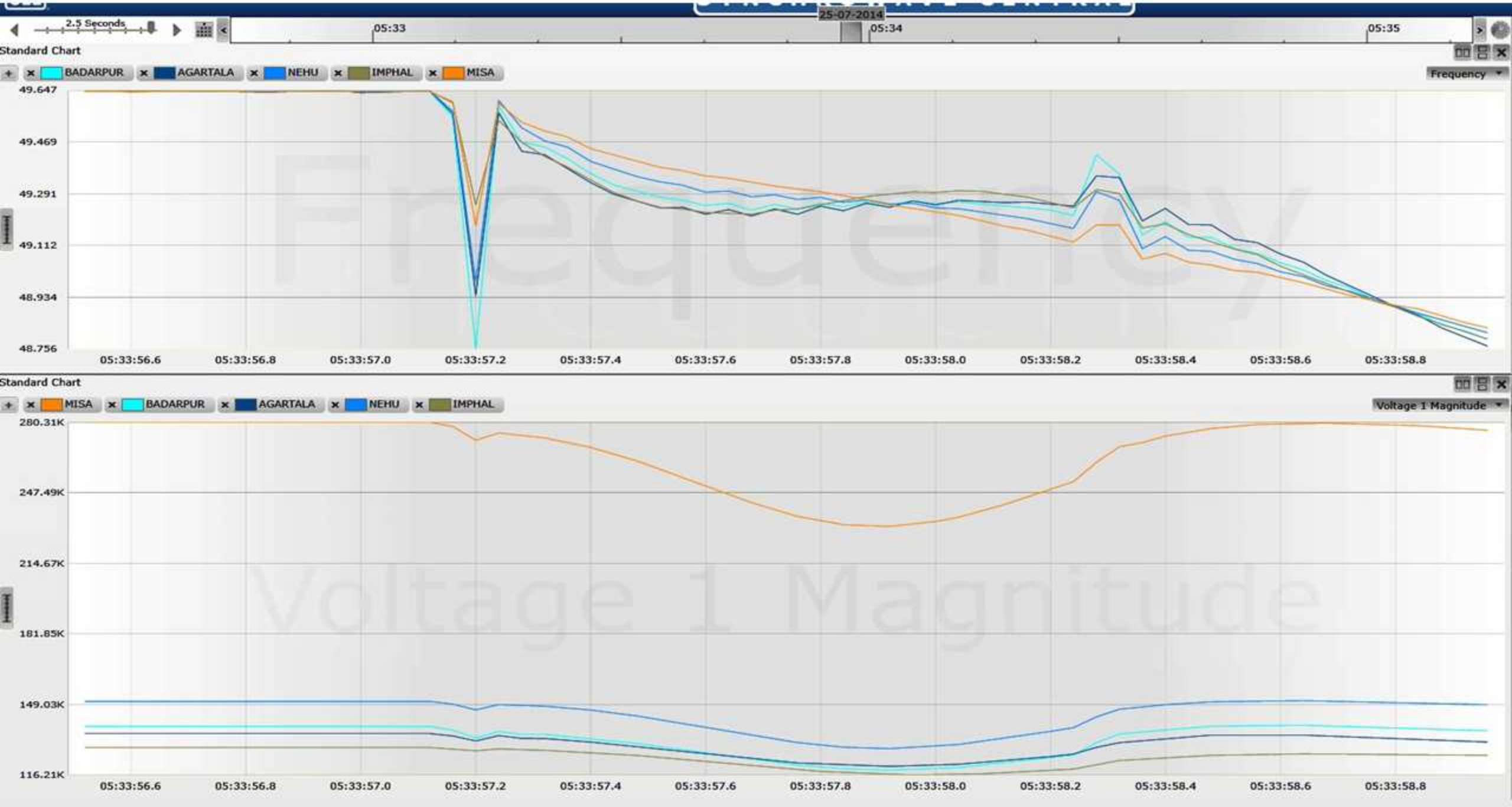
Grid Disturbance in North-Eastern Region (Category – V)

Observations

- **Delayed fault clearing is being a major issue in many cases resulting in Disturbance in NER Grid.**
- **Distance protection at Ranganadi end failed to operate in 400 kV Balipara – Ranganadi II.**
- **CB at Balipara end of 400 kV Balipara – Rangandi I failed to operate.**
- **SPS-1 operated during tripping of machines at Palatana.**
- **Fault Recorder outputs not received from all entities of NER, which could be helpful in establishing the sequence and root cause of the event.**

Progressive decay of Frequency and Voltage leading to collapse – Contd...

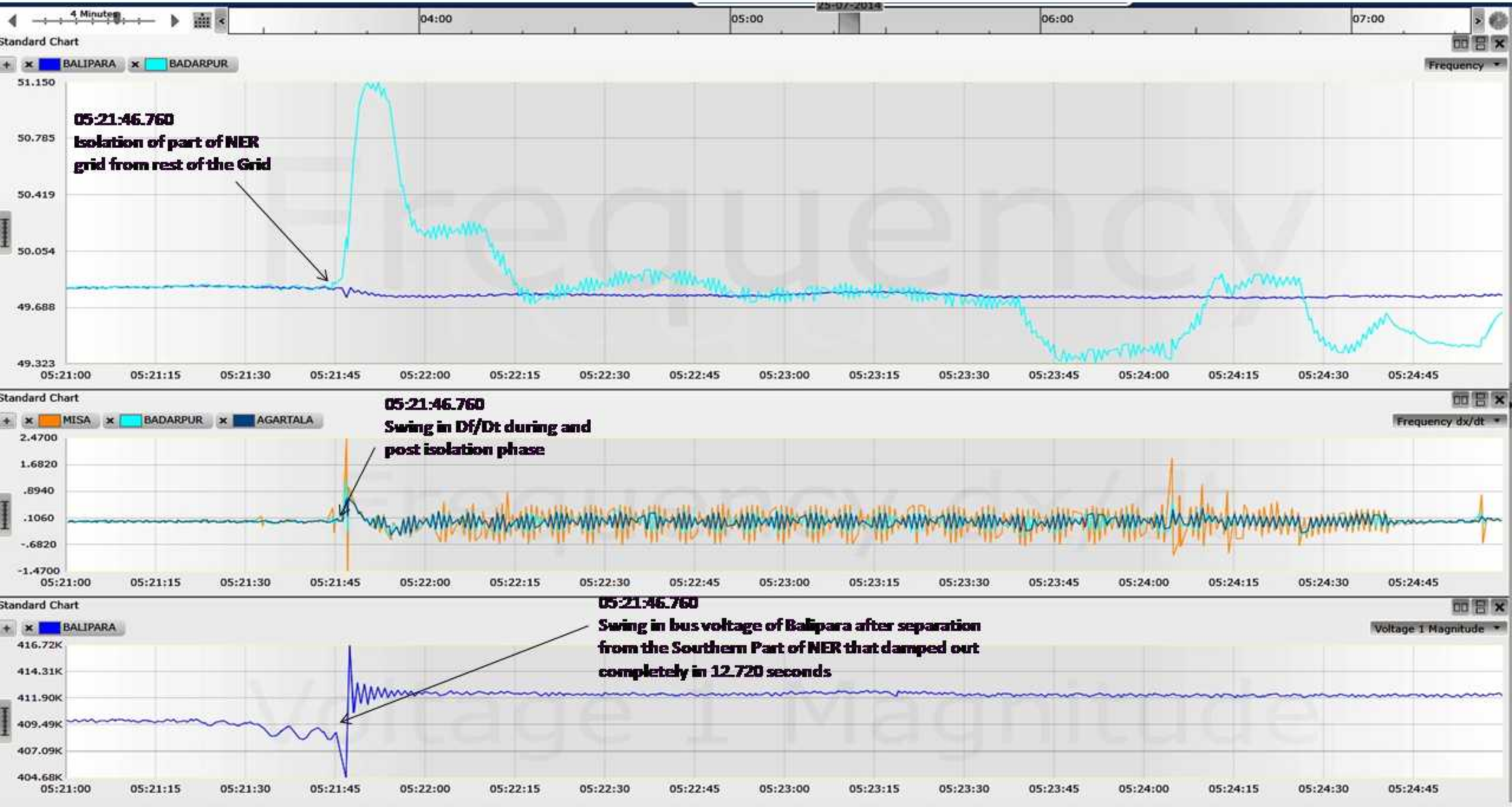
Progressive decay of Frequency and Voltage leading to collapse



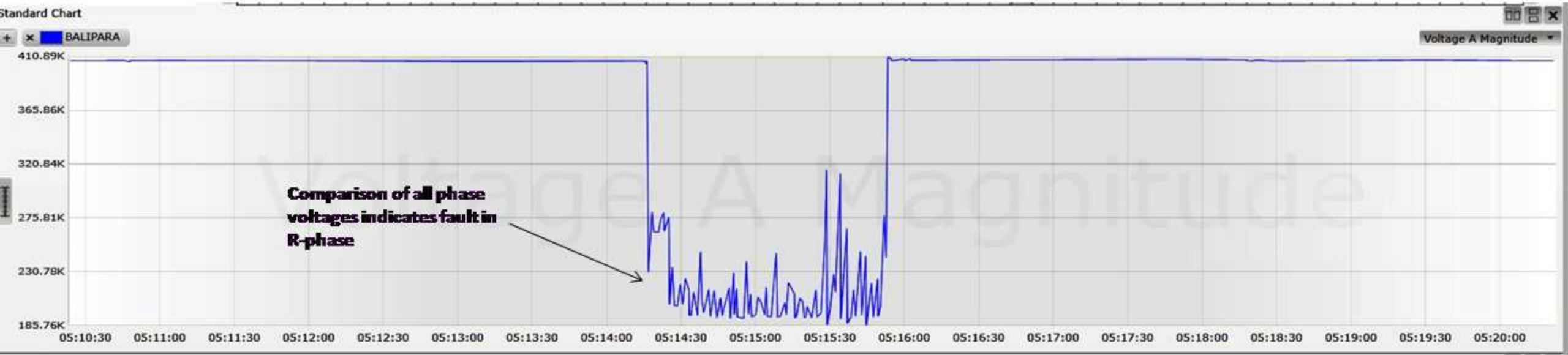
Collapse of Major Part of NER Grid

Separation of Major (Southern) part of NER Grid – Contd...

