भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

दिनांक: 21.08.2025

सेवा में
As per attached list of Members and Other invitees

विषय: संरक्षण उप-समिति की 62 वीं बैठक की कार्यसूची |
Subject: Agenda for 62nd Protection Sub-Committee Meeting.

संरक्षण उप-समिति की **62 वीं बैठक, दिनांक 26.08.2025 को 10:30 बजे** से **एनआरपीसी सचिवालय, कटवारिया सराय, नई दिल्ली** में आयोजित की जाएगी | उक्त बैठक की कार्यसूची संलग्न है । यह उत्तर क्षेत्रीय विद्युत् समिति की वेबसाइट (http://164.100.60.165/) पर भी उपलब्ध है | 56 वीं पीएससी बैठक के निर्णयों के अनुसार, आईईजीसी 2023 के सुरक्षा कोड का अनुपालन सुनिश्चित करने के लिए एनआरपीसी सदस्य के अलावा अन्य विद्युत उपयोगिताओं को भी बैठक के लिए आमंत्रित किया गया है। कृपया बैठक मे उपस्थिति सुनिश्चित करें ।

The **62nd meeting** of Protection Sub-Committee is scheduled to be held on **26.08.2025** at **10:30 Hrs** at **NRPC Secretariat, Katwaria Sarai, New Delhi**. The agenda for the meeting is attached herewith. The same is also available on NRPC website (http://164.100.60.165/). As per decisions of 56th PSC meeting, utilities other than NRPC member have also been invited for meeting for ensuring compliance of protection code of IEGC 2023. Kindly make it convenient to attend the same.

21/8/25

डी. के. मीणा
निदेशक (संरक्षण)

Members of Protection Sub-Committee (FY 25-26)

S. No.	NRPC Member Organization	Designation	Email-ID
1	Member (GO&D), CEA	Director, NPC Division	skdotancea@nic.in
2	NTPC Vidyut Vyapar Nigam Ltd.	CEO	ceonvvn@ntpc.co.in
3	CTUIL	Sr.GM	schakraborty@powergrid.in
4	PGCIL	GM	gunjan.agrawal@powergrid.in
5	NLDC*	Executive Director	scsaxena@grid-india.in
6	NRLDC	CGM(SO)	somara.lakra@grid-india.in
7	NTPC	DGM(OS-NR)	rameshsingh@ntpc.co.in, asbhogal@ntpc.co.in
8	BBMB	Director (P&C)	dirpc@bbmb.nic.in
9	THDC*	AGM (O&M) ,Tehri	ravindrasrana@thdc.co.in
10	SJVN	General Manager	sjvn.cso@sjvn.nic.in
11	NHPC	General Manager (O&M)	hod-om-co@nhpc.nic.in
12	NPCIL*	Director (Finance), SO/F, TSU(E&I)	df@npcil.co.in rajeshsharma@npcil.co.in
13	Delhi SLDC	General Manager	gmsldc@delhisldc.org
14	Haryana SLDC	Chief Engineer (SO&C)	cesocomml@hvpn.org.in
15	Rajasthan SLDC	Chief Engineer (LD)	ce.ld@rvpn.co.in
16	Uttar Pradesh SLDC	Superintending Engineer (R&A)	sera@upsldc.org
17	Uttarakhand SLDC	Chief Engineer	anupam_singh@ptcul.org
18	Punjab SLDC	Chief Engineer	ce-sldc@punjabsldc.org
19	Himachal Pradesh SLDC	Chief Engineer	cehpsldc@gmail.com
20	DTL	AGM-Protection	bharatgujardtl@gmail.com
21	HVPNL	Chief Engineer (TS)	cetspkl@hvpn.org.in
22	RRVPNL	CE (M&P)	ce.mps@rvpn.co.in
23	UPPTCL*	Managing Director	md@upptcl.org
24	PTCUL	SE(T&C)	setandchld@gmail.com
25	PSTCL	Chief Engineer (P&M)	ce-pm@pstcl.org
26	HPPTCL*	Managing Director	md.tcl@hpmail.in
27	IPGCL	DGM (Protection)	arif.ipgcl@gmail.com
28	HPGCL	SE/M&T RGTPP	semt.rgtpp@hpgcl.org.in
29	RRVUNL*	CMD	cmd@rrvun.com
30	UPRVUNL	Chief Engineer, (L-2)	ce.ppmm@uprvunl.org
31	UJVNL*	Managing Director	mdujvnl@ujvnl.com
32	HPPCL*	Managing Director	md@hppcl.in
33	PSPCL	Chief Engineer/GHTP	ce-ghtp@pspcl.in
34	DHBVN	Chief Engineer	ctorapdrp@dhbvn.org.in semp@dhbvn.org.in
35	Ajmer Vidyut Vitran Nigam Ltd.	Managing Director	MD.AVVNL@RAJASTHAN.GOV.IN
36	Purvanchal Vidyut Vitaran Nigam Ltd.	Managing Director	md@puvvnl.in
37	UPCL*	Managing Director	md@upcl.org
38	HPSEB*	Managing Director	md@hpseb.in
39	Prayagraj Power Generation Co. Ltd.*	Head (Commercial & Regulatory), DGM - Elect	sanjay.bhargava@tatapower.com, dhananjay.singh@ppgcl.co.in
40	Aravali Power Company Pvt. Ltd*	CEO	brahmajig@ntpc.co.in
41	Apraava Energy Private Limited*	GM-Electrical	navin.chaturvedi@apraava.com
42	Talwandi Sabo Power Ltd. *	COO	Vibhav.Agarwal@vedanta.co.in
43	Nabha Power Limited*	CEO	sk.narang@larsentoubro.com
44	MEIL Anpara Energy Ltd	COO & WTD, Executive Director	anandkumar.singh@meilanparapower.com arun.tholia@meilanparapower.com
45	Rosa Power Supply Company Ltd	GM-ELECTRICAL	Kesarinandan.pandey@reliancegroupindia.com
46	Lalitpur Power Generation Company Ltd	Head of Maintenance, GM Electrical	alokkumar.ltp@lpgcl.com, aupadhyay.ltp@lpgcl.com
47	MEJA Urja Nigam Ltd.	AGM-EMD	SPSPUNDIR@NTPC.CO.IN
48	Adani Power Rajasthan Limited*	GM	Ashish.Baviskar@adani.com
49	JSW Energy Ltd. (KWHEP)*	Head Regulatory & Power Sales	jyotiprakash.panda@jsw.in
50	Transition Cleantech Services Private Limited*	Deputy Manager	kswamidoss@evrenenergy.com
51	UT of J&K*	MD, JKPTCL CE, JKPCL	mdjkptcl1@gmail.com, cejkpcl2@gmail.com
52	UT of Ladakh*	Chief Engineer, LPDD	cepdladakh@gmail.com
53	UT of Chandigarh	Executive Engineer	elop2-chd@nic.in
54	Tata Power Delhi Distribution Limited*	HOG-PMG	sandeep.k@tatapowerddl.com
55	Gurgaon Palwal Transmission Limited*	Head Regulatory	Lokendra.Ranawat@indigrid.com
56	PTC India Limited*	AVP	bibhuti.prakash@ptcindia.com
57	ReNew Power Private Limited*	CEO	sumant@renew.com
58	NTPC Green Energy Limited*	CEO, Sr. Mgr	rajivgupta@ntpc.co.in, sandeepdahiya@ntpc.co.in
59	Azure Power India Pvt. Limited*	CEO	sunil.gupta@azurepower.com
60	Avaada Energy Private Limited*	CEO	kishor.nair@avaada.com
61	Adani Green Energy Limited	AVP	sanjay.bhatt@adani.com

* *Organizations from where nominations are not received for PSC, memebers of NRPC have been mentioned. Nomination for PSC forum may be sent at the earliest.*

List of Members of Rnenewable Energy Sub-committee

S. No.	Members of RE Sub-committiee	Representative Email ID
1	Ministy of New and Renewable Energy	anindya.parira@nic.in;
2	National Load Despatch Center	suhasd@grid-india.in;
3	Northern Regional Load Despatch Center	somara.lakra@grid-india.in;
4	Central Transmission Utility	sandeepk@powergrid.in
5	Powergrid Corporation of India Ltd.	saroj.mishra@powergrid.in; yashpal@powergrid.in
6	Rajasthan Rajya Vidyut Prasaran Nigam Ltd.	se.pp@rvpn.co.in;
7	Rajasthan State Load Despatch Center	se.ldrvpnl@rvpn.co.in;
8	Solar Energy Corporation of India	sanjaysharma@seci.co.in; vkumar@seci.co.in;
9	National Solar Energy Federation of India	ankur.kumar@nsefi.in; ceooffice@nsefi.in;
10	Indian Wind Power Association	secretarygeneral@indianwindpower.com;
11	ABC Renewable Pvt. Ltd	aman.chaturvedi@petronas.com; deepak.asopa@petronas.com; urvika.acharya@petronas.com
12	ACME Heeragarh powertech Pvt. Ltd	prachi.chauhan@acme.in; planthead.badisidd.solar@acme.in; ashutosh.singh@acme.in;
13	ACME Chittorgarh Solar Energy Pvt Ltd	sandeeptak@ayanapower.com; yogesh@ayanapower.com;
14	Adani Hybrid Energy Jaisalmer One Ltd.	
15	Adani Hybrid Energy Jaisalmer Two Ltd.	
16	Adani Hybrid Energy Jaisalmer Three Ltd.	
17	Adani Hybrid Energy Jaisalmer Four Ltd.	
18	Adani Renewable Energy (RJ) limited Rawara	
19	Adani Solar Energy Jaisalmer One Pvt. Ltd._450MW (Solar)	
20	Adani Solar Enegry Four Private Limited	
21	Adani Solar Energy Jaisalmer Two Private Limited	kailash.nagora@adani.com;
22	Adani Solar Energy Jaisalmer Two Private Limited Project Two	sanjay.bhatt@adani.com;
23	SB ENERGY FOUR PRIVATE LIMTED, Bhadla	
24	SB Energy Six Private Limited, Bhadla	
25	Adani Solar Enegry Jodhpur Two Limited, Rawara	
26	Adept Renewable Technologies Pvt. Ltd.	
27	Adani Solar Energy RJ Two Pvt. Ltd. (Devikot)	
28	Adani Solar Energy RJ Two Pvt. Ltd. (Phalodi)	
29	Adani Green Energy 19 Limited	

30	Altra Xergi Pvt. Ltd.	mahendra.kumar@O2power.in;
31	AMP Energy Green Five Pvt. Ltd.	vbhattacharya@ampenergyindia.com;
32	AMP Energy Green Six Pvt. Ltd.	
33	Amplus Ages Private Limited	manish.tak@amplussolar.com;
34	Avaada RJHN_240MW	alpesh.prajapati@avaada.com;
35	Avaada sunce energy Pvt limited	
36	Avaada Sunrays Pvt. Ltd.	
37	Avaada Sustainable RJ Pvt. Ltd.	
38	Ayana Renewable Power Three Private Limited	Venkatraman@ayanapower.com;
39	Ayaana Renewable Power One Pvt. Ltd.	rajeshshukla@ayanapower.com;
40	Azure Power Forty One Pvt limited	sourin.nandi@azurepower.com;
41	Azure Power Forty Three Pvt. Ltd._RSS	manohar.reddy@azurepower.com;
42	Azure Maple Pvt. Ltd.	sourin.nandi@azurepower.com;
43	AZURE POWER INDIA Pvt. Ltd., Bhadla	yogesh.kumar@adani.com;
44	Azure Power Thirty Four Pvt. Ltd.	manohar.reddy@azurepower.com;
45	Clean Solar Power (Jodhpur) Pvt. Ltd.	simhadri.kesapragada@herofutureenergies.com; atul.tomar@herofutureenergies.com; sushant.sinha@herofutureenergies.com;
46	Clean Solar Power (Bhadla) Pvt. Ltd	
47	Eden Renewable Cite Private Limited	dejendra.sharma@eden-re.com
48	Grian Energy private limited	mehul.sharma@amplussolar.com;
49	Mahindra Renewable Private Limited	mehar.rahmatulla@mahindra.com; patil.saurabh2@mahindra.com;
50	Mega Surya Urja Pvt. Ltd. (MSUPL)	msupl_250mw_ists@mahindra.com;
51	AURAIYA Solar	rajivgupta@ntpc.co.in;
52	DADRI SOLAR	
53	SINGRAULI SOLAR	
54	Anta Solar	
55	Unchahar Solar	
56	NTPC Devikot Solar plant_240MW	
57	NTPC Kolayat_400kV	
58	Nedan Solar NTPC	
59	NTPC Nokhra_300MW	
60	One Volt energy Pvt. Ltd.	amarjeet.thakur@amplussolar.com;
61	ReNew Solar Energy (Jharkhand Three) Private Limited	purnendu.chaubey@renew.com; kailash.pandey@renew.com;
62	RENEW SOLAR POWER Pvt. Ltd. Bhadla	
63	ReNew Solar Urja Private Limited	
64	Renew Sun Bright Pvt. Ltd. (RSBPL)	
65	Renew Sun Waves Private Limited (RSEJ4L)	
66	Renew Surya Partap Pvt. Ltd.	
67	Renew Surya Ravi Pvt. Ltd.	
68	Renew Surya Roshni Pvt. Ltd.	
69	Renew Surya Vihan Pvt. Ltd.	
70	Renew Surya Ayaan Pvt. Ltd.	
71	RENEW SOLAR POWER Pvt. Ltd. Bikaner	

72	Rising Sun Energy-K Pvt. Ltd.	tushar.gahlot@risingsunenergy.in;
73	Serentica Renewables India 4 Private Limited	prateek.rai@serenticaglobal.com;
74	Tata Power Green Energy Ltd. (TPGEL)	vinod.kumar@tatapower.com;
75	Tata Power Renewable Energy Ltd. (TPREL)	dhmahabale@tatapower.com; imran.khan@tatapower.com;
76	Thar Surya Pvt. Ltd.	vivek.reddy2@enel.com; mahendra.vishnoi2@enel.com
77	TP Surya Pvt. Ltd.	sivanarayana@tatapower.com; sagar.potdar@tatapower.com;
78	Banderwala Solar Plant TP Surya Ltd.	arun.sahoo@tatapower.com;
79	TRANSITION ENERGY SERVICES PRIVATE LIMITED	kak@evrenenergy.com;
80	Transition Green Energy Private Limited	
81	Transition Sustainable Energy Services Private Limited	

Address List of ISTS Transmission Licensees (other than NRPC members)

S.N.	TBCB/ Licensee Name	Owner Company	E-mail ID
1	Gurgaon Palwal Transmission Ltd	INDIGRID	vivek.karthikeyan1@indigrid.com
2	NRSS-XXIX Transmission Ltd		
3	Parbati Koldam Transmission Company Limited		
4	Patran Transmission Company Ltd		
5	NRSS-XXXI(B) Transmission Ltd	SEKURA	neeraj.verma@energy-sel.com
6	NRSS XXXVI Transmission Ltd	TATA POWER	rajnishmehrotra@tatapower.com
7	AD Hydro Power Limited	-	sumitgarg@lnjbhilwara.com
8	Aravali Power Company Private Limited		amit.hooda01@apcpl.co.in
9	POWERLINKS TRANSMISSION LIMITED (PTL)	-	sandeep.shukla@tatapower.com
10	Adani Transmission India Limited	ADANI	Sunil.Raval@adani.com
11	Bikaner Khetri Transmission Limited		

Agenda of 62nd Protection Sub-Committee Meeting (26th August, 2025)

Contents

Part-A: Agenda by NRPC Secretariat....4

A.1. Confirmation of minutes of 61st meeting of Protection Sub-Committee....4

A.2. Status of action taken on decisions of 61st Protection Sub-Committee meeting (agenda by NRPC Secretariat)....4

A.3. Submission of protection performance indices of 220 kV and above system along with reason and corrective action taken for indices less than unity to NRPC Secretariat for month of June-July 2025 (agenda by NRPC Secretariat)....4

A.4. Reporting of protection performance indices of SPS by SLDCs (agenda by NRPC Secretariat). .6

A.5. Annual protection audit plan for FY 2025-26 (agenda by NRPC Secretariat)....7

A.6. Third-party protection audit plan (agenda by NRPC Secretariat)....8

A.7. Discussion on audit reports submitted by utilities and compliance of recommendations of protection audit (agenda by NRPC Secretariat)....8

A.8. Updation of protection settings database (agenda by NRPC Secretariat)....10

A.9. Report of the Committee on Review of Protection System And Load Management In RAPS, KTPS Generation Complex (agenda by NRPC Secretariat)....11

A.10. SPS at 400kV substation Bareilly and 400 kV substation Panki (agenda by NRPC Secretariat) 14

A.11. Permission for opening of 6 nos. 50 MVAR capacity non-switchable line reactors installed on various 400 kV lines to improve voltage and reduce MVAR drawal from NR Grid in Rajasthan Control area (agenda by Rajasthan SLDC)....14

A.12. Backup O/C protection in lines at NTPC (agenda by NTPC)....16

Part-B: Agenda by NRLDC....16

B.1 Status of remedial actions recommended during previous PSC meeting (agenda by NRLDC). 16

B.2 Multiple elements tripping events in Northern region in the month of June-July 2025 (agenda by NRLDC)....17

B.3 Frequent elements tripping during June-July 2025 (agenda by NRLDC)....18

B.4 Details of tripping of Inter-Regional lines from Northern Region for June-July 2025 (agenda by NRLDC)....19

B.5 Necessity of standard operating procedure during any switching operation in view of multiple element tripping events at 220kV Salal(NHPC) on 15th July 2025 and 400/220 kV Panipat(BBMB) on 24th July 2025 (agenda by NRLDC)....19

B.6 Frequency response performance for the reportable events of month of June-July 2025 (agenda by NRLDC)....20

B.7 Mock testing of System Protection Schemes (SPS) in Northern Region (agenda by NRLDC)...25

B.8 Corrective action for healthiness of 500kV Mundra-Mahindergarh SPS (agenda by NRLDC). .27

B.9 Confirmation of regarding implementation of proposed Overvoltage protection setting by committee (agenda by NRLDC)....30

B.10 Confirmation Status of connected load relief quantum during operation of UFR and df/dt (agenda by NRLDC)....31

Agenda of 62nd Protection Sub-Committee Meeting (26th August, 2025)

B.11 Multiple elements tripping at 400/220kV Kashipur(UK) at 04:39 hrs & 05:27 hrs on 18.08.2025.....32

Part-C: Agenda for final approval of protection settings by PSC Forum for FTCs which have been provisionally allowed by NRLDC/SLDCs.....33

C.1. First Time Charging of transmission lines/Bays/Transformer/Reactor etc. by NRLDC.....33

C.2. First Time Charging of transmission lines/Bays/Transformer/Reactor etc. by SLDCs.....34

Agenda for 62nd Meeting of Protection Sub-Committee (PSC) of Northern Regional Power Committee

Date and time of meeting	***:***	***26.08.2025 10.30 Hrs.***
Venue	***:***	***NRPC Secretariat, Katwaria Sarai, New Delhi***

Part-A: Agenda by NRPC Secretariat

A.1. Confirmation of minutes of 61st meeting of Protection Sub-Committee

A.1.1 61st PSC meeting was held on 26.06.2025. Minutes of the meeting were issued vide letter dtd. 14.08.2025.

A.1.2 POWERGRID/NR-2 has requested to record in MoM that agenda for 'Replacement of SCADA at various substations of POWERGRID, NR-2 under ADD-CAP' was referred to TEST Sub-Committee by PSC forum.

Decision required from Forum:

Forum may approve the minutes.

A.2. Status of action taken on decisions of 61st Protection Sub-Committee meeting (agenda by NRPC Secretariat)

A.2.1 Status of action taken on the decisions of 61st PSC meeting is attached as **Annexure-A.I.**

***Decision* required from Forum**

Status may be deliberated for timely action on issues.

A.3. Submission of protection performance indices of 220 kV and above system along with reason and corrective action taken for indices less than unity to NRPC Secretariat for month of June-July 2025 (agenda by NRPC Secretariat)

A.3.1 *As per clause 15 (6) of IEGC 2023;*

- *Users shall submit the following protection performance indices of previous month to their respective RPC and RLDC on monthly basis for 220 kV and*

above (132 kV and above in NER) system, which shall be reviewed by the RPC:

*a) The **Dependability Index** defined as* $D = Nc/Nc+Nf$

*b) The **Security Index** defined as* $S = Nc/Nc+Nu$

*c) The **Reliability Index** defined as* $R = Nc/Nc+Ni$

where,

Nc is the number of correct operations at internal power system faults,

Nf is the number of failures to operate at internal power system faults,

Nu is the number of unwanted operations,

Ni is the number of incorrect operations and is the sum of Nf and Nu

- *Each user shall also submit the reasons for performance indices less than unity of individual element wise protection system to the respective RPC and action plan for corrective measures. The action plan will be followed up regularly in the respective RPC.*

A.3.2 In earlier PSC meeting, it was decided that each utility shall submit the performance **indices of previous month by 7th day of next month.**

A.3.3 Accordingly, the status of the indices reported for the month of **June-July 2025** is attached as **Annexure-A.II.**

A.3.4 Further, based on submitted data by the utilities as on date, the summary of events that caused indices less than unity is also attached as **Annexure-A.III.**

A.3.5 **Submitted data analysed and found the following issues:**

Some Utilities have not submitted data	As mention in Annexure-A.II.
Utilities have submitted data for some plants but not all.	**NTPC, NPCIL, THDC**
Some utilities have sent data after cut-off date of 7th	As mention in Annexure-A.II.

Decision required from Forum:

i. Forum may discuss cases where indices are less than 1 and may direct necessary action to be taken.

ii. Forum may direct utilities to submit the performance indices of previous month by 7th day of next month element wise along with the reason for indices less than unity and corrective action taken.

A.4. Reporting of protection performance indices of SPS by SLDCs (agenda by NRPC Secretariat)

A.4.1 As per clause 16 of IEGC 2023;

- *The users and SLDCs shall report about the operation of SPS immediately and detailed report shall be submitted within three days of operation to the concerned RPC and RLDC in the format specified by the respective RPCs.*
- *The performance of SPS shall be assessed as per the protection performance indices specified in these Regulations. In case, the SPS fails to operate, the concerned User shall take corrective actions and submit a detailed report on the corrective actions taken to the concerned RPC within a fortnight.*

A.4.2 The agenda has been discussed in previous PSC meetings and following has been decided:

i. Utilities and SLDCs shall report about the operation of SPS immediately and detailed report shall be submitted within three days of operation to the concerned RPC and RLDC.

ii. SLDCs may submit protection performance indices for SPS on monthly basis by 7th date of each month in the same format as that of protection performance indices of elements (lines/ICT etc.).

A.4.3 However, it has been observed that reporting of operation/failure of operation of SPS is not being done regularly by the SLDCs/utilities.

A.4.4 **None of the SLDCs have submitted indices for SPS in their control area.**

A.4.5 UPPTCL, PPGCL, and Lalitpur Plant has informed that no SPS operation has been observed.

A.4.6 UPPTCL has mentioned that **SPS at Gr. Noida is defective.**

A.4.7 NJHPS, Jhakri has reported that **SPS has operated due to malfunctioning** of watt transducer installed on the 400kV Rampur–Nalagarh-Circuit-2 (RH-NJ-II) transmission line. Faulty transducer of 400kV Rampur–Nalagarh-Circuit-2 transmission line has been replaced by RHPS with a new one. Additionally, digital outputs for >800 MW load alarms have been integrated into both the SPS and DCS systems at NJHPS for effective monitoring. An HMI has also been installed to display real-time load and breaker status for each transmission line, including feedback from the Gumma end for the Gumma–Panchkula lines. These corrective measures are intended to prevent recurrence of similar incidents, ensure accurate fault analysis, and enhance the overall reliability and operational integrity of the SPS system.

A.4.8 NRLDC has informed that SPS operated from Apr-July 2025. The same is attached as **Annexure-A.IV**

Decision required from Forum:

Forum may direct SLDC/utilities for compliance of following:

I. Utilities and SLDCs shall report about the operation of SPS immediately and detailed report shall be submitted within three days of operation to the concerned RPC and RLDC.

II. SLDCs may submit protection performance indices for SPS on monthly basis by 7th date of each month in the same format as that of protection performance indices of elements (lines/ICT etc.).

A.5. Annual protection audit plan for FY 2025-26 (agenda by NRPC Secretariat)

A.5.1 As per clause 15 of IEGC 2023;

- *Annual audit plan for the next financial year shall be submitted by the users to their respective RPC by 31st October. The users shall adhere to the annual audit plan and report compliance of the same to their respective RPC.*

A.5.2 In view of above, all utilities were requested to submit the annual protection audit plan for FY-2025-26 latest by 31st October 2024 in the 53rd PSC meeting. Further, concerned utilities were requested to submit the same at the earliest in every PSC meeting since then.

A.5.3 Accordingly, annual audit plans submitted by utilities have been compiled (enclosed as **Annexure- A.V**).

Decision required from Forum:

Forum may direct utilities who have not submitted audit plan for FY 2025-26 as deadline of 31st October 2024 has already passed.

A.6. Third-party protection audit plan (agenda by NRPC Secretariat)

A.6.1 As per clause 15 of IEGC 2023:

All users shall also conduct third party protection audit of each sub-station at 220 kV and above (132 kV and above in NER) once in five years or earlier as advised by the respective RPC.

A.6.2 In view of above, third party audit plans submitted by utilities have been compiled (enclosed as **Annexure-A.VI)**.

Decision required from Forum:

Forum may direct utilities to update the status of 3rd party protection audit as per the submitted audit plans. Subsequently, the audit reports along with compliance status may be submitted to NRPC Secretariat regularly.

A.7. Discussion on audit reports submitted by utilities and compliance of recommendations of protection audit (agenda by NRPC Secretariat)

A.7.1 As per clause 15 (1) of IEGC 2023*;*

- *All users shall conduct internal audit of their protection systems annually,* ***and any shortcomings identified shall be rectified and informed to their respective RPC****. The audit report along with action plan for rectification of deficiencies detected, if any, shall be shared with respective RPC for users connected at 220 kV and above (132 kV and above in NER).*

A.7.2 As per clause 15 (4) of IEGC 2023*;*

The third-party protection audit report shall contain information sought in the format enclosed as Annexure–1 (IEGC). The protection audit reports, along with **action plan**

for rectification of deficiencies detected, if any, shall be submitted to the respective RPC and RLDC or SLDC, as the case may be, within a month of submission of third-party audit report. The necessary compliance to such protection audit report shall be followed up regularly in the respective RPC.

A.7.3 Following utilities have submitted the internal audit report based on the audit done at their substations:

S.N.	FY (Audit Date)	Utility	Stations
1	2024-25	UPPTCL	**Agra Zone- (24 Substations)** 765 kV Substation- Fatehabad 400kV Substation- Agra (Pilipokhar), Agra South, Manth, Aligarh (Akrabad) 220kV Substation- Sirsaganj, Tundla, Bah, Shamshabad, Sikandara, Firozabad, Kirawali, Vrindavan, Gokul, Manth, Chhata, Meetai, Khair, Boner, Atrauli, Sikandararao, Kashganj (Soron), Etah, Mainpuri
2	2024-25	DTL	**220 kV sub-stations (33)** Bawana, Geeta Colony, Kanjhawala, Naraina, Narela, Ridge Valley, R K Puram, Rohini-1, Rohini-2, SGTN, Subzi Mandi, Trauma Centre, DIAL, Indraprastha, Kashmere gate, Lodhi Road, Okhla, Park Street, Peeragarhi, Pragati, Rajghat, Shalimar bagh, Vasant Kunj, Wazirpur, Maharani bagh, Mehrauli, Preet Vihar, Harsh Vihar, BTPS, Gazipur, HCML, Masjid Moth, Sarita Vihar
3	2025-26	RVPN	400 kV: Hindaun 220 kV: Khinvser, Sikar, Kotputli, Hanumangarh, MIA (Alwar), Jahlamand, Mandawar, Bherunda
4	2025-26	NPCIL	RAPP-C (RAPS-Unit-5&6)

5	2025-26	NLC	Barsingsar Thermal Plant
6	2025-26	AMP ENERGY GREEN PVT LTD	AEGPL_BHDL2,AEGSPL_BHDL2, AEGFPL_BHDL2, AEG4PL_BHDL2

A.7.4 UPPTCL has submitted action taken on recommendation of audit team. Other utilities have not submitted action plan on recommendation of audit team.

A.7.5 No 3rd Party audit report received after last 61st PSC meeting.

A.7.6 **The above submitted reports and action plan are available at NRPC website: http://164.100.60.165/meetings/prsub.html**

Decision required from Forum:

Forum may discuss audit report as well as action taken by utilities on recommendations of audit. Further, other utilities may be directed to submit the protection audit report (for audited S/s as per submitted plan) to NRPC Secretariat and may update the compliance status regularly.

A.8. Updation of protection settings database (agenda by NRPC Secretariat)

A.8.1 As per regulation 14 (3) of IEGC 2023:

RPCs shall maintain a centralized database and update the same on periodic basis in respect of their respective region containing details of relay settings for grid elements connected to 220 kV and above (132 kV and above in NER). RLDCs shall also maintain such database.

A.8.2 Data available with NRPC Secretariat has been placed in **Microsoft OneDrive** at link as give below:

https://1drv.ms/f/c/d49b7a45daaa5e75/EpRH-zD4LktJnajRIEQ4GD0B--X2hFhazWbLVZt7EmtB0g?e=TIDLTI

A.8.3 All utilities are requested to review the settings available on link and inform NRPC Secretariat if settings have been changed but not reflecting in database.

A.8.4 If any element (line/ICT/etc) is missing, a folder may be created by concerned utility and settings may be placed in that folder. Same may be intimated to NRPC Secretariat also.

Decision required from Forum:

Forum may direct all utilities to update protection setting database.

A.9. Report of the Committee on Review of Protection System And Load Management In RAPS, KTPS Generation Complex (agenda by NRPC Secretariat)

A.9.1 On 05th January 2024, at 05:16hrs, cascade tripping of multiple elements occurred in RAPS, KTPS generation complex in Rajasthan control area leading to loss of total running generation of KTPS, RAPS (A, B & C) and other small hydro stations (Jawahar Sagar HEP & Rana Pratap Sagar HEP) in the complex.

A.9.2 Again, on 29th March 2024, at 20:22 hrs. a grid event (GD-1) of blackout of this complex occurred.

A.9.3 During the above two grid events i.e., 05th January 2024 and 29th March 2024, all the running units at RAPS A, B & C went under Xe-poisioning of reactors. Units were able to synchronized back to the grid only after 2-3 days of the grid events, as significant time period (56-72 hours) is required for complete poision out of Xe from the reactor.

A.9.4 Based on decision of 50th PSC meeting, NRPC constituted the committee for detailed analysis of the events and to give recommendations for strengthening the reliability and security of this complex.

A.9.5 Report of the Committee is attached as **Annexure-A.VII.**

A.9.6 Committee has given following recommendation:

i. Strong connectivity in the complex:

a) The number of changes in the connectivity in the complex have strengthened the complex. Radial paths have been minimised, and alternate evacuation paths have been made. With the changes in the complex, reliability of the complex has been improved. However, it needs to be ensured that any future changes in the connectivity in the complex should be done after load flow and contingency analysis in the complex.

b) The changes affecting the reliability in the complex should be avoided or to be done after comprehensive discussion among concern stakeholders. SLDC-Rajasthan shall also ensure the proper load management in the complex as per network condition to avoid any cascade tripping.

c) Further, proactive Intrastate Transmission planning for creating transmission adequacy in the complex is needed.

ii. Healthiness of protection system:

a) Protection system and their proper coordination need to be ensured. It is also to be ensured that protection system and their settings are kept in line with the standards and protection philosophy. Any changes in the protection philosophy should only be done after prior approval from NRPC.

b) Necessary preventive and corrective measures need to be taken by RVPNL to minimise the frequent tripping of 220kV lines evacuation from RAPS.

c) As mandated by IEGC, conducting Annual Self Protection Audit and Third-Party Protection Audit also need to be ensured.

iii. Healthiness of SCADA data and telemetry:

a) Telemetry of SCADA data and its healthiness is necessary for decision making during real time grid operation. Non availability of complete SCADA data and issue of wrong / unhealthy data have been observed due to unhealthy RTUs at site. Concerned may take expeditious actions to make all the RTUs in the complex healthy and ensure availability and healthiness of SCADA data of the complex.

b) Further, it is also observed that there is no PMU at RAPS A, B and Rajasthan stations in the complex. Nearest PMU is at Kota(PG) at 400kV level. As this complex is critical and frequent events have also been observed in this complex. Therefore, RAPS and Rajasthan may plan for Installation of PMU at 220kV level in the complex so that high resolution data of the complex may be captured which will be useful in

monitoring and event analysis.

iv. Healthiness of ATS, protection & control system at RAPS:

a) The changes done in the ATS i.e., relay software upgradation, ATS logic review etc. will enhance the chances of successful ATS operation. However, the upgradation in ATS is pending in Unit-6 at RAPS C. Expeditious implementation of necessary changes in ATS in Unit-6 at RAPPS C need to be ensured.

b) Necessary system for alarms / control panel annunciation to alert the control room operators at RAPS regarding any deficiency in control system or auxiliary system may also be explored. It will help in better decision making by control room operators at RAPS. Further, periodic review of ATS also need to be done.

v. Island subsystem and its operation:

a) Load generation balance in RAPS island scheme has been reviewed comprehensively. Necessary changes in network configuration and load profile of island scheme have been done to ensure the feasibility of island subsystem. Further, SLDC-Rajasthan shall ensure that the load generation balance in island subsystem (feasible G/L) is maintained all the time.

b) SCADA display of RAPS island subsystem along with telemetry of all the involved substations need to be ensured. RAPS may also explore the possibility to have the island subsystem network, data telemetry at their control room.

c) Island system and its operational logic also need to be reviewed on periodic basis.

A.9.7 Following action point is pending that should be expedited:

i. Addressing Auto-recloser related issues at RAPS end **[by NPCIL/RAPS]**

ii. RAPS and Rajasthan may plan for Installation of PMU at 220kV level in the complex so that high resolution data of the complex may be captured which will be useful in monitoring and event analysis. [**Rajasthan**]

iii. Upgradation in ATS is pending in Unit-6 at RAPS C. Expeditious implementation of necessary changes in ATS in Unit-6 at RAPPS C need to be ensured. Necessary system for alarms / control panel annunciation to alert the control room operators at RAPS regarding any deficiency in control system or auxiliary system may also be explored. **[by NPCIL/RAPS]**

Decision required from Forum:

Forum may give necessary direction based on report of the committee.

A.10. SPS at 400kV substation Bareilly and 400 kV substation Panki (agenda by NRPC Secretariat)

A.10.1 In 234th OCC meeting (held on 14.08.2025), SPS proposal of UP at Bareilly and Panki was discussed. It was decided to implement the SPS, and if PSC forum has any observations, same shall be implemented by UP.

A.10.2 SPS scheme is attached as **Annexure-A.VIII.**

Decision required from Forum:

Members may give observation on above SPS scheme.

A.11. Permission for opening of 6 nos. 50 MVAR capacity non-switchable line reactors installed on various 400 kV lines to improve voltage and reduce MVAR drawl from NR Grid in Rajasthan Control area (agenda by Rajasthan SLDC)

A.11.1 In the various NRPC/OCC meetings regarding critically low voltage issues in Rajasthan control area has been discussed several times and Rajasthan SLDC has been advised to improve voltage and reduce MVAR drawl from NR grid.

A.11.2 In this regard, it is intimated that various measures viz. regular pursuance with intrastate generators for injection MVAR as per their capability curve, MVAR injection by RE Generators as per CEA Regulations, proper maintenance & operation of the shunt capacitor banks etc. are being taken by SLDC, Rajasthan. In this regard SLDC Rajasthan has also explored to open non-switchable line reactors

installed on 400 kV lines so that in day time voltage can be improved. 50 MVAR capacity non-switchable line reactors are installed on following 400 kV lines which line lengths are less than 200 km:-

i. 400 kV S/C Bikaner-Merta line (Twin moose) with 50 MVAR non switchable line reactors

at both ends of line (172 kM)

ii. 400 kV D/C Bhadla-Bikaner line (quad moose) with 50 MVAR non switchable line reactors on each circuit at Bhadla end (189.1 kM)

iii. 400 kV S/C Ramgarh-Bhadla line (Twin moose) with 50 MVAR non switchable line reactor at Ramgarh end of line (160 kM)

iv. 400 kV S/C Jaisalmer 2-Kankani line (Quad moose) with 50 MVAR non switchable line reactor at Kankani end of line (176.84 kM)

A.11.3 Rajasthan SLDC has carried out load flow studies in latest PSSE file shared by NRLDC to assess the impact of opening of above 6 nos. 50 MVAR capacity non-switchable line reactors installed on aforesaid 400 kV lines to improve day time low Grid voltage in Rajasthan Control area. Details are attached as **Annexure-A.IX.**

A.11.4 This agenda was also discussed in the 234th OCC meeting held on 14.8.2025 wherein it was advised to put up agenda in the forthcoming PSC meeting.