Separation of Major (Southern) part of NER Grid



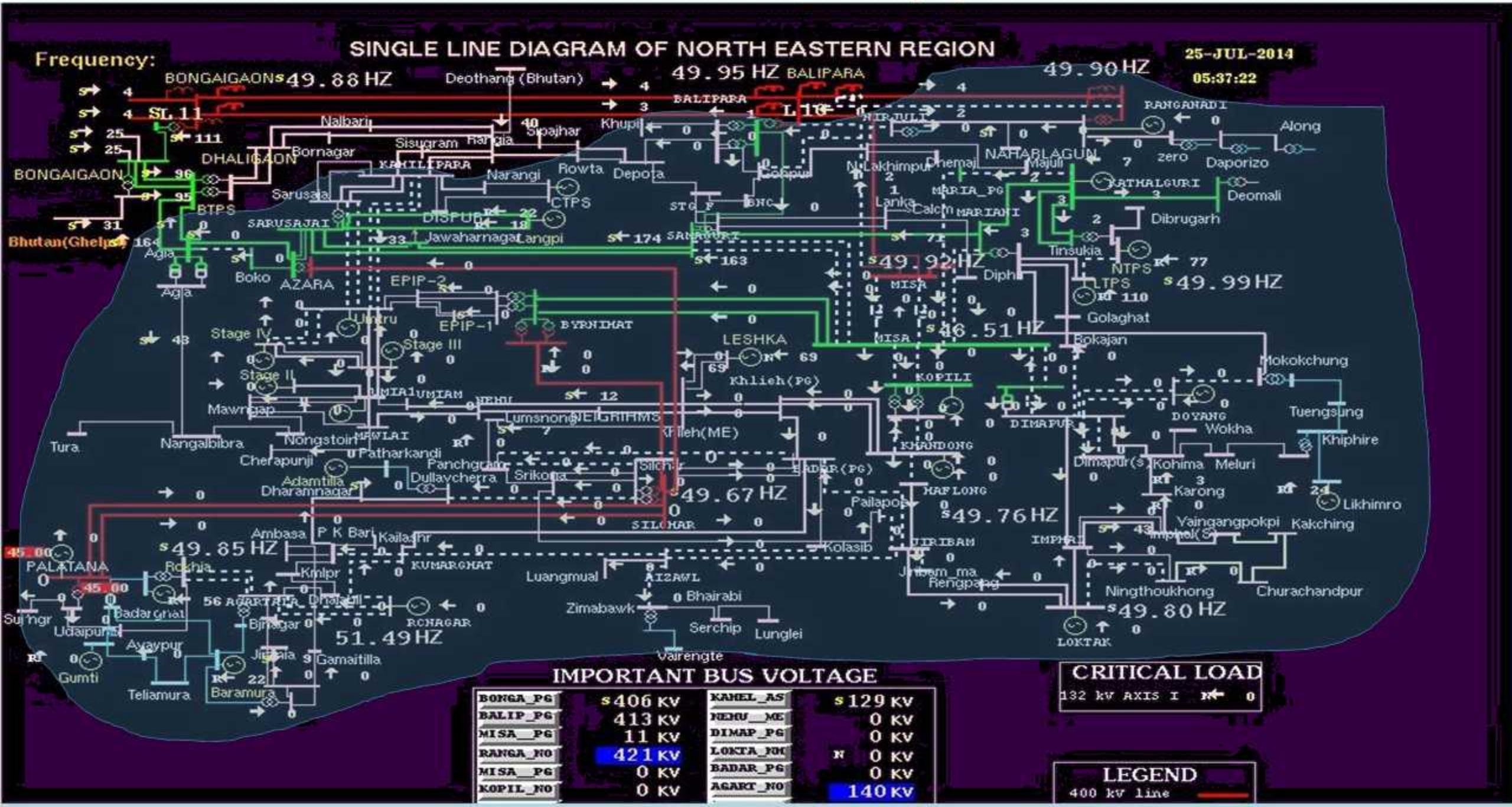
All Phase voltage of Balipara



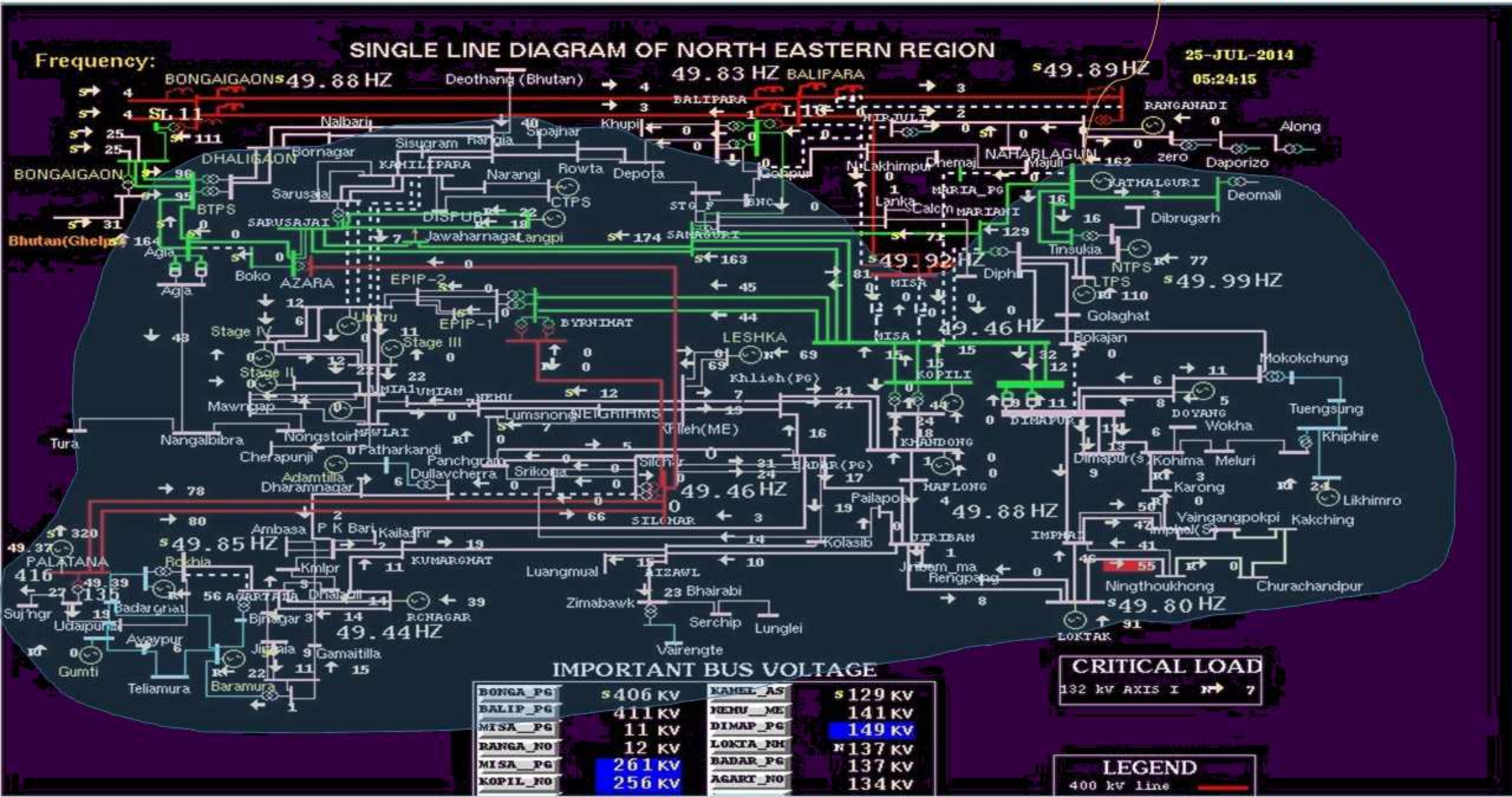
First Fault initiation and clearing

PMU plots

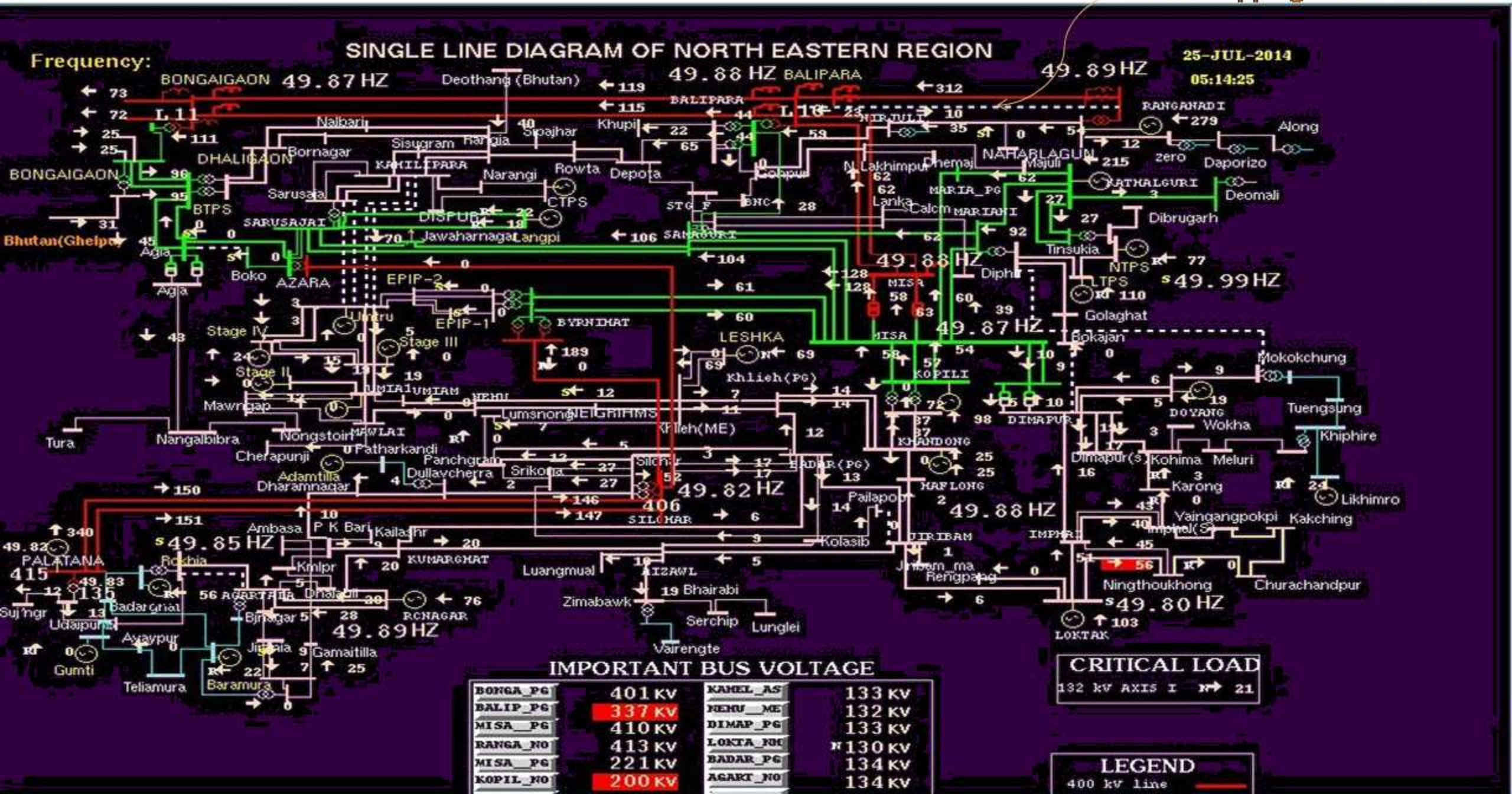
NER Grid – After Collapse of Major part



NER Grid – After Separation of Southern Part



NER Grid – Fault tripping of 400 kV Balipara – Ranganadi II



SCADA plots

Disturbance in NER Grid – Contd..

- Due to tripping of 220 kV Azara-Sarusajai I & II, Southern Part of NER Grid was separated from rest of NER Grid and frequency shot up to 51.15 Hz (PMU).
- 220 kV Misa – Marianai I and II = 05:21:51 Hrs (From DR at Misa) –– Misa end : Stage 1 O/V protection operated
- 220 kV Misa – Samaguri I = 05:24:06.083 Hrs (From DR at Misa) –– Misa : DP,Z-II,R-E , Samaguri : DP,Z-1,R-E
- 220 kV Misa – Samaguri II = 05:34:07.333 Hrs (From DR at Misa) –– Misa : Swing observed, 3 ph trip, Samaguri : Not information

- As per information received from NERTS, POWERGRID, there was initially fault on R phase of 400 kV Balipara – Ranganadi I (transient nature) and 400 kV Balipara – Ranganadi II (permanent high resistive nature resulting in tripping after 1922 msec).
- Non-availabililty of SPAR at Ranganadi end for Ckt. I (while Ckt. II already tripped) resulted in failure of Rangandi generation (Electrical and Mechanical overspeed, as per information from Ranganadi)
- As per information received from NERTS, Balipara end of 400kV Balipara – Ranangadi I initially sensed the fault on DP, Z-II, but it received carrier from relay at Ranganadi end, which accelareted it to Zone-1 at Balipara end.
- It was informed that there was failure of LA (burst) at Samaguri end of 220 kV Misa – Samaguri I.
- It was seen that 220 kV Misa – Samaguri II remained in the grid, till final collapse of the grid at around 05:34 Hrs.

Disturbance in NER Grid – Contd..

- After tripping of 400 kV Balipara – Misa I & II & 220 kV Balipara – Samaguri, Southern Part of NER Grid was connected with rest of NER Grid through narrow corridor of 220 kV BTPS–Agia line only. Southern Part of NER Grid was in insecure condition.

At 05:15:30 Hrs (After tripping of lines after the above incident)

- **Loading of 220 kV BTPS-Agia line : 74 MW (Change of 120 MW)**
- **Loading of 220 kV Misa – Samaguri I & II lines : 2 x 165 MW (Change of 2 x 60 MW)**
- **Loading of 220 kV Samaguri – Sarusajai I & II lines : 2 x 160 MW (Change of 2 x 60 MW)**
- **NER Import from ER = 251 MW**

At 05:20 Hrs, 220 kV Azara- Sarusajai I & II line tripped (As per information from AEGCL).

At 05:20 Hrs, 220 kV Azara – Boko S/C and 220 kV Boko – Sarusajai S/C also tripped.

At 05:21:00 Hrs (Just prior to Isolation of Southern Part)

- **Loading of 220 kV BTPS-Agia line : 163 MW**
- **Loading of 220 kV Misa – Samaguri I & II lines : 2 x 172 MW**
- **Loading of 220 kV Sarusajai – Samaguri I & II lines : NIL (Tripped at 05:18:30 Hrs at loading of 163 MW per circuit)**

Disturbance in NER Grid

- At 05:14:15.920 Hrs (as per PMU), major Voltage dip observed at 400 kV Balipara (54%), 400 kV Bongaigaon (25%) & 220 kV Misa (24%) & 220 kV Sarusajai (18%).
- The DR data have been received from POWERGRID, NERTS (for Balipara, Misa, Bongaigaon), from Loktak (for 132 kV Loktak – Jiribam II line), from Palatana (for all outgoing feeders, and GTG & STG)
- 400 kV Balipara – Ranganadi I, as observed from DR, fault initiated at 05:14:15.920 Hrs. After this the line opened from Rangandi end only, as Main CB at Balipara end did not trip, although Tie CB b/w Misa-I and Ranganadi I tripped. Fault current as observed from DR at Balipara was around 2.3 kA at time of initiation.

  (Ranganadi : DP, Z1, R-E & Balipara : DP, Z1, R-E but Main CB did not trip ,H/T from Balipara later.
- 400 kV Balipara – Ranganadi II, from DR, fault intitated at 05:14:16.898 and cleared at 05:14:18.820 Hrs.

  (Fault clearance time : 1922 ms – REL Relay at Balipara). Fault Current : 1.24 kA (Balipara)

  (Ranganadi : Carrier receive, O/V operated & Balipara : Dir. E/F, DT received). Tripped at 05:14:18.735 Hrs (From SOE).

  Earthwire snapped b/w loc.no. 33 & 34 resulting in a transient fault of large duration (Photo)
- 220 kV Balipara – Samaguri S/C, estimated tripping at 05:14:24.800 Hrs (From PMU)

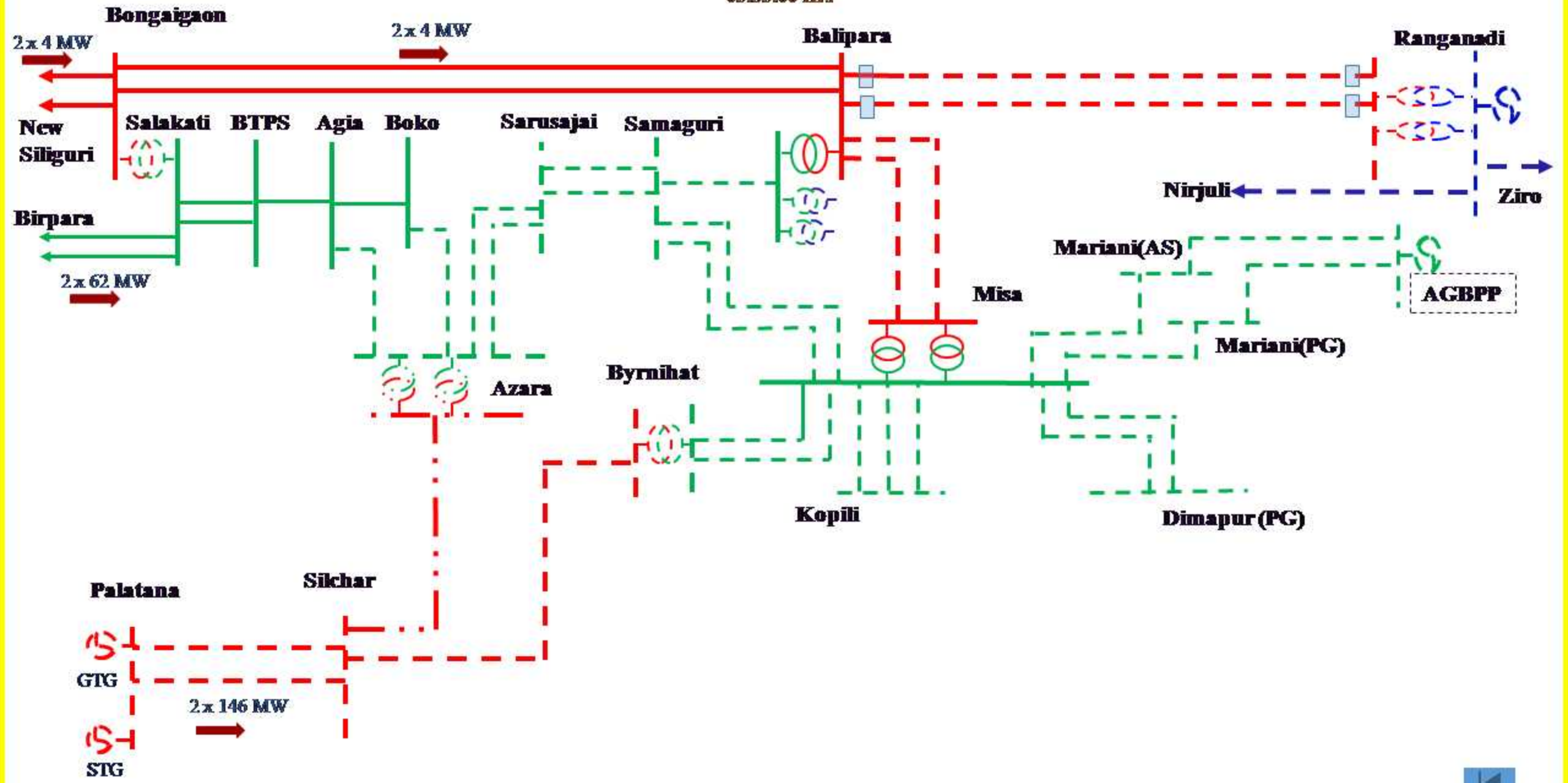
  (Samagnri : DP,Z-1,B ph & Balipara : No tripping)
- 400 kV Balipara – Misa II, tripped at 05:14:25.107 Hrs (From SOE)

  Misa end : Dir E/F (1800 msec delay), Balipara : No tripping
- 400 kV Balipara – Misa I, tripped at 05:14:25.186 Hrs (From SOE) Misa :DT received , Balipara : O/V
- 400/220 kV ICT at Bongaigaon = 05:14:32.302 Hrs (From SOE).

  HV side : O/C tripping, Dir. E/F pick up observed
- Rangandi Unit II & III tripped on Electrical and Mechanical overspeed (Informed by Ranganadi)

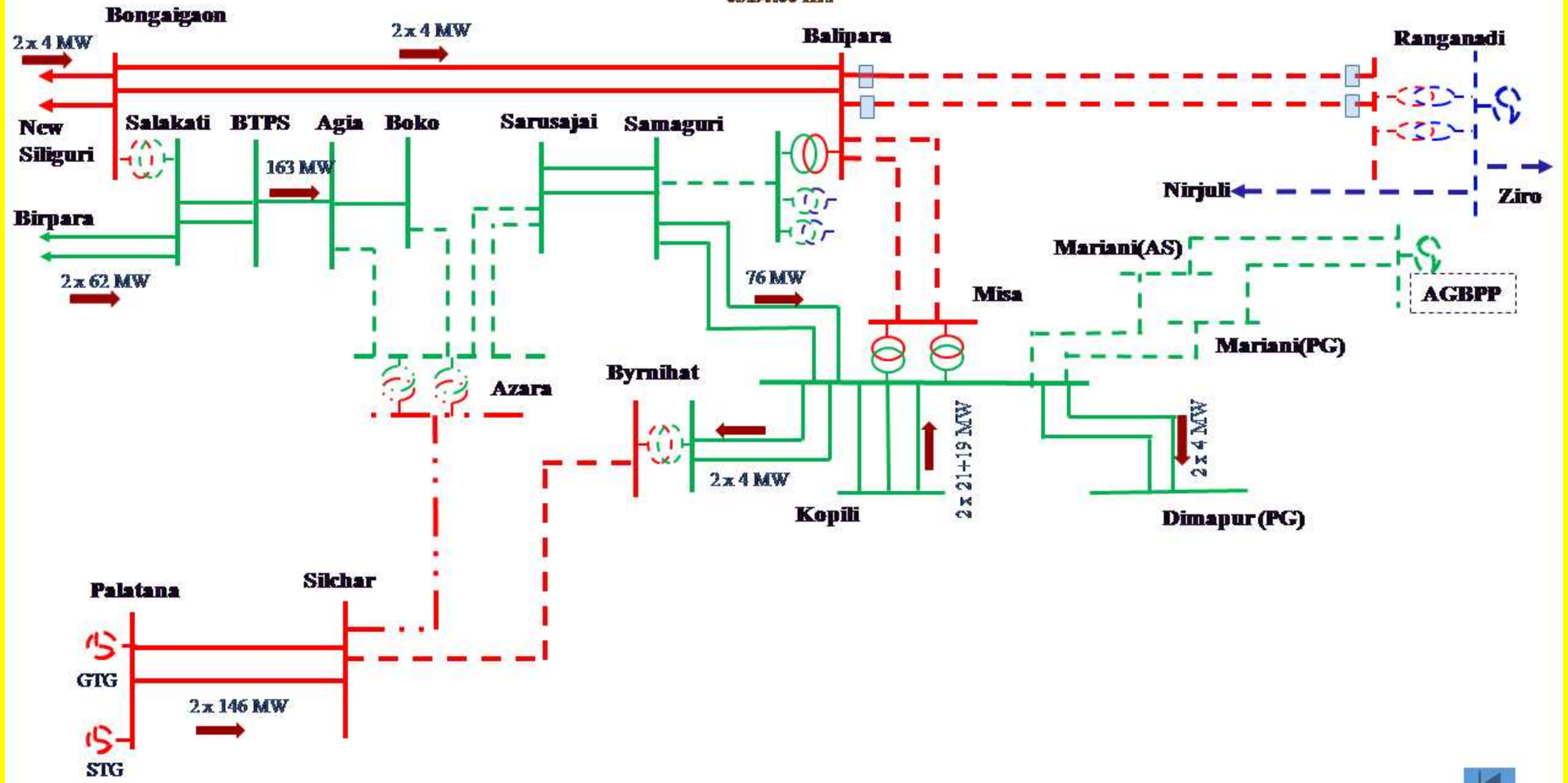
Disturbance in NER Grid on 25th July 2014

05:35:00 Hrs



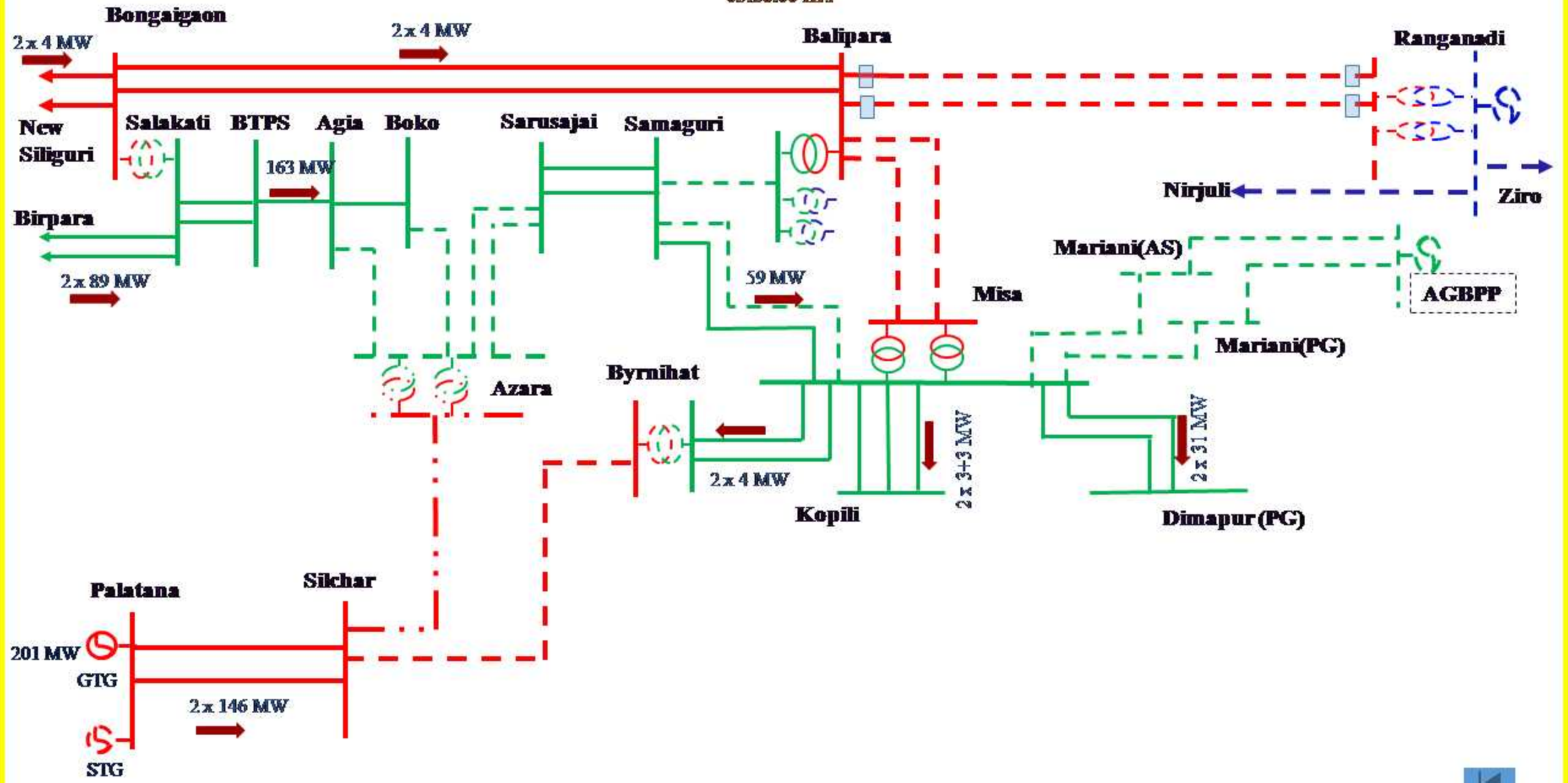
Disturbance in NER Grid on 25th July 2014

05:34:00 Hrs



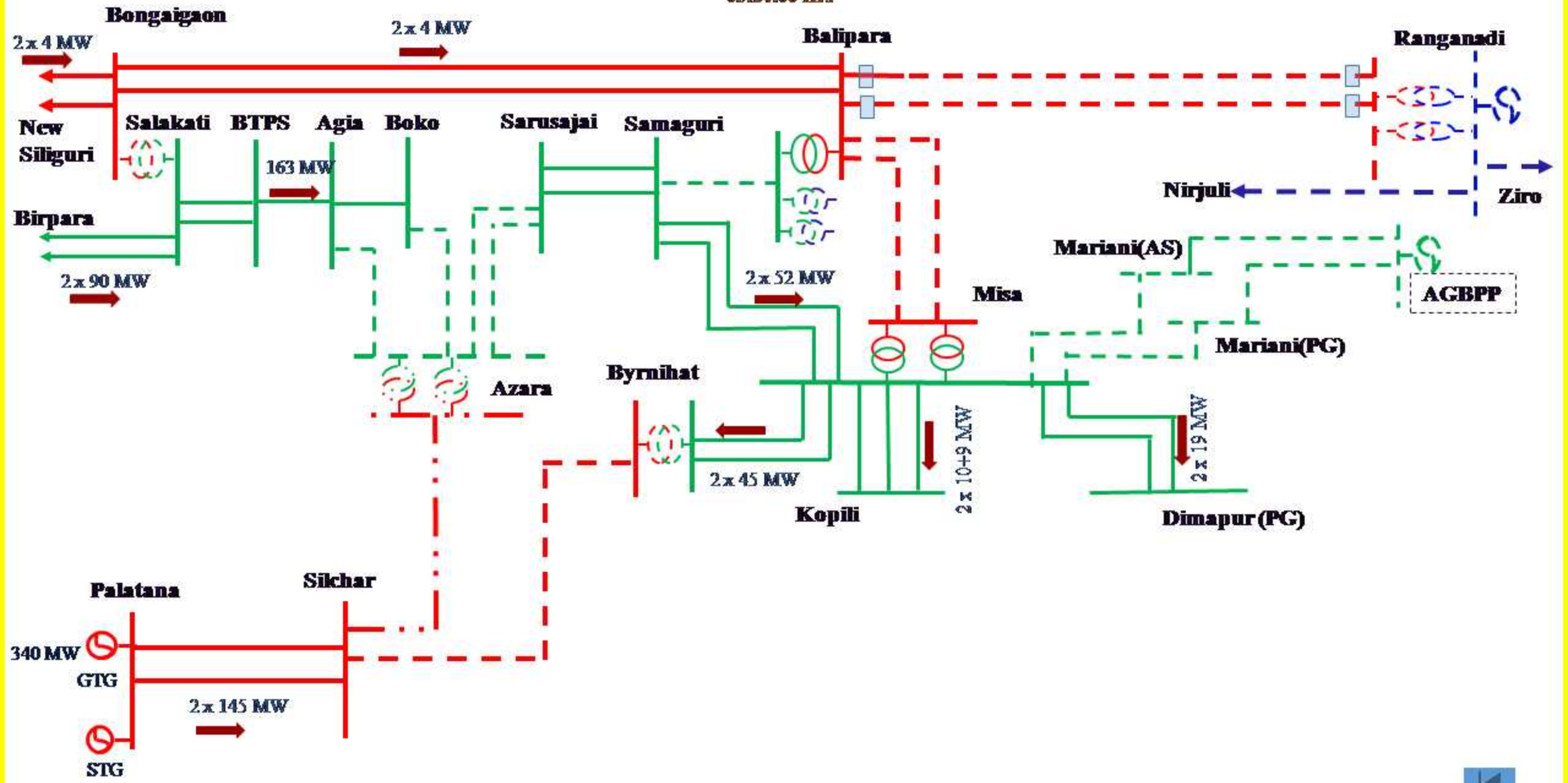
Disturbance in NER Grid on 25th July 2014