Decision required from Forum:

Forum may like to discuss.

A.12. Backup O/C protection in lines at NTPC (agenda by NTPC)

A.12.1 NTPC Dadri is having Thermal generation (1820 MW), Gas power generation (829.78 MW) & Solar (5MWp) generation capacity amounting to a total of 2654.78MW of power generation capacity.

A.12.2 In addition to generation capacity, ±500kV, 1500MW, HVDC Rihand – Dadri Link operating with power flow from Rihand to Dadri Switchyard.

A.12.3 NTPC Dadri is having 400kV and 220kV Switchyard. 400kV Switchyard from NTPC Dadri is evacuating a total maximum power capacity of 4154.78MW.

A.12.4 NTPC Engineering deptt. has provided a guiding philosophy for lines at NTPC stations, in which ‘fuse failure enabled phase over current protection’ shall get enabled in case of VT fuse failure only and pickup value around 1.7 times of thermal

rating of line conductors with time delay. Details are attached as **Annexure-A.X.**

Decision required from Forum:

Forum may like to discuss proposal of NTPC.

Part-B: Agenda by NRLDC

B.1 Status of remedial actions recommended during previous PSC meeting (agenda by NRLDC)

B.1.1 As per the discussion in pervious PSC meetings, necessary remedial actions were recommended based on the analysis and discussion of the grid events. It is expected that necessary actions would have taken place. In view of the same, a mail dt 13.08.2025 has also been sent from NRLDC to constituents requesting to share the status of remedial actions taken. List of points to be discussed in 62nd PSC meeting is attached as **Annexure-B.I.** Constituents can email the details via mail to NRLDC and NRPC.

B.1.2 On 17.08.2025 at 03:03 hrs, multiple elements tripping occurred at Khodri HEP and Majri(HP). As per NRLDC SCADA data, ~85 MW generation loss at Khodri HEP and ~135 MW load loss in HP control area occurred during the event. In view of frequent multiple elements tripping in the complex leading to generation loss and load loss, it is again requested to take expeditious corrective actions and make protection system at Khodri, Chhibro and Majri complex healthy so that such unwanted multiple elements tripping events and generation / load loss can be avoided.

Decision required from Forum:

Members may like to discuss.

B.2 Multiple elements tripping events in Northern region in the month of June-July 2025 (agenda by NRLDC)

B.2.1 A total of **42** grid events occurred during the months of **June and July 2025** out of which **23** are of GD-1 category, **10** are of GI-I category and **09** are of GI-2 Category. The tripping report of all the events have been issued from NRLDC. The list of major tripping events occurred during **June-July 2025** is attached as **Annexure-B.II.**

Maximum delayed clearance of fault observed in event of tripping event at 220/33kV RSDCL PSS2 RE station at 13:46 hrs on 04th July 2025 (As per PMU at Bhadla2(PG), R-Y phase to phase fault with delayed fault clearing time of 1200 msec is observed).

B.2.2 Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **11** events out of **42** grid events occurred in these two months. In **09** (no.) of grid events, there were no fault in the grid.

B.2.3 Concerned constituents/utilities are requested to share the detailed analysis of the tripping elements along with status of remedial action taken/to be taken.

Utilities are requested to prepare detailed analysis report and present the event details during 62nd PSC meeting. Events involving more than one utility may be jointly prepared and presented.

As per IEGC clause 37.2 (c), Disturbance Recorder (DR), station Event Logger (EL), Data Acquisition System (DAS) shall be submitted within 24 hrs of the event and as per IEGC clause 37.2 (e), the user shall submit a detailed report in the case of grid disturbance or grid incidence within one (1) week of the occurrence of event to RLDC and RPC.

B.2.4 Members may take necessary preventive measures to avoid such grid incidents / disturbances in future and report actions taken by respective utilities in OCC & PSC forum. Moreover, utilities may impress upon all concerned for providing the Preliminary Report, DR/EL & Detailed Report of the events to RLDC in line with the regulations.

Decision required from Forum:

Members may like to discuss.

B.3 Frequent elements tripping during June-July 2025 (agenda by NRLDC)

B.3.1 The following transmission elements were frequently tripping during the month of **June'25**:

S. NO.	Element Name	No. of forced outages	Utility/SLDC

1	250 MW (PSP) TEHRI HPS - UNIT 5	10	Tehri PSP
2	220 KV Meerut(PG)-Nara(UP) (PG) Ckt	7	PG/UP
3	220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1	5	NPCIL/Rajasthan
4	220 KV RAPS_B(NP)-Sakatpura(RS) (RS) Ckt-1	4	NPCIL/Rajasthan
5	220 KV Sarsawan(UP)-Khodri(UK) (UP) Ckt-1	4	UP/UK

B.3.2 The following transmission elements were frequently tripping during the month of **July 2025**:

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	250 MW (PSP) TEHRI HPS - UNIT 5	12	Tehri PSP
2	250 MW (PSP) TEHRI HPS - UNIT 6	9	Tehri PSP
3	220 KV NAPP(NP)-Simbholi(UP) (UP) Ckt-1	8	NPCIL/UP
4	220 KV Nara(UP)-Roorkee(UK) (UP) Ckt-1	5	UP/UK
5	220 KV Panipat-Kurukshetra (BB) Ckt-1	5	BBMB

B.3.3 List of tripping is attached as **Annexure-B.III**.

B.3.4 It may be noted that frequent tripping of such elements affects the reliability and security of the grid. Hence, **utilities are requested to analyse the root cause of the tripping and share the remedial measures taken/being taken in this respect.**

Decision required from Forum:

Members may like to discuss.

B.4 Details of tripping of Inter-Regional lines from Northern Region for June-July 2025 (agenda by NRLDC)

B.4.1 A total of 23 inter-regional lines tripping occurred in the month of June-July 2025. The list is attached at **Annexure-B.IV**. The status of receipt of preliminary reports, DR/EL within 24hrs of the event and fault clearing time as per PMU data has also been

mentioned in the table. The non-receipt of DR/EL & preliminary report within 24hrs of the event from SLDCs / ISTS licensees / ISGSs is in violation of regulation 37.2(c) of IEGC and regulation 15(3) of CEA Grid Standards. As per regulations, all the utilities shall furnish the DR/EL, flag details & preliminary report to RLDC/RPC within 24hrs of the event. They shall also furnish the detailed investigation report within 7 days of the event if fault clearance time is higher than that mandated by CEA (Grid Standard) Regulations.

Decision required from Forum:

Members may please note and advise the concerned for taking corrective action to avoid such tripping as well as timely submission of the information.

B.5 Necessity of standard operating procedure during any switching operation in view of multiple element tripping events at 220kV Salal(NHPC) on 15th July 2025 and 400/220 kV Panipat(BBMB) on 24th July 2025 (agenda by NRLDC)

B.5.1 Two number of multiple element tripping events i.e., at 220kV Salal (NHPC) on 15th July 2025 and at 400/220 kV Panipat(BBMB) on 24th July 2025 occurred during July 2025 months. Triggering incident for both the events were operation of isolators during ON LOAD condition which further led to heavy flashover and fault in system. Detailed analysis of these two events are attached as **Annexure-B.V.**

B.5.2 In view of the above, utilities are advised to follow Standard operating procedure during any switching operation. Necessary instruction may be given to site operators to avoid such event in future.

Decision required from Forum:

Members may like to discuss.

B.6 Frequency response performance for the reportable events of month of June-July 2025 (agenda by NRLDC)

B.6.1 During the months of June-July 2025, 4 no. of reportable events were notified by NLDC for which FRC/ FRP need to be calculated. Description of the event is as given in the Table below:

Agenda of 62nd Protection Sub-Committee Meeting (26th August, 2025)

S. No.	Event Date	Time (In hrs.)	Event Description	Starting Frequency (in Hz)	Nadir Frequency (in Hz)	End Frequency (in Hz)	*Δf(Hz)*	NR FRP during the event
1	12-June-25	13:34 hrs	As reported, at 13:34 hrs on 12th June 2025, generation loss event of 1633MW occurred in NR RE complex in Rajasthan. Hence generation loss of 1633 MW is considered for FRC/FRP Calculation.	50.006	49.822	49.944	-0.062	0.83
2	16-June-25	11:51 hrs	As reported, at 11:51 hrs on 16th June 2025, generation loss event of 1322MW occurred in Bhutan. Hence, generation loss of 1322 MW is considered for FRC/FRP Calculation.	49.963	49.863	49.920	-0.043	0.83
3	22-July-25	19:46 hrs	As reported, at 19:46 hrs on 22nd July 2025,	49.942	49.832	49.874	-0.068	1.31

			generation loss event of 1437MW occurred at Tehri, Koteshwar Hydro generation complex in NR. Hence generation loss of 1437 MW is considered for FRC/FRP Calculation.					
4	29-July-25	14:55 hrs	As reported, at 14:55 hrs on 29th July 2025, generation loss event of 1100 MW occurred at ACME_Fatehgarh_I in Rajasthan RE complex. Hence, generation loss of 1100 MW is considered for FRC/FRP Calculation.	50.145	50.044	50.075	-0.70	0.95

B.6.2 As per IEGC 2023 Clause 30.8, "The primary response of the generating units shall be verified by the Load Despatch Centres (LDCs) during grid events. The concerned generating station shall furnish the requisite data to the LDCs within two days of notification of reportable event by the NLDC."

B.6.3 As per IEGC 2023 Clause 30.10.(n), "Each control area shall assess its frequency response characteristics and share the assessment with the concerned RLDC along with high resolution data of at least 1 (one) second for regional entity generating stations and energy storage systems and 10 (ten) seconds for the state control area."

B.6.4 As per sub-clause (a(v)) of clause (9) of IEGC 2023 Annexure-2, "All the SLDCs shall work out FRC for all the intra-state entities (for events indicated by the Regional Load Despatch Centres) based on the HDR available at their respective SLDCs and submit the same to respective RLDC within six (6) working days after the event. (Format as per Table-B)."

B.6.5 As per sub-clause (a(vi)) of clause (9) of IEGC 2023 Annexure-2, "All regional entity generating stations shall also assess the FRC for their respective stations and submit the same to respective RLDC within six (6) working days. (Format as per Table-B). The high-resolution data (1 second or better resolution) of active power generation and frequency shall also be shared with RLDC."

B.6.6 Members are requested to share the FRC/FRP computation of their respective control area as per the timeline specified in IEGC 2023.

B.6.7 Frequency Response Performance (FRP) of generating stations for each reportable event are calculated based on the submitted high resolution data from generating stations. However, the generating stations for which data is not received till 10th August 2025, FRC/FRP as per NRLDC HDR data is used for computation of Average Monthly Frequency Response Performance, Beta 'β' for Generating Stations.

B.6.8 From the FRP data, it is observed that FRP of many of the control areas are not satisfactory. Therefore, it is requested to review the FRC/FRP, governor actions of your respective control area, necessary actions may be taken for improvement in the FRC/FRP.

B.6.9 Status of details received from constituents and FRP values as considered for the events of June-July 2025 are attached as **Annexure-B.VI.**

B.6.10 ISGS were requested to confirm whether FGMO as per IEGC 2023 has been implemented at their respective stations or not. Updated list on the basis of details received is as follows:

Sl. No.	Entity	Capacity(MW)	Governor Mode (FGMO as per IEGC 2023) Yes or No	Droop setting (%)	Remarks (if any)

Agenda of 62nd Protection Sub-Committee Meeting (26th August, 2025)

1	Dadri-1 (TH)	4*200			
2	Dadri -2 (TH)	2*490			
3	Jhajjar (TH)	3*500			
4	Rihand-1 (TH)	2*500	Yes	5.0	Under Implementation
5	Rihand-2 (TH)	2*500	Yes	5.0	Under Implementation
6	Rihand-3 (TH)	2*500	Yes	5.0	Under Implementation
7	Shree Cement (TH)	(2 * 150)			
8	Singrauli (TH)	2*500+5*200			
9	Tanda-2 (TH)	2*660			
10	Unchahar stg-4 (TH)	1*500			
11	Unchahar (TH)	2*210			
12	Anta (G)	(1 * 153.2 + 3 * 88.71)			
13	Auraiya (G)	(2 * 109.3 + 4 * 111.19)			
14	Dadri (G)	(2 * 154.51 + 4 * 130.19)			
15	AD Hydro (H)	(2 * 96)	YES	4.0	-
16	Bairasiul (H)	(3 * 60)	Yes	4.0	
17	Bhakra (H)	(5 * 126 + 5 * 157)			
18	Budhil (H)	(2 * 35)			
19	Chamera-1 (H)	(3 * 180)	Yes	5.0	
20	Chamera-2 (H)	(3 * 100)	Yes	5.0	
21	Chamera-3 (H)	(3 * 77)	Yes	4.0	
22	Dehar (H)	(6 * 165)			
23	Dhauliganga (H)	(4 * 70)	Yes	5.0	

24	Dulhasti (H)	(3 * 130)	Yes	5.0	
25	Karcham (H)	(4 * 261.25)	Yes	5.0	
26	Kishenganga	(3 * 110)	Yes	4.0	
27	Koldam (H)	(4 * 200)	Yes	4.0	
28	Koteswar (H)	(4 * 100)	Yes	4.0	
29	Malana-2 (H)	(2 * 50)			
30	Nathpa Jhakri (H)	(6 * 250)	Yes	5.5	
31	Parbati-2 (H)	(4 * 200)			
32	Parbati-3 (H)	(4 * 130)	Yes	4.0	
33	Pong (H)	(6 * 66)			
34	Rampur (H)	(6 * 68.67)			
35	Sainj (H)	(2 * 50)			
36	Salal (H)	(6 * 115)	Yes	3.0	
37	Sewa-II (H)	(3 * 40)	Yes	4.0	
38	Singoli Bhatwari (H)	(3 * 33)			
39	Sorang (H)	(2 * 50)			
40	Tanakpur (H)	(1 * 31.42 + 2 * 31.4)	Yes	4.0	
41	Tehri (H)	(4 * 250)	Yes	4.0	
42	Uri-1 (H)	(4 * 120)	Yes	6.0	
43	Uri-2 (H)	(4 * 60)	Yes	5.0	

B.6.11 Constituents are requested to share the details of the droop w.r.t. their generating stations.

Decision required from Forum:

Members are requested to analyse the frequency response of their respective control area and share the FRC/FRP analysis of generating stations along with unit wise 01 sec data as per timeline for ensuring IEGC compliance.

B.7 Mock testing of System Protection Schemes (SPS) in Northern Region (agenda by NRLDC)

B.7.1 As per IEGC clause 16.2

''For the operational SPS, RLDC or NLDC, as the case may be, in consultation with the concerned RPC(s) shall perform regular load flow and dynamic studies and mock testing for reviewing SPS parameters & functions, at least once in a year. RLDC or NLDC shall share the report of such studies and mock testing including any short comings to respective RPC(s). The data for such studies shall be provided by CTU to the concerned RPC, RLDC and NLDC.''

B.7.2 As per IEGC clause 16.3

''The users and SLDCs shall report about the operation of SPS immediately and detailed report shall be submitted within three days of operation to the concerned RPC and RLDC in the format specified by the respective RPCs.''

B.7.3 There are 56 numbers of System Protection Scheme (SPS) approved in Northern Region. These SPS are implemented at major generation complexes, important evacuating transmission lines and ICTs which are N-1 non-complaint. System Protection Scheme Document of Northern Region has been revised/updated on 31st January, 2025.

B.7.4 SPS is designed to detect abnormal system conditions and take predetermined, corrective action to preserve system integrity and provide acceptable system performance. Therefore, correct operation of SPS as per designed logic is important to serve its purpose. To ensure this, mock testing of SPS needs to be conducted at a regular period. Clause 16.2 of IEGC 2023 also mandates the mock testing of SPS for reviewing SPS parameters & functions, at least once a year.

B.7.5 In this regard, communication has already been sent to constituents through NRLDC letter dated 01.05.2024, 21.02.2025, 05.03.2025, 04.04.2025 & 28.05.2025 and continuous follow up is being done in OCC & PSC meeting since May 2024.

B.7.6 During 2024-25, mock testing of 14 SPS out of total 55 SPS were not conducted. In view of high demand scenario during summer 2025-26, NLRDC vide letter dated 04.04.2025 requested all the concerned utility to conduct the mock testing of pending

SPS by the end of April 2025. However, as reported, mock testing of 03 SPS out of pending 14 SPS have been done. In this regard, discussion was also held in 60th & 61st PSC meeting. PSC forum requested all the members to conduct the mock testing of all the SPS in their respective control area at the earliest.

B.7.7 Status of mock testing of all the SPS in NR is attached as **Annexure-B.VII.**

B.7.8 In view of the above, the following are requested:

i. Concerned constituents / utility are requested to conduct the mock testing of pending SPS (whose mock testing was not conducted in FY 2024-25) at the earliest.

ii. In compliance with IEGC clause 16.2, users shall ensure that mock testing along with the review of SPS logic of all the SPS is conducted at least once a year. Hence utilities are also requested to share the tentative schedule and conduct the mock testing of SPS schemes in their respective control area w.r.t. FY 2025-26.

iii. Further In compliance with IEGC clause 16.3, users shall also share the detailed report of SPS operation in their respective control area within 3 days of its operation. Presently, no such report is being received.

B.7.9 During 60th PSC meeting, forum also decided to not disable the SPS where ICTs are now N-1 compliant after augmentation. It was decided that SPS may be kept enabled with logic based on loading instead of ICT tripping.

Decision required from Forum:

Members may share the status.

B.8 Corrective action for healthiness of 500kV Mundra-Mahindergarh SPS (agenda by NRLDC)

B.8.1 On 17th May 2024 on outage of both pole (carrying total ~1500MW), SPS of 500kV HVDC Mundra-Mahindergarh inter regional link didn't operate. This issue was discussed in the 51st PSC meeting and ADANI was requested to share the details w.r.t. SPS operation.

B.8.2 Further, NRLDC in coordination with NLDC conducted an online discussion meeting with concerned stakeholders (SLDCs, ADANI, POWERGRID) on 12th August 2024, for further remedial actions required to make this SPS healthy.

B.8.3 Following actions were decided during the meeting:

i. POWERGRID, ADANI and concerned states were requested to identify the issue in communication links and take expeditious actions to make the all the communication link healthy. POWERGRID & ADANI shall review the healthiness of SPS system at different load centres and communication path between them in coordination with the SLDCs.

ii. States were requested to go through the details of load feeders mentioned in SPS document and share the changes / modifications as per present scenario and share the inputs w.r.t. unavailability in identified load feeders and load shedding. SLDCs shall share the revised updated feeder details (radial) along with expected average/peak load relief through respective feeders.

iii. SLDCs in coordination with their transmission and protection team shall share the status and healthiness of existing SPS system along with details of availability of communication path for incorporation of proposed revised/additional feeders.

B.8.4 Load end details have been received from UP, Haryana, Punjab Rajasthan & Delhi. Details and communications are attached as **Annexure-B.VIII**.

B.8.5 ADANI via mail dated 29.08.2024 has submitted the status of healthiness of communication network and hardware system at different locations on the basis of preliminary inspection. As per details submitted, counter status was found OFF at Alwar, Ratangarh, Gobindgarh, Malerkotla, Bamnauli, Shamli and Dhanonda.

B.8.6 Details of nodal officer of different substation involved in SPS scheme has already been shared with ADANI team for coordination and further remedial actions.

B.8.7 During 53rd PSC meeting, ADANI was requested to coordinate with the respective states to rectify the issues in the SPS system and share the status of remedial action taken / planned to be taken. Desired remedial actions need to be expedited.

B.8.8 ADANI agreed for the same and stated that update would be given within 01 week. However, no detail received yet from ADANI.

B.8.9 During discussion in 55th PSC meeting it was decided that ADANI shall take lead in rectification work as this SPS scheme was commissioned by them. Protection nodal officers from States will provide possible necessary assistance from their end. Further, states were also requested to ensure incorporation of revised decided feeders during work at their stations. States representative assured to provide all necessary coordination from their end.

B.8.10 During 56th PSC meeting, ADANI was requested to apprise the forum about the present status of remedial actions. ADANI representative stated that they have raised

service order to COMTEL (OEM) for approval. After approval of this service order, COMTEL engineers will visit all the sites in coordination with nodal officers from respective stations. It is expected that identification of issues and estimate hardware requirement will be completed by the end April 2025. Thereafter, after financial approval, rectification of issues will be done. ADANI was requested to ensure completion of whole work before summer 2025. State representatives were also requested to coordinate with the ADANI team and ensure incorporation of identified revised feeders for load relief in SPS.

B.8.11 Further, through mail dt 3rd April 2025, ADANI has informed that they awarded the rectification work service to M/s COMTEL for survey and restoration of possible elements installed at the locations and engineers from M/s COMTEL shall be visiting respective stations as per the schedule.

B.8.12 During 57th PSC meeting, ADANI representative informed that visit by COMTEL engineers at all the sites is completed and COMTEL will submit the report within 10 days.

B.8.13 ADANI was requested to share the report at the earliest and make Action Plan accordingly to ensure completion of whole work before summer 2025.

B.8.14 ADANI agreed to take expeditious actions and to share the action plan at the earliest.

B.8.15 During 58th PSC meeting, ADANI representative shared the observations made by COMTEL engineers and informed that it would at least require 6 months to complete the work.

B.8.16 NRLDC CGM (SO) highlighted that in view of envisaged growth in demand in next summer season, it is important to ensure rectification of issues and healthiness of SPS.

B.8.17 ADANI representative further informed that cost implication in this case is estimated as approx. Rs. 1.5 Cr. Till now they conducted technical assessment and made cost estimation. They will look into the regulatory aspect of the same for finalising the action plan.

B.8.18 During 59th PSC meeting, ADANI representative informed that they are doing discussions with ULDC for allocation of necessary links between locations. They have also initiated internal approval for placing necessary orders to the partner for execution of upgradation activity. They are expecting to complete the execution within 4-5 months in collaboration with all the stakeholders from respective utilities and ULDC team. Communication from ATIL in this regard is also sent to NRLDC through letter dated 10th April 2025.

B.8.19 PSC forum emphasized that considering the growing energy demands in summer

season, healthiness of 500kV Mundra-Mahindergarh SPS is of utmost importance for secure & reliable grid operation. State representatives were also requested to coordinate with the ADANI team and also ensure incorporation of identified revised feeders for load relief in SPS. Desired remedial actions need to be expedited.

B.8.20 During 60th PSC meeting, ADANI representative informed that internal approval is taken for placing the order and order will be released to vendor by end of June-July 2025. They have expedited the execution of upgradation activity and now it is expected to get completed by August 2025.

B.8.21 NRLDC representative requested to share weekly progress report once the execution work starts and ADANI agreed for the same.

B.8.22 ADANI is requested to apprise the forum about identified issues at various stations, action plan and progress in rectification work.

B.8.23 During 61st PSC meeting, ADANI representative informed that order will be released by 1st week of July to the vendor for completion of work. The vendor has given 06 (six) months' timeline for completion of whole work however, we will follow up with the vendor and try to complete the whole work within 04 months.

B.8.24 NRLDC representative requested ADANI to expedite the necessary actions at their end as corrective actions has already been delayed. It was also requested to give action plan of corrective actions for smooth coordination and actions. Weekly progress and status of actions may also be shared.

B.8.25 Further, through mail dt 30th July 2025, ADANI has informed that order has been placed with vendor for the procurement and development of the scheme on new devices and they also shared the timeline for the upcoming broader steps which has evolved based on discussions held with the vendor.

B.8.26 ADANI is requested to take continuous follow-up with the vendor for expeditious corrective actions.

Decision required from Forum:

Members may like to discuss.

B.9 Confirmation of regarding implementation of proposed Overvoltage protection setting by committee (agenda by NRLDC)

B.9.1 A committee was formed by NRPC during 52nd PSC meeting held on 20th September 2024 to review the Overvoltage Protection settings of 400kV and 765kV transmission lines in Northern Region. This committee was formed for compliance of the recommendation given by the committee formed by CEA for analysis of Grid incident

occurred on 17th June 2024. The committee reviewed the Overvoltage Protection settings of 400kV and 765kV transmission lines in Northern Region, finalized the protection settings for overvoltage protection and proposed the revised overvoltage protection settings. The proposed Overvoltage protection settings were discussed and approved in 58th Protection Sub-Committee (PSC) meeting held on 26th March 2025. The PSC forum requested all to implement the proposed overvoltage protection settings in 400kV and 765kV transmission lines in their respective control area. Details of the revised overvoltage protection setting to be implemented is attached as **Annexure-B.IX.**

B.9.2 Further, the agenda in this regard was again discussed in 230th OCC meeting and 60th & 61st PSC meeting. It was observed that many members are yet to confirm the implementation of revised overvoltage settings.

B.9.3 Status of confirmation received from UPPTCL, HVPNL, DTL, Lalitpur TPS (LPGCL), NHPC (Chamera-I &II, Uri-I& II, Dulhasti HEP), POWERGRID NR-1, NUPPL and Rampur HEP. SLDC Punjab vide mail dt 5th June 2025 informed that over-voltage settings implementation will take 3-4 months.

B.9.4 During 61st PSC meeting, PSTCL representative stated that due to shortage of manpower in protection team, 3–4-month time is required for implementation of revised OV settings.

B.9.5 PSC forum suggested PSTCL to address the issue and propose to form separate protection wing so that protection related compliance and grid event analysis may be done in stipulate time frame

B.9.6 All members were requested to ensure the implementation of proposed overvoltage settings in their control area at the earliest to avoid any unwanted tripping during the ongoing high demand scenario. In this regard, e-mail communication was also sent dated 07.05.2025 & 03.06.2025 to all members.

Therefore, all the concerned utilities are once again advised to ensure expeditious implementation of proposed Overvoltage Protection settings in 400kV and 765kV transmission lines in their respective control area and send a confirmation regarding this to NRPC and NRLDC.

Decision required from Forum:

Members may like to discuss.

B.10 Confirmation Status of connected load relief quantum during operation of UFR and df/dt (agenda by NRLDC)

B.10.1 UFRs and df/dt are envisaged to take care of sudden contingencies arising out of outage of generation stations or separation of inter-regional lines. UFRs setting are for steady state operation of the Grid at considerably low frequency and df/dt settings are for dynamic change when frequency falls suddenly with jerks.

B.10.2 **In view of the above, SLDCs are requested to share the list of feeders mapped for UFR and df/dt along with feeder-wise planned load relief quantum. SLDCs are also requested to share details of mapped/telemetered stage-wise quantum of load relief on UFR and df/dt operation against the planned quantum.** Data is to be furnished in the format attached as **Annexure-B.X.**

B.10.3 Further, this is to highlight that on 25.04.2025 at 21:26 hrs, significant quantum of load loss (~425 MW) occurred in Punjab control area during a fault incident at 400kV Malerkotla(PG). As reported, load loss occurred due to df/dt operation in Punjab control area.

B.10.4 **In view of recent events due to df/dt operation, major review of UFR and df/dt settings is required to avoid unwanted tripping of feeders and load loss in states.**

Decision required from Forum:

Members may like to discuss.

B.11 Multiple elements tripping at 400/220kV Kashipur(UK) at 04:39 hrs & 05:27 hrs on 18.08.2025

B.11.1 On 18.08.2025 at 04:39 hrs & 05:27 hrs, multiple elements tripping occurred at 400/220kV Kashipur(UK). Approx. 260 MW load of Uttarakhand control area affected during the event.

B.11.2 As reported, at 04:39 hrs, Y-N fault occurred on 220kV Kashipur-Jafarpur line. On this fault, A/R attempt was taken however 3-ph tripping didn't occur after dead time on permanent fault. This further led to tripping of 400/220kV ICT-1&2 at Kashipur(UK). Again at 05:27 hrs, both ICTs tripped during charging of 220kV Kashipur-Jafarpur line due to persistent fault.

B.11.3 400kV Moradabad-Kashipur Line also tripped at 05:27 hrs on distance protection operation in Z-1 from Moradabad end. Reason of tripping of the line on fault at 220kV side of Kashipur need to be identified. In case of any issue in protection settings,

necessary corrections need to be done.

B.11.4 From above tripping event, it is suspected that there is some issue in protection setting / logic of distance relay of 220kV Kashipur-Jafarpur line. Reason of the same need to be identified.

B.11.5 In view of above, SLDC-Uttarakhand / PTCUL and SLDC-UP/ UPPTCL are requested to analyse the tripping events and share the details analysis. In case of any shortcoming in protection system and its coordination, necessary corrective actions need to be taken. Confirmation w.r.t. action taken may also be shared.

Decision required from Forum:

Members may like to discuss.

Part-C: Agenda for final approval of protection settings by PSC Forum for FTCs which have been provisionally allowed by NRLDC/SLDCs

C.1. First Time Charging of transmission lines/Bays/Transformer/Reactor etc. by NRLDC

C.1.1 NRLDC has submitted the FTCs allowed in month of **June-July 2025**. The same may be found on NRPC website: http://164.100.60.165/meetings/prsub.html

C.1.2 As per approved procedure of NRPC, utilities have to put up agenda in PSC forum for final approval of settings.

C.1.3 Following utility has submitted agenda for approval of settings:

i. POWERGRID/NR-1
ii. POWERGRID/NR-2
iii. ADANI
iv. ESSEL
v. GHATAMPUR THERMAL PLANT
vi. HVPN
vii. HPSLDC
viii. Gurgaon Palwal Transmission Limited (“GPTL”)

C.1.4 However, none of the settings have been put up by following utilities:

i. KHIDRAT

ii. EDEN
iii. ACME
iv. SERENTICA
v. SJVN GREEN
vi. XL XERGI
vii. AMBUJA CEMENT LIMITED

C.1.5 These all submitted settings are available at NRPC website: http://164.100.60.165/meetings/prsub.html.

C.1.6 It is to highlight that as per decisions of 54th PSC meeting:

Quote

NRLDC shall give provisional protection clearance during FTC on conditional basis subject to submission of agenda in next Protection Sub-Committee meetings (not later than 2nd next PSC meeting). If utility does not put up the agenda within time, further FTC clearance would not be granted to the concerned.

Unquote

Decision required from Forum:

Members may refer settings put up by utilities for any correction required. Accordingly, settings may be approved by Forum. Concerned members may be directed to submit the agenda for final approval of protection settings.

C.2. First Time Charging of transmission lines/Bays/Transformer/Reactor etc. by SLDCs

C.2.1 HVPN has submitted settings for charging completed in June-July 2025.
C.2.2 HPSLDC has submitted settings for charging of Kuther HEP.
C.2.3 These all submitted settings are available at NRPC website: http://164.100.60.165/meetings/prsub.html.
C.2.4 No details of other state level FTC have been received in NRPC Secretariat.

Decision required from Forum:

Agenda of 62nd Protection Sub-Committee Meeting (26th August, 2025)

Members may refer settings put up by utilities for any correction required. Accordingly, settings may be approved by Forum. Concerned members may be directed to submit the agenda for final approval of protection settings.

*****

Status of action taken on decisions of 61st PSC

S.N.	Agenda No.	Agenda	Decision of 60th PSC	Status of action Taken
1	A.4	Intimation of performance of SPS (agenda by NRPC Secretariat	SLDCs may submit protection performance indices for SPS on a monthly basis by 7th date of each month in the same format as that of protection performance indices of elements (lines/ICT etc).	SPS Indices awaited from all SLDCs of NR.
2	B.8	Corrective action for healthiness of 500kV Mundra-Mahindergarh SPS (agenda by NRLDC)	ADANI was requested to expedite the necessary actions at their end. It was also requested to give action plan of corrective actions for smooth coordination and actions. Weekly progress and status of actions may also be shared. State representatives were also requested to coordinate with the ADANI team and also ensure incorporation of identified revised feeders for load relief in SPS. Desired remedial actions need to be expedited.	Agenda has been taken again.
3	Table Agenda	Multiple elements tripping event in Delhi control area on 15.06.2025(agenda by NRLDC)	PSC forum requested DTL to review of protection system at affected substations to avoid undesired tripping in future. Expeditious remedial measures to avoid frequent tripping events in future and for revival of transmission elements (ICTs) need to be taken	Status awaited from DTL.