05:26:00 Hrs



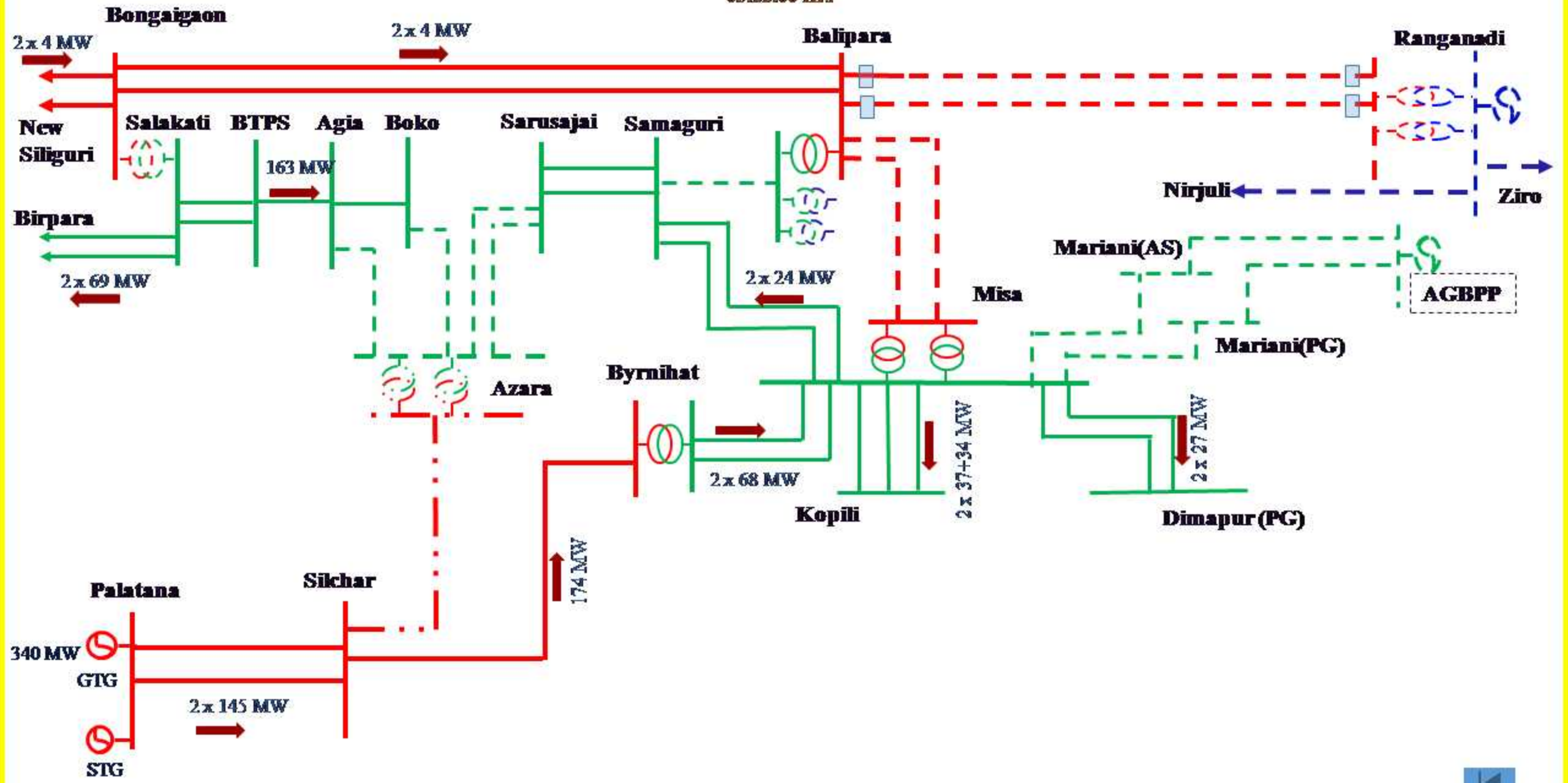
Disturbance in NER Grid on 25th July 2014

05:24:00 Hrs



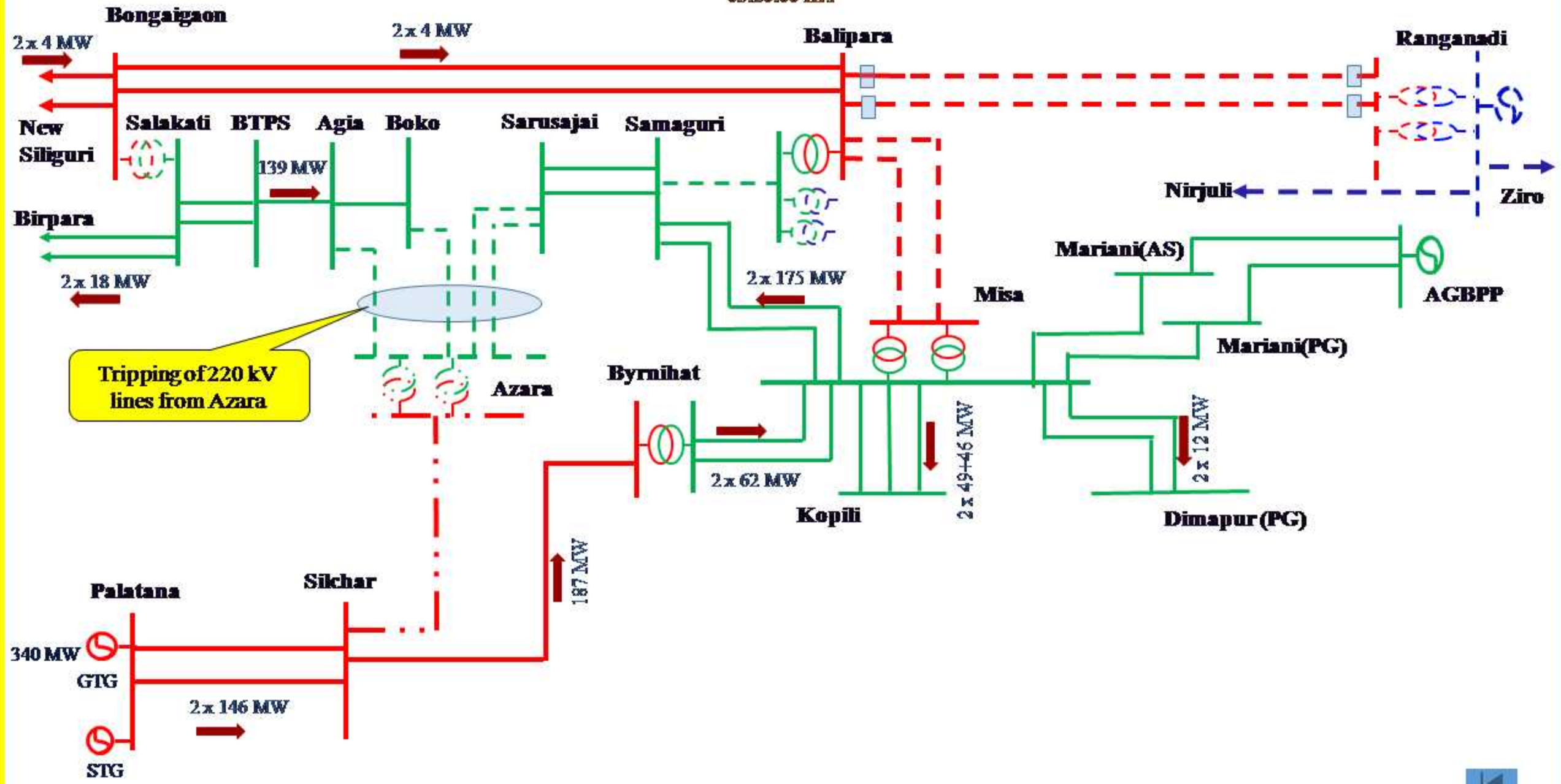
Disturbance in NER Grid on 25th July 2014

05:22:00 Hrs



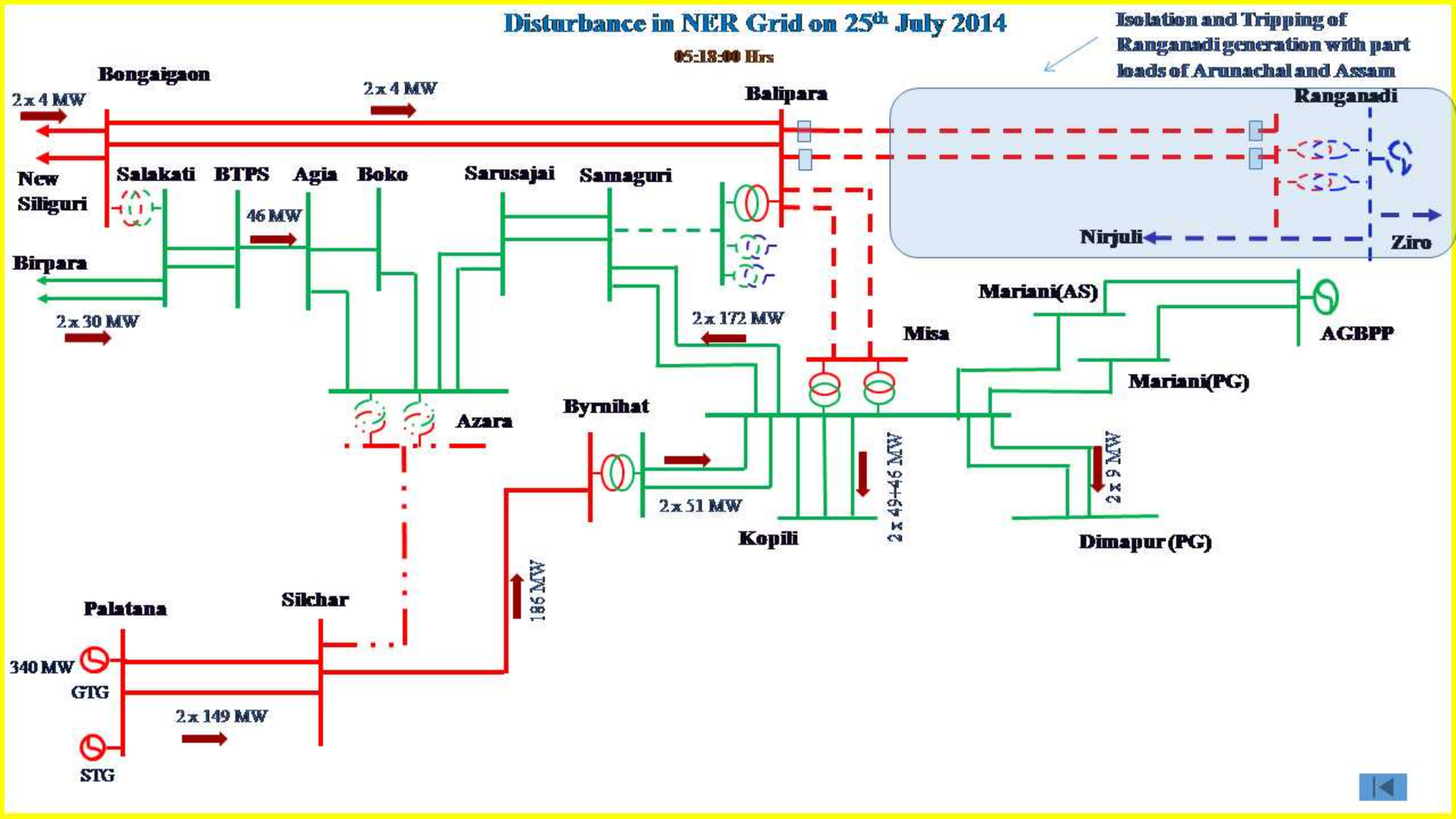
Disturbance in NER Grid on 25th July 2014

05:20:00 Hrs



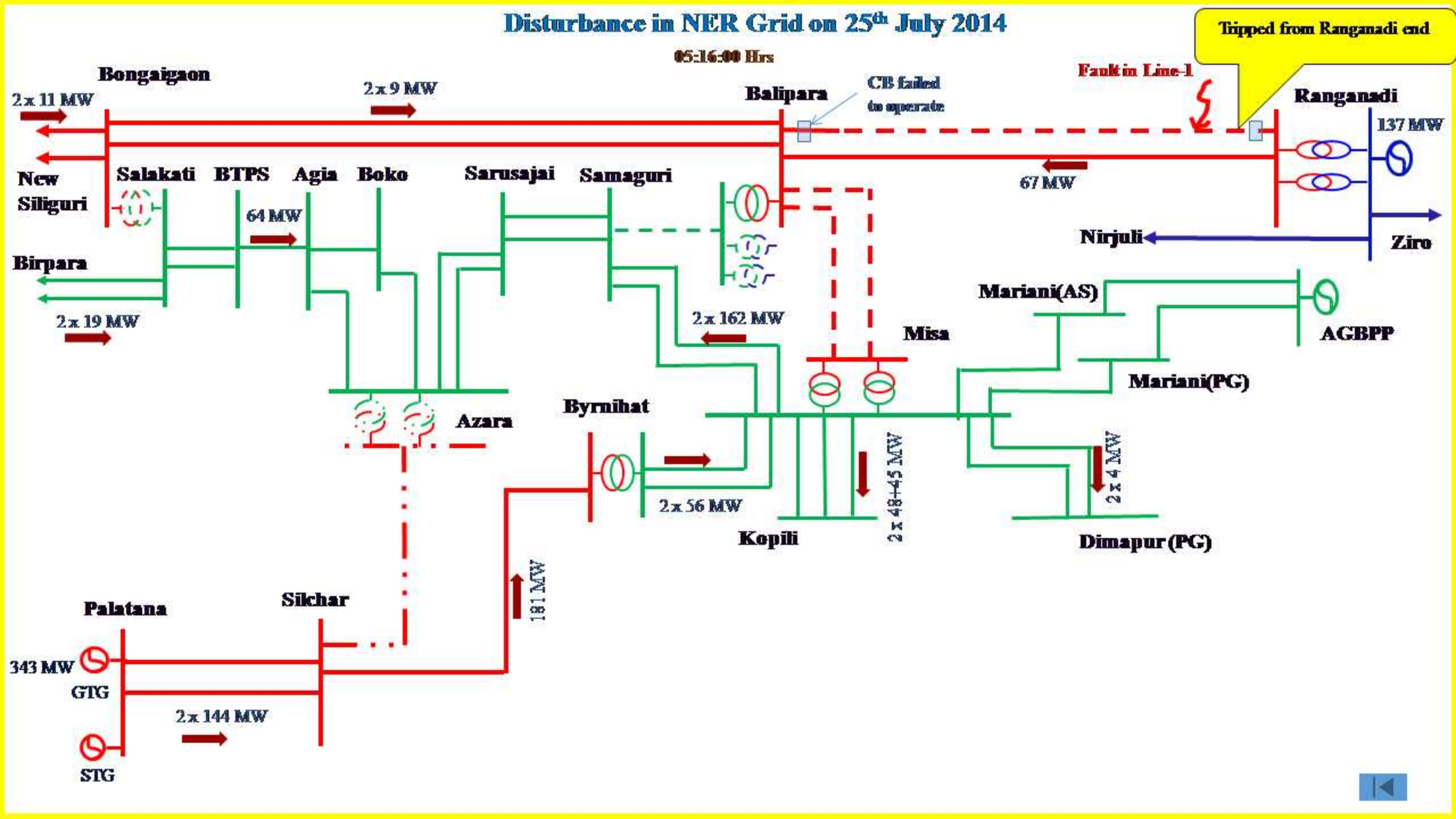
Disturbance in NER Grid on 25th July 2014