Annexure-A.II

Status of perfomance indices reporting of June 2025 (Last date of submission 07.07.2025)							
S. No.	**Utility**		**Received Status (Yes/No)**	**Vide mail dated**	**Remarks**	**Indices less than 1 (Yes/No)**	**Reason submitted and corrective action taken**
1	PGCIL	Central Government owned Transmission Company	Yes	06.07.2025	NR-1	NO	NA
			Yes	07.07.2025	NR-2	YES	YES
			Yes	08.07.2025	NR-3	NO	NA
2	NTPC	Central Generating Company	Yes	09.07.2025	Anta	YES	YES
					Auriya		
			Yes	03.07.2025	Dadri	NO	NA
			Yes	10.07.2025	Koldam	NO	NA
					Rihand		
			Yes	11.07.2025	Singrauli	NO	NA
			Yes	13.07.2025	Unchahar	NO	NA
			Yes	04.07.2025	Tanda	NO	NA
3	BBMB		Yes	21.07.2025	-	NO	NA
4	THDC		Yes	07.07.2025	Tehri	Yes	YES
					Koteshwar		
5	SJVN		Yes	05.07.2025	RHPS	NO	NA
			Yes	05.07.2025	NJHPS	NO	NA
6	NHPC		Yes	01.07.2025	-	NO	NA
7	NPCIL				RAPS-A		
			Yes	07.07.2025	RAPS-B	NO	NA
			Yes	04.07.2025	RAPS-C(5&6)	NO	NA
					RAP -D (7 & 8)		
					NAPS-1&2		
8	DTL	State Transmission Utility					
9	HVPNL		Yes	07.07.2025	-	YES	YES
10	RRVPNL		Yes	04.07.2025	-	YES	YES
11	UPPTCL		Yes	02.07.2025	Meerut Circle	NO	NA
			Yes	03.07.2025	Agra Circle		
			Yes	02.07.2025	Jhansi Circle	NO	NA
			Yes	03.07.2025	Prayagraj Circle	YES	YES
			Yes	03.07.2025	Gorakhpur Circle		
			Yes	03.07.2025	Lucknow Circle		
12	PTCUL		Yes	05.07.2025	Kumaon	NO	NA
					Garhwal		
13	PSTCL		Yes	18.08.2025		yes	no
14	HPPTCL		Yes	05.07.2025	-	NO	NA
15	JKPTCL		Yes	01.07.2025	Jammu	NO	NA
			Yes	01.07.2025	Kashmir	NO	NA
16	IPGCL		Yes	04.07.2025	PPS-I	NO	NA
			Yes	04.07.2025	PPS-III, Bawana	NO	NA
17	HPGCL		Yes	12.07.2025	PTPS, Panipat	NO	NA
			Yes	12.07.2025	DCRTPP, Yamunanagar	NO	NA
			Yes	12.07.2025	RGTPP (Khedar)	NO	NA
18	RRVUNL		YES	07.07.2025	KTPS	NO	NA
			YES	07.07.2025	kATPP, Jhalawar	NO	NA

Status of perfomance indices reporting of June 2025 (Last date of submission 07.07.2025)							
S. No.	**Utility**		**Received Status (Yes/No)**	**Vide mail dated**	**Remarks**	**Indices less than 1 (Yes/No)**	**Reason submitted and corrective action taken**
		State Generating Company	YES	07.07.2025	CSCTPP Chhabra	NO	NA
			YES	07.07.2025	RGTPP, Ramgarh	NO	NA
			YES	07.07.2025	Ctpp,Chhabra	NO	NA
			Yes	01.07.2025	DCCPP, Dholpur	NO	NA
			YES	07.07.2025	STPS Suratgarh	NO	NA
			YES	07.07.2025	SSCTPS Suratgarh	NO	NA
18	UPRVUNL				Parichha B (220 kV)		
			Yes	01.07.2025	Parichha C (400 kV)	NO	NA
			Yes	02.07.2025	DTPS Anpara	NO	NA
					Obra A & B		
					Obra C		
					Harduaganj 400 kV		
					Ghatampur 765 kV		
					Anpara-A&B		
					Panki TPS		
					Jawaharpur		
19	UJVNL		Yes	02.07.2025	Dharasu	NO	NA
			Yes	02.07.2025	Tiloth	NO	NA
					Khodri		
					Chibro		
					Vyasi		
20	HPPCL		YES	05.07.2025	Kashang HEP	NO	NA
			YES	05.07.2025	Sawara Kuddu	NO	NA
			YES	05.07.2025	Sainj	NO	NA
21	PSPCL	State Generating Company & State owned Distribution Company	Yes	03.07.2025	RSD	NO	NA
			Yes	11.07.2025	GGSTPS, Rupnagar	NO	NA
			YES	01.07.2025	GVK Power Goindwal Shahib Ltd.	NO	NA
					GHSTPS, Lehra Mohabbat		
22	HPSEBL	Distribution company having Transmission connectivity ownership	YES	05.07.2025	Hamirpur Circle	NO	NA
			YES	05.07.2025	Shimla Circle	NO	NA
23	Prayagraj Power Generation Co. Ltd.		YES	01.07.2025		YES	YES
24	Aravali Power Company Pvt. Ltd						
25	Apraava Energy Private Limited		YES	21.07.2025		NO	NA
26	Talwandi Sabo Power Ltd.		YES	02.07.2025		NO	NA
27	Nabha Power Limited		YES	01.07.2025		NO	NA
28	MEIL Anpara Energy Ltd (Anpara-C)						
29	Rosa Power Supply Company Ltd		YES	04.07.2025		NO	NA
30	Lalitpur Power Generation Company Ltd		YES	02.07.2025		NO	NA
31	MEJA Urja Nigam Ltd.						
32	Adani Power Rajasthan Limited		YES	05.07.2025	Kawai	NO	NA
33	JSW Energy Ltd. (KWHEP)		YES	03.07.2025		NO	NA
	ISTS Transmission Utilities						
#REF!	INDIGRID						
#REF!	ADHPL		Yes	07.07.2025	220 kV Prini	No	Na

Status of perfomance indices reporting of June 2025 (Last date of submission 07.07.2025)							
S. No.	**Utility**		**Received Status (Yes/No)**	**Vide mail dated**	**Remarks**	**Indices less than 1 (Yes/No)**	**Reason submitted and corrective action taken**
#REF!	Adani Transmission Limited	AESL	Yes	11.07.2025		No	Na
#REF!	Bikaner Khetri Transmission Limited		Yes	11.07.2025		No	Na
#REF!	Fatehgarh Bhadla Transmission Limited		Yes	11.07.2025		No	Na
#REF!	Powergrid Sikar Transmission Limited	POWERGRID, NR-1					
#REF!	Powergrid Aligarh Sikar Transmission Limited						
#REF!	Powergrid Ajmer Phagi Transmission Limited						
#REF!	Powergrid Bikaner Transmission System Limited						
#REF!	Powergrid Khetri Transmission System Limited						
#REF!	Powergrid Ramgarh Transmission Limited						
#REF!	Powergrid Fatehgarh Transmission Limited						
#REF!	Powergrid Bhadla Transmission Limited						
#REF!	Powergrid Meerut Simbhavli Transmission Limited						
#REF!	Powergrid Kala Amb Transmission Limited	POWERGRID, NR-2					
	State Utilities						
	Uttar Pradesh						
#REF!	Vishnuprayag Hydro Electric Plant (J.P.)						
#REF!	Alaknanda Hydro Electric Plant (GVK)		YES	08.07.2025		NO	NA
#REF!	Khara Power House (Khara)		YES	04.07.2025		NO	NA
#REF!	WUPPTCL		Yes	02.07.2025		No	NA
#REF!	SEUPPTCL						
#REF!	ATSCL	**AESL**					
#REF!	GTL	**AESL**					
#REF!	HPTSL	**AESL**					
#REF!	MTSCL	**AESL**					
#REF!	OCBTL	**AESL**					
69	STSL	**AESL**					
	Rajasthan						
70	Barsingsar Plant	**NLC**					
71	Rajwest Plant	**JSW**					
	RE Utilities						
72	ABC Renewable Pvt. Ltd		YES	07.07.2025		NO	NA
73	ACME Heeragarh powertech Pvt. Ltd						
74	ACME Chittorgarh Solar Energy Pvt Ltd						
75	AHEJOL-Hybrid-1 Madhopura	ADANI GREEN	YES	07.07.2025		NO	NA
76	AHEJ3L - Hybrid-2B 300MW	ADANI GREEN	YES	07.07.2025		NO	NA
77	AHEJFL(AEML_250)	ADANI GREEN	YES	07.07.2025		NO	NA
78	AHEJ4L(AEML-350)	ADANI GREEN	YES	07.07.2025		NO	NA
79	ASEJ2PL(Hapasar 300MW) SPC11PL	ADANI GREEN	YES	07.07.2025		NO	NA

Status of perfomance indices reporting of June 2025 (Last date of submission 07.07.2025)							
S. No.	Utility		Received Status (Yes/No)	Vide mail dated	Remarks	Indices less than 1 (Yes/No)	Reason submitted and corrective action taken
80	Adani Renewable Energy (RJ) Limited Rawra 200	ADANI GREEN	YES	07.07.2025		NO	NA
81	Adani Solar Energy Four Limited SECI 50	ADANI GREEN	YES	07.07.2025		NO	NA
82	Adani Solar Energy Jodhpur Two Limited Merchant 50	ADANI GREEN	YES	07.07.2025		NO	NA
83	ASEJ05PL (RJ200)	ADANI GREEN	YES	07.07.2025		NO	NA
84	ASERJ2PL - Phalodi 150 MW	ADANI GREEN	YES	07.07.2025		NO	NA
85	ASERJ01PL-Pokhran 300 MW (SB energy six)	ADANI GREEN	YES	07.07.2025		NO	NA
86	AGE25L(Badi Sid)	ADANI GREEN	YES	07.07.2025		NO	NA
87	Bhadla park - South block	ADANI GREEN	YES	07.07.2025		NO	NA
	AGE24L (Bhimsar)	ADANI GREEN					
	AHEJ2L - Hybrid-2A 300MW	ADANI GREEN					
	ASERJ2PL - Devikot 180 MW	ADANI GREEN					
88	ASEJOPL-Hybrid 450 MW	ADANI GREEN	YES	07.07.2025		NO	NA
89	Altra Xergi Pvt. Ltd.		YES	07.07.2025		NO	NA
90	AMP Energy Green Four Pvt. Ltd.		YES	05.07.2025		NO	NA
91	AMP Energy Green Five Pvt. Ltd.		YES	05.07.2025		NO	NA
	AMP Energy Green Six Pvt. Ltd.		YES	05.07.2025		NO	NA
92	Amplus Ages Private Limited	AmPlus Solar	YES	07.07.2025		NO	NA
93	Avaada RJHN_240MW	Avaada	YES	04.07.2025		NO	NA
94	Avaada sunce energy Pvt limited		YES	04.07.2025		NO	NA
95	Avaada Sunrays Pvt. Ltd.		YES	04.07.2025		NO	NA
96	Avaada Sustainable RJ Pvt. Ltd.		YES	04.07.2025		NO	NA
97	Ayana Renewable Power Three Private Limited						
98	Ayaana Renewable Power One Pvt. Ltd.						
99	Azure Power Forty One Pvt limited						
100	Azure Power Forty Three Pvt. Ltd._RSS						
101	Azure Maple Pvt. Ltd.						
102	AZURE POWER INDIA Pvt. Ltd., Bhadla						
103	Azure Power Thirty Four Pvt. Ltd.						
104	SB Energy Six Private Limited, Bhadla						
105	Clean Solar Power (Jodhpur) Pvt. Ltd.						
106	Clean Solar Power (Bhadla) Pvt. Ltd						
107	Eden Renewable Cite Private Limited						
108	Grian Energy private limited		YES	07.07.2025		NO	NA
109	Mahindra Renewable Private Limited						
110	Mega Surya Urja Pvt. Ltd. (MSUPL)						
111	AURAIYA Solar						
112	DADRI SOLAR						
113	SINGRAULI SOLAR						
114	Anta Solar						
115	Unchahar Solar						

Status of perfomance indices reporting of June 2025 (Last date of submission 07.07.2025)							
S. No.	Utility		Received Status (Yes/No)	Vide mail dated	Remarks	Indices less than 1 (Yes/No)	Reason submitted and corrective action taken
116	NTPC Devikot Solar plant-1	NGEL	y	08.08.2025		n	na
117	NTPC Devikot Solar plant-2		y	08.08.2025		n	na
#REF!	SKB NTPC -1 (250MW)	NGEL	y	08.08.2025		n	na
#REF!	SKB NTPC-2 (300MW)		y	08.08.2025		n	na
#REF!	NTPC Nokhra_300MW		y	08.08.2025		Y	NO
#REF!	NTPC Fatehgarh 296MW		y	08.08.2025		n	na
#REF!	One Volt energy Pvt. Ltd.		YES	07.07.2025		NO	NA
#REF!	ReNew Solar Urja Private Limited	IndiGrid					
#REF!	ReNew Solar Energy (Jharkhand Three) Private Limited	ReNew	YES	04.07.2025		NO	NA
#REF!	RENEW SOLAR POWER Pvt. Ltd. Bhadla		YES	04.07.2025		NO	NA
#REF!	Renew Sun Bright Pvt. Ltd. (RSBPL)		YES	04.07.2025		NO	NA
#REF!	Renew Surya Partap Pvt. Ltd.		YES	04.07.2025		NO	NA
#REF!	Renew Surya Ravi Pvt. Ltd.		YES	04.07.2025		NO	NA
#REF!	Renew Surya Roshni Pvt. Ltd.		YES	04.07.2025		NO	NA
#REF!	Renew Surya Vihan Pvt. Ltd.		YES	04.07.2025		NO	NA
#REF!	Renew Surya Ayaan Pvt. Ltd.		YES	04.07.2025		YES	YES
#REF!	Renew Solar Photovoltaic Pvt Ltd		YES	04.07.2025		NO	NA
#REF!	RENEW SOLAR POWER Pvt. Ltd. Bikaner						
#REF!	Rising Sun Energy-K Pvt. Ltd.						
#REF!	Serentica Renewables India 4 Private Limited						
#REF!	Solzen Urja Private Limited	Sekura	YES	07.07.2025		NO	NA
#REF!	Tata Power Green Energy Ltd. (TPGEL)	TATA POWER					
#REF!	Tata Power Renewable Energy Ltd. (TPREL)						
#REF!	Banderwala Solar Plant TP Surya Ltd.						
#REF!	Thar Surya Pvt. Ltd.						
#REF!	TP Surya Pvt. Ltd.						
#REF!	TRANSITION ENERGY SERVICES PRIVATE LIMITED						
#REF!	Transition Green Energy Private Limited						
#REF!	Transition Sustainable Energy Services Private Limited						

Status of perfomance indices reporting of July 2025 (Last date of submission 07.08.2025)							
S. No.	**Utility**		**Received Status (Yes/No)**	**Vide mail dated**	**Remarks**	**Indices less than 1 (Yes/No)**	**Reason submitted and corrective action taken**
1	PGCIL	Central Government owned Transmission Company	Y	07.08.2025	NR-1	No	NA
			y	12.08.2025	NR-2	yes	no
			Y	08.08.2025	NR-3	No	NA
2	NTPC				Anta		
					Auriya		
			y	12.08.2025	Dadri	No	NA
					Koldam		
					Rihand		
					Singrauli		
			Yes	01.08.2025	Unchahar	No	NA
			Y	05.08.2025	Tanda	No	NA
3	BBMB	Central Generating Company					
4	THDC		Yes	02.08.2025	Tehri	No	NA
			Y	06.08.2025	Tehri PSP	No	NA
			y	13.08.2025	Koteshwar	No	NA
5	SJVN		Y	06.08.2025	RHPS	YES	YES
			Y	06.08.2025	NJHPS	YES	YES
6	NHPC		Yes	01.08.2025	-	Yes	Yes
7	NPCIL		y	07.08.2025	RAPS-A	No	na
			Y	05.08.2025	RAPS-B	No	na
			Y	05.08.2025	RAPS-C(5&6)	No	na
					RAP -D (7 & 8)		
					NAPS-1&2		
8	DTL	State Transmission Utility					
9	HVPNL		Yes	05.08.2025	-	No	NA
10	RRVPNL		Y	07.08.2025	-	YES	YES
11	UPPTCL		Yes	02.08.2025	Meerut Circle	No	NA
			Yes	04.08.2025	Agra Circle	No	NA
			Yes	01.08.2025	Jhansi Circle	No	NA
			Yes	04.08.2025	Prayagraj Circle	Yes	No
			Yes	04.08.2025	Gorakhpur Circle	No	NA
			Yes	04.08.2025	Lucknow Circle	No	NA
12	PTCUL		Yes	05.08.2025	Kumaon	No	NA
			Yes	05.08.2025	Garhwal	No	NA
13	PSTCL						
14	HPPTCL				-		
15	JKPTCL	UT	Yes	05.08.2025	Jammu	No	NA
		UT	Yes	05.08.2025	Kashmir	No	NA
	Chandigarh Power Distribution Ltd	UT	Y	07.08.2025	220 Kv Kishangarh	No	NA
16	IPGCL		y	06.08.2025	PPS-I	No	NA
			y	06.08.2025	PPS-III, Bawana	No	NA
17	HPGCL		y	06.08.2025	PTPS, Panipat	No	NA
			y	06.08.2025	DCRTPP, Yamunanagar	No	NA
			y	06.08.2025	RGTPP (Khedar)	No	NA
18	RRVUNL		Yes	01.08.2025	KTPS	No	NA

Status of perfomance indices reporting of July 2025 (Last date of submission 07.08.2025)							
S. No.	**Utility**		**Received Status (Yes/No)**	**Vide mail dated**	**Remarks**	**Indices less than 1 (Yes/No)**	**Reason submitted and corrective action taken**
		State Generating Company	Y	07.08.2025	kATPP, Jhalawar	No	NA
			Y	07.08.2025	CSCTPP Chhabra	No	NA
			Y	05.08.2025	RGTPP, Ramgarh	No	NA
			Y	07.08.2025	Ctpp,Chhabra	No	NA
			Yes	01.08.2025	DCCPP, Dholpur	No	NA
			Y	07.08.2025	STPS Suratgarh	No	NA
			Y	07.08.2025	SSCTPS Suratgarh	No	NA
18	UPRVUNL				Parichha B (220 kV)		
			Yes	01.08.2025	Parichha C (400 kV)	No	NA
			Yes	01.08.2025	DTPS Anpara	No	NA
					Obra A & B		
					Obra C		
					Harduaganj 400 kV		
					Ghatampur 765 kV		
					Anpara-A&B		
					Panki TPS		
					Jawaharpur		
19	UJVNL				Dharasu		
					Tiloth		
					Khodri		
					Chibro		
					Vyasi		
20	HPPCL				Kashang HEP		
					Sawara Kuddu		
					Sainj		
21	PSPCL	State Generating Company & State owned Distribution Company	Y	05.08.2025	RSD	No	NA
					GGSTPS, Rupnagar		
			Yes	01.08.2025	GVK Power Goindwal Shahib Ltd.	No	NA
			Y	06.08.2025	GHSTPS, Lehra Mohabbat	No	NA
22	HPSEBL	Distribution company having Transmission connectivity ownership	Yes	04.08.2025	Hamirpur Circle	No	NA
					Shimla Circle		
23	Prayagraj Power Generation Co. Ltd.		Yes	01.08.2025	-	No	NA
24	Aravali Power Company Pvt. Ltd						
25	Apraava Energy Private Limited		Y	06.08.2025		No	NA
26	Talwandi Sabo Power Ltd.		Y	06.08.2025		No	NA
27	Nabha Power Limited		Y	01.08.2025		No	NA
28	MEIL Anpara Energy Ltd (Anpara-C)						
29	Rosa Power Supply Company Ltd		Yes	04.08.2025		No	NA
30	Lalitpur Power Generation Company Ltd						
31	MEJA Urja Nigam Ltd.						
32	Adani Power Rajasthan Limited		Y	05.08.2025	Kawai	No	NA
33	JSW Energy Ltd. (KWHEP)		Yes	04.08.2025		No	NA
	ISTS Transmission Utilities						
#REF!	INDIGRID						
#REF!	ADHPL		Y	06.08.2025	220 kV Prini	No	NA
#REF!	Adani Transmission Limited	AESL	Y	06.08.2025		No	NA
#REF!	Bikaner Khetri Transmission Limited		Y	06.08.2025		No	NA
#REF!	Fatehgarh Bhadla Transmission Limited		Y	06.08.2025		No	NA
#REF!	Powergrid Sikar Transmission Limited	POWERGRID, NR-1					
#REF!	Powergrid Aligarh Sikar Transmission Limited	POWERGRID, NR-1					

Status of perfomance indices reporting of July 2025 (Last date of submission 07.08.2025)							
S. No.	**Utility**		**Received Status (Yes/No)**	**Vide mail dated**	**Remarks**	**Indices less than 1 (Yes/No)**	**Reason submitted and corrective action taken**
#REF!	Powergrid Ajmer Phagi Transmission Limited	POWERGRID, NR-1					
#REF!	Powergrid Bikaner Transmission System Limited	POWERGRID, NR-1					
#REF!	Powergrid Khetri Transmission System Limited	POWERGRID, NR-1					
#REF!	Powergrid Ramgarh Transmission Limited	POWERGRID, NR-1					
#REF!	Powergrid Fatehgarh Transmission Limited	POWERGRID, NR-1					
#REF!	Powergrid Bhadla Transmission Limited	POWERGRID, NR-1					
#REF!	Powergrid Meerut Simbhavli Transmission Limited	POWERGRID, NR-1					
#REF!	Powergrid Kala Amb Transmission Limited	POWERGRID, NR-2					
	State Utilities						
	Uttar Pradesh						
5	Vishnuprayag Hydro Electric Plant (J.P.)		Yes	01.08.2025		No	NA
6	Alaknanda Hydro Electric Plant (GVK)		Y	05.08.2025		N	NA
7	Khara Power House (Khara)		Y	04.08.2025		N	NA
8	WUPPTCL		Y	02.08.2025		N	NA
9	SEUPPTCL						
10	ATSCL	**AESL**	Y	06.08.2025		No	NA
11	GTL	**AESL**	Y	06.08.2025		No	NA
12	HPTSL	**AESL**	Y	06.08.2025		No	NA
13	MTSCL	**AESL**	Y	06.08.2025		No	NA
14	OCBTL	**AESL**	Y	06.08.2025		No	NA
69	STSL	**AESL**	Y	06.08.2025		No	NA
	Rajasthan						
70	Barsingsar Plant	**NLC**					
71	Rajwest Plant	**JSW**					
	RE Utilities						
72	ABC Renewable Pvt. Ltd		Y	07.08.2025		NO	NA
73	ACME Heeragarh powertech Pvt. Ltd						
74	ACME Chittorgarh Solar Energy Pvt Ltd						
75	AHEJOL-Hybrid-1 Madhopura	ADANI GREEN	Y	06.08.2025		No	NA
76	AHEJ3L - Hybrid-2B 300MW	ADANI GREEN	Y	06.08.2025		No	NA
77	AHEJFL(AEML_250)	ADANI GREEN	Y	06.08.2025		No	NA
78	AHEJ4L(AEML-350)	ADANI GREEN	Y	06.08.2025		No	NA
79	ASEJ2PL(Hapasar 300MW) SPC11PL	ADANI GREEN	Y	06.08.2025		No	NA
80	Adani Renewable Energy (RJ) Limited Rawra 200	ADANI GREEN	Y	06.08.2025		No	NA
81	Adani Solar Energy Four Limited SECI 50	ADANI GREEN	Y	06.08.2025		No	NA
82	Adani Solar Energy Jodhpur Two Limited Merchant 50	ADANI GREEN	Y	06.08.2025		No	NA
83	ASEJ05PL (RJ200)	ADANI GREEN	Y	06.08.2025		No	NA
84	ASERJ2PL - Phalodi 150 MW	ADANI GREEN	Y	06.08.2025		No	NA
85	ASERJ01PL-Pokhran 300 MW (SB energy six)	ADANI GREEN	Y	06.08.2025		No	NA
86	AGE25L(Badi Sid)	ADANI GREEN	Y	06.08.2025		No	NA

Status of perfomance indices reporting of July 2025 (Last date of submission 07.08.2025)							
S. No.	Utility		Received Status (Yes/No)	Vide mail dated	Remarks	Indices less than 1 (Yes/No)	Reason submitted and corrective action taken
87	Bhadla park - South block	ADANI GREEN	Y	06.08.2025		No	NA
	AGE24L (Bhimsar)	ADANI GREEN	Y	06.08.2025		No	NA
	AHEJ2L - Hybrid-2A 300MW	ADANI GREEN	Y	06.08.2025		No	NA
	ASERJ2PL - Devikot 180 MW	ADANI GREEN	Y	06.08.2025		No	NA
88	ASEJOPL-Hybrid 450 MW	ADANI GREEN	Y	06.08.2025		No	NA
89	Altra Xergi Pvt. Ltd.		Yes	04.08.2025		N	NA
90	AMP Energy Green Four Pvt. Ltd.	AMPIN ENERGY	Y	07.08.2025		N	NA
91	AMP Energy Green Five Pvt. Ltd.	AMPIN ENERGY	Y	07.08.2025		N	NA
	AMP Energy Green Six Pvt. Ltd.	AMPIN ENERGY	Y	07.08.2025		N	NA
92	Amplus Ages Private Limited	GENTARI	Y	07.08.2025		N	NA
93	Avaada RJHN_240MW	Avaada	Yes	04.08.2025		N	NA
94	Avaada sunce energy Pvt limited		Yes	04.08.2025		N	NA
95	Avaada Sunrays Pvt. Ltd.		Yes	04.08.2025		N	NA
96	Avaada Sustainable RJ Pvt. Ltd.		Yes	04.08.2025		N	NA
97	Ayana Renewable Power Three Private Limited						
98	Ayaana Renewable Power One Pvt. Ltd.						
99	Azure Power Forty One Pvt limited						
100	Azure Power Forty Three Pvt. Ltd._RSS						
101	Azure Maple Pvt. Ltd.						
102	AZURE POWER INDIA Pvt. Ltd., Bhadla						
103	Azure Power Thirty Four Pvt. Ltd.						
104	SB Energy Six Private Limited, Bhadla						
105	Clean Solar Power (Jodhpur) Pvt. Ltd.						
106	Clean Solar Power (Bhadla) Pvt. Ltd						
107	Eden Renewable Cite Private Limited						
108	Grian Energy private limited	GENTARI	Y	07.08.2025		N	NA
109	Mahindra Renewable Private Limited						
110	Mega Surya Urja Pvt. Ltd. (MSUPL)						
111	AURAIYA Solar						
112	DADRI SOLAR						
113	SINGRAULI SOLAR						
114	Anta Solar						
115	Unchahar Solar						
116	NTPC Devikot Solar plant-1	NGEL	y	08.08.2025		n	na
117	NTPC Devikot Solar plant-2		y	08.08.2025		n	na
#REF!	SKB NTPC -1 (250MW)	NGEL	y	08.08.2025		n	na
#REF!	SKB NTPC-2 (300MW)		y	08.08.2025		n	na
#REF!	NTPC Nokhra_300MW		y	08.08.2025		n	na
#REF!	NTPC Fatehgarh 296MW		y	08.08.2025		n	na
#REF!	One Volt energy Pvt. Ltd.	GENTARI	Y	07.08.2025		N	NA
#REF!	ReNew Solar Urja Private Limited	IndiGrid					
#REF!	ReNew Solar Energy (Jharkhand Three) Private Limited		Y	08.08.2025			
#REF!	RENEW SOLAR POWER Pvt. Ltd. Bhadla		N				
#REF!	Renew Sun Bright Pvt. Ltd. (RSBPL)		Y	08.08.2025			
#REF!	Renew Surya Partap Pvt. Ltd.	ReNew	Y	08.08.2025			
#REF!	Renew Surya Ravi Pvt. Ltd.		Y	08.08.2025			
#REF!	Renew Surya Roshni Pvt. Ltd.		Y	08.08.2025			
#REF!	Renew Surya Vihan Pvt. Ltd.		Y	08.08.2025			
#REF!	Renew Surya Ayaan Pvt. Ltd.		Y	20.08.2025			

Status of perfomance indices reporting of July 2025 (Last date of submission 07.08.2025)							
S. No.	**Utility**		**Received Status (Yes/No)**	**Vide mail dated**	**Remarks**	**Indices less than 1 (Yes/No)**	**Reason submitted and corrective action taken**
#REF!	Renew Solar Photovoltaic Pvt Ltd		Y	20.08.2025			
#REF!	RENEW SOLAR POWER Pvt. Ltd. Bikaner		Y	08.08.2025			
#REF!	Rising Sun Energy-K Pvt. Ltd.						
#REF!	Serentica Renewables India 4 Private Limited						
#REF!	Solzen Urja Private Limited	Sekura	Y	05.08.2025		No	NA
#REF!	Tata Power Green Energy Ltd. (TPGEL)	TATA POWER	Y	06.08.2025		No	NA
#REF!	Tata Power Renewable Energy Ltd. (TPREL)		Y	06.08.2025		No	NA
#REF!	Banderwala Solar Plant TP Surya Ltd.		Y	06.08.2025		No	NA
#REF!	Thar Surya Pvt. Ltd.						
#REF!	TP Surya Pvt. Ltd.						
#REF!	TRANSITION ENERGY SERVICES PRIVATE LIMITED						
#REF!	Transition Green Energy Private Limited						
#REF!	Transition Sustainable Energy Services Private Limited						

Annexure-A.III

~~Annexure-X~~

FormatNo.-PI-01

Reporting of performance indices for protection system

(forelementsconnected at 220KV and above)

Name of Utility: Tehri HEP,THDCIL

Month: June-2025

S.N.	Sub-station	Unit(SPS/LINE/ICT/GT/etc.)	Nc	Nf	Nu	Ni	Dependability Index(D)	Security Index(s)	Reliability Index(R)	Remarks
1.	TEHRI HPP	TEHRI-KOTESHWAR CKT-1	0	0	1	1	Not defined	0	0	On 28.06.2025 at 15:52 Hrs. 400KV Tehri Koteshwar Ckt-1 CB tripped due to LBB operation caused by DC earth leakage.

Justification for less than one index may be attached separately.

Nc is the number of correct operations at internal power System faults

Nf is the number of failures to operate at Internal power system faults

Nu is the number of unwanted Operations

Ni is the number of incorrect operations and Di is the sum of Nf and Nu

07/07/2025

सागर बागड़ा
Sagar Bagra
सहा. प्रबंधक (ओ.एण्ड.एम.)
Asst. Manager (O&M)
टीएचडीसीआईएल, टिहरी
THDCIL, Tehri

Annexure-X

Format No.-PI-01

Reporting of performance indices for protection system

(for elements connected at 220 kV and above)

Name of Utility: HVPNL

Month: June, 2025

S.N.	Substation	Unit (SPS/Line/ICT/GT/ etc)	Nc	Nf	Nu	Ni	Dependability Index (D=Nc/Nc+Nf)	Security Index (S=Nc/Nc+Nu)	Reliability Index (R=Nc/Nc+Ni)
M&P Division, Gurugram									
1	220KV B/Pur	220KV B/Pur to Sohna Road Ckt-1	**1**	**0**	**0**	**0**	**1**	**1**	**1**
2	220KV B/Pur	220KV B/Pur to Sohna Road Ckt-2	**1**	**0**	**0**	**0**	**1**	**1**	**1**
3	220KV Lula Ahir	220KV Dadri (BBMB)-Lula Ahir line	**1**	**0**	**0**	**0**	**1**	**1**	**1**
4	220KV GIS Transport Hub IMT Manesar	220KV GIS Transport Hub IMT Manesar-MSIL Ckt-2	**1**	**0**	**0**	**0**	**1**	**1**	**1**
5	220KV Sector-107 Gurugram	220/33KV 100MVA T-1	**1**	**0**	**0**	**0**	**1**	**1**	**1**
M&P Division, Faridabad									
1	220KV Palli	220KV Kadarpur-Palli Ckt-1	**0**	**0**	**1**	**1**	**0**	**1**	**1**
M&P Division, Hisar									
1	220 KV S/Stn. Bhuna	220 KV Fatehabad PG – Bhuna Line	**2**	**0**	**0**	**0**	**1**	**1**	**1**
2	220 KV S/Stn. Bhiwani	220 KV Bhiwani – Bhiwani PG Ckt. 01	**1**	**0**	**0**	**0**	**1**	**1**	**1**
3	220 KV S/Stn. Bhiwani	220 KV Bhiwani – Bhiwani PG Ckt. 02	**1**	**0**	**0**	**0**	**1**	**1**	**1**
M&P Division, Dhulkote									

1.	220 KV Baddi HP SLDC	220 KV Baddi- Pinjore Ckt.-1(12.06.2025)	**1**	**0**	**0**	**0**	**1**	**1**	**1**
2.	220 KV Baddi HP SLDC	220 KV Baddi- Pinjore Ckt.-2(12.06.2025)	**1**	**0**	**0**	**0**	**1**	**1**	**1**
3.	220 KV Pinjore	220 kV Pinjore-PG- Panchkula ckt-2(12.06.2025)	**1**	**0**	**0**	**0**	**1**	**1**	**1**
4.	220 KV Pinjore	220 kV Pinjore- Panchkula ckt-2(15.06.2025)	**1**	**0**	**0**	**0**	**1**	**1**	**1**
5.	220 KV Pinjore	220 kV Pinjore- PG-Panchkula ckt-1(18.06.2025)	**1**	**0**	**0**	**0**	**1**	**1**	**1**
6.	220 KV Pinjore	220 kV Pinjore- PG-Panchkula ckt-1(28.06.2025)	**1**	**0**	**0**	**0**	**1**	**1**	**1**
M&P Division, Rohtak									
1	220kV Chajjpur	220kV BBMB Sewah Panipat - Chajjpur Ckt.-2	**1**	**0**	**0**	**0**	**1**	**1**	**1**
2	220kV Mohana	220kV Mohana - Sonipat_PG Ckt.-2	**1**	**0**	**0**	**0**	**1**	**1**	**1**
M&P Division, Karnal									
1	220KV Substation kaithal	220KV Kaithal-PG-kaithal ckt-I	**2**	**0**	**0**	**0**	**1**	**1**	**1**
2	220KV Substation kaithal	220KV Kaithal-PG-kaithal ckt-I	**2**	**0**	**0**	**0**	**1**	**1**	**1**
3	220KV substation Pehowa	220KV Pehowa-PG Kurukshetra line	**1**	**0**	**0**	**0**	**1**	**1**	**1**

Note: Justification for less than one index may be attached separately.

Nc is the number of correct operations at internal power system faults

Nf is the number of failures to operate at internal power system faults

Nu is the number of unwanted operations

Ni is the number of incorrect operations and is the sum of Nf and Nu.

Sr. No.	Dated	Divn.	Name of sub/ station	Tripping /Breakdown element	Length of line	Duration of Tripping /Break down			Relays Operated along with Relay Data		Reasons of Tripping /break-down	Area Affected if any	Analysis of Tripping/Breakdown by designated committee.	Remarks if any.
						From (Hrs.)	To (Hrs.)	Total (Hrs.)	This end (Reporting Substation)	Other end (in case of line)				
1	15.06.2025	XEN TS Faridabad	220KV Palli	220KV Palli-Kadarpur Ckt-1	19Km	11:28	13:03	01:35	Not tripped	DPR, Z-3, D=48.15km, Y-ph, E/F & master86	Tripped when tried to close ckt breaker of Ckt-2	220KV Palli, 22no.11KV fdrs, 4no.industries, 3no.independent, 15no.Urban, Load affected=28MVA	The 220kV Pali – Kaderpur Ckt-1 tripped form 400kV Kaderpur end while trying to charge the 220kV Pali - Kaderpur Ckt-II from 220kV S/Stn. Pali end, which was already under breakdown.	The mixing of Bus PT supply in the DPS relays of both 220kV Pali - Kaderpur Ckt-1 & Ckt-2 be got attended on top priority to avoid unnecessary tripping of both circuits from 400kV kaderpur S/Stn. End.

U. P. POWER TRANSMISSION CORPORATION LIMITED
(A Govt. Of Uttar Pradesh Undertaking)
(उ0 प्र0 पावर ट्रॉसमीशन कारपारेशन लिमिटेड)
(उ0 प्र0 सरकार का उपकम)

Office of the Superintending Engineer
Electricity Test & Commissioning Circle
1st Floor, 132KV G.I.S. Old Power House
Substation, 1-A Kamala Nehru Road,
Prayagraj-211001
Email:- setncalbd@upptcl.org

UPPTCL

कार्यालय अधीक्षण अभियन्ता
विद्युत परीक्षण एवं परिचालन मण्डल,
प्रथम तल, 132के0वी0 जी0आई0एस0 ओल्ड पावर
हाउस उपकेन्द्र, 1–ए कमला नेहरू रोड,
प्रयागराज 211001
Email:-setncalbd@upptcl.org

No 572 /ET&CCPr/ Protection Date 1-7- 2025

Subject: - Calculation of Protection performance indices report for the month of June 2025.

(By Email.)

Chief Engineer(A)
Director Operation
U.P.Power Transmmision Corp. Ltd.,
Shakti Bhawan Extn.,
Lucknow.

Kindly find enclosed herewith the Calculation of Protection performance indices report of 220 KV and above Sub Stations for the month of June 2025, Under TSE Zone Prayagraj for your information and necessary action.

Encl.- As above

(S. K. Gupta)
Superintending Engineer

No 572 /ET&CCPr/ Protection Date 1-7- 2025

Copy forwarded to following for kind information and necessary action:-

1- Chief Engineer (TSE), U.P. Power Transmission Corporation Ltd., 57–George Town, Pragayraj.
2- Superintending Engineer (R&A) U.P. Power Transmission Corporation Ltd., Lucknow

(S. K. Gupta)
Superintending Engineer

ET&C CIRCLE, PRAYAGRAJ

Format No.-PI-01

Reporting of performance indices for protection system

(for elements connected at 220 KV and above)

Name of utility:UPPTCL

Month 06-2025

.N.	Sub-station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni	Dependability index (D) D=(Nc/(Nc+Nf))	Security Index (S) S=(Nc/(Nc+Nu	Relibality Index (R) R=(Nc/(Nc+Ni))	REMARK
1	220 KV S/S FATEHPUR	220 KV FATEHPUR-UNCHAHAR	0	0	0	0	0	0	0	
		220 KV FATEHPUR- PGCIL-I	0	0	0	0	0	0	0	
		220 KV FATEHPUR- PGCIL-II	0	0	0	0	0	0	0	
		220KV FATEHPUR-PRAYAGRAJ CANTT	1	0	0	0	1	1	1	
		220 KV FATEHPUR- SIRATHU	3	0	0	0	P	1	1	Due to fault in DC cable (negative earthed)
		220 KV FATEHPUR- BANDA	0	0	0	0	0	0	0	
		220 KV FATEHPUR- MALWAN	0	0	0	0	0	0	0	
		200 MVA ICT-I	0	0	0	0	0	0	0	
		200 MVA ICT-II	0	0	0	0	0	0	0	
2	220 KV SS Cantt	200 MVA T/F-I	0	0	0	0	0	0	0	
		200 MVA T/F-II	0	0	0	0	0	0	0	
		220KV REWA ROAD LINE	0	0	0	0	0	0	0	
		220KV FATEHPUR LINE	1	0	0	0	1	1	1	
3	220 KV Rewa Road	200 MVA T/F-I	0	0	0	0	0	0	0	
		200 MVA T/F-II	0	0	0	0	0	0	0	
		160 MVA T/F	0	0	0	0	0	0	0	
		220 KV MIRZAPUR	0	0	0	0	0	0	0	
		220KV OBRA-I	0	0	0	0	0	0	0	
		220KV OBRA-III	1	0	0	0	1	1	1	
		220KV PGCIL-I	0	0	0	0	0	0	0	
		220KV PGCIL-II	0	0	0	0	0	0	0	
		220KV CANTT	0	0	0	0	0	0	0	
		220KV SIRATHU	0	0	0	0	0	0	0	
4	400 KV SS SARNATH	400 KV Anpara L3 Line	0	0	0	0	0	0	0	
		400 KV Anpara-L5 Line	1	0	0	0	1	1	1	
		400 KV Azamgarh Line	0	0	0	0	0	0	0	
		400 KV Varanasi-I (PG) Line	0	0	0	0	0	0	0	
		400 KV VAranasi-II (PG) Line	0	0	0	0	0	0	0	
		400/220 KV 315 MVA ICT-I	0	0	0	0	0	0	0	
		400/220 KV 500 MVA ICT-II	0	0	0	0	0	0	0	
		400/220 KV 315 MVA ICT-III	0	0	0	0	0	0	0	
		400/220 KV 315 MVA ICT-IV	0	0	0	0	0	0	0	
		400KV 125 MVAR Reactor	0	0	0	0	0	0	0	
		220 KV Azamgarh-II Line	1	0	0	0	1	1	1	
		220 KV Bhaduara Line	0	0	0	0	0	0	0	
		220 KV Harhua Line	0	0	0	0	0	0	0	
		220 KV Gajokhar-I Line	0	0	0	0	0	0	0	
		220 KV Gajokhar-II Line	2	0	0	0	1	1	1	
		220 KV Ghazipur Line	0	0	0	0	0	0	0	
		220 KV Beerapatti TSS Feeder	0	0	0	0	0	0	0	
		220/132 KV 160 MVA TF-I	0	0	0	0	0	0	0	
		220/132 KV 200 MVA TF-I	0	0	0	0	0	0	0	
		220/132 KV 160 MVA TF-III	0	0	0	0	0	0	0	
5	220 kV Substation, Sahupuri	220 kV Obra Line	0	0	0	0	0	0	0	
		220 kV Robestganj Line (through Churk)	1	0	0	0	1	1	1	
		220 kV Bhadaura Line	0	0	0	0	0	0	0	
		220 kV Karamnasa Line	0	0	0	0	0	0	0	
		220 kV Raja ka Talab Line	0	0	0	0	0	0	0	
		220 kV Bhadohi (GIS) Line	0	0	0	0	0	0	0	
		220 kV Sahupuri-I (400 kV GIS Interconnector) Line	2	0	0	0	2	2	2	
		220 kV Sahupuri-II (400 kV GIS Interconnector) Line	1	0	0	0	1	1	1	
		200 MVA (220/132 kV) T/F-I	-	0	0	0	0	0	0	
		160 MVA (220/132 kV) T/F-II	1	0	0	0	1	1	1	
		200 MVA (220/132 kV) T/F-III	1	0	0	0	1	1	1	

ET&C CIRCLE, PRAYAGRAJ

Format No.-PI-01

Reporting of performance indices for protection system

(for elements connected at 220 KV and above)

Name of utility:UPPTCL

Month 06-2025

S.N.	Sub-station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni	Dependability index (D) D=(Nc/(Nc+Nf))	Security Index (S) S=(Nc/(Nc+Nu	Relibality Index (R) R=(Nc/(Nc+Ni))	REMARK
6	400 kV GIS Substation, Sahupuri	400 kV Biharsharif- I (PG) Line {with 63 MVAR Line Reactor}	1	0	2	2	1	0.33	0.33	This line tripped twice falsely (erratically) on A/R Lockout flag due to the malfunction of its unhealthy BCU as A/R function is enabled in BCU (MiCOM, C264)
		400 kV Biharsharif- II (PG) Line {with 63 MVAR Line Reactor}	-	-	-	-	-	-	-	
		400 kV Thathra-I (Varanasi-PG) Line	-	-	-	-	-	-	-	
		400 kV Thathra-II (Varanasi-PG) Line	1	-	-	-	1	1	1	
		500 MVA (400/220 kV) ICT-I	-	-	-	-	-	-	-	
		500 MVA (400/220 kV) ICT-II	-	-	-	-	-	-	-	
		125 MVAR (400 kV) Bus Reactor	-	-	-	-	-	-	-	
		220 kV Sahupuri- I (Interconnector) Line	2	-	-	-	2	2	2	
		220 kV Sahupuri- II (Interconnector) Line	1	-	-	-	1	1	1	
		220 kV Bhelupuri- I Line	-	-	-	-	-	-	-	
		220 kV Bhelupuri- II Line	-	-	-	-	-	-	-	
7	220 KV substation Bhelupur	60 MVA T_F-I	0	0	0	0	0	0	0	
		60 MVA T_F-II	0	0	0	0	0	0	0	
		60 MVA T_F-III	1	0	0	0	1	1	1	
		220 KV Sahupuri-I	0	0	0	0	0	0	0	
		220 KV Sahupuri-II	0	0	0	0	0	0	0	
8	220 KV substation Harahua	60 MVA T_F-I	1	0	0	0	1	1	1	
		60 MVA T_F-II	1	0	0	0	1	1	1	
		220 KV Azamgarh	0	0	0	0	0	0	0	
		220 KV Sarnath	0	0	0	0	0	0	0	
9	220 KV substation Gajokhar	160 MVA ICT-I	1	0	0	0	1	1	1	
		160 MVA ICT-II	1	0	0	0	1	1	1	
		220 KV Sarnath	2	0	0	0	1	1	1	
		220 KV Machhlisahar	0	0	0	0	0	0	0	
10	220 KV S/S Ghazipur	220KV Sarnath-Ghazipur Line	1	0	0	0	1	1	1	
		220KV Rasra-Ghazipur Line	1	0	0	0	1	1	1	
		220/ 132 KV , 160 MVA ICT 1	1	0	0	0	1	1	1	
		220/ 132 KV , 160 MVA ICT 2	1	0	0	0	1	1	1	
11	220KV Robertsganj	220KV Obra Line	0	0	0	0	0	0	0	
		220KV Churk-Sahupuri Line	1	0	0	0	1	1	1	
		160MVA T/F-I (220/132KV)	0	0	0	0	0	0	0	
		160MVA T/F-II (220/132KV)	0	0	0	0	0	0	0	
		TOTAL	**29**	**0**	**2**	**2**				

PERFORMANCES INDICES FROM TSE ZONE UPPTCL	Dependability index (D) D=(Nc/(Nc+Nf))	1
	Security Index (S) S=(Nc/(Nc+Nu))	0.935483871
	Relibality Index (R) R=(Nc/(Nc+Ni))	0.935483871

NOTE:- (i) Reason for performance indices less than unity is mentioned in above particular element remark.

Nc - No. of correct operations at internal power system faults
Nf - No. of failures to operate at internal power system faults
Nu - No. of unwanted operations
Ni - No. of incorrect operations, (Ni=Nf+Nu)

Suprintending Engineer

ET&C CIRCLE, PRAYAGRAJ

Format No.-PI-01

Reporting of performance indices for protection system

(for elements connected at 220 KV and above)

Name of utility:UPPTCL

Month 06-2025

S.N.	Sub-station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni	Dependability index (D) D=(Nc/(Nc+Nf))	Security Index (S) S=(Nc/(Nc+Nu))	Relibality Index (R) R=(Nc/(Nc+Ni))	REMARK
6	400 kV GIS Substation, Sahupuri	400 kV Biharsharif- I (PG) Line {with 63 MVAR Line Reactor}	1	0	2	2	1	0.33	0.33	This line tripped twice falsely (erraticely) on A/R Lockout flag due to the malfunction of its unhealthy BCU as A/R function is enabled in BCU (MiCOM, C264)
		TOTAL	**1**	**0**	**2**	**2**				

Suprintending Engineer

ET&C CIRCLE, PRAYAGRAJ

Format No.-PI-01

Reporting of performance indices of SPS

(for elements connected at 220 KV and above)

Name of utility:UPPTCL

Month 06-2025

S.N.	Sub-station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni	Dependability index (D) D=(Nc/(Nc+Nf))	Security Index (S) S=(Nc/(Nc+Nu))	Relibality Index (R) R=(Nc/(Nc+Ni))	REMARK
1	400 KV SS SARNATH	400 KV Anpara L3 Line	0	0	0	0	0	0	0	
2		400 KV Anpara-L5 Line	1	0	0	0	1	1	1	
3		400 KV Azamgarh Line	0	0	0	0	0	0	0	
4		400 KV Varanasi-I (PG) Line	0	0	0	0	0	0	0	
5		400 KV VAranasi-II (PG) Line	0	0	0	0	0	0	0	
6		400/220 KV 315 MVA ICT-I	0	0	0	0	0	0	0	
7		400/220 KV 500 MVA ICT-II	0	0	0	0	0	0	0	
8		400/220 KV 315 MVA ICT-III	0	0	0	0	0	0	0	
9		400/220 KV 315 MVA ICT-IV	0	0	0	0	0	0	0	
10		400KV 125 MVAR Reactor	0	0	0	0	0	0	0	
11		220 KV Azamgarh-II Line	1	0	0	0	1	1	1	
12		220 KV Bhaduara Line	0	0	0	0	0	0	0	
13		220 KV Harhua Line	0	0	0	0	0	0	0	
14		220 KV Gajokhar-I Line	0	0	0	0	0	0	0	
15		220 KV Gajokhar-II Line	2	0	0	0	1	1	1	
16		220 KV Ghazipur Line	0	0	0	0	0	0	0	
17		220 KV Beerapatti TSS Feeder	0	0	0	0	0	0	0	
18		220/132 KV 160 MVA TF-I	0	0	0	0	0	0	0	
19		220/132 KV 200 MVA TF-I	0	0	0	0	0	0	0	
20		220/132 KV 160 MVA TF-III	0	0	0	0	0	0	0	
		TOTAL	**4**	**0**	**0**	**0**				

PERFORMANCES INDICES FROM TSE ZONE UPPTCL	Dependability index (D) D=(Nc/(Nc+Nf))	1
	Security Index (S) S=(Nc/(Nc+Nu))	1
	Relibality Index (R) R=(Nc/(Nc+Ni))	1

NOTE:- (i) Reason for performance indices less than unity is mentioned in above particular element remark.

Nc - No. of correct operations at internal power system faults
Nf - No. of failures to operate at internal power system faults
Nu - No. of unwanted operations
Ni - No. of incorrect operations, (Ni=Nf+Nu)

Suprintending Engineer
ET&C CIRCLE PRAYAGRAJ

Performance Indices for Protection System

Punjab State Transmission Corporation Limited

June-2025

S.N.	Sub-Station	Unit (SPS/Line/ICT/GT/etc.)	Nc	Nf	Nu	Ni	Dependability Index (D)	Security Index (S)	Reliabilty Index (R)
1		220 kV Muktsar(400)-Abohar ckt.II	1	0	0	0	1	1	1
2		400 kV Makhu-Amritsar ckt.I	1	0	0	0	1	1	1
3		220 kV Makhu-Algon ckt.II	1	0	0	0	1	1	1
4		220 kV Makhu-Algon ckt.I	1	0	0	0	1	1	1
5		220 kV Doraha - PGCIL ckt	1	0	0	0	1	1	1
6		220 kV Jadla - RTP Ckt. 1	2	0	0	0	1	1	1
7		220 kV Jadla - RTP Ckt. 2	1	0	0	0	1	1	1
8		220 kV Dhandari - PGCIL Ckt. 1	1	0	0	0	1	1	1
9		220 kV Dhandari - PGCIL Ckt. 2	1	0	0	0	1	1	1
10	220 kV S/S Sahnewal	T-4 (220/66 Kv 160 MVA)	0	0	1	1	#DIV/0!	0	0
11		220 KV Ikolaha-Malerkotla line	1	0	0	0	1	1	1
12		220kv G-1 - Wazirabad (G5) Ckt. No.1	1	0	0	0	1	1	1
13		220kv G-1 - RTP Ckt. No.2	1	0	0	0	1	1	1
14	220 kv S/S G-1	220/66 KV, 100 MVA T/F T-6	1	0	0	0	1	1	1
15		220KV G5-RTP	1	0	1	1	1	0.5	0.5
16		220 kV Science City- Kanjli Ckt-2	1	0	0	0	1	1	1
17		220 kV Sultanpur-Chola Sahib Ckt	1	0	0	0	1	1	1
18		220 kV Rehana Jattan- Jamsher Line	2	0	0	0	1	1	1
19		220 kV Banga-Jadla Ckt	1	0	0	0	1	1	1
20		220 kV Sultanpur-Chola Sahib Ckt	1	0	0	0	1	1	1
21		220kV Malerkotla-Ikolaha	1	0	0	0	1	1	1
22	220kv S/S Malerkotla	160MVA PTF T-2	0	0	1	1	#DIV/0!	0	0
23		220 kv Nabha - Bhawinigarh ckt. No. 1	1	0	0	0	1	1	1
24	220 kV S/S Rajla	160 MVA T/F T-3	0	0	1	1	#DIV/0!	0	0
25		220 KV Patran-Banwala Ckt-1	1	0	0	0	1	1	1
26		220 kV Mohali 1 - RTP	1	0	0	0	1	1	1
27		220 kV Mohali 2 - Derabassi	1	0	0	0	1	1	1
28		220 kV Rajpura - Rajpura ckt-1	1	0	0	0	1	1	1
29	220 kVS/S Rajpura	220/66kV 100 MVA T/F T-5	1	0	0	0	1	1	1
30		220 kV Abohar Mukatsar Ckt-2	1	0	0	0	1	1	1
31	220 KV S/S Barnala	220/66 kV 100 MVA T/F T-3	1	0	1	1	1	0.5	0.5
32		220 kV Mansa Patran Line	1	0	0	0	1	1	1
33		220KV Moga -Sadiq Line	1	0	0	0	1	1	1
34	220 KV S/S Singhanwala	220/132 kV100 MVA T/F T-3	2	0	0	0	1	1	1
35	220 kV S/S Singhanwala	220/66 kV 100 MVA T/F T-6	1	0	0	0	1	1	1
36		220 kv Ghubaya-muktsar line	1	0	0	0	1	1	1
37		220kv ckt-1 Ghubaya-400kv muktsar	1	0	0	0	1	1	1
38		220kv ckt-2 Ghubaya-400kv muktsar	1	0	0	0	1	1	1
39	220KV S/S Sandhwan	220/66KV 100MVA PTF T-1	1	0	0	0	1	1	1
40		220KV Sadiq-Moga line	1	0	0	0	1	1	1
41	220 KV S/S Kotkaror	66 kV 160 MVA 220/66 kV PT/F T-7	1	0	0	0	1	1	1
42		220kV GVK/BTW Ckt-1	1	0	0	0	1	1	1
43	220KV Verpal	T2 (220/66 kV, 100 MVA) PTF	1	0	0	0	1	1	1
44		220 kV Verpal - Balachak Circuit No.-1	1	0	0	0	1	1	1
45		220 kV Naraingarh - Balachak Circuit No.-1	2	0	0	0	1	1	1
46		220 kV Naraingarh - Balachak Circuit No.-2	1	0	0	0	1	1	1
47		220 kV Khassa - Balachak Circuit No.-1	1	0	0	0	1	1	1
48		220 kV Khassa - Balachak Circuit No.-2	1	0	0	0	1	1	1
49		220 kV Khassa - Civil Line Circuit.	1	0	0	0	1	1	1
50		220KV Chohla Sahib - Sultanpur Circuit.	3	0	0	0	1	1	1
51		220kV Algon - Makhu Circuit No. 1	1	0	0	0	1	1	1
52		220 kV Sarna -Wadala Granthian Circuit No.-1	2	0	0	0	1	1	1
53		220 kV Sarna - Wadala Granthian Circuit No.-4	1	0	0	0	1	1	1
54		220 kV Gurdaspur - Sarna Circuit	1	0	0	0	1	1	1
55		220 kV Gurdaspur - Wadala Granthian Circuit	1	0	0	0	1	1	1
56	220 kV Sub Station, Gurdaspur	T-5 (220/66 KV 100 MVA) PTF	1	0	0	0	1	1	1
		Overall PPI of PSTCL	**60**	**0**	**5**	**5**	**1**	**0.923076923**	**0.92307692**

Performance Indices for Protection System										
Punjab State Transmission Corporation Limited										
June-2025										
S.N.	**Sub-Station**	**Unit (SPS/Line/ICT/GT/etc.)**	**Nc**	**Nf**	**Nu**	**Ni**	**Dependability Index (D)**	**Security Index (S)**	**Reliabilty Index (R)**	**Remarks**
1	400 kV Muktsar	220 kV Muktsar(400)-Abohar ckt.II	1	0	0	0	1	1	1	
400 kV Muktsar			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
2	400 kV Makhu	400 kV Makhu-Amritsar ckt.I	1	0	0	0	1	1	1	
		220 kV Makhu-Algon ckt.II	1	0	0	0	1	1	1	
		220 kV Makhu-Algon ckt.I	1	0	0	0	1	1	1	
400 kV Makhu			**3**	**0**	**0**	**0**	**1**	**1**	**1**	
3	220 kV Doraha	220 kV Doraha - PGCIL ckt	1	0	0	0	1	1	1	
220 kV Doraha			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
4	220 kV Jadla	220 kV Jadla - RTP Ckt. 1	2	0	0	0	1	1	1	
		220 kV Jadla - RTP Ckt. 2	1	0	0	0	1	1	1	
220 kV Jadla			**3**	**0**	**0**	**0**	**1**	**1**	**1**	
5	220 kV Dhandari - 1	220 kV Dhandari - PGCIL Ckt. 1	1	0	0	0	1	1	1	
		220 kV Dhandari - PGCIL Ckt. 2	1	0	0	0	1	1	1	
220 kV Dhandari - 1			**2**	**0**	**0**	**0**	**1**	**1**	**1**	
6	220 kV Sahnewal	T-4 (220/66 Kv 160 MVA)	0	0	1	1	0	0	0	Due to leakage from butterfly valve of NIFPES tank
220 kV Sahnewal			**0**	**0**	**1**	**1**	**0**	**0**	**0**	
7	220 kV Ikolaha	220 KV Ikolaha-Malerkotla line	1	0	0	0	1	1	1	
220 kV Ikolaha			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
8	220 kV s/s G-1	220kv G-1 - Wazirabad (G5) Ckt. No.1	1	0	0	0	1	1	1	
		220kv G-1 - RTP Ckt. No.2	1	0	0	0	1	1	1	
		220/66 KV, 100 MVA T/F T-6	1	0	0	0	1	1	1	
220 kV s/s G-1			**3**	**0**	**0**	**0**	**1**	**1**	**1**	
9	220 kV s/s G-5	220KV G5-RTP	1	0	1	1	1	0.5	0.5	
220 kV s/s G-5			**1**	**0**	**1**	**1**	**1**	**0.5**	**0.5**	
10	220 kV S/S Science City	220 kV Science City- Kanjli Ckt-2	1	0	0	0	1	1	1	
220 kV S/S Science City			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
11	220 kV S/S Sultanpur	220 kV Sultanpur-Chola Sahib Ckt	1	0	0	0	1	1	1	
220 kV S/S Sultanpur			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
12	220 kV S/S Rehana Jattan	220 kV Rehana Jattan- Jamsher Line	2	0	0	0	1	1	1	
220 kV S/S Rehana Jattan			**2**	**0**	**0**	**0**	**1**	**1**	**1**	
13	220 kV Banga	220 kV Banga-Jadla Ckt	1	0	0	0	1	1	1	
220 kV Banga			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
14	220 kV S/S Sultanpur	220 kV Sultanpur-Chola Sahib Ckt	1	0	0	0	1	1	1	
220 kV S/S Sultanpur			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
15	220 kV S/S Malerkotla	220kV Malerkotla-Ikolaha	1	0	0	0	1	1	1	
		160MVA PTF T-2	0	0	1	1	0	0	0	B-phase capillary tube of winding gauge found damaged.
220 kV S/S Malerkotla			**1**	**0**	**1**	**1**	**1**	**0.5**	**0.5**	
16	220 kV S/S Nabha	220 kv Nabha - Bhawinigarh ckt. No. 1	1	0	0	0	1	1	1	
220 kV S/S Nabha			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
17	220 kV S/S Rajla	160 MVA T/F T-3	0	0	1	1	0	0	0	PRV Relay operated, on checking found ingress of moisture in PRV terminal Box.
220 kV S/S Rajla			**0**	**0**	**1**	**1**	**0**	**0**	**0**	
18	220 kV S/S Patran	220 KV Patran-Banwala Ckt-1	1	0	0	0	1	1	1	
220 kV S/S Patran			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
19	220 kV Mohali - 1	220 kV Mohali 1 - RTP	1	0	0	0	1	1	1	
220 kV Mohali - 1			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
20	220 kV SEC-80 Mohali-2	220 kV Mohali 2 - Derabassi	1	0	0	0	1	1	1	
220 kV SEC-80 Mohali-2			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
21	220 kV Rajpura	220 kV Rajpura - Rajpura ckt-1	1	0	0	0	1	1	1	
		220/66kV 100 MVA T/F T-5	1	0	0	0	1	1	1	
220 kV Rajpura			**2**	**0**	**0**	**0**	**1**	**1**	**1**	
22	220 kV S/S Abohar	220 kV Abohar Mukatsar Ckt-2	1	0	0	0	1	1	1	
220 kV S/S Abohar			**1**	**0**	**0**	**0**	**1**	**1**	**1**	

23	220 kV S/S Barnala	220/66 kV 100 MVA T/F T-3	1	0	1	1	1	0.5	0.5	Due to jerk of switching off operations of cooling Pumps. P/T/F charged at 18:10 hrs.
220 kV S/S Barnala			**1**	**0**	**1**	**1**	**1**	**0.5**	**0.5**	
24	220 kV S/S Mansa	220 kV Mansa Patran Line	1	0	0	0	1	1	1	
220 kV S/S Mansa			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
25	220 kV S/S Singhanwala	220KV Moga -Sadiq LineLine	1	0	0	0	1	1	1	
		220/132 kV100 MVA T/F T-3	2	0	0	0	1	1	1	
		220/66 kV 100 MVA T/F T-6	1	0	0	0	1	1	1	
220 kV S/S Singhanwala			**4**	**0**	**0**	**0**	**1**	**1**	**1**	
26	220 kV S/S Ghubaya	220 kv Ghubaya-muktsar line	1	0	0	0	1	1	1	
		220kv ckt-1 Ghubaya-400kv muktsar	1	0	0	0	1	1	1	
		220kv ckt-2 Ghubaya-400kv muktsar	1	0	0	0	1	1	1	
220 kV S/S Ghubaya			**3**	**0**	**0**	**0**	**1**	**1**	**1**	
27	220 kV S/S Sandhwan	220/66KV 100MVA PTF T-1	1	0	0	0	1	1	1	
220 kV S/S Sandhwan			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
28	220 kV S/S Sadiq	220KV Sadiq-Moga line	1	0	0	0	1	1	1	
220 kV S/S Sadiq			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
29	220 kV S/S Kotkaror	66 kV 160 MVA 220/66 kV PT/F T-7	1	0	0	0	1	1	1	
220 kV S/S Kotkaror			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
30	220 kV S /S Botian Wala	220kV GVK/BTW Ckt-1	1	0	0	0	1	1	1	
220 kV S /S Botian Wala			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
31	220 kV Verpal	T2 (220/66 kV, 100 MVA) PTF	1	0	0	0	1	1	1	
		220 kV Balachak Circuit No.-1	1	0	0	0	1	1	1	
220 kV Verpal			**2**	**0**	**0**	**0**	**1**	**1**	**1**	
32	220 kV Nariangarh	220 kV Balachak Circuit No.-1	2	0	0	0	1	1	1	
		220 kV Balachak Circuit No.-2	1	0	0	0	1	1	1	
220 kV Nariangarh			**3**	**0**	**0**	**0**	**1**	**1**	**1**	
33	220 kV Khassa	220 kV Balachak Circuit No.-1	1	0	0	0	1	1	1	
		220 kV Balachak Circuit No.-2	1	0	0	0	1	1	1	
		220 kV Civil Line Circuit.	1	0	0	0	1	1	1	
220 kV Khassa			**3**	**0**	**0**	**0**	**1**	**1**	**1**	
34	220 kV Chohla sahib	220KV Sultanpur Circuit.	3	0	0	0	1	1	1	
220 kV Chohla sahib			**3**	**0**	**0**	**0**	**1**	**1**	**1**	
35	220 kV Algon kothi	220kV Makhu Circuit No. 1	1	0	0	0	1	1	1	
220 kV Algon kothi			**1**	**0**	**0**	**0**	**1**	**1**	**1**	
36	220 kV Sub Station, Sarna	220 kV Wadala Granthian Circuit No.-1	2	0	0	0	1	1	1	
		220 kV Wadala Granthian Circuit No.-4	1	0	0	0	1	1	1	
220 kV Sub Station, Sarna			**3**	**0**	**0**	**0**	**1**	**1**	**1**	
37	220 kV Sub Station, Gurdaspur	220 kV Sarna Circuit	1	0	0	0	1	1	1	
		220 kV Wadala Granthian Circuit	1	0	0	0	1	1	1	
		T-5 (220/66 KV 100 MVA) PTF	1	0	0	0	1	1	1	
220 kV Sub Station Gurdaspur			**3**	**0**	**0**	**0**	**1**	**1**	**1**	
38	220 kV Sub Station, Wadala Granthian	220 kV Sarna Circuit No.-1	1	0	0	0	1	1	1	
		220 kV Sarna Circuit No.-4	2	0	0	0	1	1	1	
		220 kV Gurdaspur Circuit	1	0	0	0	1	1	1	
220 kV Sub Station Wadala Granthian			**4**	**0**	**0**	**0**	**1**	**1**	**1**	

Tripping Details Punjab State Transmission Corporation Limited June-2025						Remarks
S.N.	**Sub-Station**	**Unit (SPS/Line/ICT/GT/etc.)**	**Date on which Power System Fault occurred**	**Local End Indications**	**Remote End Indications**	
1	400 kV S/S Muktsar	220 kV Muktsar(400)-Abohar ckt.II	14-06-20025 at 18.53 Hrs	Zone-I, B-ph, Fault Location-34 km	B-ph, Fault Distance-1.241 km	
2	400 kV S/S Makhu	400 kV Makhu-Amritsar ckt.I	27-06-2025 at 16.18 Hrs	Zone-I, Y-ph, Fault Distance-52.2 km	Zone-I, Y-ph, Fault Distance-9.39 km	
		220 kV Makhu-Algon ckt.II	29-06-2025 at 16.08 Hrs	Zone-I, B-ph	Zone-I, B-ph	
		220 kV Makhu-Algon ckt.I	29-06-2025 at 16.08 Hrs	Zone-I, B-ph	Not tripped	
3	220 kV Doraha	220 kV Doraha - PGCIL ckt	1/6/2025 AT 6:33	Zone - 1, Fault Location - 14.97 Km, R-Phase, Auto Reclose Blocked	Zone - 1, Fault Location - 4.56 Km, R-Phase, Auto Reclose Blocked	
4	220 kV Jadla	220 kV Jadla - RTP Ckt. 1	2/6/2025 AT 22:49	Zone - 1, Fault Location - 18.18 Km, B-Phase, Auto Reclose Blocked	Zone - 1, Fault Location - 20.83 Km, B-Phase, Auto Reclose Blocked	
		220 kV Jadla - RTP Ckt. 1	28/6/2025 AT 14:02	Zone - 1, Fault Location - ___ Km, R-Phase, Auto Reclose Blocked	Zone - 1, Fault Location - 18.75 Km, R-Phase, Auto Reclose Blocked	
		220 kV Jadla - RTP Ckt. 2	28/6/2025 AT 13:33	Zone - 1, Fault Location - 30.84 Km, YB-Phase, Auto Reclose Blocked	Zone - 1, Fault Location - 11.0 Km, YB-Phase, Auto Reclose Blocked	
5	220 kV Dhandari - 1	220 kV Dhandari - PGCIL Ckt. 1	24/6/2025 AT 5:16	Zone - 1, Fault Location - 3.172 Km, YB-Phase, Auto Reclose Blocked	Zone - 2, Fault Location - 19.6 Km, YB-Phase, Auto Reclose Blocked	
		220 kV Dhandari - PGCIL Ckt. 2	1/6/2025 AT 6:33	Zone - None, YB-Phase, Auto Reclose Blocked, Carrier receive	Zone - 1, Fault Location - 13.86 Km, B-Phase, Auto Reclose Blocked	
6	220 kV Sahnewal	T-4 (220/66 Kv 160 MVA)	24/6/2025 AT 5:54	Buchholz stage 1 and Buchholz stage 2	_____	Due to leakage from butterfly valve of NIFPES tank
7	220 kv s/s Ikolaha	220 KV Ikolaha-Malerkotla line	03.06.2025 at 19:43	Main-1 DPR Ia-4316.23 A Ib-4500.78 A Ic-222.18 A, Zone-1.	Main-1 DPR Ia- 9289A Ib- 9316A Ic-214 A, Zone-1. F.L-18.33 km	
8	220 kv s/s G-1	220kv G-1 - Wazirabad (G5) Ckt. No.1	20.06.2025 at 11:34	Main-1 DPR R ϕ Ia-189.7 A Ib-436.6 A Ic-421 A, Zone-1, F.L-55.50 mtr Main 2 Any trip ABC, Ia-421.1 A, Zone-1	Main-1 DPR Ia-0 A Ib-15.63 A Ic-0 A, Zone-1, F.L-372.6 mtr Main 2 O/C Y ϕ, Zone-1	
		220kv G-1 - RTP Ckt. No.2	28.06.2025 at 13:45	Main 2 DPR REL 670 Ia- 280.87 A, Ib-384.2 A, Ic-3013.81 A, In-3268.73 A, Zone-1, Main 1 DPR Micom P440 Zone- 1 trip, FL-19.87 KM	Ia- 264.3 A, Ib-399.6 A Ic-3.640 A, Zon3-1 B phase, F.L- 41.03 KM	
		220/66 KV, 100 MVA T/F T-6	03.06.2025 at 22:29	HV Side - REF, Master LV Side - Master		
9	220 kv s/s Wairabad(G5)	220KV G5-G1 Ckt No. 1	20.06.2025 at 11:34	Main-1 DPR Ia-0 A Ib-15.63 KA Ic-0 A, Zone-1, F.L-372.6 mtr Main 2 O/C Y ϕ, Zone-1	Main-1 DPR R ϕ Ia-189.7 A Ib-436.6 A Ic-421 A, Zone-1, F.L-55.50 mtr Main 2 Any trip ABC, Ia-421.1 A, Zone-1	
		220KV G5-RTP	20.06.2025 at 11:34	Main-1: DPR Ia=790.4A, Ib=2.633 KA, IC=541.1 A Main-2: DPR Y Phase	REL 670 Relay , A, B, C Phase, DTP Tripping, P 442 Relay A, b, c Phase	
		220KV G5-RTP	28.06.2025 at 13:45	Breaker tripped from G-5 end with CB PDR Trip indication	Not tripped	
10	220 KV S/S Science City	220 kV Science City- Kanjli Ckt-2	27.06.2025 at 23.45 Hrs	RYB-Phase, Z-1	RYB-Phase, Z-2	Coupling Capacitor damaged at 220 kv Science City end.
11	220 KV S/S Sultanpur	220 kV Sultanpur-Chola Sahib Ckt	03.06.2025 at 18.29 Hrs	B-Phase, Z-1, Ia=137.5 A, Ib=14.46 A, Ic= 6.268 kA, 15.03 Kms	RYB-Phase, Z-1, Ia=12.94 A, Ib=9.071 A, Ic= 8.394 kA, 9.842 Kms	Bad weather
12	220 kV S/S Rehana Jattan	220 kV Rehana Jattan- Jamsher Line	09.06.2025 at 13.05Hrs	DPR,B-ph,Z-1,15.90 km,Ic-288.2A	M-1,DPR,B-pg,Z-1,14.80km,Ic-5.157kA M-2,DPR B-pg,Z-1,7.0km,Ic-5.419kA	
		220 kV Rehana Jattan- Jamsher Line	09.06.2025 at 14.40 Hrs	DPR, B-ph, Z-1,16.01 km, Ia-352A, Ib-343 A, Ic-6.058kA	ON	B-ph Jumper damaged at Tower No. 124
13	220 kV Banga	220 kV Banga-Jadla Ckt	06.06.2025 at 09.54 Hrs	R-ph,Z-1,26.412km	R-ph Z-1,13.52 km	
14	220 KV S/S Sultanpur	220 kV Sultanpur-Chola Sahib Ckt	04.06.2025 at 13.37 Hrs	ON	RYB-Phase, Z-1, Ia-29.42A, Ib-100.8A, Ic-166.8A	
15	220KV S/S Malerkotla	220kV Malerkotla-Ikolaha	3.6.25 at 19.43 to 3.6.2025 at 22.23	DPR RY-phase H-Set Ia-9.216kA Ib-9.3kA Z-1 18.33KM	DPR RY-phase Ia-4.316kA Ib-4.5kA	
		160MVA PTF T-2	17.6.2025 at 15.24 to 17.6.2025 at 17.07	Transformer Winding Temperature High Alarm/Trip indications		B-phase capillary tube of winding gauge found damaged.

16	220KV S/S Nabha	220 kv Nabha - Bhawinigarh ckt. No. 1	15.06.2025 at 5.15 to 15.06.2025 to 08.09	DPR M-1 Z-1 B-phase 16.51kA 0KM & DPR M-2 Z-1 B-phase 1.3KM	DPR M-1 Z-1 A/R optd B-phase, Breaker autoreclose operated	
17	220 kV S/S Rajla	160 MVA T/F T-3	25.6.2025 at 13.00 to 25.6.2025 at 15.36	PRV Relay		PRV Relay operated, on checking found ingress of moisture in PRV terminal Box.
18	220KV S/S Patran	220 KV Patran-Banwala Ckt-1	26.6.2025 at14.19 to 27.6.25 at 0.56	Main-2 DPR,Zone-1 R & Y Phase, O/C Zone-1,R Phase 578A,Y Phase 558A & B Phase 546A Distance- 0 Km	Tripped from patran end only	
19	220 kV Mohali - 1	220 kV Mohali 1 - RTP	10.06.2025 at 13:52	Main-1 : Z1, Trip Phase A, Ia - 7.29 kA, Ib - 0.32 kA, Ic - 0.431 kA, Distance-13.7 km, Main-2: Started Phase AN, Tripped phase A, Z1, Ia-7.638 kA, Ib-340.2A, Ic - 438.9 A, Dist - 13.43 KM	Started Phase AN Z1, R-Phase, Dist - 35.5 KM, Ia - 4.283 kA, Ib - 333.18 A, Ic - 449 A	Bottom phase of line come in induction of 11 kV Line under tower span 101 -102
20	220 kV SEC-80 Mohali-2	220 kV Mohali 2 - Derabassi	17.06.2025 at 18:57	DPR Main-1, IL1-0.13kA, IL2-12.10 kA, IL3 - 11.80 kA, Z-1, distt - 0.8km, DPR Main-2, IL1 - 136.3A, IL2 - 11.25 kA, IL3 - 11.34 kA, Z-1, Dist - 774.7 mt.	DPR Main-1, Dist - 22.9 km, DPR Main-2, IL1 - 123 A, IL2 - 3.720 kA, Ic - 3.575 kA, Dist - 33.3 km	A metalic tape roll was thrown toward the line by children playing in public park
21	220 kV Rajpura	220 kV Rajpura - Rajpura ckt-1	27.06.2025 at 02:50	Auto reclosed Blocked, Master Trip	No tripping at other end	Transient fault, Line charged per pc instruction.
		220/66kV 100 MVA T/F T-5	30.06.2025 at 17:14	O/C R-ph.		Due to 66 kV Dhamgarh Line Fault
22	220 kV S/S Abohar	220 kV Abohar-Mukatsar ckt no.02	14-06-2025 at 18:53 hrs	Main-1, Zone-1, Dist- 34 km, Fault Current Ic: 4.25 KA Main-2, L1 (No fault current)	Zone-1 Distance=1.241 km, Fault Current: Ic 6.071 KA	Transient Fault
23	220 kV S/S Singhawala	220 kV Moga-Sadiq Line	11-06-2025 at 14:20 hrs	DPR Main-1 Operated. YN Phase Distance:- 74.5 km	Started Phase :YN Phase, Tripped Phase: RYB Phase , DPR Main-1 Operated , Fault Current: R phase- 559.6 A, Y phase 2.259 KA, B-260.2 A	
		220/132 kV 100 MVA P/T/F T-3	15-06-2025 at 17:37 hrs	HV side Indications: REF operated Fault current IA-0.149 KA, IB-0.159 KA, IC-0.198 KA, IN-0.088 KA, IG-0.130 KA LV side Indications: Master Trip Relay operated	N.A	After review the settings by Protection team Bathinda, try taken and P/T/F holds at 19:52. Again P/T/F tripped at 23:59 hrs then after compelete inspection by Protection team Bathinda It is found that the existing core of NCT was misbehaving then after changed the existing core with spare core P/T/F charged at 05:29 hrs. No supply affected.
		220/132 kV 100 MVA P/T/F T-3	15-06-2025 at 23:59 hrs	HV side Indications: REF operated Fault current IA-0.135 KA, IB-0.134 KA, IC-0.156 KA, IN-0.000 KA, IG-0.102 KA LV side Indications: Master Trip Relay operated	N.A	
		220/66 kV 100 MVA P/T/F T-6	19-06-2025 at 22:55 hrs	LV side Indications: REF and Master Trip Relay operated	N.A	Tripped while charging newly installed 20 MVA 66/11 Kv P/T/F T-7.Rectified the issue with NCT connections. Charged at 23:13 hrs.
24	220 kV S/S Mansa	220 kV Mansa-Patran CKT	22/06/2025 15:35 hrs	DPR Main-1 Operated Zone-1 Dist-25.78 km Y phase Highset Fault current R phase- 447 A, Y phase- 4557 KA , B Phase-602 A DPR Main-2 Operated Zone-1 Dist- 28.14 km Y phase Highset R phase- 690 A, Y phase- 4022 KA , B Phase-522 A	DPR Main-1 Operated Dist-41.6 km Y phase Highset Fault current Y phase- 3.77 KA DPR Main-2 Operated Dist- 42.1 km Y phase-2.58 KA	Due to a conductor of Tower (which is newly installed between Tower no.31&32 by TLSC, PSPCL Sangrur) came in range of these towers as sag is pending on that Tower. Line charged at 19:04 after Patrolling.
25	220 kV S/S Barnala	220/66 kV 100 MVA P/T/F T-3	29/06/2025 16:48 hrs	Main Buchholz trip relay operated	N.A	Due to jerk of switching off operations of cooling Pumps. P/T/F charged at 18:10 hrs.
26	220 kv S/S Ghubaya	220 kv Ghubaya-muktsar line	29/6/2025 at 16:50	220 kv Ghubaya - 220 muktsar line R-412A Y-560A B-3018A DPR-61meter		Bad weather Conditions
		220kv ckt-1 Ghubaya-400kv muktsar	29/6/2025 at 16:50	220kv ckt-1 (Ghubaya -400kv muktsar) R-356A Y-533A B-2956A Dpr-66.49 meter		Bad weather Conditions
		220kv ckt-2 Ghubaya-400kv muktsar	29/6/2025 at 16:50	220kv ckt-2 (Ghubaya -400kv muktsar) R-246A Y-125A B-3231A DPR-58meter		Bad weather Conditions