05:18:00 Hrs



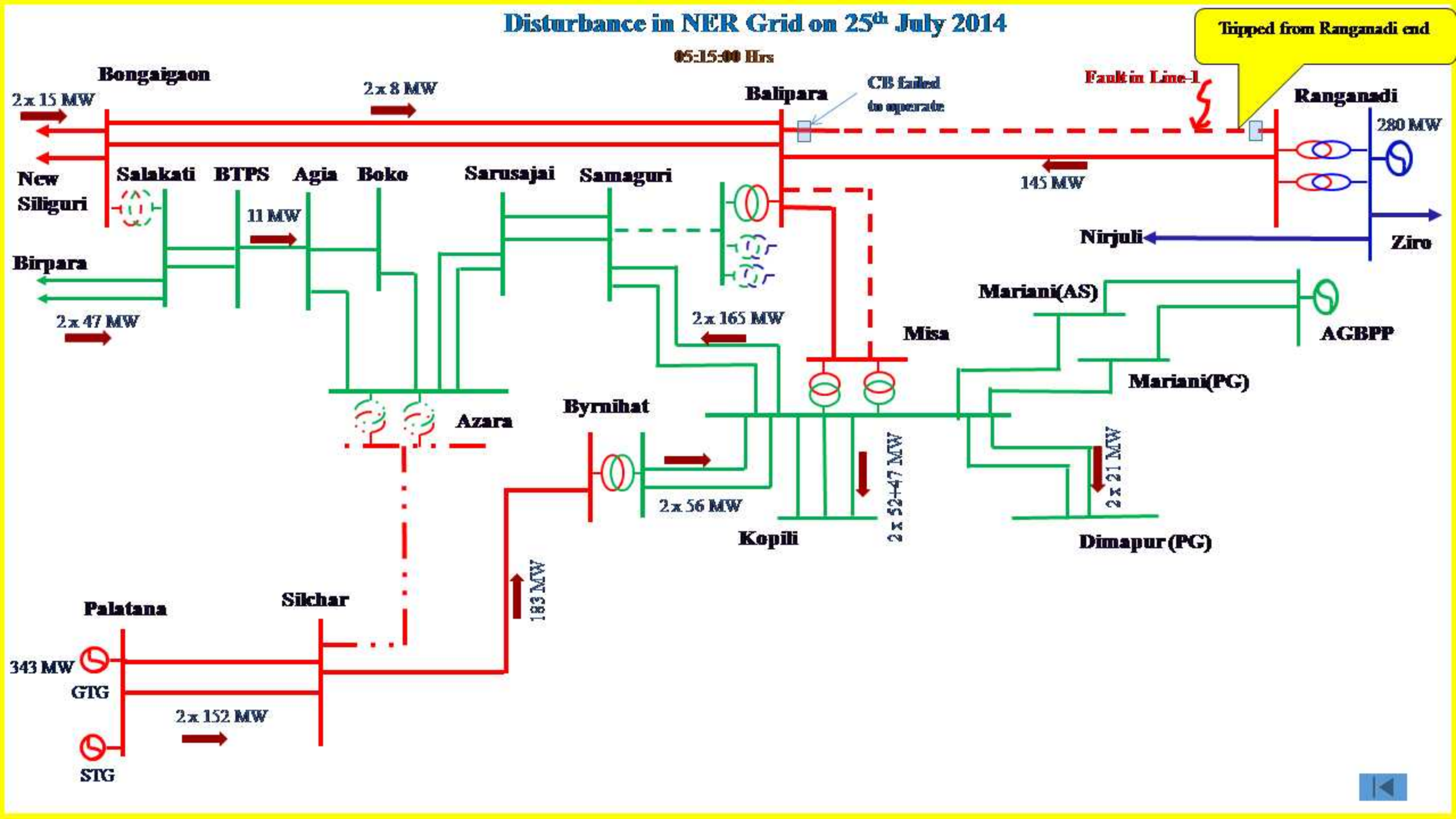
Disturbance in NER Grid on 25th July 2014

05:16:00 Hrs



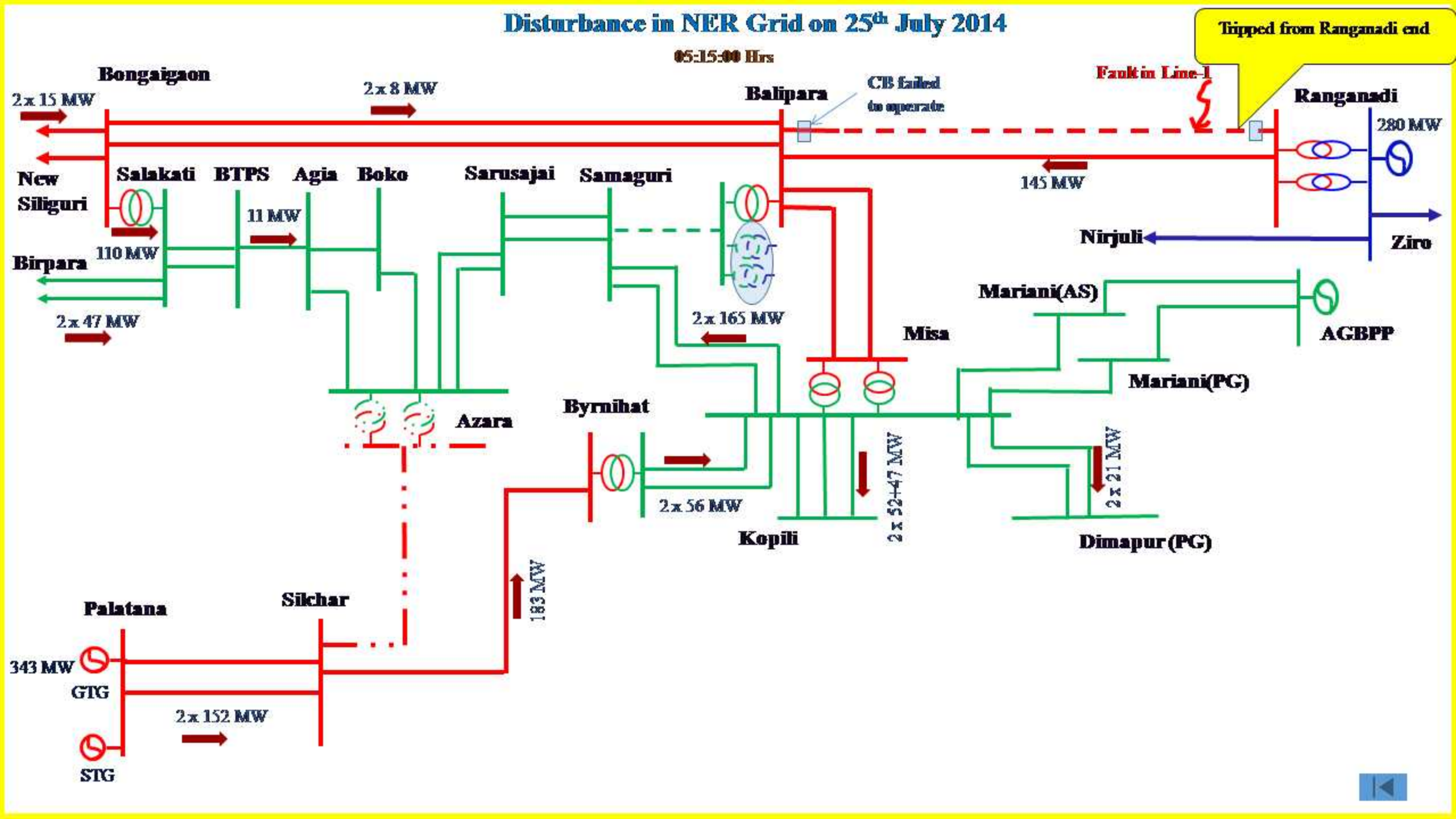
Disturbance in NER Grid on 25th July 2014

05:15:00 Hrs



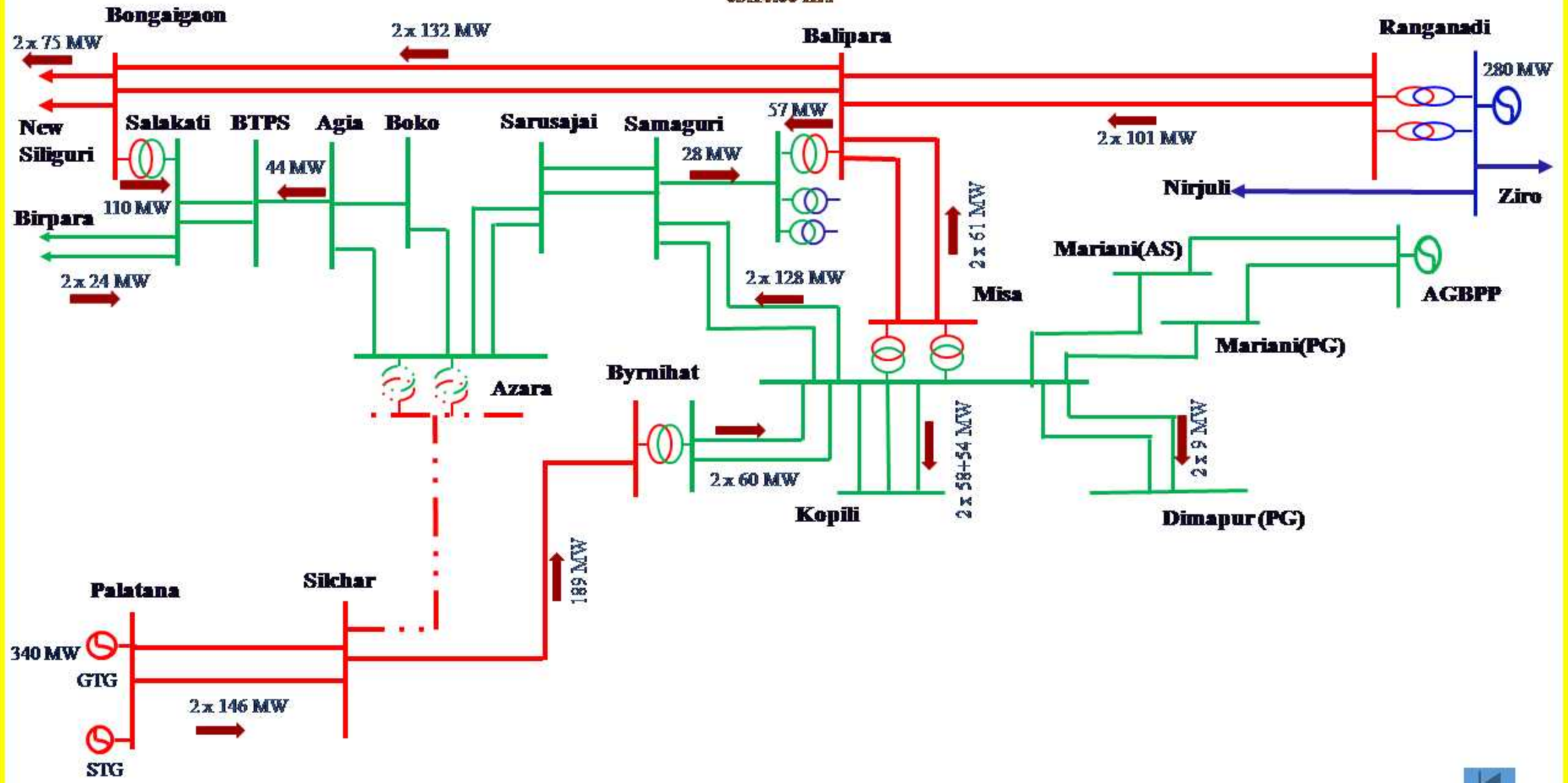
Disturbance in NER Grid on 25th July 2014

05:15:00 Hrs

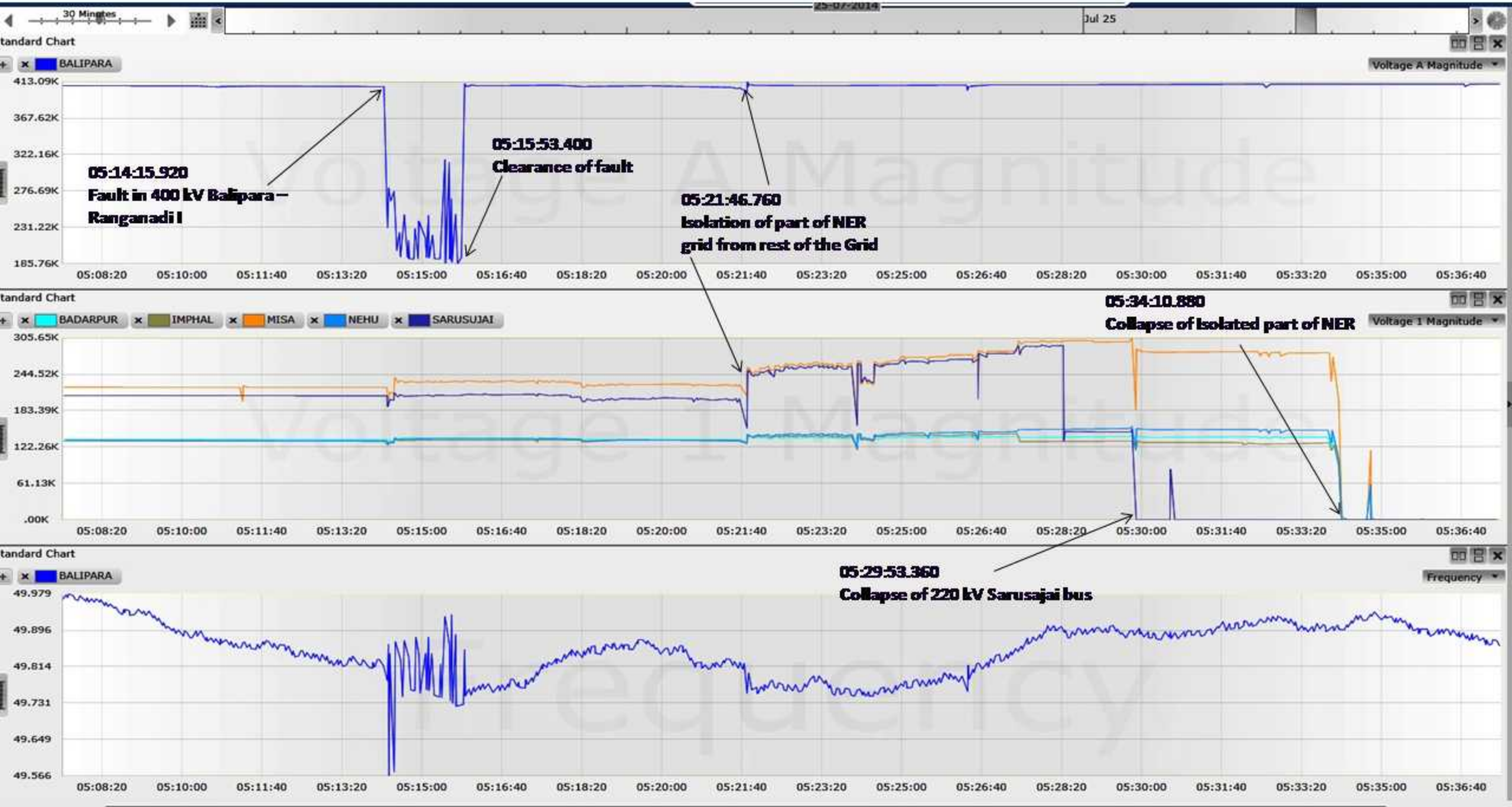


Disturbance in NER Grid on 25th July 2014

05:14:00 Hrs



Entire Incident – PMU Plots



Overview – Contd…

- At **05:22:07** Hrs => 400 kV Silchar – Byrnihat S/C tripped alongwith SPS-1 Operation

- At around 05:23 Hrs => 400/220 kV ICTs and 220/132 kV ICTs at Byrnihat tripped on **Overflux** (Exact timings not available)
- At 05:24:06.083 Hrs => 220 kV Misa – Samaguri I tripped

- At **05:24:21 Hrs** => Palatana STG-I tripped due to Loss of Excitation => Instability in NER Grid due to Huge Generation Loss

- At 05:34:07.333 Hrs => 220 kV Misa – Samaguri II tripped
- At **05:34:07 Hrs** => Palatana GTG – I tripped due to Gas Turbine Runback (at 50.07 Hz) followed by Customer Trip.

- Loss of 340 MW of Palatana (GTG + STG) led to fast declining frequency and the isolated part of NER Grid collapsed due to load-generation imbalance. Automated actions like SPS -1 operation and UFR based load shedding occurred (UFR operation report received only from Mizoram)

- All this led to event of Category GD-V as per CEA Grid Standards regulations, 2010.

- Estimated Energy Not served = **2668 MWH** (Considered as per regulation till restoration of 60 percent of load prior to disturbance)

- Major elements in NER Grid restored by **06:40 Hrs**. All the generating units were synchronized by **13:54 hours** on the same day.

Overview

- **NER Grid North-Eastern Regional (NER) power grid experienced a major disturbance at 05:34 hours of 25th July 2014 leading to around 92% load loss and 100% generation loss in most of NER Grid except radial loads at Dhaligaon of Assam, which was being fed by Eastern Regional Grid. Blackout in most of NER Grid due to cascade tripping of lines starting at 05:14 Hrs.**

- **The incident started with fault in 400 kV Balipara – Ranganadi line I, with tripping of line I at 05:14:15:920 Hrs from Ranganadi end. At this time, severe voltage dip was observed at 400 kV Balipara (54%), 400 kV Bongaigaon (25%) and other stations of NER Grid. As per information received from NERTS, POWERGRID, CB at Balipara end of the line failed to operate due to Low SF6 gas pressure. This resulted in fault feeding from other parts of NER Grid.**

- **Other relevant trippings (At around 05:14 Hrs):**
  - **400 kV Balipara – Ranganadi II => Led to blackout of Ranganadi generation with part of Arunachal load and Gohpur load (Assam)**
  - **220 kV Balipara – Samaguri**
  - **400 kV Balipara – Misa I and II**
  - **400/220 kV , 315 MVA ICT at Bongaigaon**

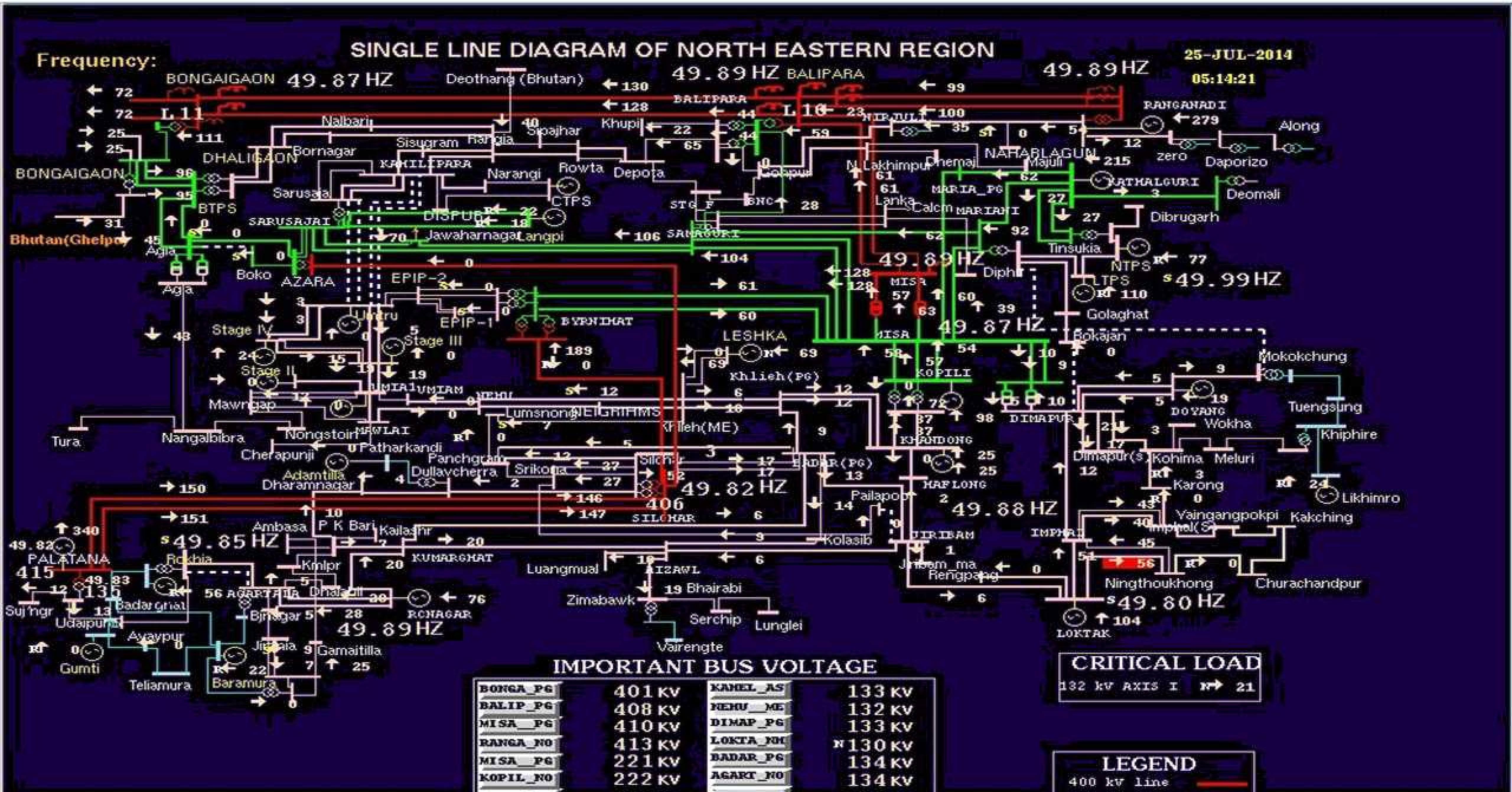
  Major part of NER Grid connected to rest of All India Grid through 220 kV BTPS-Agia I

- **Trippings after 7 minutes at around 05:21 Hrs =>**
  - **220 kV Misa – Samaguri I (LA burst reported)**
  - **220 kV Azara – Sarusajai I and II**
  - **220 kV Azara – Boko S/C**
  - **220 kV Azara – Agia S/C**

  Isolation of major part of NER Grid in South Bank of Brahmaputra river (Frequency Shot up to 51.15 Hz post isolation)

Disturbance Scenario

Pre event NER Grid



NER Grid – Antecedent Conditions

- **NER Grid was synchronised with All India Grid through 400 kV Bongaigaon - New Siliguri I & II lines and through 220 kV Birpara - Salakati I & II.**

- **132 kV Rangia – Motonga (Bhutan) S/C was out of service, while 132 kV Salakati – Gelyphu (Bhutan) was in service.**

- **Major Line under Shutdown —– None**

- **Antecedent Demand Met = 1504 MW**
- **Antecedent Generation = 1564 MW**
- **Antecedent Frequency = 49.79 Hz**
- **NER Export to ER = 30 MW**

- **Weather Conditions : Ranganadi – Extremely bad weather with heavy lightning, Balipara, Misa, Samaguri area – Heavy rainfall accompanied by lightning.**

Pre-Event Scenario

Annexure-A.9

Sl. No.	Name of tripping element/ Description	Owner	Data to be furnished by	Date & Time of Event provided by CR operator	Operation of Auto Reclose (Lockout/ sucessfully operated)	Relay indications provided by CR operator	Effect (Loss of Load & Generation in MW)	Category as per CEA Grid Standards	Date and time or restoration provided by CR operator	Details of SPS Operation	Quantum of TTC of NER-ER corridor reduced in MW	DR output furnished within 24 hours (Y/N)	EL output furnished within 24 hours (Y/N)	Violation of Regulation/ Standard	Date & Time of Event from SOE of SCADA	Date & Time of Event from DR
A. Multiple / Repeated tripping																
1	132 kV Jiribam(PG)- Jiribam	MSPCL	**POWERGRID & MSPCL**	03.09.14 at 0024 Hrs	Not Furmished	Jiribam(PG)- Y-ph, LA Faliure & Jiribam- Not available	Load Loss: 3 (Manipur)	GD-I	1215 Hrs on 03.09.14	No SPS	Not Reduced	N	N			
	132 kV Jiribam(PG)- Badarpur	POWERGRID				Jiribam(PG)- E/F, Y-ph & Badarpur- No tripping			0040 Hrs on 03.09.14			N	N			
	132 kV Jiribam(PG)- Loktak	POWERGRID				Jiribam(PG)-Not available & Loktak- DP, Z2, Y-ph			0421 Hrs on 03.09.14			N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 132 kV Jiribam(PG)- Loktak, 132 kV Jiribam(PG)- Badarpur &132 kV Jiribam(PG)- Jiribam, power supply to Jiribam area of Manipur disrupted. **(Antecedent Generation : 1270 MW , Antecedent Load : 1422 MW)**														
2	132 kV Silchar- Panchgram	POWERGRID/ AEGCL	**POWERGRID & AEGCL**	04.09.14 at 0031 Hrs	Not Furnished	Silchar- DP, Z2, B-ph & Panchgram- Y-ph, E/F	Load Loss: 10 (Assam)	GD-I	0043 Hrs on 04.09.14	No SPS	Not Reduced	N	N			
	132 kV Silchar- Dullavchera	POWERGRID/ AEGCL				Silchar- DP, Z1, Y-ph & Dullavchera- No tripping			0107 Hrs on 04.09.14			N	N			
	132 kV Dullavchera- Dharmanagar	AEGCL/ TSECL		04.09.14 at 0035 Hrs		Loos of Voltage			0107 Hrs on 04.09.14			N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 132 kV Silchar- Panchgram, 132 kV Silchar- Dullavchera & 132 kV Dullavchera- Dharmanagar, power supply to Dullavchera area of Assam disrupted. **(Antecedent Generation : 1575 MW , Antecedent Load : 1625 MW)**														
3	400 kV Silchar- Byrnihat	NETC	**POWERGRID, MePTCL & OTPC**	05.09.14 at 0226 Hrs	Not Furnished	Silchar- DP, Z1, R-ph, E/F & Byrnihat- DP, Z1, R-ph, E/F	Load Loss: 60 (Assam) Generation Loss: 340	GD-III		SPS I operated Load Relief- 60 MW	Not Reduced	N	N			
	Palatana GTG I	OTPC			Not Furnished	Tripped due to Generator Protection Trip			0450 Hrs on 05.09.14			N	N			
	Palatana STG I								0551 Hrs on 05.09.14			N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 400 kV Silchar- Byrnihat and Palatana GTG-I & STG-I, SPS-I operated which provided load relief in South Assam area. **(Antecedent Generation : 1539 MW , Antecedent Load : 1548 MW)**														
4	220 kV Misa- Kopili I	POWERGRID	**POWERGRID**	06.09.14 at 0546 Hrs	Not Furnished	Misa- DP, Z2, R-ph & Kopili- DP, Z1, R-ph	-	-	0602 Hrs on 06.09.14	No SPS	Not Reduced	N	N			
	220 kV Misa- Kopili II	POWERGRID				Misa- DP, Z2, R-ph & Kopili- DP, Z1, R-ph			0604 Hrs on 06.09.14			N	N			
5	220 kV Misa- Dimapur II	POWERGRID	**POWERGRID & DoP, Nagaland**	06.09.14 at 0631 Hrs	Not Furnished	Misa- DP,Z1, R-ph & Dimapur- DP,Z1,R-ph	Load Loss: 15 (Nagaland)	GD-I	0650 Hrs on 06.09.14	No SPS	Not Reduced	N	N			
	132 kV Dimapur- Kohima	Nagaland				Dimapur-DP,Z1,R-ph & Kohima-No tripping			0651 Hrs on 06.09.14			N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 220 kV Misa- Dimapur II and 132 kV Dimapur- Kohima, power supply to Kohima area in Nagaland disrupted. **(Antecedent Generation : 1540 MW , Antecedent Load : 1449 MW)**														