27	220KV S/S Sandhwan	220/66KV 100MVA PTF T-1	28/06/25 at 13:14	OLTC Bucholoz Trip		Tripped from 13:14 to 18:17 due to jerk while tripping of newly commissioned 66KV Capacitor bank.T/F charged at 18:17hrs after testing done by Protection team Ferozepur and receiving charging code from PC patiala.
28	220 KV S/S Sadiq	220KV Sadiq-Moga line	11/06/2025 at	Started phase:-BN phase Tripped Phase:-ABC phase DPR-1 Operated Zone-None R phase -559.6 A Y phase -2.259 KA B phase -260.2 A		Transient Fault
29	220 KV S/S Kotkaror	66 kV 160 MVA 220/66 kV PT/F T-7	29/06/2025 at 05:41	LV Side O/C Relay Fault Current:- Ia:- 483.4A Ib:- 644.3 A Ic:- 6.246 kA REF Relay:- 0.86 Amp Differential Relay Current:- 1W1A:- 140 mA 1W1B:- 189 mA 1W1C:- 2.30 A IW2A:- 137 mA 1W2B:- 188mA 1W2C:- 1.730 A No Supply Affected.		66 kV LV (66 kV) found B-Phase LV damaged
30	220 KV S S Botian Wala	220kV GVK/BTW Ckt-1	29/06/2025 at 16:35	DPR Relay operated Zone-1 started phase BC Fault location 33.61 KmIA= 53.85A IB= 5.545 kA IC = 5.564 kA		
31	220 KV Verpal	220 KV Verpal-Balachak-1	07.06.25 at 17.2	Zone-1 A phase DPR operated	*****	Found Nothing
		220/ 66 KV 100 MVA T-2	26.06.2025 at 06.15	Oil Temprature Trip	Control cable found defective somewhere from breaker to C&R panel	Power T/F charged after testing by Protection team and Instructions of PC Patiala
32	220 kV Naraingarh	220 KV Naraingarh-Balachak - 1	07.06.25 at 17.2	Zone-1,2 A phase DPR operated	*****	Y Phase Jumper found burnt
		220 KV Naraingarh-Balachak - 1	12.06.25 at 14.35	Zone-1ABC phase DPR operated	*****	Y Phase Jumper found burnt
		220 KV Naraingarh-Balachak - 2	12.06.25 at 14.35	Zone-1ABC phase DPR operated	*****	Found Nothing
33	220 kV Khassa	220 KV Khassa-Balachak-1	02.06.25 at 15.42	Zone-1 C phase DPR-1 operated, And Zone-1 CN phase DPR-2	*****	Disc String flashed
		220 KV Khassa-Balachak-2	07.06.25 at 17.2	Zone-1 A phase DPR operated	*****	Earth Wire Broken
		220 KV Khassa-Civil line	22.06.25 at 15.06	Zone-1 ABC phase DPR operated	*****	R Phase jumper burnt at tower no. 94.
34	220 kV Chohla Sahib	220 KV Chohla-Sultanpur	03.06.25 at 18.3	Zone-1 ABC phase DPR operated	*****	Found Nothing
		220 KV Chohla-Sultanpur	04.06.25 at 8.49	Zone-1 ABC phase DPR operated	*****	Found Nothing
		220 KV Chohla-Sultanpur	04.06.25 at 13.37	Zone-1 ABC phase DPR operated	*****	Found Nothing
35	220 kV Algon kothi	220 KV Algo-Makhu-2	29.06.25 at 16.08	Zone-1 B phase DPR operated	*****	Due to bad weather conditions
36	220 kV Sarna	220 kV WG Circuit No.-4	04.06.2025 at 11:59	DPR M-1, CN PHASE, Z1, FL - 3.87 kM Ic -12.24 KA + MTR 86	DPR M-1, C PHASE, Z2, + MTR 86	Due to very Bad & Stormy Weather
		220 kV WG Circuit No.-1	07.06.2025 at 10:26	DPR M1, AN PHASE, Z1, FAULT LOCATION 15.27KM, IA-5.836KA	DPR M1, AN PHASE, Z1, FAULT LOCATION 42.03KM, IA-2.413KA	No visible fault found during patrolling.
		220 kV WG Circuit No.-1	15.06.2025 at 12:55	DPR M1, BCN PHASE, Z1, FAULT LOCATION 42.04 KM, IC-3.337 KA	DPR M1, ABCN PHASE, Z1, FAULT LOCATION 1.68 KM, IC-15.84 KA	Due to breakdown of B-Ph conductor near tower no. 167
37	220 kV Gurdaspur	220 kV Sarna Circuit No.-4	04.06.2025 at 11:59	DPR M-1, C PHASE, Z2, + MTR 86	DPR M-1, CN PHASE, Z1, FL - 3.87 kM Ic - 12.24 KA + MTR 86	Due to very Bad & Stormy Weather
		220 kV Sarna Circuit No.-1	07.06.2025 at 10:26	DPR M1, AN PHASE, Z1, FAULT LOCATION 42.03KM, IA-2.413KA	DPR M1, AN PHASE, Z1, FAULT LOCATION 15.27KM, IA-5.836KA	No visible fault found during patrolling.
		220 kV Gurdaspur Circuit	14.06.2025 at 00:04	Main 1 Any trip phase CN Tripped phase ABC, Distance trip Zone 2	Main 2 Started phase CN, Tripped phase ABC	Due to very Bad & Stormy Weather
		220 kV Sarna Circuit No.-4	15.06.2025 at 12:55	DPR M1, ABCN PHASE, Z1, FAULT LOCATION 1.68 KM, IC-15.84 KA	DPR M1, BCN PHASE, Z1, FAULT LOCATION 42.04 KM, IC-3.337 KA	Due to breakdown of B-Ph conductor near tower no. 167
38	220 kV Sub Station, Gurdaspur	220 kV WG Circuit	14.06.2025 at 00:05	M1 DPR Z2, FL - 31.88 kM, Ic - 4.118 kA	-	Due to breaking of earth wire of 66 kV Galhri Feeder & come in the induction zone of 220 kV Circuits
		220 kV Sarna Circuit	14.06.2025 at 00:05	M1 DPR Z2, FL - 0.327 kM, Ic - 4.189 kA	-	Due to breaking of earth wire of 66 kV Galhri Feeder & come in the induction zone of 220 kV Circuits
		220/66 kV, 100 MVA PTF T5	18.06.2025 at 15:30	REF + MTR 86	Due to flash in the 11 kV Bus Bar of 66/11 kV, 20 MVA PTF T3	PTF Energised after protection testing & as per directions of PC Patiala.

न्यूक्लियर पावर कारपोरेशन ऑफ इण्डिया लिमिटेड
NUCLEAR POWER CORPORATION OF INDIA LIMITED
(भारत सरकार का उद्यम) (A Government of India Enterprise)
रावतभाटा राजस्थान साइट–7एवं8 Rawatbhata Rajasthan Site-7&8
फोन Tel: 01475–242372 फैक्स Fax:,01475–256871, ईमेल Email: rkmisra@npcil.co.in

सं.No.:रारास्थ-7एवं8/RRS-7&8/व.अ.अ.(वि.) SME(E)/2025/ दिनांक Date: 26 June 2025

Sub: - Reporting of Protection Performance Indices of 400 KV transmission lines emanating from RAPS-D (RAPS-7&8) for the month of May-2025.

1. 400kV KOTA-2 LINE:-

Dependability Index (D)	Security Index (S)	Reliability Index (R)	Remark
Nc = 0	Nc = 0	Nc =0	No outage reported.
Nf = 0	Nu = 0	Ni = 0	
D= Nc/Nc+Nf	S= Nc/Nc+Nu	R= Nc/Nc+Ni	
D=Not Applicable	S= Not Applicable	R= Not Applicable	

2. 400kV JAIPUR LINE:-

Dependability Index (D)	Security Index (S)	Reliability Index (R)	Remark
Nc = 0	Nc = 0	Nc =0	No outage reported.
Nf = 0	Nu = 0	Ni = 0	
D= Nc/Nc+Nf	S= Nc/Nc+Nu	R= Nc/Nc+Ni	
D= Not Applicable	S= Not Applicable	R= Not Applicable	

3. 400kV SHUJALPUR-1 LINE:-

Dependability Index (D)	Security Index (S)	Reliability Index (R)	Remark
Nc = 0	Nc = 0	Nc =0	No outage reported.
Nf = 0	Nu = 0	Ni = 0	
D= Nc/Nc+Nf	S= Nc/Nc+Nu	R= Nc/Nc+Ni	
D= Not Applicable	S= Not Applicable	R= Not Applicable	

4. 400kV SHUJALPUR-2 LINE:-

Dependability Index (D)	Security Index (S)	Reliability Index (R)	Remark
Nc = 0	Nc = 0	Nc = 0	No outage reported.
Nf = 0	Nu = 0	Ni = 0	
D= Nc/Nc+Nf	S= Nc/Nc+Nu	R= Nc/Nc+Ni	
D= Not Applicable	S= Not Applicable	R= Not Applicable	

Nomenclature:-

Nc=Number of correct operations at internal power system faults

Nf=Number of failure to operate at internal power system faults

Nu=Number of unwanted operations

Ni=Number of incorrect operations & sum of Nf & Nu

न्यूक्लियर पावर कारपोरेशन ऑफ इण्डिया लिमिटेड
NUCLEAR POWER CORPORATION OF INDIA LIMITED
(भारत सरकार का उद्यम) (A Government of India Enterprise)
रावतभाटा राजस्थान साइट–7एवं8 Rawatbhata Rajasthan Site-7&8
फोन Tel: 01475–242372 फैक्स Fax:,01475–256871, ईमेल Email: rkmisra@npcil.co.in

D=Dependability index

S=Security index

R=Reliability index

Shaik Benazeer

SO/D (EMU)

RAPS-7&8

Through:

(R.K. Misra)

SME (E)

RAPS-7&8

To,

SE (O), NRPC, New Delhi

seo-nrpc@nic.in

CC:

SD/CS for kind information please

TSS/OS/MS

Sh. Ruchir v oza, ACE, HQ, NPCIL (rvoza@npcil.co.in)

STE(E&I)

File

Reporting of Performance Indices for Protection System

Name of Utility: Renew Surya Ayan Pvt Ltd, 300MW

Month: June'25

Sl No	Sub-station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni	Dependability Index(D)	Security Index (S)	Reliability Index (R)	Remarks
1	Fatehgarh-III (PG)	Line	-	-	-	-	-	-	-	No tripping faced.
2	Fatehgarh-III (PG)	ICT-1	0	0	1	1	-	0	0	PTR-01 tripped due to operation of OSR on 24th Jun 25. No abnormality observed during physical inspection at site. For detailed internal inspection of OLTC, visit by OLTC OEM (M/s CTR) has been planned on 06th Jul 25.
3	Fatehgarh-III (PG)	ICT-2	-	-	-	-	-	-	-	No tripping faced.

Nc is the number of correct operations at internal power system faults,
Nf is the number of failures to operate at internal power system faults,
Nu is the number of unwanted operations

S.No.	Substation	Element name	Total number of tripping	Nc	Nf	Nu	Ni	Dependability Index (D)	Security Index(S)	Reliability Index(R)
1	PPGCL, BARA	765/400KV 3X1500 MVA ICT 2	1	0	0	1	1	0	0	0

The Dependability Index defined as (D) = Nc/(Nc+Nf)

The Security Index defined as (S) = Nc/(Nc+Nu)

The Reliability Index defined as (R) = Nc/(Nc+Ni)

Nc is the number of correct operations at internal power system faults.

Nf is the number of failures to operate at internal power system faults.

Nu is the number of unwanted operations.

Ni is the number of incorrect operations and the sum of Nf and Nu.

*** PPI (Protection Performance indices) should be submitted only for tripped elements of any sub station (Example 1,2 & 3)**

*** In case of no tripping of any element in a sub station it is should be submitted as "Nil" (Example 4)**

*** In case of single tripping which is Nf or Nu, PPI will be "Zero" (Example 1)**

*** In case of PPI less than one, details for that tripping should be submitted seperately (Example "Remarks for less than one**

S.No.	Substation	Element name	Date & Time of the tripping	Categorization (F/U) F = Failures to operate at internal power system faults U = Unwanted operations	Reason for failures/Unwanted operation	Corrective action taken/ to be taken
1	BARA	765/400KV 3X1500 MVA ICT 2	On 15th June at 00:09:21:037 Hrs	U	•On 15th June at 00:09:21:037 Hrs, 765 kV Bara-Mainpuri Line-2 experienced a severe Y-ph to ground fault which was cleared by the distance protection relay as desired and also initiated auto-reclosure cycle. Line was successfully restored through auto reclosure process and sustained thereafter suggesting that fault was temporary in nature and got cleared. •The distance recorded by the relay was 180 meter suggesting that location of fault was either in our switchyard or very close to take off gantry Tripping of ICT-2 on REF protection: •While the line fault was being fed by ICT-2, it tripped on REF (Restricted Earth Fault) protection at 00:09:21:097 which resulted in operation of master trip relay on 765kV as well as 400kV side •Visual inspection of ICT-2 was carried out and was found normal. No other protection or field device alarms got triggered. •Since the fault was outside the REF zone, operation of REF protection needs to be further analysed with the help of relay records to	The matter has been discussed and relay file shared with M/s Schneider (OEM) to find the root cause. PPGCL asked to OEM to share the corrective action plan to avoid the future reoccurrence .

Performance Indices of Anta Gas Power Station for June-2025

Index. No.	Number of correct operations at internal power system faults(Nc)	Number of failures to operate at internal power system faults(Nf)	The Dependability Index(D=Nc/(Nc+Nf)
1	1	0	1

Index. No.	Number of correct operations at internal power system faults(Nc)	Number of unwanted operations (Nu)	The Security Index(S=Nc/(Nc+Nu)
2	1	1	0.5

Index. No.	Number of correct operations at internal power system faults(Nc)	Number of incorrect operations (Ni=Nf+Nu)	The Reliability Index (R=Nc/(Nc+Ni)
3	1	1	0.5

Number of Unwanted operation	Root cause	Corrective Action
Kota line breaker openend at Anta end on 29th June-25	Remote command relay maloperated and trip the breaker at Anta end.	The same relay checked and replaced with new one.

NOTE for reference of deciding parameters:

1) Nc = The number of correct operation of switchyard breakers (220kV and above) on protection to be counted i.e if the breaker has operated correctly on internal protection operation

2) Nf = The number of failure of switchyard breaker (220kV and above) to operate on its protection to be counted i.e if the breaker has not operated on internal protection operation (includes LBB operation etc)

3) Nu = The number of unwanted operation of switchyard breaker (220kV and above) without its own protection operation to be counted i.e if the breaker has opened without operation of its protection leading to tripping of other breaker or grid connected equipments

4) In case if the Nf or Nu is not zero/ index is less than 1, then the report alongwith reasons and corrective action plan to be discussed with COS & ROS before sending to RPC & RLDC.

5) The report shall be prepared by EMD (station) and share it to EEMG (station) which shall be sent to ROS for further submission to RLDC & RPC. However if there is any deviation as mentioned in (4) above then the report shall be submitted to COS for vetting before onward submission to RPC & RLDC.

Reason for Performance Indices less than Unity- June 2025 (RVPN)

Case-1 3*80 MVAR line reactor bank -2 of Phagi Ckt -2 at 765 KV ANTA on 03&04 .06.2025

No. of Unwanted operation –2

Reason of unwanted operation –

Cable damaged.

Corrective Action taken – YES

Damaged cable replaced.

Case-2 765 KV Phagi-Anta-1, 240 MVAR Line Reactor at 765 KV GSS PHAGI on 19, 20 & 21.06.2025

No. of Unwanted operation – 4

Reason of unwanted operation –

Due to problem in DC change over switch, which is found burnt.

Corrective Action taken – YES

DC change over switch replaced.

Case-3 400 KV Hindaun-Alwar line at 400 KV GSS HINDAUN on 13.06.2025

No. of Unwanted operation – 1

Reason of unwanted operation –

DT receive contact shorted due to mice urination.

Corrective Action taken – YES

Contacts cleaned and relay is healthy.

Case-4 400/220 KV 315 MVA ILT -4, Tie Circuit at 400KV GSS HEERAPURA on 14.06.2025

No. of Unwanted operation – 1

Reason of unwanted operation –

TC-1 & TC-2 wiring issue.

Corrective Action taken – YES

Wiring checked and problem rectified.

Case-5 220 KV DAUSA-MANDAWAR LINE at 220KV GSS DAUSA on 10.06.2025

No. of Unwanted operation – 1

Reason of unwanted operation –

QMho relay defective.

Corrective Action taken – YES

The defective relay has been replaced on dated 26.06.2025.

Case-6 220KV Bhawad- Soorpura -II Line at 220KV GSS Soorpura on 13.06.2025

No. of Unwanted operation – 1

Reason of unwanted operation –

Wiring issue.

Corrective Action taken – YES

The substation is going for Automation, hence some wiring issues arise sometimes, which has been rectified.

Case-7 220KV / 132 KV 100 MVA TRANSFORMER-I at 220 KV GSS KUKAS on 02.06.2025

No. of Unwanted operation – 1

Reason of unwanted operation –

Tripping remained connected on NDR relay.

Corrective Action taken – YES

Tripping removed from NDR relay.

Case-8 220/132KV, 100 MVA Transformer No-2, TELK Make at 220 kV GSS KANKROLI on 10.06.2025

No. of Unwanted operation – 1

Reason of unwanted operation –

MIT type REF relay defective.

Corrective Action taken – YES

REF relay replaced.

U. P. POWER TRANSMISSION CORPORATION LIMITED
(A Govt. Of Uttar Pradesh Undertaking)
(उ0 प्र0 पावर ट्रॉसमीशन कारपारेशन लिमिटेड)
(उ0 प्र0 सरकार का उपक्रम)

Office of the Superintending Engineer
Electricity Test & Commissioning Circle
1st Floor, 132KV G.I.S. Old Power House
Substation, 1-A Kamala Nehru Road,
Prayagraj-211001
Email:- setncalbd@upptcl.org

UPPTCL

कार्यालय अधीक्षण अभियन्ता
विद्युत परीक्षण एवं परिचालन मण्डल,
प्रथम तल, 132के0वी0 जी0आई0एस0 ओल्ड पावर
हाउस उपकेन्द्र, 1–ए कमला नेहरू रोड,
प्रयागराज 211001
Email:-setncalbd@upptcl.org

No 643 /ET&CCPr/ Protection Date 02-08-2025

Subject: - Calculation of Protection performance indices report for the month of July 2025.

Chief Engineer(A) **(By Email.)**
Director Operation
U.P.Power Transmmision Corp. Ltd.,
Shakti Bhawan Extn.,
Lucknow.

Kindly find enclosed herewith the Calculation of Protection performance indices report of 220 KV and above Sub Stations for the month of July 2025, Under TSE Zone Prayagraj for your information and necessary action.

Encl.- As above

for M Ahmad
Superintending Engineer
o/c

No 643 /ET&CCPr/ Protection Date 02-08-2025

Copy forwarded to following for kind information and necessary action:-

1- Chief Engineer (TSE), U.P. Power Transmission Corporation Ltd., 57–George Town, Pragayraj.
2- Superintending Engineer (R&A) U.P. Power Transmission Corporation Ltd., Lucknow

M Ahmad
Superintending Engineer
o/c

ET&C CIRCLE, PRAYAGRAJ

Format No.-PI-01

Reporting of performance indices for protection system

(for elements connected at 220 KV and above)

Name of utility:UPPTCL

Month 07-2025

S.N.	Sub-station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni	Dependability index (D) D=(Nc/(Nc+Nf))	Security Index (S) S=(Nc/(Nc+Nu))	Relibality Index (R) R=(Nc/(Nc+Ni))	REMARK
1	220 KV S/S FATEHPUR	220 KV FATEHPUR- UNCHAHAR	0	0	0	0	0	0	0	
		220 KV FATEHPUR- PGCIL-I	**2**	**0**	**0**	**0**	**1**	**1**	**1**	**DUE TO BROKEN CONDUCTOR**
		220 KV FATEHPUR- PGCIL-II	0	0	0	0	0	0	0	
		220KV FATEHPUR- PRAYAGRAJ CANTT	0	0	0	0	0	0	0	
		220 KV FATEHPUR- SIRATHU	0	0	0	0	0	0	0	
		220 KV FATEHPUR- BANDA	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		220 KV FATEHPUR- MALWAN	0	0	0	0	0	0	0	
		200 MVA ICT-I	0	0	0	0	0	0	0	
		200 MVA ICT-II	0	0	0	0	0	0	0	
2	220 KV Jhunsi	**220 KV SARANGAPUR LINE**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		220 KV PHOOLPUR LINE	0	0	0	0	0	0	0	
		200 MVA T/F-I	0	0	0	0	0	0	0	
		200 MVA T/F-II	0	0	0	0	0	0	0	
3	220 KV PRATAPGARH	220 KV SULTANPUR LINE	2	0	0	0	0	0	0	
		220 KV PHOOLPUR LINE	0	0	0	0	0	0	0	
		100 MVA T/F-I	0	0	0	0	0	0	0	
		100 MVA T/F-II	0	0	0	0	0	0	0	
		160 MVA T/F	0	0	0	0	0	0	0	
4	220 KV Rewa Road	200 MVA T/F-I	0	0	0	0	0	0	0	
		200 MVA T/F-II	0	0	0	0	0	0	0	
		160 MVA T/F	0	0	0	0	0	0	0	
		220 KV MIRZAPUR	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		220KV OBRA-I	**2**	**0**	**0**	**0**	**1**	**1**	**1**	
		220KV OBRA-III	0	0	0	0	0	0	0	
		220KV PGCIL-I	0	0	0	0	0	0	0	
		220KV PGCIL-II	0	0	0	0	0	0	0	
		220KV CANTT	0	0	0	0	0	0	0	
		220KV SIRATHU	0	0	0	0	0	0	0	
5	400 KV MASAULI	**200MVA ICT-I**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		200MVA ICT-II	0	0	0	0	0	0	0	
		200MVA ICT-III	0	0	0	0	0	0	0	
		400KV MEJA LINE	0	0	0	0	0	0	0	
		400KV REWA ROAD LINE	0	0	0	0	0	0	0	
6	220KV Robertsganj	220KV Obra Line	1	0	0	0	1	1	1	
		220KV Churk-Sahupuri Line	0	0	0	0	0	0	0	
		160MVA T/F-I (220/132KV)	0	0	0	0	0	0	0	
		160MVA T/F-II (220/132KV)	0	0	0	0	0	0	0	
7	400 KV SS SARNATH	400 KV Anpara L3 Line	0	0	0	0	–	–	–	
		400 KV Anpara-L5 Line	0	0	0	0	–	–	–	
		400 KV Azamgarh Line	0	0	0	0	–	–	–	
		400 KV Varanasi-I (PG) Line	0	0	0	0	–	–	–	
		400 KV VAranasi-II (PG) Line	0	0	0	0	–	–	–	
		400/220 KV 315 MVA ICT-I	0	0	0	0	–	–	–	
		400/220 KV 500 MVA ICT-II	0	0	0	0	–	–	–	
		400/220 KV 315 MVA ICT-III	0	0	0	0	–	–	–	
		400/220 KV 315 MVA ICT-IV	0	0	0	0	–	–	–	
		400KV 125 MVAR Reactor	0	0	0	0	–	–	–	
		220 KV Azamgarh-II Line	0	0	0	0	–	–	–	
		220 KV Bhaduara Line	0	0	0	0	–	–	–	
		220 KV Harhua Line	0	0	0	0	–	–	–	
		220 KV Gajokhar-I Line	0	0	0	0	–	–	–	
		220 KV Gajokhar-II Line	0	0	0	0	–	–	–	
		220 KV Ghazipur Line	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		220 KV Beerapatti TSS Feeder	0	0	0	0	–	–	–	
		220/132 KV 160 MVA TF-I	0	0	0	0	–	–	–	
		220/132 KV 200 MVA TF-I	0	0	0	0	–	–	–	
		220/132 KV 160 MVA TF-III	0	0	0	0	–	–	–	
8	400 KV Sub-Station M.Shahar	**400 KV PGCIL-I Line**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		400 KV PGCIL-II Line	0	0	0	0				
		400 KV Obra B Line	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		400 KV Obra C Line	0	0	0	0				
		400/220/33KV,315 MVA ICT - 1	0	0	0	0				
		400/220/33KV,315 MVA ICT - 3	0	0	0	0				
		220 KV JAUNPUR LINE	0	0	0	0				
		220 KV GAJOKHAR LINE	0	0	0	0				
		220 KV BHADOHI LINE	0	0	0	0				
		220 KV AZAMGARH-II LINE	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		220 KV JHOOSI LINE	0	0	0	0				
		220 KV PHULPUR LINE	0	0	0	0				
		220/ 132 KV , 160 MVA ICT I	0	0	0	0				
		220/ 132 KV , 160 MVA ICT II	0	0	0	0				

ET&C CIRCLE, PRAYAGRAJ

Format No.-PI-01

Reporting of performance indices for protection system

(for elements connected at 220 KV and above)

Name of utility:UPPTCL

Month 07-2025

S.N.	Sub-station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni	Dependability index (D) D=(Nc/(Nc+Nf))	Security Index (S) S=(Nc/(Nc+Nu))	Relibality Index (R) R=(Nc/(Nc+Ni))	REMARK
9	220 KV S/S Jaunpur	220 KV Jaunpur -M. Shahar (400KV) Line	0	0	0	0	-	-	-	-
		220 KV Jaunpur -Azamgarh line	0	0	0	0				
		220/ 132 KV , 160 MVA ICT 1	0	0	0	0				
		220/ 132 KV , 160 MVA ICT 2	0	0	0	0				
		220/ 132 KV , 160 MVA ICT 3	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
10	220 KV substation Bhelupur	**60 MVA T F-I**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		60 MVA T F-II	0	0	0	0	0	0	0	
		60 MVA T F-III	1	0	0	0	1	1	1	
		220 KV Sahupuri-I	0	0	0	0	0	0	0	
		220 KV Sahupuri-II	0	0	0	0	0	0	0	
11	220 KV substation Raja Ka Talab	160 MVA ICT-I	0	0	0	0	0	0	0	
		160 MVA ICT-II	0	0	0	0	0	0	0	
		220 KV Sahupuri	1	0	0	0	1	1	1	
		220 KV Bhadohi(GIS)	0	0	0	0	0	0	0	
	220 kV Substation, Sahupuri	**220 kV Obra Line**	-	-	-	-	-	-	-	
		220 kV Robestganj Line (through Churk)	-	-	-	-	-	-	-	
		220 kV Bhadaura Line	-	-	-	-	-	-	-	
		220 kV Karamnasa Line	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		220 kV Raja ka Talab Line	**1**	**0**	**0**	**0**	**1**	**1**	**1**	
		220 kV Bhadohi Line	-	-	-	-	-	-	-	
		220 kV Sahupuri-I (400 kV GIS Interconnector) Line	-	-	-	-	-	-	-	
		220 kV Sahupuri-II (400 kV GIS Interconnector) Line	-	-	-	-	-	-	-	
		200 MVA (220/132 kV) ICT-I	-	-	-	-	-	-	-	
		160 MVA (220/132 kV) ICT-II	**3**	**0**	**0**	**0**	**1**	**1**	**1**	
		200 MVA (220/132 kV) ICT-III	-	-	-	-	-	-	-	
	400 kV GIS Substation, Sahupuri	**400 kV Biharsharif-I (PG) Line {with 63 MVAR Line Reactor}**	**0**	**0**	**2**	**2**	-	**0**	**0**	This line tripped twice on 1st & 2nd July, 25 due to false A/R L/O command given by unhealthy (defective) BCU (MiCOM-C264).
		400 kV Biharsharif-I (PG) Line {with 63 MVAR Line Reactor}	-	-	-	-	-	-	-	
		400 kV Thathra-I (Varanasi-PG) Line	-	-	-	-	-	-	-	
		400 kV Thathra-II (Varanasi-PG) Line	-	-	-	-	-	-	-	
		500 MVA (400/220 kV) ICT-I	-	-	-	-	-	-	-	
		500 MVA (400/220 kV) ICT-II	-	-	-	-	-	-	-	
		125 MVAR (400 kV) Bus Reactor	-	-	-	-	-	-	-	
		220 kV Sahupuri- I (Interconnector) Line	-	-	-	-	-	-	-	
		220 kV Sahupuri- II (Interconnector) Line	-	-	-	-	-	-	-	
		220 kV Bhelupuri- I Line	**2**	**0**	**0**	**0**	**1**	**1**	**1**	
		220 kV Bhelupuri- II Line	-	-	-	-	-	-	-	
14	220 KV S/S Ghazipur	220KV Sarnath-Ghazipur Line	0	0	0	0				
		220KV Rasra-Ghazipur Line	0	0	0	0				
		220/ 132 KV , 160 MVA ICT 1	1	0	0	0	1	1	1	
		220/ 132 KV , 160 MVA ICT 2	0	0	0	0				
		TOTAL	**23**	**0**	**2**	**2**				

PERFORMANCES INDICES FROM TSE ZONE UPPTCL	Dependability index (D) D=(Nc/(Nc+Nf))	1
	Security Index (S) S=(Nc/(Nc+Nu))	0.92
	Relibality Index (R) R=(Nc/(Nc+Ni))	0.92

NOTE:- (i) Reason for performance indices less than unity is mentioned in above particular element remark.

Nc - No. of correct operations at internal power system faults

Nf - No. of failures to operate at internal power system faults

Nu - No. of unwanted operations

Ni - No. of incorrect operations, (Ni=Nf+Nu)

Suprintending Engineer

ET&C CIRCLE, PRAYAGRAJ

Format No.-PI-01

Reporting of performance indices for protection system

(for elements connected at 220 KV and above)

Name of utility:UPPTCL

Month 07-2025

S.N.	Sub-station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni	Dependability index (D) D=(Nc/(Nc+Nf))	Security Index (S) S=(Nc/(Nc+Nu))	Relibality Index (R) R=(Nc/(Nc+Ni))	REMARK
6	400 kV GIS Substation, Sahupuri	400 kV Biharsharif-I (PG) Line {with 63 MVAR Line Reactor}	0	0	2	2	-	0	0	This line tripped twice on 1st & 2nd July, 25 due to false A/R L/O command given by unhealthy (defective) BCU (MiCOM- C264).
		TOTAL	0	0	2	2				

for M Ahmad

Suprintending Engineer

Ashok
JE

MONTHLY SPS REPORT

E T&C CIRCLE PRAYAGRAJ

FORMAT NO.: PI-01

Reportinc of Performanc Indices of Protection System

(For elements connected at 220KV System and Above

Name of Utility: 400 KV SUBSTATION SARNATH UNDER E T&C DIVISION-I VARANASI

S.No.	Sub Station	Unit(SPS/Line/ICT/GT/etc	N_C	N_f	N_u	N_i	Dependebility Index(D) $D=\frac{N_C}{N_C+N_f}$	Security Index(S) $D=\frac{N_C}{N_C+N_u}$	Reliability Index $D=\frac{N_C}{N_C+N_i}$
		Jul-25							
1	400 KV SS SARNATH	400/220 KV 315 MVA ICT-I	0	0	0	0	_	_	_
2		400/220 KV 500 MVA ICT-II	0	0	0	0	_	_	_
3		400/220 KV 315 MVA ICT-III	0	0	0	0	_	_	_
4		400/220 KV 315 MVA ICT-IV	0	0	0	0	_	_	_
5		220 KV Azamgarh-II Line	0	0	0	0	_	_	_
6		220 KV Bhaduara Line	0	0	0	0	_	_	_
7		220 KV Harhua Line	0	0	0	0	_	_	_
8		220 KV Gajokhar-I Line	0	0	0	0	_	_	_
9		220 KV Gajokhar-II Line	0	0	0	0	_	_	_
10		220 KV Ghazipur Line	0	0	0	0	_	_	_
11		132 KV Saidpur	0	0	0	0	_	_	_
12		132 KV Kaithi	0	0	0	0	_	_	_
Month		01-Aug							
PERFORMANCES INDICES FROM TNE ZONE UPPTCL		Dependability index (D) D=(Nc/(Nc+Nf))	0	NOTE:- (i) Reason for performance indices less than unity is mentioned in above particular element remark.					
		Security Index (S) S=(Nc/(Nc+Nu))	0						
		Relibality Index (R) R=(Nc/(Nc+Ni))	0						

Nc - No. of correct operations at internal power system faults
Nf - No. of failures to operate at internal power system faults
Nu - No. of unwanted operations
Ni - No. of incorrect operations, (Ni=Nf+Nu)

for Suprintending Engineer

Reporting of Performance Indices for NHPC Power Stations In NR-Region
Month-JULY '2025

Sl No	Name of Utility	Name of PS	Elements (Line/ Unit)	From		To		Total Outage	Outage Reason	Nc	Nf	Nu	Ni	Dependability Index (D=Nc/(Nc+Nf))	Security Index (S=Nc/(Nc+Nu))	Reliability Index (R=Nc/(Nc+Ni))	Reason for wrong operation	Action Taken
1	NHPC Ltd	SALAL	220 KV Salal-Jammu Line#1	15-Jul-25	11:17	15-Jul-25	12:01	0:44	Master Trip Relay Operated	1	0	1	1	1	0.5	0.5	May be due to improper protecion scheme	To be checked at the earliest opportunity
2	NHPC Ltd	SALAL	220 KV Salal-Jammu Line#2	15-Jul-25	11:17	15-Jul-25	12:09	0:52	Busbar operated in R-Phase at Bus#A	1	0	0	0	1	1	1	NA	NA
3	NHPC Ltd	SALAL	220 KV Salal-Kishanpur Line#1	15-Jul-25	11:17	15-Jul-25	12:41	1:24	Busbar operated in R-Phase at Bus#A	1	0	0	0	1	1	1	NA	NA
4	NHPC Ltd	SALAL	220 KV Salal-Kishanpur Line#2	15-Jul-25	11:17	15-Jul-25	12:00	0:43	Master Trip Relay Operated	1	0	1	1	1	0.5	0.5	May be due to improper protecion scheme	To be checked at the earliest opportunity
5	NHPC Ltd	SALAL	220 KV Salal-Kishanpur Line#3	15-Jul-25	11:17	15-Jul-25	12:00	0:43	Master Trip Relay Operated	1	0	1	1	1	0.5	0.5	May be due to improper protecion scheme	To be checked at the earliest opportunity
6	NHPC Ltd	SALAL	220 KV Salal-Kishanpur Line#4	15-Jul-25	11:17	15-Jul-25	12:00	0:43	Busbar operated in R-Phase at Bus#A	1	0	0	0	1	1	1	NA	NA
7	NHPC Ltd	UR-II	400 KV Uri-II-Woogura Line#1	25-Jul-25	13:44	25-Jul-25	16:53	3:09	GIS Controller Fault	1	0	0	0	1	1	1	NA	NA
No Line tripping has been observed from other Power Stations of NHPC of NR region for Month of July'2025																		

Protection Performance Indices of Rampur HPS

Tripping of transmission line ckt Rampur-Nalagarh-2 of Rampur HPS on 14.07.2025.

Number of unwanted operations = 1

Reason for unwanted operation – SPS activated on case-1 i.e. load exceeds 900MW as malfunction by line transducer.

Corrective action – Faulty transducer was replaced with spare available during line shutdown.

Taken- Yes (Corrective action has been taken)

Tripping of Unit#1 of Rampur HPS on 25.07.2025.

Number of unwanted operations = 1

Reason for unwanted operation –Unit#1 tripped on transformer differential protection as malfunction by transformer protection relay RET650.

Corrective action –Relay RET650 was replaced with spare available during plant shutdown.