Annexure-A.9

Sl. No.	Name of tripping element/ Description	Owner	Data to be furnished by	Date & Time of Event provided by CR operator	Operation of Auto Reclose (Lockout/ sucessfully operated)	Relay indications provided by CR operator	Effect (Loss of Load & Generation in MW)	Category as per CEA Grid Standards	Date and time or restoration provided by CR operator	Details of SPS Operation	Quantum of TTC of NER-ER corridor reduced in MW	DR output furnished within 24 hours (Y/N)	EL output furnished within 24 hours (Y/N)	Violation of Regulation/ Standard	Date & Time of Event from SOE of SCADA	Date & Time of Event from DR
6	220 kV Misa- Samaguri I	POWERGRID	**POWERGRID**	06.09.14 at 0726 Hrs	Not Furnished	Misa- No tripping & Samaguri- B-ph, E/F	-	-	0741 Hrs on 06.09.14	No SPS	Not Reduced	N	N			
	220 kV Misa- Samaguri II	POWERGRID							0742 Hrs on 06.09.14			N	N			
7	220 kV Balipara- Samaguri	POWERGRID/ AEGCL	**POWERGRID, AEGCL & MePTCL**	06.09.14 to 0728 Hrs	Not Furnished	Balipara-DP,Y-ph & Samaguri- No tripping	-	-	0739 Hrs on 06.09.14	No SPS	Not Reduced	N	N			
	220 kV Misa- Brynihat II	MePTCL				Misa-DP,Z1,B-ph & Byrnihat-DP,Z2,B-ph			0805 Hrs on 06.09.14			N	N			
8	400 KV Silchar- Brynihat	NETC	**POWERGRID, MePTCL & OTPC**	06.09.14 at 0135 Hrs	Not Furnished	Silchar- Not available & Byrnihat- DP, Z1,R-ph, E/F	Load Loss: 70 (Assam) Generation Loss: 340	GD-III		SPS I operated Load Relief- 60 MW	Not Reduced	N	N			
	Palatana GTG I	OTPC			Not Furnished	Tripped due to Generator Protection Trip						N	N			
	Palatana STG I											N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 400 kV Silchar- Byrnihat and Palatana GTG-I & STG-I, SPS-I operated which provided load relief in South Assam area. **(Antecedent Generation : 1481 MW , Antecedent Load : 1516 MW)**														
9	400/220 kV, 315 MVA ICT I at Azara	AEGCL	**AEGCL**	06.09.14 at 1346 Hrs	Not Furnished	Tripped	-	-	1721 Hrs on 06.09.14	No SPS	Not Reduced	N	N			
	400/220 kV, 315 MVA ICT II at Azara	AEGCL							1721 Hrs on 06.09.14			N	N			
10	220 kV Misa- Samguri I	POWERGRID	**POWERGRID & AEGCL**	07.09.14 at 0350 Hrs	Not Furnished	Tripped	Load Loss: 40 (Assam)	GD-I	0508 Hrs on 07.09.14	No SPS	Not Reduced	N	N			
	220 kV Misa- Samguri II	POWERGRID							0508 Hrs on 07.09.14			N	N			
	220 kV Balipara-Samaguri	POWERGRID/ AEGCL							0509 Hrs on 07.09.14			N	N			
	400/220 kV,315 MVA ICT I at Misa	POWERGRID							0511 Hrs on 07.09.14			N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 220 kV Misa- Samguri I &II, 220 kV Balipara-Samaguri & 400/220 kV,315 MVA ICT I at Misa, Misa subststion was blackout. **(Antecedent Generation : 1455 MW , Antecedent Load : 1438 MW)**														
11	132 kV Jiribam- Haflong	POWERGRID	**POWERGRID**	0522 Hrs on 11.09.14	Not Furnished	Jiribam- DP,Z1, R-Y ph & Haflong- DP,Z1, R-Y ph	Load Loss: 2 (Assam)	GD-I	0544 Hrs on 11.09.14	No SPS	Not Reduced	N	N			
	132 kV Khandong- Haflong	POWERGRID				Khandong- No Tripping & Haflong- DP,Z1			0534 Hrs on 11.09.14			N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 132 kV Jiribam- Haflong and 132 kV Khandong- Haflong, power supply to Haflong area of Assam interrupted **(Antecedent Generation : 1541 MW , Antecedent Load : 1462 MW)**														
12	400 kV Silchar-Byrnihat	NETC	**POWERGRID/ MePTCL**	2104 Hrs on 13.09.14	Successful at Brynihat only	Silchar- DP,Z2,Y-ph & Byrnihat- Not available	Load Loss: 47 (Assam)	GD-I	2130 Hrs on 13.09.14	SPS- I operated	Not Reduced	N	N			
		NETC		2139 Hrs on 13.09.14		Silchar- DP,Z2,Y-ph & Byrnihat- Not available	Load Loss: 48 (Assam)	GD-I	2221 Hrs on 13.09.14	SPS- I operated	Not Reduced	N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 400 kV Silchar-Byrnihat line, SPS- I operated providing a load relief in South Assam area. **(Antecedent Generation : 1790 & 1820 MW respectively , Antecedent Load : 1899 & 1734 MW respectively)**														
13	220 kV Misa- New Mariani	POWERGRID	**POWERGRID**	0016 Hrs on 12.09.14	Succesful at Misa end only	Misa- DP,Z1,B-ph (H/T later) & New Mariani- DP,Z1,B-ph	-	-	0310 Hrs on 12.09.14	No SPS	Not Reduced	N	N			
	220 kV AGBPP- New Mariani	POWERGRID			Not furnished	AGBPP- Hand tripped & New Mariani- O/V			0526 Hrs on 12.09.14	No SPS	Not Reduced	N	N			
14	220 kV Samaguri-Jawaharnagar	AEGCL	**AEGCL**	1055 Hrs on 15.09.14	Not Furnished	Samaguri- DP, Z2, B-ph E/F & Jawaharnagar- No tripping	Load Loss: 46 (Assam)	GD-I	1108 Hrs on 15.09.14	No SPS	Not Reduced	N	N			
	220 kV Jawaharnagar- Sarusajai	AEGCL				Jawaharnagar-DP, Z2, B-ph E/F & Sarusajai- No tripping			1121 Hrs on 15.09.14			N	N			

Annexure-A.9

Sl. No.	Name of tripping element/ Description	Owner	Data to be furnished by	Date & Time of Event provided by CR operator	Operation of Auto Reclose (Lockout/ sucessfully operated)	Relay indications provided by CR operator	Effect (Loss of Load & Generation in MW)	Category as per CEA Grid Standards	Date and time or restoration provided by CR operator	Details of SPS Operation	Quantum of TTC of NER-ER corridor reduced in MW	DR output furnished within 24 hours (Y/N)	EL output furnished within 24 hours (Y/N)	Violation of Regulation/ Standard	Date & Time of Event from SOE of SCADA	Date & Time of Event from DR
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 220 kV Samaguri-Jawaharnagar and 220 kV Jawaharnagar- Sarusajai, power supply to Jawaharnagar in Assam interrupted. **(Antecedent Generation : 1434 MW , Antecedent Load : 1344 MW)**														
15	132 kV Loktak- Ningthoukhong	MSPCL	**MSPCL**	1023 Hrs on 18.09.14	Not Furnished	Loktak- E/F & Ningthoukhong- Not available	Load Loss: 16 (Manipur)	GD-I		No SPS	Not Reduced	N	N			
	132 kV Imphal- Ningthoukhong	MSPCL			Not Furnished	Imphal- E/F & Ningthoukhong- Not available						N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 132 kV Loktak- Ningthoukhong and 132 kV Imphal- Ningthoukhong, power supply to Ningthoukhong area of Manipur interrupted **(Antecedent Generation : 1408 MW , Antecedent Load : 1421 MW)**														
16	132 kV Silchar- Panchgram	POWERGRID/ AEGCL	**POWERGRID & AEGCL**	1930 Hrs on 18.09.14	Not Furnished	Silchar- DP,Z2 & Panchgram- Not available	Load Loss: 16 (Assam)	GD-I	1956 Hrs on 18.09.14	No SPS	Not Reduced	N	N			
	132 kV Silchar- Dullavchera	POWERGRID/ AEGCL			Not Furnished	Silchar- DP, Z1, R-Y-ph & Dullavchera- Not vailable			2015 Hrs on 18.09.14			N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)	Due to tripping of 132 kV Silchar- Panchgram and 132 kV Silchar- Dullavchera, power supply to Dullavchera area in Assam interrupted **(Antecedent Generation : 1892 MW , Antecedent Load : 1943 MW)**														
B. Tripping of critical element																
1	400 KV Silchar- Azara	NETC	**POWERGRID & AEGCL**	01.09.14 at 1236 Hrs	Not Furnished	Silchar- DP, Z2, B-ph & Azara-DP, Z1, Y-ph	-	-	1341 Hrs on 01.09.14	No SPS	Not Reduced	N	N			
2	220 kV Mariani- Samaguri	AEGCL	**AEGCL**	03.09.14 at 1040 Hrs	Not Furnished	Mariani- E/F, Y-ph & Samaguri-E/F, R-ph	-	-	1100 Hrs on 03.09.14	No SPS	Not Reduced	N	N			
3	220 kV Balipara- Samaguri	POWERGRID/ AEGCL	**POWERGRID & AEGCL**	03.09.14 at 1045 Hrs	Not Furnished	Balipara- Not vailable & Samaguri- No Tripping	-	-	1100 Hrs on 03.09.14	No SPS	Not Reduced	N	N			
4	400 kV Silchar- Palatana I	NETC	**POWERGRID & OTPC**	06.09.14 at 1423 Hrs	Not Furnished	Silchar- O/V & Palatana- DT received	-	-	1502 Hrs on 06.09.14	No SPS	Not Reduced	N	N			
5	400 KV Silchar- Brynihat	NETC	**POWERGRID & MePTCL**	06.09.14 at 1508 Hrs	Not Furnished	Silchar- DP,Z1,R-E & Byrnihat- DP, Z1,R-E	-	-	1549 Hrs on 06.09.14	SPS-IV not operated succesfully	Not Reduced	N	N			
6	400 kV Silchar - Byrnihat	NETC	**POWERGRID/ MePTCL**	0655 Hrs on 08.09.14	Not Furnished	Silchar- DP, Z1, B-ph & Byrnihat -DP, Z1, Y-ph	Load Loss: 67	GD-I	0731 Hrs on 08.09.14	SPS-I operated	Not Reduced	N	N			
7	220 kV Azara - Boko	AEGCL	**AEGCL**	1145 Hrs on 08.09.14	Not Furnished	Azara - E/F & Boko -E/F, B-ph	-	-	1229 Hrs on 08.09.14	No SPS	Not Reduced	N	N			
8	400 kV Balipara- Bongaigaon III	POWERGRID	**POWERGRID**	1629 Hrs on 09.09.14	Not Furnished	Baliapar- DP,Z1,B-Ph & Bongaigaon- Not available	-	-	1651 Hrs on 09.09.14	No SPS	Not Reduced	N	N			
9	220 kV Baliapar- Samaguri	POWERGRID/ AEGCL	**POWERGRID/ AEGCL**	1004 Hrs on 10.09.14	Not Furnished	Balipara- DP, B-ph & Samaguri- No tripping	-	-	1012 Hrs on 10.09.14	No SPS	Not Reduced	N	N			
10	400 klV Silchar- Palatana I	NETC	**POWERGRID & OTPC**	0839 Hrs on 12.09.14	Not Furnished	Silchar-DT received & Silchar- O/V	-	-	0909 Hrs on 12.09.14	No SPS	Not Reduced	N	N			
11	220 kV Sarusajai- Samaguri II	AEGCL	**AEGCL**	2143 Hrs on 13.09.14	Not Furnished	Sarusajai- DP,Z1,B-ph, E/F & Samaguri- Not available	-	-	2228 Hrs on 13.09.14	No SPS	Not Reduced	N	N			
12	400 kV Balipara- Bongaigaon I	POWERGRID	**POWERGRID**	1655 Hrs on 14.09.14	Not Furnished	Balipara-DP,Z1,Y-ph & Bongaigaon- DP,Z1,Y-ph	-	-	1745 Hrs on 14.09.14	No SPS	Not Reduced	N	N			
13	400 kV Bongaigaon- New Siliguri I	POWERGRID	**POWERGRID**	0755 Hrs on 15.09.14	Not Furnished	Bongaigaon- No tripping & New Siliguri- Direct trip received	-	-	0822 Hrs on 15.09.14	No SPS	Not Reduced	N	N			
14	132 kV Dimapur- Kohima	Nagaland	**POWERGRID & DoP, Nagaland**	1150 Hrs on 17.09.14	Not Furnished	Dimapur- DP,Z1, B-ph & Kohima- Not available	Load Loss: 10 (Nagaland)	GD-I	1155 Hrs on 17.09.14	No SPS	Not Reduced	N	N			

Annexure-A.9

Sl. No.	Name of tripping element/ Description	Owner	Data to be furnished by	Date & Time of Event provided by CR operator	Operation of Auto Reclose (Lockout/ sucessfully operated)	Relay indications provided by CR operator	Effect (Loss of Load & Generation in MW)	Category as per CEA Grid Standards	Date and time or restoration provided by CR operator	Details of SPS Operation	Quantum of TTC of NER-ER corridor reduced in MW	DR output furnished within 24 hours (Y/N)	EL output furnished within 24 hours (Y/N)	Violation of Regulation/ Standard	Date & Time of Event from SOE of SCADA	Date & Time of Event from DR
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 132 kV Dimapur- Kohima, power supply to Kohima area of Nagaland got interrupted. **(Antecedent Generation : 1442 MW , Antecedent Load : 1471 MW)**														
15	400 kV Balipara- Baongaigaon	POWERGRID	**POWERGRID**	1210 Hrs on 17.09.14	Not Furnished	Balipara- DP, Z1, Y-ph & Baongaigaon- DP,Z1, Y-ph	-	-	1214 Hrs on 17.09.14	No SPS	Not Reduced	N	N			
16	400 kV Silchar-Azara	NETC	**POWERGRID/ AEGCL**	1415 Hrs on 17.09.14	Not Furnished	Silchar-DP,Z1,B-ph & Azara-DEF, Direct Trip sent	-	-	1428 Hrs on 17.09.14	No SPS	Not Reduced	N	N			
17	220 kV Birpara- Salakati	POWERGRID	**POWERGRID**	1607 Hrs on 21.09.14	Succesful at Salakati end only (Birpara- not furnished)	Birpara- R-B-N & Salakati- DP,Z1, R-E	-	-	1702 Hrs on 21.09.14	No SPS	Not Reduced	N	N			
18	132 kV Dimapur- Kohima	Nagaland	**POWERGRID & DoP, Nagaland**	2228 Hrs on 21.09.14	Not Furnished	Dimapur- DP,Z1, B-ph & Kohima- Not available	Load Loss: 20 (Nagaland)	GD-I	2234 Hrs on 21.09.14	No SPS	Not Reduced	N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of 132 kV Dimapur- Kohima, power supply to Kohima area of Nagaland got interrupted. **(Antecedent Generation : 1873 MW , Antecedent Load : 1566 MW)**														
C. Unit tripping																
1	Palatana GTG I	OTPC	**OTPC**	02.09.14 at 0749 Hrs	Not available	Tripped due to high Condenser Pressure	Generation Loss: 15	GI-II	0832 Hrs on 02.09.14	SPS did not operate	No Reduction	N	N			
2	Palatana GTG I	OTPC	**OTPC**	02.09.14 at 1540 Hrs	Not available	Tripped due to Combustion trouble	Generation Loss: 61	GI-II	2359 Hrs on 02.09.14	SPS did not operate	No Reduction	N	N			
3	Palatana STG I						Generation Loss: 70		0030 Hrs on 03.09.14		No Reduction	N	N			
4	AGTPP U 4	NEEPCO	**NEEPCO**	06.09.14 at 0257 Hrs	Not available	Tripped due to Low Lubricant oil pressure	Generation Loss: 18	GI-I	1540 Hrs on 07.09.14	No SPS	No Reduction	N	N			
5	Khandong U 1	NEEPCO		06.09.14 at 0327 Hrs	Not available	Tripped due to high UGB temperature	Generation Loss: 24	GI-I	1854 Hrs on 06.09.14	No SPS	No Reduction	N	N			
6	Kopili U 1	NEEPCO		07.09.14 at 0255 Hrs	Not available	Tripped sue to Auxiliary Supply Faliure	Generation Loss: 46	GD-I	1701 Hrs on 15.09.14	No SPS	No Reduction	N	N			
7	Kopili U 2	NEEPCO		07.09.14 at 0258 Hrs	Not available		Generation Loss: 49		2011 on 12.09.14	No SPS	No Reduction	N	N			
8	AGBPP U 8	NEEPCO	**NEEPCO**	1120 Hrs on 09.09.14	Not available	Tripped due to high bearing temperature	Generation Loss: 27	GI-II	1312 Hrs on 09.09.14	No SPS	Not Reduced	N	N			
9	Loktak U 1	NHPC	**NHPC**	1304 Hrs on 10.09.14	Not available	Tripped due to high air temperature	Generation Loss: 32	GI-I	1325 Hrs on 10.09.14	No SPS	Not Reduced	N	N			
10	Kopili U 4	NEEPCO	**NEEPCO**	1526 Hrs on 11.09.14	Not available	Triiped due to Generator Rotor E/F	Generation Loss: 49	GI-I	1945 Hrs on 11.09.14	No SPS	Not Reduced	N	N			
11	AGTPP U 4	NEEPCO	**NEEPCO**	1908 Hrs 11.09.14	Not available	Tripped due to Oil leakage in diffuser of GTG U-4	Generation Loss: 17	GI-I	1826 Hrs on 12.09.14	No SPS	Not Reduced	N	N			
12	AGBPP U 5	NEEPCO	**NEEPCO**	0032 Hrs on 13.09.14	Not available	Tripped due to high inlet differential air pressure	Generation Loss: 32	GI-II	0317 Hrs on 13.09.14	No SPS	Not Reduced	N	N			
13	Loktak U 1	NHPC	**NHPC**	0511 Hrs on 13.09.14	Not available	Tripped due to excitation faliure	Generation Loss: 33	GI-I	0536 Hrs on 13.09.14	No SPS	Not Reduced	N	N			
14	AGBPP U 5	NEEPCO	**NEEPCO**	0501 Hrs on 14.09.14	Not available	Tripped due to high inlet differential air pressure	Generation Loss: 11	GI-II	1918 Hrs on 18.09.14	No SPS	Not Reduced	N	N			

Annexure-A.9

Sl. No.	Name of tripping element/ Description	Owner	Data to be furnished by	Date & Time of Event provided by CR operator	Operation of Auto Reclose (Lockout/ sucessfully operated)	Relay indications provided by CR operator	Effect (Loss of Load & Generation in MW)	Category as per CEA Grid Standards	Date and time or restoration provided by CR operator	Details of SPS Operation	Quantum of TTC of NER-ER corridor reduced in MW	DR output furnished within 24 hours (Y/N)	EL output furnished within 24 hours (Y/N)	Violation of Regulation/ Standard	Date & Time of Event from SOE of SCADA	Date & Time of Event from DR
15	Leshka U 1	MePGCL	**MePGCL**	1339 Hrs on 16.09.14	Not available	Tripped	Generation Loss: 105	GD-I	1433 Hrs on 16.09.14	No SPS	Not Reduced	N	N			
16	Leshka U 2					Tripped			1433 Hrs on 16.09.14	No SPS	Not Reduced	N	N			
17	Leshka U 3					Tripped			1446 Hrs on 16.09.14	No SPS	Not Reduced	N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	Due to tripping of all three units of Myntdu Leshka HEP in Meghalaya, there was generation loss of 105 MW. **(Antecedent Generation : 1458 MW , Antecedent Load : 1474 MW)**														
18	Khandong U 1	NEEPCO	**NEEPCO**	0501 Hrs on 17.09.14	Not available	Tripped due to MIV problem	Generation Loss: 22	GI-I	1029 Hrs on 17.09.14	No SPS	Not Reduced	N	N			
19	AGBPP U 4	NEEPCO	**NEEPCO**	1226 Hrs on 17.09.14	Not available	Tripped due to tripping of GC-II	Generation Loss: 28	GI-II	1316 Hrs on 17.09.14	No SPS	Not Reduced	N	N			
20	AGBPP U 7			1225 Hrs on 17.09.14	Not available	Tripped due to tripping of GC-II	Generation Loss: 25	GI-II	1732 Hrs on 17.09.14	No SPS	Not Reduced	N	N			
21	Khandong U 1	NEEPCO	**NEEPCO**	0150 Hrs on 18.09.14	Not available	Tripped due to mechanical problem	Generation Loss: 24	GI-I	1200 Hrs on 18.09.14	No SPS	Not Reduced	N	N			
22	Kopili Stg II	NEEPCO	**NEEPCO**	1839 Hrs on 18.09.14	Not available	Tripped due to high thrust bearing temperature	Generation Loss: 25	GI-I	2020 on 18.09.14	No SPS	Not Reduced	N	N			
23	Kopili Stg II	NEEPCO	**NEEPCO**	0614 Hrs on 19.09.14	Not available	Tripped due to reverse power and mechanical over speed	Generation Loss: 25	GI-I	1550 Hrs on 19.09.14	No SPS	Not Reduced	N	N			
24	AGBPP U 4	NEEPCO	**NEEPCO**	1455 Hrs on 19.09.14	Not available	Tripped due to tripping of GC-II	Generation Loss: 29	GI-II	1506 Hrs on 19.09.14	No SPS	Not Reduced	N	N			
25	AGBPP U 6	NEEPCO	**NEEPCO**	1503 Hrrs on 19.09.14	Not available	Tripped due to tripping of GC-II	Generation Loss: 29	GI-II		No SPS	Not Reduced	N	N			
26	Kopili Stg II	NEEPCO	**NEEPCO**	0105 Hrs on 20.09.14	Not available	Tripped due to high thrust bearing temperature	Generation Loss: 25	GI-I	0221 Hrs on 20.09.14	No SPS	Not Reduced	N	N			
27	Kopili Stg II	NEEPCO	**NEEPCO**	0613 Hrs on 20.09.14	Not available	Tripped due to high thrust bearing temperature	Generation Loss: 25	GI-I	1857 Hrs on 20.09.14	No SPS	Not Reduced	N	N			
28	AGBPP U 8	NEEPCO	**NEEPCO**	2032 Hrs on 20.09.14	Not available	Tripped due to high generator negative sequence current	Generation Loss: 30	GI-II	2153 Hrs on 20.09.14	No SPS	Not Reduced	N	N			
D. Power Station Blackout																
1	220 kV AGBPP- Mariani	POWERGRID	**POWERGRID, AEGCL, NEEPCO & DoP, Arunachal Pradesh**	0420 Hrs on 12.09.14	Lockout at AGBPP	Tripped	Load Loss: 2 (Arunachal Pradesh) Generation Loss: 205	GD-II	0520 Hrs on 12.09.14	No SPS	Not Reduced	N	N			
	220 kV AGBPP- Tinsukia I	AEGCL			Not Furnished	Tripped on O/C at AGBPP			1004 Hrs on 12.09.14			N	N			
	220 kV AGBPP- Tinsukia II	AEGCL			Not Furnished				1004 Hrs on 12.09.14			N	N			
	132 kV LTPS- Mariani	AEGCL			Not Furnished	Tripped on E/F & O/C			0503 Hrs on 12.09.14			N	N			
	AGBPP U 1	NEEPCO			Not available	Tripped due to loss of evacuation path			0655 Hrs on 12.09.14			N	N			
	AGBPP U 2	NEEPCO			Not available				0658 Hrs on 12.09.14			N	N			
	AGBPP U 3	NEEPCO			Not available				0635 Hrs on 12.09.14			N	N			
	AGBPP U 4	NEEPCO			Not available				0632 Hrs on 12.09.14			N	N			
	AGBPP U 5	NEEPCO			Not available				1156 Hrs on 12.09.14			N	N			
	AGBPP U 7	NEEPCO			Not available				1105 Hrs on 12.09.14			N	N			
	AGBPP U 8	NEEPCO			Not available				1955 Hrs on 12.09.14			N	N			
	220 kV AGBPP-Deomali	DoP, Arunachal Pradesh		0433 Hrs on 12.09.14		Hand Tripped			0622 Hrs on 12.09.14			N	N			
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent	No														
	Description of Incident (For GD only)	All the running units of AGBPP tripped due to loss of evacuation path as 220 kV AGBPP- Mariani and 220 kV AGBPP- Tinsukia D/C (while 220 kV AGBPP-New Mariani was out) tripped. **(Antecedent Generation : 1462 MW , Antecedent Load : 1448 MW)**														

Sl. No.	Name of tripping element/ Description	Details of operation of Main I / Main Relay	Details of operation of Main II / Back up Relay	Whether the element tripped due to UFR/ ROCOF	Details of Fault locator	Date and time or restoration from SOE of SCADA	Date and time or restoration from DR	Output of Data Acquisation System (Y/N)	Fault Clearance time (from DR & nearest PMU)	Issues with the Sub-station confirguration as per CEA standard	Protection Mal-operation	Non availability of LBB/ Bus Bar Protection	Non Availability of DR	Non availability of Event logger	Non-availability of SCADA /SOE at RLDC	System is not safe after N-1 Contingency
A. Multiple / Repeated tripping																
1	132 kV Jiribam(PG)- Jiribam															
	132 kV Jiribam(PG)- Badarpur															
	132 kV Jiribam(PG)- Loktak															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
2	132 kV Silchar- Panchgram															
	132 kV Silchar- Dullavchera															
	132 kV Dullavchera- Dharmanagar															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
3	400 kV Silchar- Byrnihat															
	Palatana GTG I															
	Palatana STG I															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
4	220 kV Misa- Kopili I															
	220 kV Misa- Kopili II															
5	220 kV Misa- Dimapur II															
	132 kV Dimapur- Kohima															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															

Sl. No.	Name of tripping element/ Description	Details of operation of Main I / Main Relay	Details of operation of Main II / Back up Relay	Whether the element tripped due to UFR/ ROCOF	Details of Fault locator	Date and time or restoration from SOE of SCADA	Date and time or restoration from DR	Output of Data Acquisation System (Y/N)	Fault Clearance time (from DR & nearest PMU)	Issues with the Sub-station confirguration as per CEA standard	Protection Mal-operation	Non availability of LBB/ Bus Bar Protection	Non Availability of DR	Non availability of Event logger	Non-availability of SCADA /SOE at RLDC	System is not safe after N-1 Contingency
6	~~220 kV Misa- Samaguri I~~															
	220 kV Misa- Samaguri II															
7	220 kV Balipara- Samaguri															
	220 kV Misa- Brynihat II															
8	400 KV Silchar- Brynihat															
	Palatana GTG I															
	Palatana STG I															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
9	400/220 kV, 315 MVA ICT I at Azara															
	400/220 kV, 315 MVA ICT II at Azara															
10	220 kV Misa- Samguri I															
	220 kV Misa- Samguri II															
	220 kV Balipara-Samaguri															
	400/220 kV,315 MVA ICT I at Misa															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
11	132 kV Jiribam- Haflong															
	132 kV Khandong- Haflong															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
12	400 kV Silchar-Byrnihat															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
13	220 kV Misa- New Mariani															
	220 kV AGBPP- New Mariani															
14	220 kV Samaguri-Jawaharnagar															
	220 kV Jawaharnagar- Sarusajai															

Sl. No.	Name of tripping element/ Description	Details of operation of Main I / Main Relay	Details of operation of Main II / Back up Relay	Whether the element tripped due to UFR/ ROCOF	Details of Fault locator	Date and time or restoration from SOE of SCADA	Date and time or restoration from DR	Output of Data Acquisation System (Y/N)	Fault Clearance time (from DR & nearest PMU)	Issues with the Sub-station confirguration as per CEA standard	Protection Mal-operation	Non availability of LBB/ Bus Bar Protection	Non Availability of DR	Non availability of Event logger	Non-availability of SCADA /SOE at RLDC	System is not safe after N-1 Contingency
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
15	132 kV Loktak- Ningthoukhong															
	132 kV Imphal- Ningthoukhong															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
16	132 kV Silchar- Panchgram															
	132 kV Silchar- Dullavchera															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
B. Tripping of critical element																
1	400 KV Silchar- Azara															
2	220 kV Mariani- Samaguri															
3	220 kV Balipara- Samaguri															
4	400 kV Silchar- Palatana I															
5	400 KV Silchar- Brynihat															
6	400 kV Silchar - Byrnihat															
7	220 kV Azara - Boko															
8	400 kV Balipara- Bongaigaon III															
9	220 kV Baliapar- Samaguri															
10	400 klV Silchar- Palatana I															
11	220 kV Sarusajai- Samaguri II			2228 Hrs on 13.09.14												
12	400 kV Balipara- Bongaigaon I															
13	400 kV Bongaigaon- New Siliguri I															
14	132 kV Dimapur- Kohima															

Sl. No.	Name of tripping element/ Description	Details of operation of Main I / Main Relay	Details of operation of Main II / Back up Relay	Whether the element tripped due to UFR/ ROCOF	Details of Fault locator	Date and time or restoration from SOE of SCADA	Date and time or restoration from DR	Output of Data Acquisation System (Y/N)	Fault Clearance time (from DR & nearest PMU)	Issues with the Sub-station confirguration as per CEA standard	Protection Mal-operation	Non availability of LBB/ Bus Bar Protection	Non Availability of DR	Non availability of Event logger	Non-availability of SCADA /SOE at RLDC	System is not safe after N-1 Contingency
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
15	400 kV Balipara- Baongaigaon															
16	400 kV Silchar-Azara															
17	220 kV Birpara- Salakati															
18	132 kV Dimapur- Kohima															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
C. Unit tripping																
1	Palatana GTG I															
2	Palatana GTG I															
3	Palatana STG I															
4	AGTPP U 4															
5	Khandong U 1															
6	Kopili U 1															
7	Kopili U 2															
8	AGBPP U 8															
9	Loktak U 1															
10	Kopili U 4															
11	AGTPP U 4															
12	AGBPP U 5															
13	Loktak U 1															
14	AGBPP U 5															

Sl. No.	Name of tripping element/ Description	Details of operation of Main I / Main Relay	Details of operation of Main II / Back up Relay	Whether the element tripped due to UFR/ ROCOF	Details of Fault locator	Date and time or restoration from SOE of SCADA	Date and time or restoration from DR	Output of Data Acquisation System (Y/N)	Fault Clearance time (from DR & nearest PMU)	Issues with the Sub-station confirguration as per CEA standard	Protection Mal-operation	Non availability of LBB/ Bus Bar Protection	Non Availability of DR	Non availability of Event logger	Non-availability of SCADA /SOE at RLDC	System is not safe after N-1 Contingency
15	Leshka U 1															
16	Leshka U 2															
17	Leshka U 3															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															
18	Khandong U 1															
19	AGBPP U 4															
20	AGBPP U 7															
21	Khandong U 1															
22	Kopili Stg II															
23	Kopili Stg II															
24	AGBPP U 4															
25	AGBPP U 6															
26	Kopili Stg II															
27	Kopili Stg II															
28	AGBPP U 8															
D. Power Station Blackout																
1	220 kV AGBPP- Mariani															
	220 kV AGBPP- Tinsukia I															
	220 kV AGBPP- Tinsukia II															
	132 kV LTPS- Mariani															
	AGBPP U 1															
	AGBPP U 2															
	AGBPP U 3															
	AGBPP U 4															
	AGBPP U 5															
	AGBPP U 7															
	AGBPP U 8															
	220 kV AGBPP-Deomali															
	Details of Analysis Done by PCC															
	Remedial measures taken															
	FIR by the constituent															
	Description of Incident (For GD only)															