Taken- Yes (Corrective action has been taken)

NR222016	607083	220KV SALAL-JAMMU-I	7/15/2025 11:17	7/15/2025 12:01	00:00	00:44	00:00	00:00	NR-2507-2987	SBBU	Line remains charged from Jammu(JKPTCL) but tripped from Salal NPC due to problem in their Bay at Salal. As intimated by NHPC Salal, there was complete blackout of 220KV Yard at NHPC Salal caused by problem in machine 4. For reference, copy of email from NHPC indicating problem in their yard is attached	NC
NR222017	607084	220KV SALAL-JAMMU-II	7/15/2025 11:17	7/15/2025 12:09	00:00	00:52	00:00	00:00	NR-2507-2991	SBBU	Line remains charged from Jammu(JKPTCL) but tripped from Salal NPC due to problem in their Bay at Salal. As intimated by NHPC Salal, there was complete blackout of 220KV Yard at NHPC Salal caused by problem in machine 4. For reference, copy of email from NHPC indicating problem in their yard is attached	NC
NR222018	607079	220KV SALAL-KISHENPUR-I	7/15/2025 11:17	7/15/2025 12:41	00:00	01:24	00:00	00:00	NR2507-2988	SBBU	Line remains charged from Kishenpur but tripped from Salal NPC due to problem in their Bay at Salal. As intimated by NHPC Salal, there was complete blackout of 220KV Yard at NHPC Salal caused by problem in machine 4. For reference, voltage graph od Kishenpur end showing line in charged condition and copy of email from NHPC indicating problem in their yard is attached	NC
NR222019	607080	220KV SALAL-KISHENPUR-II	7/15/2025 11:17	7/15/2025 12:00	00:00	00:43	00:00	00:00	NR-2507-2989	SBBU	Line remains charged from Kishenpur but tripped from Salal NPC due to problem in their Bay at Salal. As intimated by NHPC Salal, there was complete blackout of 220KV Yard at NHPC Salal caused by problem in machine 4. For reference, voltage graph od Kishenpur end showing line in charged condition and copy of email from NHPC indicating problem in their yard is attached	NC
NR222020	607081	220KV SALAL-KISHENPUR-III	7/15/2025 11:17	7/15/2025 12:00	00:00	00:43	00:00	00:00	NR2507-2990	SBBU	Line remains charged from Kishenpur but tripped from Salal NPC due to problem in their Bay at Salal. As intimated by NHPC Salal, there was complete blackout of 220KV Yard at NHPC Salal caused by problem in machine 4. For reference, voltage graph od Kishenpur end showing line in charged condition and copy of email from NHPC indicating problem in their yard is attached	NC
NR222021	607082	220KV SALAL-KISHENPUR-IV	7/15/2025 11:17	7/15/2025 12:00	00:00	00:43	00:00	00:00	NR-2507-2999	SBBU	Line remains charged from Kishenpur but tripped from Salal NHPC due to problem in their Bay at Salal. As intimated by NHPC Salal, there was complete blackout of 220KV Yard at NHPC Salal caused by problem in machine 4. For reference, voltage graph od Kishenpur end showing line in charged condition and copy of email from NHPC indicating problem in their yard is attached	NC
NR222042	607054	220KV ALUSTENG-DRASS	7/10/2025 16:22	7/10/2025 17:28	00:00	00:00	01:06	00:00	NR2507-2082	LNCC	Line tripped on Y-N Fault due to heavy thunderstorm and lightning persisting in the area. During tower top patrolling, Flashover marks were noticed on arcing horn and corona ring at Loc No 200 indicating lightening. Fault Data Alustang:54.1kM,=2.19kA. Following documnets has been attached for reference: 1. Time tagged GPS photo of tower name plate. 2. GPS tagged photo of arcing horns showing flash marks 3. Relay fault location (Alustang) JKPTCL. 4. Tower Schedule and kmz file	NC
NR222042	607090	220KV ALUSTENG-DRASS	7/16/2025 13:42	7/16/2025 14:43	00:00	00:00	01:01	00:00	NR2507-3218	LNCC	Line tripped on R-B-N fault caused by falling of tree from about 30 meters from outer conductor from uphill side caused by huge land-sliding in Tower span 200-201. Falling, tree infringed with B-Ph (left) & R-Ph (top) phases conductors leading to the tripping of the line. Fault Data Drass: 65.12Km, Ir=0.300kA, Ib=0.471kA. Following documents has been attached for reference: 1.Time tag photo with GPS coordinate for nearest tower name plate 2. GPS tagged photo showing tripping due to falling of tree. 3.Drass(PG) Relay fault location of relay. 4.Tower Schedule and KMZ file.	NC
NR240051	607135	400KV URI 2-WAGOORA	7/25/2025 13:44	7/25/2025 16:53	00:00	03:09	00:00	00:00	NR2507-5181	SRMU	Line remains charged from Wagoora(PG) but tripped from Uri-2(NHPC) only due to problem in their Bay at URI. As intimated by NHPC, Mal functioning of GIS Controller at Uri-2 (NHPC) resulted in unwanted opening of CB. For reference, voltage graph of Wagoora end showing line in charged condition and copy of email from NHPC indicating problem in their yard is attached	NC
NR276504	607088	765KV MEERUT-MOGA	7/16/2025 9:29	7/16/2025 19:19	09:50	00:00	00:00	00:00	NR2507-3184	LHWT	Line tripped on Y-N fault due to failure of insulator V string at Loc No 02. Fault data Moga:336.6km, 2.53kA, Fault data Meerut : 0.46km, 23.9kA Y-ph (V string) polymer insulator decapped at tower no.02	NC
NR276504	607161	765KV MEERUT-MOGA	7/31/2025 1:13	7/31/2025 2:29	01:16	00:00	00:00	00:00	---	LEFT	Line tripped on Y-N fault due to jumper swing caused by heavy winds and thunderstorm persisting in the area. Fault Data Moga:90.6km,5.7kA,Fault data Meerat:222.2km,3.07Ka (M1).	NC
NR2ICT88	607006	CHANDIGARH 160 MVA ICT-I	02-07-2025 03:23	02-07-2025 06:56	03:33	00:00	00:00	00:00	NR2507-221	SRMT	ICT tripped on NRV trip.	NU

	Total tripping including LNCC & successful autoreclosures	12
NC	Nc is the number of correct operations at internal power system faults	12
NF	Nf is the number of failures to operate at internal power system faults,	0
NU	Nu is the number of unwanted operations,	1
NI	Ni is the number of incorrect operations and is the sum of Nf and Nu	0
	The Dependability Index defined as $D = Nc/(Nc+Nf)$	100.00%
	The Security Index defined as $S = Nc/(Nc+Nu)$	92.31%
	The Reliability Index defined as $R = Nc/(Nc+Ni)$	100.00%

PROTECTION PERFORMANCE INDICES PKATL

		NIL									NA

	Total tripping including LNCC & successful autoreclosures	
NC	Nc is the number of correct operations at internal power system faults	
NF	Nf is the number of failures to operate at internal power system faults,	
NU	Nu is the number of unwanted operations,	
NI	Ni is the number of incorrect operations and is the sum of Nf and Nu	
	The Dependability Index defined as $D = Nc/(Nc+Nf)$	
	The Security Index defined as $S = Nc/(Nc+Nu)$	
	The Reliability Index defined as $R = Nc/(Nc+Ni)$	

DATA CLASSIFICATION : CONTROLLED

PROTECTION PERFORMANCE INDICES POWERGRID NR2

NR222037	606153	220KV JALANDHAR-NEHRIAN (HPSEB)-II	6/25/2025 11:08	6/25/2025 11:08	00:00	00:00	00:00	00:00	------	LART	Line Auto reclosed successfully on transient R-N fault from both ends.	NC
NR240001	606149	400KV ABDULLAPUR-BAWANA-I	6/25/2025 5:35	6/25/2025 5:35	00:00	00:00	00:00	00:00	------	LART	Line Auto reclosed successfully on transient R-N fault from both ends.	NC
NR240011	606183	400KV CHAMERA1-JALANDHAR-II	30-06-2025 05:12	30-06-2025 05:12	00:00	00:00	00:00	00:00	--------	LART	Line Auto reclosed successfully on transient B-N fault from both ends.	NC
NR240013	606041	400KV DULHASTI-KISHENPUR-I	6/6/2025 13:33	6/6/2025 13:33	00:00	00:00	00:00	00:00	------	LART	Line Auto reclosed successfully on transient B-N fault from both ends.	NC
NR240049	606140	400KV LUDHIANA-PATIALA-II	6/22/2025 15:49	6/22/2025 15:49	00:00	00:00	00:00	00:00	--------	LART	Line Auto reclosed successfully on transient Y-N fault from both ends.	NC
NR240101	606150	400KV KURUKSHETRA-NAKODAR	6/25/2025 5:51	6/25/2025 5:51	00:00	00:00	00:00	00:00	------	LART	Line Auto reclosed successfully on transient B-N fault from both ends.	NC
NR240105	606103	400KV KAITHAL-BAGPAT-II	6/15/2025 2:58	6/15/2025 2:58	00:00	00:00	00:00	00:00	------	LART	Line Auto reclosed successfully on transient B-N fault from both ends.	NC
NR240114	606027	400KV AMRITSAR-JALANDHAR - II	6/4/2025 10:50	6/4/2025 10:50	00:00	00:00	00:00	00:00	------	LART	Line Auto reclosed successfully on transient R-N fault from both ends.	NC
NR240116	606173	400KV KAITHAL-MALERKOTLA	28-06-2025 01:15	28-06-2025 01:15	00:00	00:00	00:00	00:00	------	LART	Line Auto reclosed successfully on transient B-N fault from both ends.	NC
NR240117	606001	400KV DADRI-KAITHAL	6/1/2025 4:00	6/1/2025 4:00	00:00	00:00	00:00	00:00	-------	LART	Line auto reclosed successfully on Y-N fault from both ends. Fault data Kaithal end (AFAS): 136.267KM, Iy=3.39kA and Dadri end: 79.9km (Fault under NR1 jurisdiction).	NC
NR240121	606020	400KV KISHENPUR- NEW WANPOH-IV	6/3/2025 16:13	6/3/2025 16:13	00:00	00:00	00:00	00:00	--------	LART	Line Auto reclosed successfully on transient B-N fault from both ends.	NC
NR213202	606107	132KV SEWA2 - MAHANPUR	6/15/2025 15:24	6/15/2025 16:13	00:00	00:49	00:00	00:00	NR2506-4293	SRMU	Line succesfully Auto Reclosed from Mahanpur (JKPTCL) end on transient R-N fault but tripped from Sewa 2 (NHPC) due to maloperation of Auto reclose scheme at SEWA 2 end. Bay and Protection at Sewa(NHPC) is owned and maintained by NHPC. Fault data Sewa_2: B-N fault, FL=6.55KM, Ib=2.053KA, Following document has been attached for refrence: 1.Mahanpur(JKPTCL) end DR showing successful Auto Reclosure.	NC
NR213204	606171	132KV MAHANPUR - KATHUA	6/27/2025 22:03	28-06-2025 06:05	00:00	08:02	00:00	00:00	NR2506-6920	OMSU	Line tripped on B-N fault due to snaping of conductor of "220KV JKPTCL Line (D/C Thein-Ghatti) caused by failure of Tower/cross arm of JKPTCL line. Snapped conductor of JKPTCL Line has fallen on span 158-159 of "132KV Mahanpur-Kathua" and "132KV Sewa2-Kathua" lines resulting in line outage. Fault data Kathua(JKPTCL) 4.268KA, 2.42KM & Sewa2(NHPC): 1.03KA, 41.32KM. Lateron line taken under S/D by JKPTCL to replace snapped conductor. Following documents are attcahed for reference : 1. Relay fault distance data of Kathua end 2. Geotagged photo showing tower name plate 3. Geo tagged photo of snapped JKPTCL conductor 4. Tower schedule and KMZ File	NC
NR213205	606172	132KV SEWA2 - KATHUA	6/27/2025 22:03	28-06-2025 06:01	00:00	07:58	00:00	00:00	NR2506-6918	OMSU	Line tripped on B-N fault due to snaping of conductor of "220KV JKPTCL Line (D/C Thein-Ghatti) caused by failure of Tower/cross arm of JKPTCL line. Snapped conductor of JKPTCL Line has fallen on span 158-159 of "132KV Mahanpur-Kathua" and "132KV Sewa2-Kathua" lines resulting in line outage. Fault data Kathua(JKPTCL) 4.268KA, 2.42KM & Sewa2(NHPC): 1.03KA, 41.32KM. Lateron line taken under S/D by JKPTCL to replace snapped conductor. Following documents are attcahed for reference : 1. Relay fault distance data of Kathua end 2. Geotagged photo showing tower name plate 3. Geo tagged photo of snapped JKPTCL conductor 4. Tower schedule and KMZ File	NC
NR222020	606110	220KV SALAL-KISHENPUR-III	6/17/2025 22:08	6/18/2025 20:09	00:00	22:01	00:00	00:00	NR2506-4946	SEFU	As intimated by NHPC Salal, Line tripped due to sparking in wavetrap in their bay at NHPC. For reference, mail from NHPC indicating sparking in wavetrap is attached	NC	
NR222024	606128	220KV WAGOORA-PAMPORE-I	6/20/2025 23:24	6/21/2025 3:27	00:00	04:03	00:00	00:00	NR2506-5452	SEFU	Line tripped on operation of distance protection in Zone 2 caused by 220KV Bus fault in JKPTCL Substatin Pampore. Fault data Wagoora Main-1: FL=11.85 KM, Iy=5.678 KA. As intimated by JKPTCL Pampore, there was failur of 220/66KV Transformer at JKPTCL Station Pampore and fault was neirher cleared by transformer protection at pampore nor by or 220KV BB protection at JKPTCL Pampore. Following Documnets has been attached for reference: 1.Wagoora end DR showing operaion of distance protection in Z2 2. Wagoora end relay snap showing Z2 operated and fault distance 11.85KM against line length of 10.29km. 3. Mail from JKPTCL indicatig failure of Failure of Transformer at Pampore	NC	At JKPTCL S/S Pampore, neither Transformer protection operated nor BB operated
NR222025	606129	220KV WAGOORA-PAMPORE-II	6/20/2025 23:24	6/21/2025 3:26	00:00	04:02	00:00	00:00	NR2506-5453	SEFU	Line tripped on operation of distance protection in Zone 2 caused by 220KV Bus fault in JKPTCL Substatin Pampore. Fault data Wagoora Main-1: FL=11.85 KM, Iy=5.678 KA. As intimated by JKPTCL Pampore, there was failur of 220/66KV Transformer at JKPTCL Station Pampore and fault was neirher cleared by transformer protection at pampore nor by or 220KV BB protection at JKPTCL Pampore. Following Documnets has been attached for reference: 1.Wagoora end DR showing operaion of distance protection in Z2 2. Wagoora end relay snap showing Z2 operated and fault distance 11.76KM against line length of 10.29km. 3. Mail from JKPTCL indicatig failure of Failure of Transformer at Pampore	NC	At JKPTCL S/S Pampore, neither Transformer protection operated nor BB operated
NR240009	606040	400KV CHAMERA2-KISHENPUR	6/6/2025 11:40	6/6/2025 13:21	00:00	01:41	00:00	00:00	NR2506-1652	SEFU	Line remained charged from kishenpur(PG) and tripped from Chamera 2 (NHPC) . As per NHPC Chamera, line tripped due to maloperation in their Bay at Chamera. Following documents are attached for refrence: 1. Mail from Chamera 2 NHPC regarding problem in their bay at Chamera 2.Voltage and MVAR Graphs Kishenpur(PG) showing line in charge condition from Kishenpur(PG).	NC	
NR2ICT61	606062	MOGA 500MVA ICT-I	6/9/2025 20:20	6/10/2025 1:50	05:30	00:00	00:00	00:00	NR2506-2714	SICT	ICT tripped on operation of Bucholz protection	NU	

	Total tripping including LNCC & successful autoreclosures	19
NC	Nc is the number of correct operations at internal power system faults	18
NF	Nf is the number of failures to operate at internal power system faults,	0
NU	Nu is the number of unwanted operations,	1
NI	Ni is the number of incorrect operations and is the sum of Nf and Nu	1
	The Dependability Index defined as $D = Nc /(Nc+Nf)$	100.00%
	The Security Index defined as $S = Nc/(Nc+Nu)$	94.74%
	The Reliability Index defined as $R = Nc/ (Nc+Ni)$	94.74%

PROTECTION PERFORMANCE INDICES PKATL

		NIL								NA	

	Total tripping including LNCC & successful autoreclosures	
NC	Nc is the number of correct operations at internal power system faults	
NF	Nf is the number of failures to operate at internal power system faults,	
NU	Nu is the number of unwanted operations,	
NI	Ni is the number of incorrect operations and is the sum of Nf and Nu	
	The Dependability Index defined as $D = Nc /(Nc+Nf)$	
	The Security Index defined as $S = Nc/(Nc+Nu)$	
	The Reliability Index defined as $R = Nc/ (Nc+Ni)$	

Protection Performance Indices (PPI) for the Month of July 2025 of KPH, Khara.

S.No.	Substation	Element name	Date & Time of the Tripping	Categorization (F/U) F = Failures to operate at internal power system faults U = Unwanted operations	Reason for failures/Unwanted operation	Corrective action taken/ to be taken
1	Khara Power House (Khara)	220 KV Khara - Behat	07/07/2025, 14:15 Hrs	-	Distance Protection Z1	SOTF disabled after consultation with Testing & Commissioning Engineer.
2		220 KV Khara - Saharanpur (PG)	09/07/2025, 09:34 Hrs	-	Distance Protection Z1	
3		220 KV Khara - Saharanpur (PG)	25/07/2025, 10:24 Hrs	-	Distance Protection Z1	

Reason for Performance Indices less than Unity- July 2025 (RVPN)

Case-1 400 KV Bhensara - Akal Line at 400KV BHENSARA on 22.07.2025

No. of Unwanted operation –1

Reason of unwanted operation –

DT signal received at Bhensara end

Corrective Action taken – YES

Lizard found stuck at DT send contacts, which was removed and contacts cleaned.

Case-2 400 KV AKAL-JODHPUR LINE at 400 KV GSS AKAL on 22 & 23.07.2025

No. of Unwanted operation – 2

Reason of unwanted operation –

DT signal sent during testing by service engineer of OEM.

Corrective Action taken – YES

Working personnel was asked to disconnect any outgoing signal during testing.

Case-3 80 MVAR, 400 KV Bus Reactor at 400KV GSS BABAI on 07.07.2025

No. of Unwanted operation – 1

Reason of unwanted operation –

Due to water logging in auxiliary relays.

Corrective Action taken – YES

Auxiliary relays cleaned and proper packing has been done.

Case-4 400/220KV 315MVA ICT-III at 400 KV GSS AJMER on 15.07.2025

No. of Unwanted operation – 1

Reason of unwanted operation –

OSR cable defective.

Corrective Action taken – YES

Cable replaced.

Case-5 400KV/125Mvar Reactor at 400 KV GSS PACHPADRA on 19, 27 & 30.07.2025

No. of Unwanted operation – 3

Reason of unwanted operation –

Backup relay defective.

Corrective Action taken – YES

The defective relay has been replaced.

Case-6 220 kV SWM-Anta Line at 220KV GSS SWM on 05.07.2025

No. of Unwanted operation – 1

Reason of unwanted operation –

PT selection issue.

Corrective Action taken – YES

PT selection issue resolved.

Case-7 220 KV Ramgarh-Greenko Line at 400 KV GSS RAMGARH on 22.07.2025

No. of Unwanted operation – 1

Reason of unwanted operation –

Manual mistake during testing of bus bar protection.

Corrective Action taken – YES

Workmen were asked to work carefully.

Case-8 220/132 KV 100 MVA TR NO.NO.6 at 220KV GSS KHETRI on 10.07.2025

No. of Unwanted operation – 2

Reason of unwanted operation –

Cable defective.

Corrective Action taken – YES

Cable replaced.

Case-9 220/132 KV, 100 MVA, Transformer-II (T&R) at 220KV GSS PALI on 11.07.2025, 220/132KV 100MVA TRF.3rd at 220 MIA ALWAR on 13.07.2025 & 220/132 KV 100 MVA TR .NO.5 at 220 KV GSS KHETRI on 23.07.2025

No. of Unwanted operation – 3

Reason of unwanted operation –

Water logging during rain.

Corrective Action taken – YES

Relays cleaned and proper packing has been done.

Sl. No.	Month	SPS Operated	Details of SPS operated	No. of times operated in Month	No. of correct operations	No. of mal-operation	No. of times failed to operate	Remarks
1	May'25	SPS for safe evacuation of Lalitpur TPS Generation	1. i) At 15:32:37 hrs, B-N fault occurred on 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-1 and A/R started. At the same instant, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-2 tripped on operation of OV stage-2 protection. As per DR of line, voltage of R-ph of 765kV Lalitpur-Agra Fatehabad line-II increased from 441kV to ~845kV for ~140msec. ii)Further, after dead time of A/R operation, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-1 also tripped due to permanent nature of fault. iii)As per PMU at Agra765(PG), B-N phase to earth fault with delayed clearance of ~560msec is observed. iv)Due to tripping of both the 765kV evacuating lines, case-3 for SPS for safe evacuation of Lalitpur generation operated. As per SPS case-3, in case of tripping of both the 765kV lines, one 660MW unit, in this case unit-3 shall come to house load and remaining unit shall trip. 220kV lines to Lalitpur and Jhansi shall also trip. v)However, as 100MVA ST-2 already tripped at 15:26 hrs during LBB operation of 220kV Bus-1, BFP for Unit-3 was not available and therefore, 660MW Unit-3 also tripped along with 660MW Unit-1&2. 220kV line to Lalitpur(2nd ckt) also tripped on SPS operation. vi)Due to tripping of both the units and all the 220kV feeders on loss of evacuation path and SPS operation, complete 765/220kV Lalitpur S/s got blackout. vii)As per SCADA, generation loss of 1040MW at Lalitpur TPS (UP) and change in UP demand of ~90MW is observed. 2. i)At 13:49 hrs, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-2 tripped on R-B phase to phase fault. ii)Further at 13:56hrs, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-1 tripped on R-N phase to earth fault. iii)Due to tripping of both the 765kV evacuating lines, case-3 for SPS for safe evacuation of Lalitpur generation operated. As per SPS case-3, in case of tripping of both the 765kV lines, one 660MW unit (in this case unit-3 shall come to house load and remaining unit shall trip. 220kV lines to Lalitpur and Jhansi shall also trip. iv)As a result, 660 MW Lalitpur Unit-1 & Unit-2 tripped alongwith, 220 KV Lalitpur –Jhansi (UP) CKT, 220kV Lalitpur-Lalitpur220 ckt-2, 220kV Lalitpur-Lalitpur220 ckt-1 and 220 KV Lalitpur –Babina (UP) CKT tripped on SPS. v)As per SPS, the generation of 660MW Unit-3 reduced to 70MW for house load operation. vi)As per PMU at 765KV Agra(PG), two consecutive R-N phase to phase faults with fault clearing time of 120ms is observed.	1 03.05.2025 at 15:32hrs 2 11.05.2025 at 13:49hrs	2	0	0	**During 1st event:** As 100MVA ST-2 already tripped at 15:26 hrs during LBB operation of 220kV Bus-1, BFP for Unit-3 was not available and therefore, 660MW Unit-3 also tripped along with 660MW Unit-1&2. 220kV line to Lalitpur(2nd ckt) also tripped on SPS operation.
2	May'25	HVDC Rihand-Dadri SPS	i)As reported at 20:21 hrs, during multiple elments tripping event in Dadri, Meerut complex on subsequent line faults,500 kV HVDC Rihand-Dadri (PG) Ckt-1 and Ckt-2 tripped due to commutation failure. At the time of tripping 500 kV HVDC Rihand-Dadri (PG) Ckt-1 and Ckt-2 were carrying total ~1150 MW. As a result of tripping of both the ckt, SPS condition 2 operated. ii)As per details received from POWERGRID, as per logic if commutation failure persists for more than 2600 ms then the Protection shall issue a Y Trip to the converters. Since starting from 20:20:58:2785 Hrs. 12 successive commutation failures were detected at a gap of less than 500ms, at 20:21:00:8782 both Poles of the Rihand Dadri HVDC Link tripped on Commutation failure protection from HVDC Dadri S/s. iii)As per SPS case-2 operation, there should be load shed in load group-A, B, C & D and generation back down of total ~500 MW at Rihand & Singrauli TPS. As per SCADA data, generation backdown of ~335MW is observed in Rihand Stage I and Stage II. However, there wasn't any significant generation back down (only ~30MW) in Singrauli observed. At load stations also, no siginificatn load relief was observed as per SCADA. As per status received from sites, SPS signal was sent from POWERGRID (Dadri S/s) however SPS action didn't occur at multiple stations due to issue in SPS system at load stations end.	1 21.05.2025 at 20:21hrs	1	0	0	As per details received from SLDCs and POWERGRID, SPS signal was sent from POWERGRID (Dadri S/s) however SPS action didn't occur at multiple stations due to issue in SPS system at load stations end. Non-operation of SPS at Singrauli, Malerkotla, Muzaffarnagar, Modipuram, Panipat(HR). Confirmation from some of the load stations not received yet.
3	Jul'25	SPS for reliable evacuation of power from N. Jhakri, Rampur, Karcham Wangtoo, Sawra Kuddu, Baspa, Sorang and Naitwar Mori HEP	At 06:25 hrs, case-1 of "SPS for reliable evacuation of power from N. Jhakri, Rampur, Karcham Wangtoo, Sawra Kuddu, Baspa, Sorang and Naitwar Mori HEP" operated. As per SPS logic, condition for SPS case-1 operation is "Load on any of the lines at Jhakri, Rampur or Gumma towards Nallagarh or Panchkula exceeds 900 MW". However, loading on all the evacuating lines were within permissable limit (<900MW).	1 14.07.2025 at 06:25hrs	0	1		As confirmed, SPS operated due to faulty transducer of the 400kV Rampur–Nalagarh transmission line at the Rampur end and faulty transducer has been successfully replaced by the RHPS team
	Total			**4**	**3**	**1**	**0**	

Status of Internal Protection Audit Plan for FY 2025 -26								
S. No.	**NRPC Member**	**Category**	**Status**	**Schedule submitted as per utililty**	**Present Status Comlpleted (yes/no)**	**Report Submission Date by audit party**	**Discussion held in PSC meeting number**	**Compliance status**
1	PGCIL	Central Government owned Transmission Company	Received (NR-1,2,3)					
2	NTPC	Central Generating Company	Received					
3	BBMB		Received					
4	THDC		Received	Tehri- March, 2026 Koteshwar- December, 2025				
5	SJVN		Received (NJHPS, RHPS)					
6	NHPC		Received					
7	NPCIL		Received (RAP C)	July, 2025				
			Conducted (RAPS-1,2)	Jun-25			61	
8	Delhi SLDC	SLDC						
9	Haryana SLDC							
10	Rajasthan SLDC							
11	Uttar Pradesh SLDC		Received (Jaypee Vishnuprayag, WUPPTCL, SEUPPTCL, Alaknanda, GTL)	GTL- Jan'2026 & Feb'2026				
12	Uttarakhand SLDC							
13	Punjab SLDC							
14	Himachal Pradesh SLDC							
15	DTL	State Transmission Utility	Received					
16	HVPNL		Received					
17	RRVPNL		Received					
18	UPPTCL		Received (All zones)	Jan-March 2026				
19	PTCUL		Received	July-December 2025				
20	PSTCL							
21	HPPTCL		Received					
22	IPGCL	State Generating Company	Received (PPS-III, I)					
23	HPGCL		Received	Aug'25				
24	RRVUNL		Received					
25	UPRVUNL		Received (Anpara B)	Jun-25				
			Received (Obra A & B)	Jan - March 2026				
			Received (Anpara D)	May-25				
			Received (Harduaganj)	April -May 2025				
			Received (Harduaganj D)	April -May 2025				
			Received (Harduaganj E)	April -May 2025				
			Received (Parichha)	May-25				
			Received (Parichha Ext)	Feb-26				
			Received (Obra C)	Mar-26				
			Received (Jawaharpur)	Jul-25				
26	UJVNL		Received (Chibro)	Oct-25				
			Received (Khodri)	Nov-25				
			Received (Vyasi)	Dec-25				
			Received (Dharashu, Tiloth)					
27	HPPCL		Received (Kasheng HEP, Sawara Kuddu, Sainj)	Nov'25-Mar'26				
28	PSPCL	State Generating Company & State owned Distribution Company	Received (GHTP, GGSSTP, GATP, RSD)					
29	HPSEBL	Distribution company having Transmission connectivity ownership	Received					
30	Prayagraj Power Generation Co. Ltd.	IPP having more than 1000 MW installed capacity	Received	Aug'25				
31	Aravali Power Company Pvt. Ltd							
32	Apraava Energy Private Limited		Received	May'25				
33	Talwandi Sabo Power Ltd.		Received	May'25				
34	Nabha Power Limited		Received	May'25				
35	MEIL Anpara Energy Ltd		Received	May'25				
36	Rosa Power Supply Company Ltd		Received	Jan'26				
37	Lalitpur Power Generation Company Ltd		Received	Oct - Nov 2025				
38	MEJA Urja Nigam Ltd.							
39	Adani Power Rajasthan Limited							
40	JSW Energy Ltd. (KWHEP)		Received	Nov-25 to Feb 26				
41	UT of J&K	UT of Northern Region						
42	UT of Ladakh							
43	UT of Chandigarh							
	ISTS Transmission Utilities							

44	INDIGRID		Received	Aug-25 to March-26				
45	ADHPL							
46	Adani Transmission Limited		Received(400kV Mohindergarh SS)	October, 2025				
47	Bikaner Khetri Transmission Limited		Received (765 kV Bikaner and Khetri extension bays)	September, 2025				
48	Fatehgarh Bhadla Transmission Limited		Received (400 kV Fatehgarh SS)	September, 2025				
49	Powergrid Sikar Transmission Limited		Received	Sikar- August,25				
50	Powergrid Aligarh Sikar Transmission Limited		Received	Aligarh- April, 25 Sikar- August,25				
51	Powergrid Ajmer Phagi Transmission Limited		Received	March,2025				
52	Powergrid Bikaner Transmission System Limited		Received	Bikaner-II Feb,2025				
53	Powergrid Khetri Transmission System Limited		Received	Khetri-Feb,2025				
54	Powergrid Ramgarh Transmission Limited		Received	Fatehgarh-II Dec, 2025 Fatehgarh-III May, 2025				
55	Powergrid Fatehgarh Transmission Limited		Received	Fatehgarh-II Dec, 2025 Bhadla-II Jan, 2025				
56	Powergrid Bhadla Transmission Limited		Received	Fatehgarh-II Dec, 2025 Bhadla-II Jan, 2025				
57	Powergrid Meerut Simbhavli Transmission Limited		Received	Nov, 2025				
58	Powergrid Kala Amb Transmission Limited		Received	September, 2025				
	State Utilities							
	Uttar Pradesh							
59	Vishnuprayag Hydro Electric Plant (J.P.)		Received	Jun-25				
60	Alaknanda Hydro Electric Plant (GVK)		Received	Dec'25 -Mar'26				
61	Ghatampur TPS		Received	February, 26				
62	Khara Power House (Khara)		Received	Dec'25				
63	WUPPTCL		Received	Oct-25				
64	SEUPPTCL		Received	Jan-26				
65	ATSCL	**AESL**	Received (400/220KV Alwar SS)	September, 2025				
66	GTL	**AESL**	Received (765 kV Hapur extension bays**)**	September, 2025				
67	GTL	**AESL**	Received (765 kV Agra and Gr. Noida extension bays)	September, 2025				
68	HPTSL	**AESL**	Received (220kV Ranpur SS)	August, 2025				
69	MTSCL	**AESL**	Received (400/220/132KV Deedwana SS)	August, 2025				
70	OBTL	**AESL**	Received (400/220/132KV Badaun SS)	Jan'2026				
71	STSL	**AESL**						
	Rajasthan							
72	Barsingsar Plant	**NLC**						
73	Rajwest Plant	**JSW**						

	RE Utilities							
74	ABC Renewable Pvt. Ltd							
75	ACME Heeragarh powertech Pvt. Ltd		Received	Jun-25				
76	ACME Pholidi		Received	Jun-25				
77	ACME Deagarh		Received	Jun-25				
78	ACME Raisar		Received	Jun-25				
79	ACME Dhoulpar		Received	Jun-25				
80	ACME Chittorgarh Solar Energy Pvt Ltd							
81	Adani Hybrid Energy Jaisalmer One Ltd.		Received	Jul-25				
82	Adani Hybrid Energy Jaisalmer Two Ltd.		Received	Jul-25				
83	Adani Hybrid Energy Jaisalmer Three Ltd.		Received	Aug-25				
84	Adani Hybrid Energy Jaisalmer Four Ltd.		Received	Aug-25				
85	Adani Renewable Energy (RJ) limited Rawara		Received	Sep-25				
86	Adani Solar Energy Jaisalmer One Pvt. Ltd. 450MW (Solar)		Received	Oct-25				
87	Adani Solar Enegry Four Private Limited		Received	Sep-25				
88	Adani Hybrid Energy Jaisalmer Four Ltd. (AEML 2-350)		Received	Sep-25				
89	Adani Solar Energy Jaisalmer Two Private Limited Project Two		Received	Oct-25				
90	SB Energy Six Private Limited, Bhadla		Received	Oct-25				
91	Adani Solar Enegry Jodhpur Two Limited, Rawara		Received	Sep-25				
92	Adani Solar Energy RJ Two Pvt. Ltd. (Devikot)		Received	Nov-25				
93	Adani Solar Energy RJ Two Pvt. Ltd. (Phalodi)		Received	Nov-25				
94	Adani Green Energy 24 Limited (Bhimsar)		Received	Nov-25				
95	Adani Green Twenty-Five Limited (Badisid)		Received	Dec-25				
96	Altra Xergi Pvt. Ltd.							
97	AMP Energy Green Five Pvt. Ltd.		Received	Completed			62	
98	AMP Energy Green Six Pvt. Ltd.		Received	Completed			62	
99	Amplus Ages Private Limited							
100	Avaada RJHN_240MW		Received	Oct-25				
101	Avaada sunce energy Pvt limited		Received	Oct-25				
102	Avaada Sunrays Pvt. Ltd.		Received	Oct-25				
103	Avaada Sustainable RJ Pvt. Ltd.		Received	Oct-25				
104	Ayana Renewable Power Three Private Limited							
105	Ayaana Renewable Power One Pvt. Ltd.							
106	Azure Power Forty One Pvt limited							
107	Azure Power Forty Three Pvt. Ltd._RSS							
108	Azure Maple Pvt. Ltd.							
109	AZURE POWER INDIA Pvt. Ltd., Bhadla							
110	Azure Power Thirty Four Pvt. Ltd.							
111	Clean Solar Power (Jodhpur) Pvt. Ltd.							
112	Clean Solar Power (Bhadla) Pvt. Ltd							
113	Eden Renewable Cite Private Limited							
114	Grian Energy private limited							
115	Mahindra Renewable Private Limited							
116	Mega Surya Urja Pvt. Ltd. (MSUPL)							
117	AURAIYA Solar							
118	DADRI SOLAR							
119	SINGRAULI SOLAR							
120	Anta Solar							
121	Unchahar Solar							
122	NTPC Devikot Solar plant 240MW							
123	NTPC Kolayat_400kV							
124	Nedan Solar NTPC							
125	NTPC Nokhra 300MW							
126	One Volt energy Pvt. Ltd.							
127	ReNew Solar Energy (Jharkhand Three) Private Limited		Received	19-11-2025				
128	RENEW SOLAR POWER Pvt. Ltd. Bikaner		Received	17-11-2025				
129	ReNew Solar Urja Private Limited							
130	Renew Sun Bright Pvt. Ltd. (RSBPL)		Received	20-11-2025				
131	Renew Surya Partap Pvt. Ltd.		Received	21-11-2025				
132	Renew Surya Ravi Pvt. Ltd.		Received	18-11-2025				
133	Renew Surya Roshni Pvt. Ltd.		Received	24-11-2025				
134	Renew Surya Vihan Pvt. Ltd.		Received	28.11.2025				
135	Renew Surya Ayaan Pvt. Ltd.							
136	Renew Solar Photovoltaic Pvt Ltd		Received	25-11-2025				
137	Renew Hans Urja Pvt Ltd		Received	26-11-2025				
138	Renew Surya Jyoti Pvt Ltd		Received	27-11-2025				
139	RENEW SOLAR POWER Pvt. Ltd. Bhadla							
140	Rising Sun Energy-K Pvt. Ltd.							
141	Serentica Renewables India 4 Private Limited							
142	Solzen Urja Private Limited		Received	Oct-25				
143	Tata Power Green Energy Ltd. (TPGEL) (225MW)		Received	30-1-2026				

144	Tata Power Renewable Energy Ltd. (TPREL) (300MW)		Received	28-1-2026				
145	Thar Surya Pvt. Ltd.							
146	TP Surya Ltd., Noorsar (110MW)		Received	30-1-2026				
147	Banderwala Solar Plant TP Surya Ltd. (300MW)		Received	28-02-2026				
148	TRANSITION ENERGY SERVICES PRIVATE LIMITED							
149	Transition Green Energy Private Limited							
150	Transition Sustainable Energy Services Private Limited							

Status of 3rd Party Protection Audit Plan								
S. No.	**NRPC Member**	**Category**	**Status**	**Schedule submitted as per utililty**	**Present Status Comlpleted (yes/no)**	**Report Submission Date by audit party**	**Discussion held in PSC meeting number**	**Compliance status**
1	PGCIL	Central Government owned Transmission Company	Received (7 S/s of NR-1, 1 S/s of NR-2, 4 S/s of Nr-3)	By Jan 2025				
2	NTPC	Central Generating Company	Received (Singrauli, Rihand, Unchahar, Dadri, Dadri Gas, Auraiya Gas, Faridabad Gas, Anta Gas Power Station)	By Oct 2028				
			Received (Tanda)	By 17.07.2025				
3	BBMB		Received	Feb-27				
4	THDC		Received	March 2026-Tehri, F.Y. 2025-26- Koteshwar				
5	SJVN		Received	Nov-Dec 2025 for RHPS, Nov 24- March 25 for NJHPS				
6	NHPC		Received	FY-2025-26				
7	NPCIL		Completed (220kV) (NAPS)	Jan'25	Completed	18.01.2025	57	
			RAPS-C (6&&)	-	Completed	23.06.2025	Planned for 62	
8	Delhi SLDC	SLDC						
9	Haryana SLDC							
10	Rajasthan SLDC							
11	Uttar Pradesh SLDC		Received (Tanda extension)	17.07.2025				
			Received (Tanda)	17.07.2025				
12	Uttarakhand SLDC							
13	Punjab SLDC							
14	Himachal Pradesh SLDC							
15	DTL	State Transmission Utility	Received	September, 2025 to November, 2026				
16	HVPNL		Received	June-Oct 2025				
17	RRVPNL							
18	UPPTCL		Received	2025;	Under tendering; GKP-cpmpleed but report awaited			
19	PTCUL		Received	By Jan 2025				
20	PSTCL							
21	HPPTCL		Received	FY 25-26				
22	IPGCL	State Generating Company	Received (PPS-III)	FY 25-26				
23	HPGCL		Received	Oct'25				
24	RRVUNL		Received					
25	UPRVUNL		Obra-B	2026-27				
			Obra-C	Feb-26				
			Anpara D	2025	Under tendering			
			Anpara B	2025	Under tendering			
			Harduaganj	2025	Under tendering			
			Harduaganj D	2025	Under tendering			
			Parichha	2025	Under tendering			
			Parichha Ext	2025	Under tendering			
			Jawaharpur	2025	Under tendering			
			Paricha BTPS	2026				
			Panki	2025				
26	UJVNL		Dharasu		Completed in Nov, 2024		56	submitted
			Others					
27	HPPCL		Swara Kuddu	2026				
			Kashang HEP	FY 2025-26				
28	PSPCL	State Generating Company & State owned Distribution Company	Reeceived (GHTP)	Dec. 2025				
			Received (GATP)	May 2025				
			GGSSTP	2026				
			RSD/ Sahapur Kandi	Mar'26				
29	HPSEBL	Distribution company having Transmission connectivity ownership	Kunihar	Conducted			55	
			Upper Nangal	Conducted			61	
			Baddi	Conducted			61	
30	Prayagraj Power Generation Co. Ltd.	IPP having more than 1000 MW installed capacity	Received	Dec-24	Januray 2025	08.01.2025	59	
31	Aravali Power Company Pvt. Ltd							
32	Apraava Energy Private Limited		Received	By May, 2025				
33	Talwandi Sabo Power Ltd.		Conducted	Dec'22	completed	20.12.2024	60	
34	Nabha Power Limited		Received	By December, 2025				
35	MEIL Anpara Energy Ltd		Received	* May 2025				
36	Rosa Power Supply Company Ltd		Conducted	By 30.09.2024	08.08.2024	13.01.2025	57	
37	Lalitpur Power Generation Company Ltd		Conducted	26.03.2024				
38	MEJA Urja Nigam Ltd.		Conducted		Completed in Oct, 2024	22.03.2025	59	
39	Adani Power Rajasthan Limited		Conducted	November, 2024	Kawai		56	Pending
40	JSW Energy Ltd. (KWHEP)		Received	December 2024 to March 2025	Completed		57	Pending

41	UT of J&K	UT of Northern Region						
42	UT of Ladakh							
43	UT of Chandigarh							
	ISTS Transmission Utilities							
44	INDIGRID		Received (PTCL)	FY 25-26				
			Received (NRSS 29)	FY 24-25				
45	ADHPL		Received	* September 2026				
46	Adani Transmission Limited		Received (400kV Mohindergarh SS)	October, 2025				
47	Bikaner Khetri Transmission Limited		Received (765 kV Bikaner and Khetri extension bays)	September, 2025				
48	Fatehgarh Bhadla Transmission Limited		Received (400 kV Fatehgarh SS)	September, 2025				
49	Powergrid Sikar Transmission Limited							
50	Powergrid Aligarh Sikar Transmission Limited							
51	Powergrid Ajmer Phagi Transmission Limited							
52	Powergrid Bikaner Transmission System Limited							
53	Powergrid Khetri Transmission System Limited							
54	Powergrid Ramgarh Transmission Limited							
55	Powergrid Fatehgarh Transmission Limited							
56	Powergrid Bhadla Transmission Limited							
57	Powergrid Meerut Simbhavli Transmission Limited							
58	Powergrid Kala Amb Transmission Limited							
	State Utilities							
	Uttar Pradesh							
59	Vishnuprayag Hydro Electric Plant (J.P.)		Received	December, 2028				
60	Alaknanda Hydro Electric Plant (GVK)		Received	Mar-25				
61	Ghatampur TPS		Received	FY 27-28				
62	Khara Power House (Khara)		Received	Dec-25				
63	WUPPTCL		Conducted		Completed		59	
64	SEUPPTCL		Completed on Oct 2024		Completed		59	
65	ATSCL	**AESL**	Received (400/220KV Alwar SS)	September, 2025				
66	GTL	**AESL**	Received (765 kV Hapur extension bays)	September, 2025				
67	GTL	**AESL**	Received (765 kV Agra and Gr. Noida extension bays)	September, 2025				
68	HPTSL	**AESL**	Received (220kV Ranpur SS)	August, 2025				
69	MTSCL	**AESL**	Received (400/220/132KV Deedwana SS)	August, 2025				
70	OCBTL	**AESL**	Received (400/220/132KV Badaun SS)	FY 24-25	Completed			
71	STSL	**AESL**						
	Rajasthan							
72	Barsingsar Plant	**NLC**						
73	Rajwest Plant	**JSW**						
	RE Utilities							
74	ABC Renewable Pvt. Ltd							
75	ACME Heeragarh powertech Pvt. Ltd							
76	ACME Pholidi							
77	ACME Deagarh							
78	ACME Raisar							
79	ACME Dhoulpar							
80	ACME Chittorgarh Solar Energy Pvt Ltd							
81	Adani Hybrid Energy Jaisalmer One Ltd.							
82	Adani Hybrid Energy Jaisalmer Two Ltd.							
83	Adani Hybrid Energy Jaisalmer Three Ltd.							
84	Adani Hybrid Energy Jaisalmer Four Ltd.							
85	Adani Renewable Energy (RJ) limited Rawara							
86	Adani Solar Energy Jaisalmer One Pvt. Ltd. 450MW (Solar)							
87	Adani Solar Enegry Four Private Limited							
88	Adani Hybrid Energy Jaisalmer Four Ltd. (AEML 2-350)							
89	Adani Solar Energy Jaisalmer Two Private Limited Project Two							
90	SB Energy Six Private Limited, Bhadla							
91	Adani Solar Enegry Jodhpur Two Limited, Rawara							
92	Adani Solar Energy RJ Two Pvt. Ltd. (Devikot)							

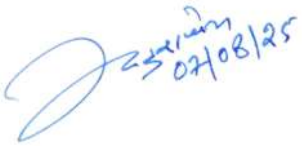
93	Adani Solar Energy RJ Two Pvt. Ltd. (Phalodi)							
94	Adani Green Energy 24 Limited (Bhimsar)							
95	Adani Green Twenty-Five Limited (Badisid)							
96	Altra Xergi Pvt. Ltd.		Conducted		Completed	03.02.2025-04.02.2025	60	
97	AMP Energy Green Five Pvt. Ltd.		Received	Nov-27				
98	AMP Energy Green Six Pvt. Ltd.		Received	Nov-27				
99	Amplus Ages Private Limited							
100	Avaada RJHN 240MW		Received	Aug-26				
101	Avaada sunce energy Pvt limited		Received	Aug-26				
102	Avaada Sunrays Pvt. Ltd.		Received	Aug-27				
103	Avaada Sustainable RJ Pvt. Ltd.		Received	Aug-26				
104	Ayana Renewable Power Three Private Limited		Conducted		18.05.2025		61	
105	Ayaana Renewable Power One Pvt. Ltd.		Conducted		09.03.2025		59	
106	Azure Power Forty One Pvt limited							
107	Azure Power Forty Three Pvt. Ltd. RSS							
108	Azure Maple Pvt. Ltd.							
109	AZURE POWER INDIA Pvt. Ltd., Bhadla							
110	Azure Power Thirty Four Pvt. Ltd.							
111	Clean Solar Power (Jodhpur) Pvt. Ltd.							
112	Clean Solar Power (Bhadla) Pvt. Ltd							
113	Eden Renewable Cite Private Limited							
114	Grian Energy private limited							
115	Mahindra Renewable Private Limited							
116	Mega Surya Urja Pvt. Ltd. (MSUPL)							
117	AURAIYA Solar							
118	DADRI SOLAR							
119	SINGRAULI SOLAR							
120	Anta Solar							
121	Unchahar Solar							
122	NTPC Devikot Solar plant 240MW							
123	NTPC Kolayat 400kV							
124	Nedan Solar NTPC							
125	NTPC Nokhra 300MW							
126	One Volt energy Pvt. Ltd.							
127	ReNew Solar Energy (Jharkhand Three) Private Limited							
128	RENEW SOLAR POWER Pvt. Ltd. Bhadla							
129	ReNew Solar Urja Private Limited							
130	Renew Sun Bright Pvt. Ltd. (RSBPL)							
131	Renew Surya Partap Pvt. Ltd.							
132	Renew Surya Ravi Pvt. Ltd.							
133	Renew Surya Roshni Pvt. Ltd.							
134	Renew Surya Vihan Pvt. Ltd.							
135	Renew Surya Ayaan Pvt. Ltd.							
136	Renew Solar Photovoltaic Pvt Ltd							
137	RENEW SOLAR POWER Pvt. Ltd. Bikaner							
138	Rising Sun Energy-K Pvt. Ltd.							
139	Serentica Renewables India 4 Private Limited							
140	Solzen Urja Private Limited		Received	Oct-26				
141	Tata Power Green Energy Ltd. (TPGEL) (225MW)		Received	31-03-2027				
142	Tata Power Renewable Energy Ltd. (TPREL) (300MW)		Received	31-03-2027				
143	Thar Surya Pvt. Ltd.							
144	TP Surya Ltd., Noorsar (110MW)		Received	31-03-2027				
145	Banderwala Solar Plant TP Surya Ltd. (300MW)		Received	31-03-2027				
146	TRANSITION ENERGY SERVICES PRIVATE LIMITED							
147	Transition Green Energy Private Limited							
148	Transition Sustainable Energy Services Private Limited							

REPORT OF THE COMMITTEE ON REVIEW OF PROTECTION SYSTEM AND LOAD MANAGEMENT IN RAPS, KTPS GENERATION COMPLEX

AUGUST 7, 2025

Report of Committee Constituted by NRPC for review of Protection System and Load management in RAPS, KTPS generation complex

NRPC had constituted a committee vide office order dated 06.06.2024 to analyse the issues responsible for the repeated cascade tripping of RAPS, KTPS generation complex. Members were nominated in the committee from NRPC, NLDC, NRLDC, NPCIL, RVPNL, RVUNL, POWERGRID and SLDC Rajasthan. After due deliberation in seven meetings, the committee hereby submits it's report to MS, NRPC.



Reeturaj Pandey



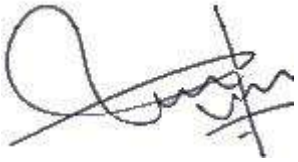
D K Jain



Harsh Singh



Manas Ranjan Chand



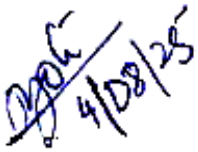
Raman Jain



M.P Sharma



Pankaj Pachoori



Jyoti Thakur



Deepak Kumar

Contents

ACKNOWLEDGEMENT 4
List of Committee Members 5
List of Contributors 5
Executive Summary 6
List of Abbreviations 9
Chapter 1: Introduction 10
Chapter 2: Overview of RAPS, KTPS generation complex 13
2.1 Network connectivity of the complex 13
2.2 RAPS auxiliary supply scheme and Auto Transfer Scheme (ATS) 14
2.3 RAPS House load operation 16
2.4 RAPS Islanding Operation 16
2.5 Xe-135 Reactor Poisoning in Nuclear Reactors 16
Chapter 3: Analysis of the Grid Events 19
3.1 Grid Event on 05.01.2024 at 05:16 hrs 19
3.1.1 Antecedent Condition 19
3.1.2 Sequence Of Events (SOE) and analysis 22
3.2 Grid Event on 29.03.2024 at 20:22 hrs 31
3.2.1 Antecedent Condition 32
3.2.2 Sequence Of Events (SOE) and analysis 33
Chapter 4: Observations from the Grid Events and Action taken 39
4.1 Observations 39
4.2 Action taken 40
Chapter 5: Load Flow Analysis 44
Chapter 6: Impact during Grid Event in the complex after revision in Network 49
Chapter 7: Review of Islanding Scheme in RAPS complex 51
Chapter 8: Committee Recommendations 52
Annexures 53

ACKNOWLEDGEMENT

The Committee acknowledges the contribution of various officers of NRPC, NRLDC, NLDC, NPCIL-HQ, RAPS, RVPNL, RVUNL and SLDC-Rajasthan who assisted the Committee in its deliberations.

The Committee would also like to acknowledge the assistance given by Protection Sub Committee of NRPC that has provided guidance in discussion of cause of grid events and remedial measures.

The Committee would like to acknowledge the guidance of Member Secretary, NRPC throuhout the process.

,

List of Committee Members

Advisory Members:

- Sh. V.K. Singh — Member (Power System), CEA
- Smt. Rishika Sharan — Member Secretary, NRPC
- Sh. D. K. Meena — SE (Protection), NRPC, Secretariat
- Sh. Somara Lakra — CGM, SO, NRLDC
- Sh. Mahavir Prasad Singh — DGM, SO, NRLDC

Committee Members:

1. Sh. Reeturaj Pandey, EE (Protection), NRPC Secretariat
2. Sh. D.K. Jain, SE (Protection Engg.), RVPN
3. Sh. Harsh Singh, Superintending Engineer, RVUNL
4. Sh. Raman Jain, Executive Engineer, RVUNL
5. Sh. M. P. Sharma, XEN (SOLD), Rajasthan SLDC
6. Smt. Jyoti Thakur, DGM, NPCIL
7. Sh. Manas R Chand, DGM, NLDC
8. Sh. Pankaj Pachoori, DGM, POWERGRID
9. Sh. Deepak Kumar, Dy. Mgr., NRLDC

List of Contributors

Northern Regional Power Committee (NRPC)

- Sh. Lokesh Agrawal — AEE, NRPC Secretariat

SLDC-Rajasthan

- Sh. Kamal Patidar — SE (SOLD), Rajasthan SLDC

Rajasthan Atomic Power Stations

- Sh. Samir Rai, TSS
- Sh. R.D. Yadav, SO/H
- Smt. Supriya, SME
- Sh. D.K. Shringi, SO/F

Executive Summary

1. On 05th January 2024, at 05:16hrs, cascade tripping of multiple elements occurred in RAPS, KTPS generation complex in Rajasthan control area leading to loss of total running generation of KTPS, RAPS (A, B & C) and other small hydro stations (Jawahar Sagar HEP & Rana Pratap Sagar HEP) in the complex. During antecedent condition, total generation in the complex was ~1365 MW i.e., RAPS A 200 MW, RAPS B 185 MW, KTPS 800 MW, Jawahar Sagar(JS) HEP 90 MW and Rana Pratap Sagar(RPS) HEP 90 MW. Half of the auxilliary supply of RAPP C (generating ~450 MW) was also being met through 220kV RAPP B in line with the auxilliary supply scheme at RAPP C. Antecedent weather condition was foggy and three (no.s) of 220kV lines in this complex tripped between 04:00hrs – 05:00 hrs on same day. Apart from this, three (no.s) of 220kV lines were not in service in the complex. Therefore, after tripping of three (no.s) of 220kV lines between 04:00hrs – 05:00 hrs, remaining lines in the complex became highly loaded and some of the lines were connected radially. Total generation of KTPS & RAPS (A & B) was evacuating through limited lines and connectivity to the grid was also very limited. At 05:15hrs, one 220kV line in the complex was manually opened for load management however it resulted into overloading of remaining 220kV lines. Thereafter, cascade tripping of two(no.s) of grid connected 220kV lines occurred due to overloading. Remaining 220kV lines in the complex were radially connected and thus overfrequency occurred in the compelx due to load generation imbalane (surplus generation). This had resulted in loss of complete generation in the complex i.e., 1815 MW (1365MW on overfrequency due to loss of evacuation path and 450 MW of RAPP C due to failure of Auto Transfer Scheme(ATS) at RAPS C.
2. Unit-2 at RAPS B came to the house load during the overfrequency however it couldn't be synced to the grid due to wiring related issue at RAPS B end, and unit operated at house laod for ~1.5 hours. Operation of ATS for changeover of auxilliary supply from 220kV to 400kV level at RAPS C was also not successful due to siginificant mismatch in frequency between 220kV & 400kV side. SCADA data of some of the elements were showing incorrectly and some of the data became suspected during the event. Autorecloser (A/R) also didn't operate in some of the lines on single phase to earth fault.
3. The analysis of this grid event and observations were discussed in 216th meeting of Operation Co-ordination Sub-Committee (OCC) of NRPC held on 14.02.2024. During the meeting, various remedial measures to be taken by SLDC-Rajasthan, RVPNL, RAPS A, B & C were discussed.
4. Again, on 29th March 2024, at 20:22 hrs a grid event (GD-1) of blackout of this complex occurred. During antecedent condition of this grid event, two no of 220kV lines were out on system constraints and one no of line was under shutdown. The complex was connected to the grid with five (no.s) of the 220kV lines. Most of the 220kV lines were operating in radial mode. Total generation in the complex was ~1587 MW i.e., RAPS A: 195 MW, RAPS B: 177 MW, KTPS: 1150 MW, JS HEP: 32 MW and RPS

HEP: 40 MW. Triggerring incident was damage of R-ph CT of one of the 220/132kV ICT at 220/132kV Kota Sakatpura S/s of Rajasthan that led to the occurrence of bus fault. Due to non-availbility of bus bar protection at 220kV bus at Kota Sakatpura , multilple 220kV lines tripped on reverse distance protection operation. Thereafter, cascade tripping of grid connected 220kV lines occurred due to overloading. Remaining 220kV lines in the complex were radially connected and thus overfrequency occurred in the compelx due to load generation imbalane (surplus generation). This event had resulted a complete loss of generation in the complex i.e., 2020 MW (1587MW on overfrequeny due to loss of evacuation path and 433 MW of RAPP C due to failure of ATS at RAPS C).

5. Unit-2 at RAPS B couldn't come to house load due to unsuccessful ATS operation due to issue in ATS logic. Operation of ATS for changeover of auxilliary supply from 220kV to 400kV level at RAPS C was also not successful due to siginificant mismatch in frequency between 220kV & 400kV side. Further, after outage of generation of RAPS B and KTPS on overfrequency, RAPS A got islanded with radial load of Debari and Chittorgarh. However, island got collapsed after operation of around 18 minutes.

6. During both the grid events i.e., 05th January 2024 and 29th March 2024, all the running units at RAPS A, B & C went under Xe-poisioning of reactors. Units were able to sync back to the grid only after 2-3 days of the grid events as large time period is required for complete poision out of Xe from the reactors.

7. Successive two grid events in just 3 months in RAPS, KTPS generation complex highlighted the weakness and constraints of this complex. The issue was discussed in 50th PSC meeting held on 29th April, 2024 and a committee was formed having members from NRPC Secretariat, NRLDC, NLDC, POWERGRID, NPCIL, RVUNL (KTPS) and RVPN. Committee was given the task of comprehensive review of protection system, load management, islanding scheme, SPS requirement, Auto Transfer Scheme at RAPS, and other related aspects in the RAPS, KTPS complex.

8. This report includes a detailed analysis of the event by the Committee constituted for the purpose. The analysis was supplimented by teams of SLDC Rajasthan, RVPNL, RUVNL, NPCIL/RAPS and NRPC Secretariat. Data and information about the event were gathered from the entities affected in the disturbance, and this was instrumental to the successful and timely completion of this analysis. This report uses terminology that is aligned with the extant CEA/CERC Regulations and NRPC protection Protocol. The analysis in the report is based on data available from load despatch centres, event records from substations, information received from various stakeholders and simulation studies. This report looks into the various aspects of these events including determination of the cause and recording of key findings and recommendations to ensure that occurrences of such events are avoided in future.

9. The analysis of the event was carried out as a comprehensive review of various aspects observed during the event. The report is focussed on following points:

    (i) Connectivity of the complex with the grid.

(ii) Review of protection system and its coordiantion.

(iii) Load management in the complex.

(iv) Review of Auto Transfer Scheme (ATS) at RAPS B & C.

(v) Contingency analysis in the complex.

(vi) Review of islanding scheme of RAPS.

10. The key observations and recommendations in the report are as below:

(i) Strengthening the connectivity of the complex with the grid.

(ii) Improvement in load management in the complex.

(iii) Improvement in working philosophy of ATS at RAPS B & C.

(iv) Contingency analysis after revision in network configuration.

(v) Revision in islanding scheme of RAPS.

List of Abbreviations

ATS: Auto Transfer Scheme

D/c: Double Circuit

G/L: Generation to Load

ICT: Inter-Connecting Transformer

IEGC: Indian Electricity Grid Code

ISGS: Inter-State Generating Station

ISTS: Inter State Transmission System

Intra-STS: Intra-State Transmission System

kA: kilo Ampere

km: kilo meter

kV: kilo Volt

ms: millisecond

MVA: Mega Volt Ampere

MVAr: Mega Volt Ampere reactive

MW: Mega Watt

NLDC: National Load Dispatch Centre

NRLDC: Northern Regional Load Despatch Centre

NRPC: Northern Regional Power Committee

OV: Over Voltage

P: Active Power

PMU: Phasor Measurement Unit

pu: per unit

Q: Reactive Power

RAPS: Rajasthan Atomic Power Station

S/c: Single Circuit

SCADA: Supervisory Control and Data Acquisition System

SLDC: State Load Despatch Centre

SOE: Sequence of Events

S/s: Sub-station

SUT: Start Up Transformer

Chapter 1: Introduction

1.1 On 05th January 2024, at 05:16hrs, cascade tripping of multiple elements occurred in RAPS, KTPS generation complex in Rajasthan control area led to loss of total running generation of KTPS, RAPS (A, B & C) and other small hydro stations (JS HEP & RPS HEP) in the complex. During antecedent condition, total generation in the complex was ~1365 MW i.e., RAPS A 200 MW, RAPS B 185 MW, KTPS 800 MW, Jawahar Sagar(JS) HEP 90 MW and Rana Pratap Sagar(RPS) HEP 90 MW. Half of the auxilliary supply of RAPP C (generating ~450 MW) was also being met through 220kV RAPP B in line with the auxilliary supply scheme at RAPP C. Antecedent weather condition was foggy and three (no.s) of 220kV lines in this complex tripped between 04:00hrs – 05:00 hrs on same day. Apart from this, three (no.s) of 220kV lines were not in service in the complex. Therefore, after tripping of three (no.s) of 220kV lines between 04:00hrs – 05:00 hrs, remaining lines in the complex were became highly loaded and some of the lines were connected radially. Total generation of KTPS & RAPS (A & B) was evacuating through limited lines and connectivity to the grid was also very limited. At 05:15hrs, one 220kV line in the complex was manually opened for load management however it resulted into overloading of remaining 220kV lines. Thereafter, cascade tripping of two(no.s) of grid connected 220kV lines occurred due to overloading. Remaining 220kV lines in the complex were radially connected and thus overfrequency occurred in the complex due to load generation imbalane (surplus generation). This had resulted in loss of complete generation in the complex i.e., 1815 MW (1365MW on overfrequency due to loss of evacuation path and 450 MW of RAPP C due to failure of Auto Transfer Scheme(ATS) at RAPS C.

1.2 Again, on 29th March 2024, at 20:22 hrs a grid event (GD-1) of blackout of this complex occurred. During antecedent condition of this grid event, two no of 220kV lines were out on system constraints.The complex was connected to the grid with five (nos) of the 220kV lines. Most of the 220kV lines were operating in radial mode . Total generation in the complex was ~1587 MW i.e., RAPS A: 195 MW, RAPS B: 177 MW, KTPS: 1150 MW, JS HEP: 32 MW and RPS HEP: 40 MW. Triggerring incident was damage of R-ph CT of one of the 220/132kV ICT at 220/132kV Kota Sakatpura S/s of Rajasthan that led to the occurrence of bus fault. Due to non-availbility of bus bar protection at 220kV bus at Kota Sakatpura, multilple 220kV lines tripped on reverse distance protection operation. Thereafter, cascade tripping of grid connected 220kV lines occurred due to overloading. Remaining 220kV lines in the complex were radially connected and thus overfrequency occurred in the compelx due to load generation imbalane (surplus generation). This event had resulted a complete loss of generation in the complex i.e., 2020 MW (1587MW on overfrequeny due to loss of evacuation path and 433 MW of RAPP C due to failure of ATS at RAPS C).

1.3 During the above two grid events i.e., 05th January 2024 and 29th March 2024, all the running units at RAPS A, B & C went under Xe-poisioning of reactors. Units were able to synchronized back to the grid only after 2-3 days of the grid events, as significant time period (56-72 hours) is required for complete poision out of Xe from the reactor.

1.4 Both the events were discussed in OCC and PSC forum of NRPC. Based on decision of 50th PSC meeting, NRPC constituted the committee for detailed analysis of the events and to give

recommendations for strengtening the realiability and security of this complex. Committee constituion order and MoM of 50th PSC meeting is attached as **Annexure-I.**

1.5 Terms of reference of the committee are as below:

- Comprehensive review of protection system of the complex.
- Review of load management within the generation complex.
- Review of Islanding scheme of RAPS_KTPS complex, SPS requirement, Auto Transfer Scheme at RAPS, and other related aspects**.**

1.6 The Committee held seven (no.) meetings. The 4th meeting of committee also comprised the site visit of KTPS & RAPS generating stations during 07-08 Oct 2024. Committee reviewed different operation and contingency related aspects in the complex i.e., strength of the connectivity of the complex with the grid, protection system and their coordination, Auto Transfer Scheme and house load operation of RAPS, island scheme and its operation, contigency analysis and auxulliary supply management at RAPS.

1.7 The Committee held seven meetings on following dates including field visit to RAPS_KTPS complex as mentioned below :

i. The first meeting of the Committee took place on 10st June 2024 at 11:00 Hrs via video conferencing.

ii. The second meeting of the Committee took place on 06th August 2024 at 11:00 Hrs via video conferencing.

iii. The third meeting of the Committee took place on 06th September 2024 at 11:00 Hrs at NRPC Secretariat, Katwaria Sarai, New Delhi.

iv. The fourth meeting of the Committee took place on 07th – 08th October 2024 at KTPS, Kota & RAPS site, Rawatbhata.

v. The fifth meeting of the Committee took place on 10th January 2025 at 11:00 Hrs via video conferencing.

vi. The sixth meeting of the Committee took place on 10th February 2025 at 11:00 Hrs via video conferencing.

vii. The seventh meeting of the Committee took place on 08th April 2025 at 15:00 Hrs via video conferencing.

1.8 **Suggestions** : The Committee analysed the root cause of cascade tripping and conducted system study in the RAPP-KTPS generation complex and associated evacuating lines. Accordingly, the committee suggested following:

- Network reconfiguration of RAPS_KTPS complex and enhancment of grid connectivity of evacuating lines.
- Closing the lines which are open on system constraints.
- Ensuring healthiness of bus bar system in the generation complex and grading of protection zone operating time.
- Review of ATS at RAPP B & C.
- Periodic checking of wiring issues of auxiliaries to avoid generation loss.

- Changes in existing islanding scheme.

1.9 **Recommendation**:

- Protection system and their proper coordination need to be ensured as per CEA grid standards, CEA Technical standards and RPC protection Philosophy. Any changes in the protection philosophy should only be done after prior approval from NRPC.
- Necessary preventive and corrective measures need to be taken by RVPNL to minimise the frequent tripping of 220kV lines evacuation from RAPS.
- As mandated by IEGC 2023, conducting Annual Self Protection Audit and Third-Party Protection Audit also need to be ensured.
- SLDC-Rajasthan shall also ensure the proper load management in the complex as per network condition to avoid any cascade tripping.
- Further, proactive Intrastate Transmission planning for creating transmission adequacy in the complex is needed.
- Reliablilty of SCADA telemetry and alarm for control room operators to be ensured.
- The Auto Change Over of Auxiliary power supply of RAPP generators need to be ensured by proper perodic testings and software/logic changes.
- SLDC Rajasthan to review the RAPP A &B islanding schemes periodically and ensure G/L ratio proper for reliable island operation.

Chapter 2: Overview of RAPS, KTPS generation complex

2.1 Network connectivity of the complex

i) The network diagram of the RAPS, KTPS generation complex is shown below in Figure 1. Connected loas centres, evacuating lines and connectivity to the grid is also shown in network diagram.

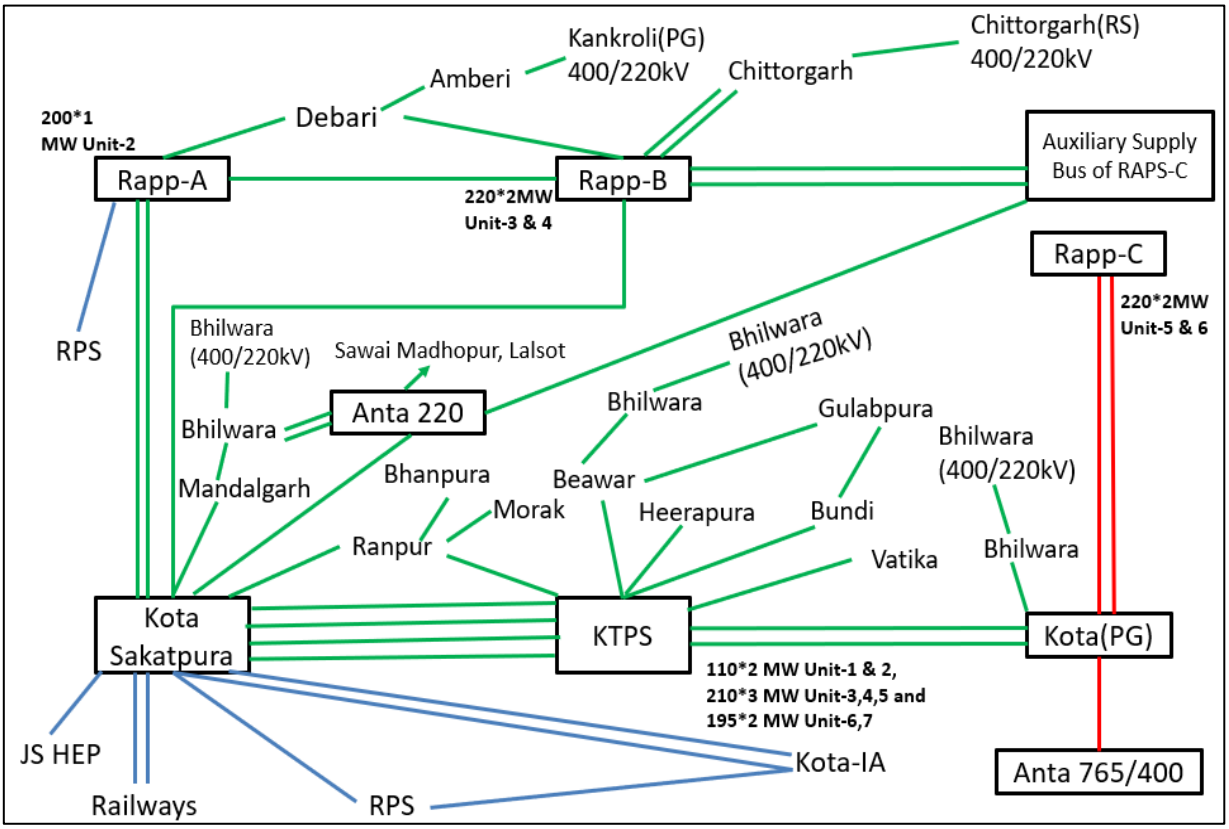


Figure 1: Network diagram of RAPS, KTPS generation complex

ii) Major generating stations in the complex are RAPS A & B and KTPS. Apart from this, two small hydro generating station i.e., JS HEP & RPS HEP are also connected in the complex. 220kV bus at RAPS C is also connected in the complex via tie lines through RAPS B and Anta(RS). Start Up Transformers (SUTs) of RAPS C are connected at this 220kV bus and generating units of RAPS C are connected at 400kV bus. There is no interconnection between 400kV & 220kV part of RAPS C. Summary of generating station in the complex is shown in below table:

Table 1: The Region Wise Demand and Generation

S. No	Name of Generating Station	Generation capacity
1.	RAPS-A	1*200MW = 200MW
2.	RAPS-B	2*220MW = 440MW
3.	RAPS-C	2*220MW = 440MW (only auxiliary supply bus is at 220kV side, generation is at 400kV side)
4.	KTPS	2*110MW, 3*210MW, 2*195MW = 1240MW

5.	Jawahar Sagar HEP	3*33MW = 99MW
6.	Rana Pratap Sagar HEP	4*43MW = 172MW

iii) The complex is connected to the grid through following path:
   a) 220kV RAPS A/B → Debari → Amberi → Kankroli(PG) (400/220kV)
   b) 220kV RAPS B → Chittorgarh → Chittorgarh(RS) (400/220kV)
   c) 220kV RAPS B → RAPS C → Anta(RS) → Bhilwara → Bhilwara(RS) (400/220kV)
   d) 220kV Kota Sakatpura → Mandalgarh → Bhilwara → Bhilwara(RS) (400/220kV)
   e) 220kV Kota Sakatpura → Anta(RS) → Bhilwara → Bhilwara(RS) (400/220kV)
   f) 220kV KTPS → Beawar → Bhilwara → Bhilwara(RS) (400/220kV)
   g) 220kV KTPS → Kota(PG) → Bhilwara → Bhilwara(RS) (400/220kV)

iv) To avoid overloading of 220kV Debari-Amberi line, this line is kept opened from Debari end. Therefore, 220kV Debari is being fed radially from RAPS A & B.

v) 220kV Chittorgarh was also being fed radially from RAPS-B by opening 220kV Chittorgarh(400kV)-Chittorgarh(220).

vi) 220kV Kota(PG)-KTPS D/C were also kept open since September 2023, lines were kept open on request of KTPS, on concern of hotspot related issues in KTPS switchyard due to heavy import of power from Kota(PG) end).

vii) All the stations i.e., RAPS A, RAPS B, RAPS C (220kV), KTPS and Kota Sakatpura have double main & transfer bus scheme.

2.2 RAPS auxiliary supply scheme and Auto Transfer Scheme (ATS)

i) The power supply to unit auxiliary loads are fed through two sources at 6.6kV level:
   a) One source is through SUT (Start-Up Transformer) 220kV/6.6kV.

   b) Second source is from Generator to UT (Unit Transformer) (16.5/6.6kV). In case, the Generator is shut down, then it is through GT. In case of RAPP-B, GT is 220kV /16.5kV) and in RAPP-C, GT is 400kV /16.5kV).

   c) The half of the auxiliary load is fed from SUT and another half through GT.

   d) 6.6kV Bus section breaker is provided to extend the power supply automatically from the healthy transformer in the event of failure of the other transformer by closing these bus section breakers. This is the design criteria of ATS.

   e) For successful ATS, the bus section breaker should be closed in less than 200msec to limit the transient current and voltages within safe limits and also to ensure smooth and quick acceleration of all motors without drawing excessive current from healthy source. Also voltage dip on faulty bus should be limited to prevent stalling and tripping of motors. This is called Fast transfer.

   f) Fast transfer is achieved by energizing the trip circuit of the secondary breaker of the faulty transformer and initiating closing of the bus section breaker. To avoid closing of bus section breaker before faulty transformer breaker is tripped,

minimum 2 cycle dead time is ensured between closing and tripping of the circuit breaker.

This dead time is small and doesn't lead to out of phase condition of the faulty supply with healthy supply and also dip in residual voltage is minimum thereby transient voltage and currents are minimum at the time of closing bus section breaker.

g) If fast transfer is not successful due to block by syn permissive, operation of bus under voltage will lockout relay will trip all loads of faulty transformer. Slow transfer will be initiated if following condition are satisfied:

i. Bus under voltage lock out relay operated.
ii. No protection operated on the bus.
iii. The faulty transformer side breaker is tripped.

On initiation of slow transfer, closing signal is given to bus coupler breaker. Thus supply will be restored in both section of 6.6kV switchgear. The restoration of supply to motors by closing respective breakers is to be done manually.

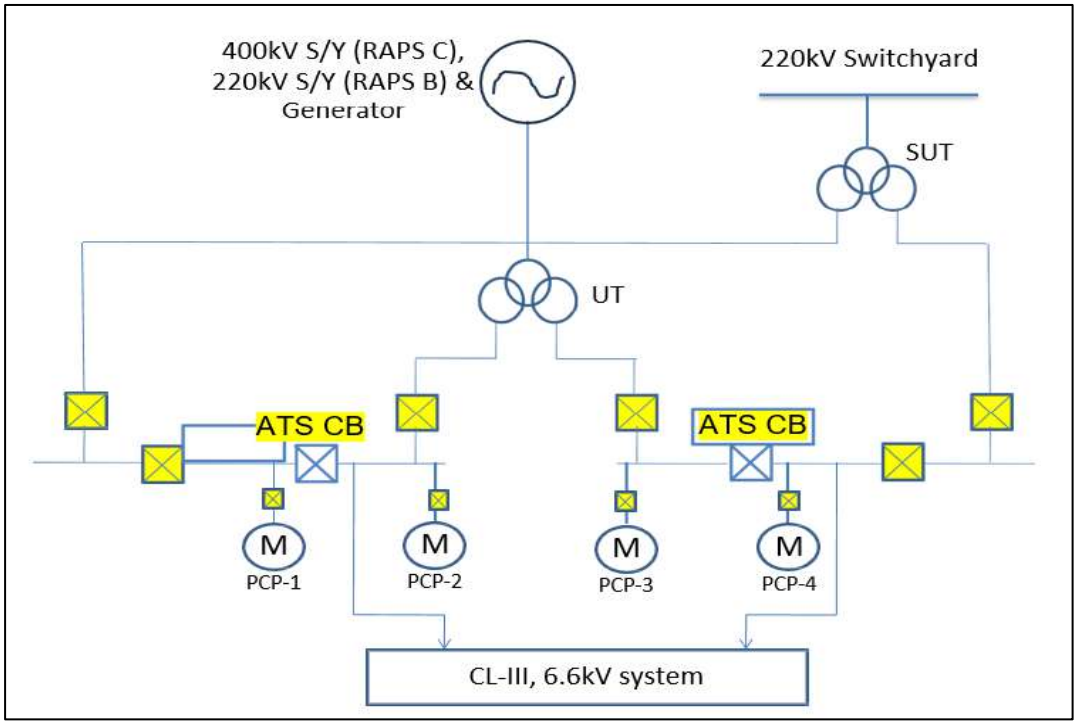


Fig.1 Auto Transfer Scheme (General)

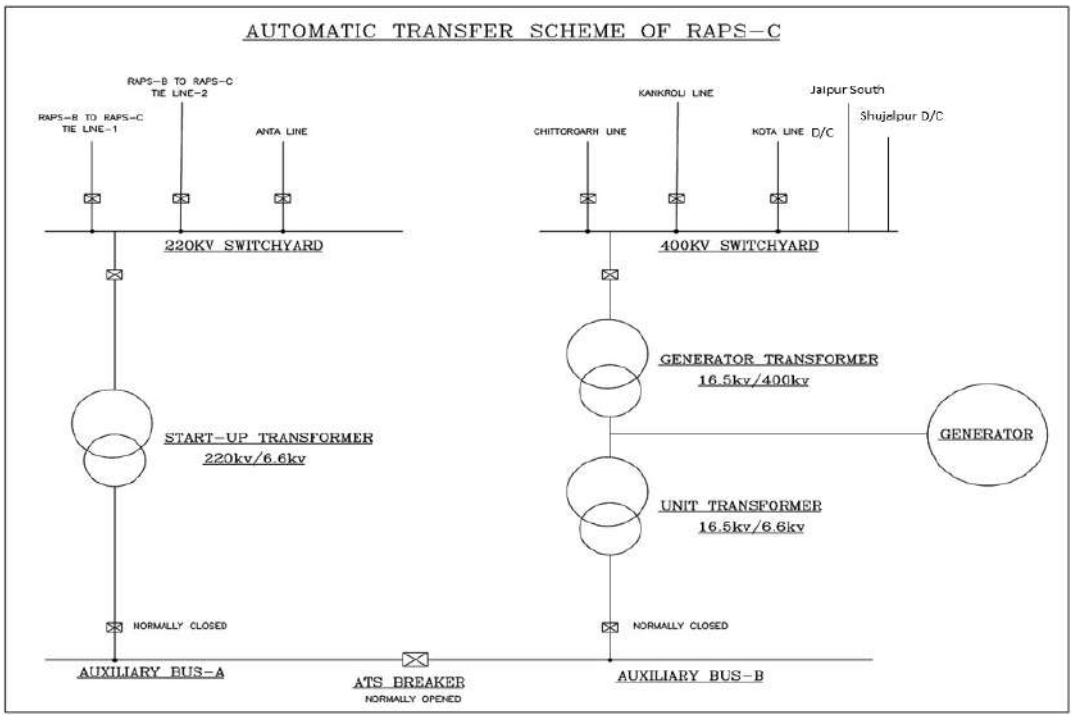


Fig.2 Auto Transfer Scheme at RAPS-C

2.3 RAPS House load operation

There is provision of house load operation of generating units at RAPS. House load operation triggers during grid disturbance and follows following criteria:

a. During Over frequency: at 51.5 Hz with 5 sec delay and 51.7 Hz instantaneously
b. During Under Frequency: at 47.5 Hz with 4 sec delay and 47.3 Hz instantaneously

2.4 RAPS Islanding Operation

i) To prevent tripping of RAPS units and poisoning out of the nuclear reactors during any grid disturbance, an island scheme is implemented in RAPS complex.
ii) The brief details of RAPS islanding scheme are as follows:
   a. Island subsystem: Generating units at RAPS A & B and loads of 220kV Debari, Chittorgarh, Sawa & Nimbahera.
   b. Island Generation: 640 MW (RAPS A Unit-1: 200 MW, RAPS B Unit 1 & 2: 220 MW each).
   c. Island Load: 618 MW (Load of load stations: 509 MW, Auxiliary load of RAPS; 110 MW)
   d. Island setting: Triggering frequency 48 Hz.
iii) Complete details of existing RAPS islanding scheme is attached as **Annexure-II.**

2.5 Xe-135 Reactor Poisoning in Nuclear Reactors

i) Xenon is a noble gas that has an atomic number of 54 and an atomic mass of 131.3 g/mol. It has nine stable isotopes and seven known radioactive isotopes. During a nuclear fission reaction process, a fissile nuclear fuel such as U-235 undergoes a chain of reactions as a result of capturing a thermal neutron. The captured neutron

distorts the U-235 nucleus and the electrostatic repulsion force overcomes the nuclear attraction causing a split into two fission fragments. This process is accompanied by energy release in the form of gamma rays as well as neutron emission. Some of the neutrons are released spontaneously while smaller numbers are delayed due to radioactive decay of certain fragments. The fission process produces several neutrons that play major role in sustaining the chain reactions. The fission process releases fragments of different mass numbers mainly around 90 and 140, most of which are radioactive. These fission fragments would decay, each with different half-life, to reach stable end products. Therefore, there would be a series of fragments decay that are inevitable. It is important to keep the chain reaction sustained to ensure neutrons growth to the desired level to deliver the required power output.

ii) One critical stage of the fission reaction is the formation of I-135, a subsequence of Te-135 beta decay. The I-135 is a weak neutron absorber and has a half-life of ~6.7 hours. The beta decay of I-135 to Xe-135 introduces a very powerful neutron absorber product. Xe-135 has a large cross section of 2.6 million barns. This is about 5128 times higher than the thermal cross-section of U-235, which is 507 barns. A barn is equivalent to 10-28 m2. This makes it an effective neutron absorber with a high interaction probability with the thermal neutrons. Xe-135 is produced with about 5% probability from every fission process but with 95% probability from I-135 decay. Xe-135 has a half-life of 9.1 hours. Increase in Xe-135 concentration in the reactor stops the neutron growth due its large cross-section. Absorption causes the formation of a stable isotope, Xe-136. The neutron population decreases and the chain reaction stops. The reactor eventually shuts down due to xenon accumulation. Understanding how to deal with the produced Xe-135 is essential to keep the reaction chain sustainable and the neutron flux at desired rate.

iii) When operating a new reactor, the startup stage initially has no trace xenon, and the reactor is maintained critical at a low power level. Small traces of Xe-135 are detected afterwards as a direct product of fission process. As the power level is increased, Xe-135 starts to build up. It eventually reaches an equilibrium level. Negative reactivity is delivered due to Xe-135 growth, and it is proportional to the power level. To maintain criticality, the control rods (absorbers) are withdrawn so the reactor remains critical. This keeps the negative impact of the Xe-135 under control. The destruction of Xe-135 occurs mainly via neutron absorption. Most of it is burned off due to neutron flux forming Xe-136 (weak absorber) and the rest due to beta decay forming Cs-135.

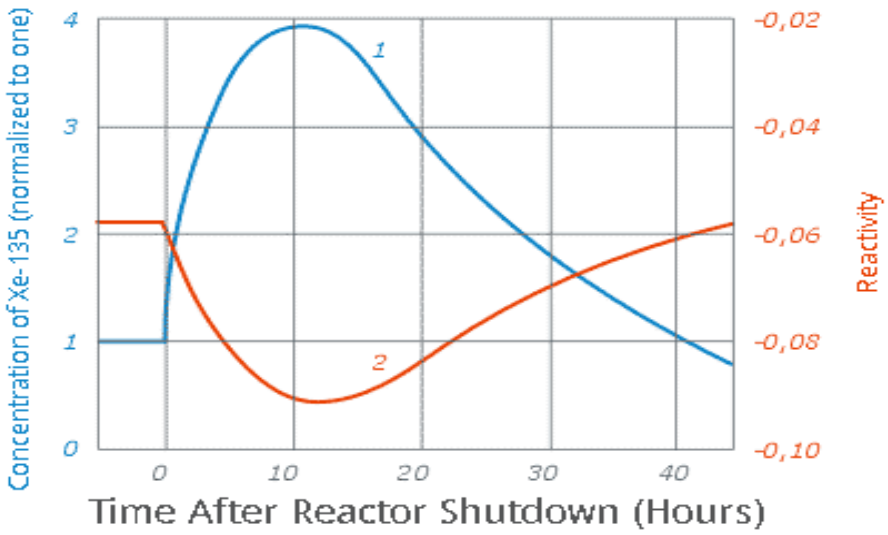


Fig 3 Xe-135 concentration in the reactor and neutrons reactivity

iv) The poisoning of Xe-135 arises when the reactor is shut down, see Fig.4. The neutron flux (reactivity) decreases drastically (point 2 in Fig.4) while Xe-135 production increases due to the continuous decay of I-135 see Fig.4. The poisoning increases, therefore, and reaches a peak value few hours after shutting down the reactor, see point 1 in Fig.4. Once the reactor enters what is known as the xenon dead time it would be impossible to restart it. The poison must be allowed to decay, and such a process may take few days before the restart becomes possible. As a result, a shortage in power supply can suddenly occur to major electrical grids leading to blackout.

Source: http://large.stanford.edu/courses/2014/ph241/alnoaimi2/

Chapter 3: Analysis of the Grid Events

3.1 Grid Event on 05.01.2024 at 05:16 hrs

On 05th January 2024, at 05:16hrs, cascade tripping of multiple elements occurred in RAPS, KTPS generation complex in Rajasthan control area leading to loss of total running generation of KTPS, RAPS (A, B & C) and other small hydro stations (JS HEP & RPS HEP) in the complex. During antecedent condition, total generation in the complex was ~1365 MW i.e., RAPS A 200 MW, RAPS B 185 MW, KTPS 800 MW, Jawahar Sagar(JS) HEP 90 MW and Rana Pratap Sagar(RPS) HEP 90 MW. Half of the auxilliary supply of RAPP C (generating ~450 MW) was also being met through 220kV RAPP B in line with the auxilliary supply scheme at RAPP C. Antecedent weather condition was foggy and three (no.s) of 220kV lines in this complex tripped between 04:00hrs – 05:00 hrs on same day. Apart from this, three (no.s) of 220kV lines were not in service in the complex. Therefore, after tripping of three (no.s) of 220kV lines between 04:00hrs – 05:00 hrs, remaining lines in the complex were became highly loaded and some of the lines were connected radially. Total generation of KTPS & RAPS (A & B) was evacuating through limited lines and connectivity to the grid was also very limited. At 05:15hrs, one 220kV line in the complex was manually opened for load management however it resulted into overloading of remaining 220kV lines. Thereafter, cascade tripping of two(no.s) of grid connected 220kV lines occurred due to overloading. Remaining 220kV lines in the complex were radially connected and thus overfrequency occurred in the compelx due to load generation imbalane (surplus generation). This had resulted in loss of complete generation in the complex i.e., 1815 MW (1365MW on overfrequency due to loss of evacuation path and 450 MW of RAPP C due to failure of Auto Transfer Scheme(ATS) at RAPS C.

3.1.1 Antecedent Condition

During the antecedent condition, the following lines were out of service:

i. 220kV Kota(PG)-KTPS(RVUN) (RS) Ckt-1 & 2 (lines were kept out since 09th Sept 2023 on request of KTPS, as intimated by KTPS, hotspot related issue arises due to heavy import of power from Kota(PG) end).
ii. 220kV KTPS-Heerapura Ckt (tripped on 01-01-2024 on phase to earth fault; as reported insulator disc punctured and jumper fell on location no. 199; line charged at 13:58hrs on 06-01-2024).
iii. 220kV KTPS-Beawar Ckt (tripped at 04:05hrs of 05.01.2024 on R–N phase to earth fault).
iv. 220 KV Anta(NT)-Sakatpura(RS) (RS) Ckt (tripped at 04:43hrs of 05.01.2024 on B-N fault, A/R operated at Sakatpura end, 3-ph trip from Anta end) (DR of Sakatpura end is shown in Fig.5).

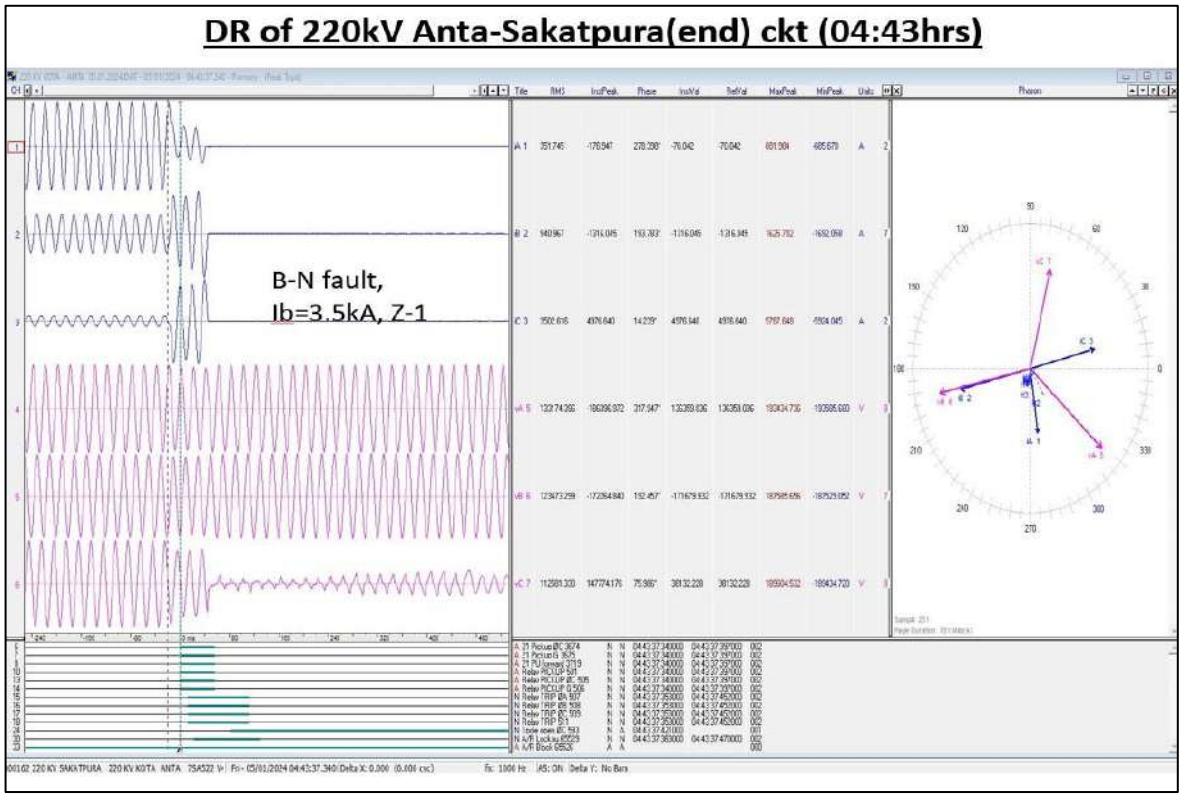


Fig.4 DR of 220kV Anta-Sakatpura(end) ckt (04:43hrs)

v. 220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt (tripped at 04:57 hrs of 05.01.2024 on B-N fault, A/R off in line) ((DR of RAPS-A end is shown in Fig.6)

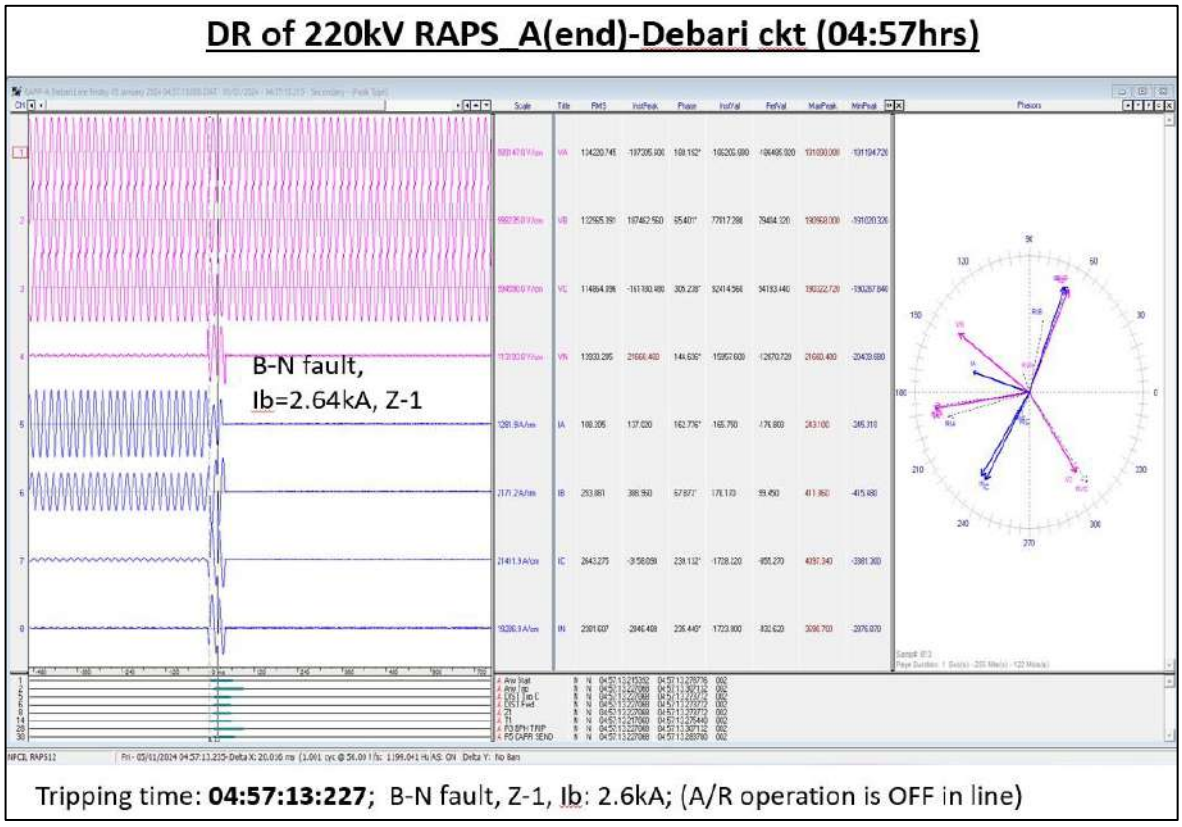


Fig.5 DR of 220kV RAPS_A(end)-Debari ckt (04:57hrs)

vi. Due to tripping of aforementioned lines, loading of remaining lines increased. As per SCADA, at 05:15 hrs, 220kV KTPS-Bundi Ckt, 220kV KTPS-Vatika Ckt, 220kV RAPS-A-RAPS-B Ckt and 220kV RAPS-C-Anta220 Ckt were carrying 288MW, 214MW, 273MW and 289MW respectively and limited connectivity with the grid via 220kV Vatika, Bundi-Gulabpura and Anta was available (Refer Fig.7)

During antecedent condition, the following units were under service:

i. 110MW Unit-1, 210MW Unit 4 & 5 and 195MW Unit 6 & 7 at 220kV KTPS (generating total ~800MW),
ii. 200MW Unit-2 at RAPS-A (generating ~200MW),
iii. 220MW Unit-4 at RAPS-B (generating ~185MW),
iv. 220MW Unit-5 & 6 at RAPS-C (generating total ~450MW),
v. 43MW Unit-1, 3 & 4 at RPS HEP (generating total ~90MW)
vi. 33MW Unit-1, 2 & 3 at JS HEP (generating total ~90MW).

Antecedent scenario of the network complex is shown in Fig.7.

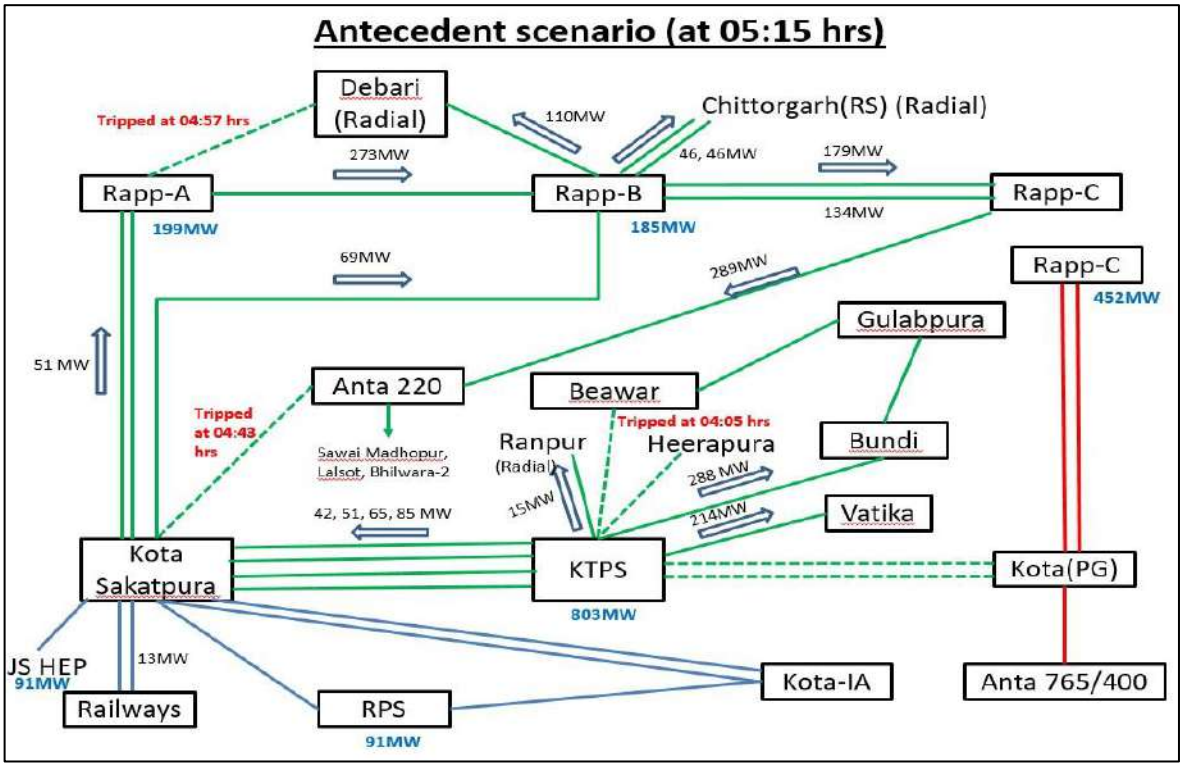


Fig.6 Antecedent scenario of the network complex

3.1.2 Sequence Of Events (SOE) and analysis

i. Sequence of event is mentioned as below:

S. No.	Time	Event	Remarks
1	04:05 hrs	220kV KTPS-Beawar line tripped on R-N fault	-
2	04:43 hrs	220 KV Anta(NT)-Sakatpura(RS) (RS) Ckt tripped on B-N fault	A/R non operation at Anta end
3	04:57 hrs	220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt tripped on B-N fault	A/R OFF in line
4	After tripping of above lines, loading of remaining lines increased. Line loading at 05:15 hrs: 220kV KTPS-Bundi Ckt =**288 MW**, 220kV KTPS-Vatika Ckt=**214 MW**, 220kV RAPS-A-RAPS-B Ckt=**273 MW** and 220kV RAPS-C-Anta220 Ckt =**289 MW**		
5	05:15:56 hrs	220kV Bundi-Gulabpura (RS) ckt was manually opened on SLDC instruction	-
6	05:16 hrs	220kV KTPS-Vatika Ckt tripped on overcurrent (ph current: 800-850A)	-
7	05:16:03:855 hrs	220kV RAPS-C(NP)-Anta(NT) ckt tripped on load enroachment (Z-1 Dist. Prot.), ph current increased from 1000A to 1750A within 600msec.	Last grid-connected line in the complex
8	Island formed with generation of RAPS A & B, KTPS and radial load of Debari, Chittorgarh, Ranpur, Bundi etc. Due to load generation imbalance, frequency rose to 51.63 Hz		
9	05:16:06 hrs	SUT at RAPS C, RAPS B unit-3, RAPS A unit-II and KTPS units tripped on overfrequency. RAPS-B unit-4 came on house load.	Frequency recorded at RAPS A was ~53Hz.
10	06:50 hrs	RAPS B unit-4 tripped, couldn't able to restored back to grid mode due to issue at RAPS B end	-

ii. Triggering incident scenario is shown in Fig.8.

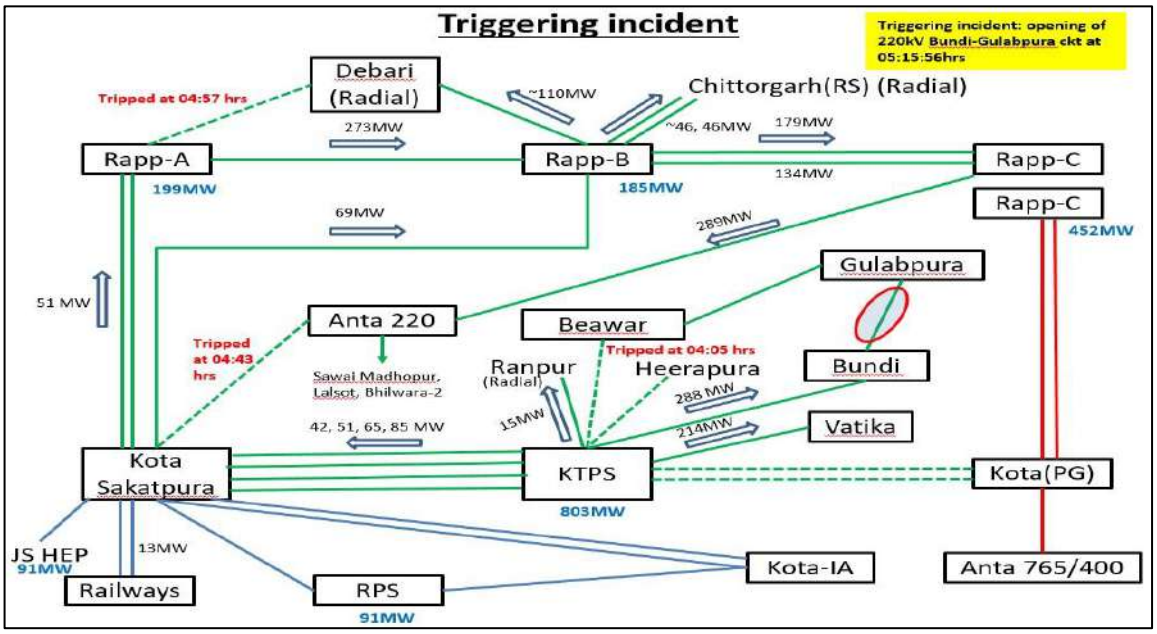


Fig.7 Triggering Incident Scenario

iii. At 05:15:56 hrs, 220kV Bundi-Gulabpura (RS) ckt was manually opened on SLDC instruction to avoid line tripping on overloading. Scenario after opening of 220kV Bundi-Gulabpura ckt is shown in Fig.9.

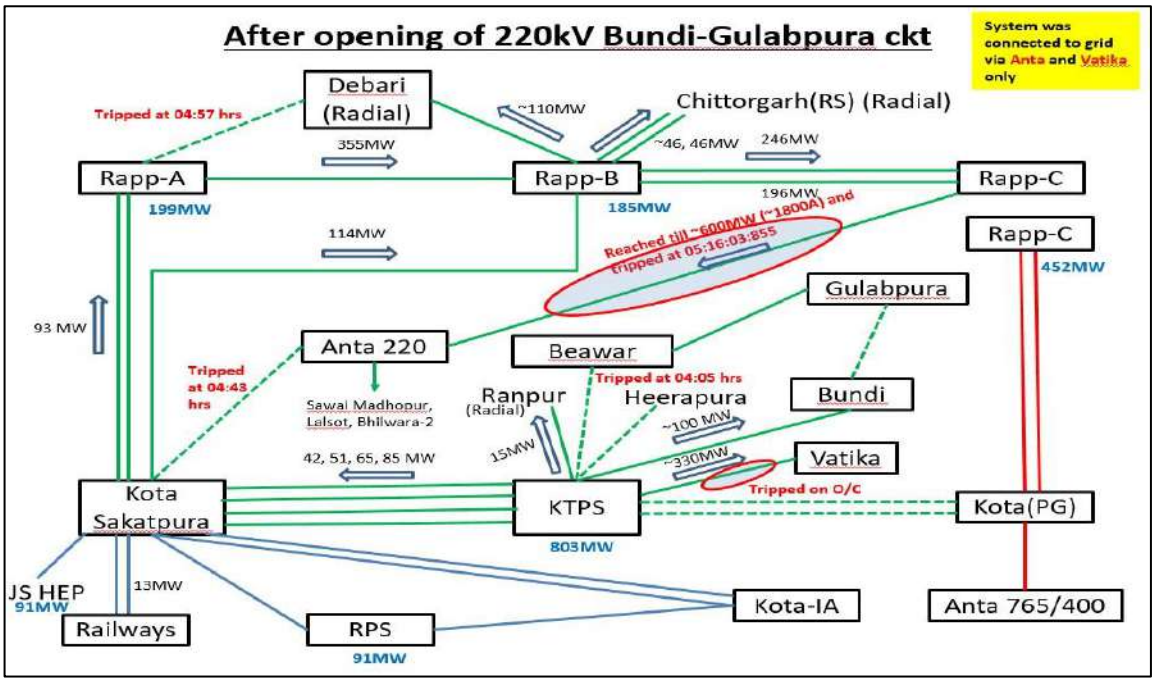


Fig.8 Scenario after opening of 220kV Bundi-Gulabpura ckt

iv. After this, as per DR shown in Fig.10, 220kV KTPS-Vatika Ckt current reached ~850A (~360MW) and tripped on over-current protection operation from KTPS end. Further within ~500msec, as per DR shown in Fig.11, 220kV RAPS-C(NP)-Anta(NT) ckt current reached from ~1000A to ~1750A (~660MW) and line tripped due to Z-1 distance protection operation on load encroachment.

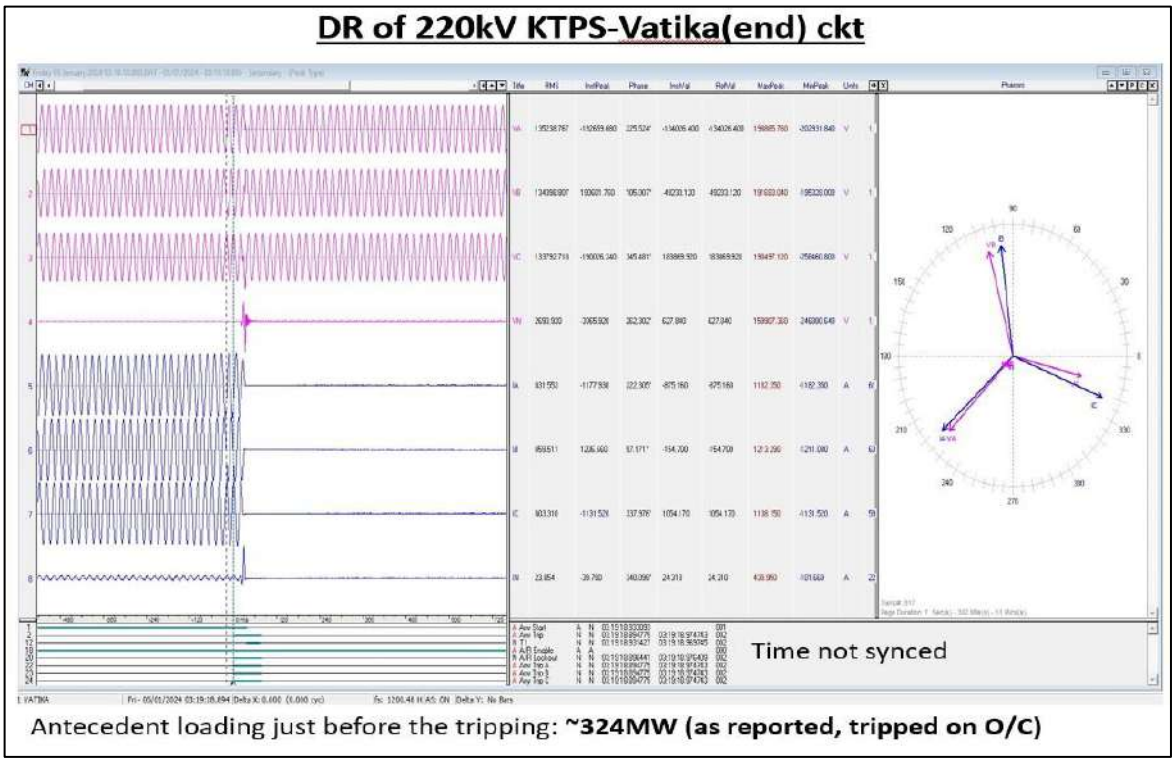


Fig.9 DR of 220kV KTPS-Vatika(end) ckt

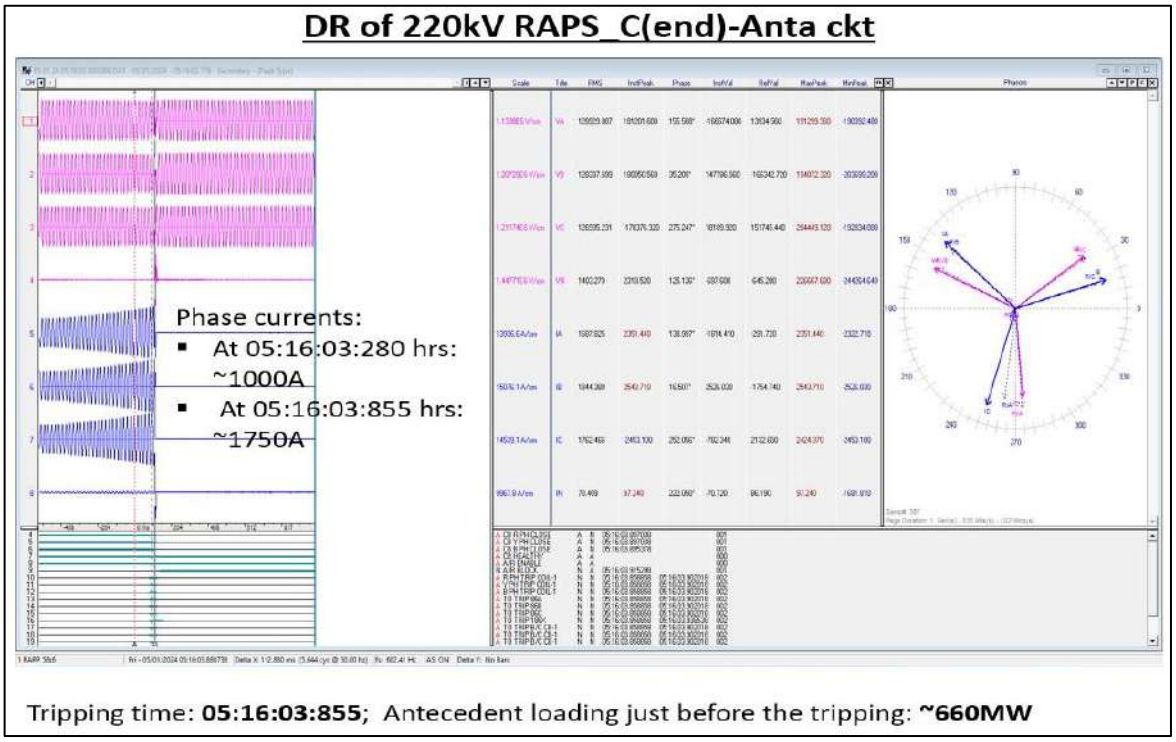


Fig.10 DR of 220kV RAPS_C(end)-Anta ckt

v. Due to tripping of 220kV KTPS-Vatika Ckt and 220kV RAPS-C(NP)-Anta(NT) ckt, connectivity to main load centre was cut off. Only radial load available for RAPS-A, RAPS-B and KTPS generation was 220kV Debari and 220kV Chittorgarh and system got isolated from main Grid. Island formation scenario is shown in Fig.12.

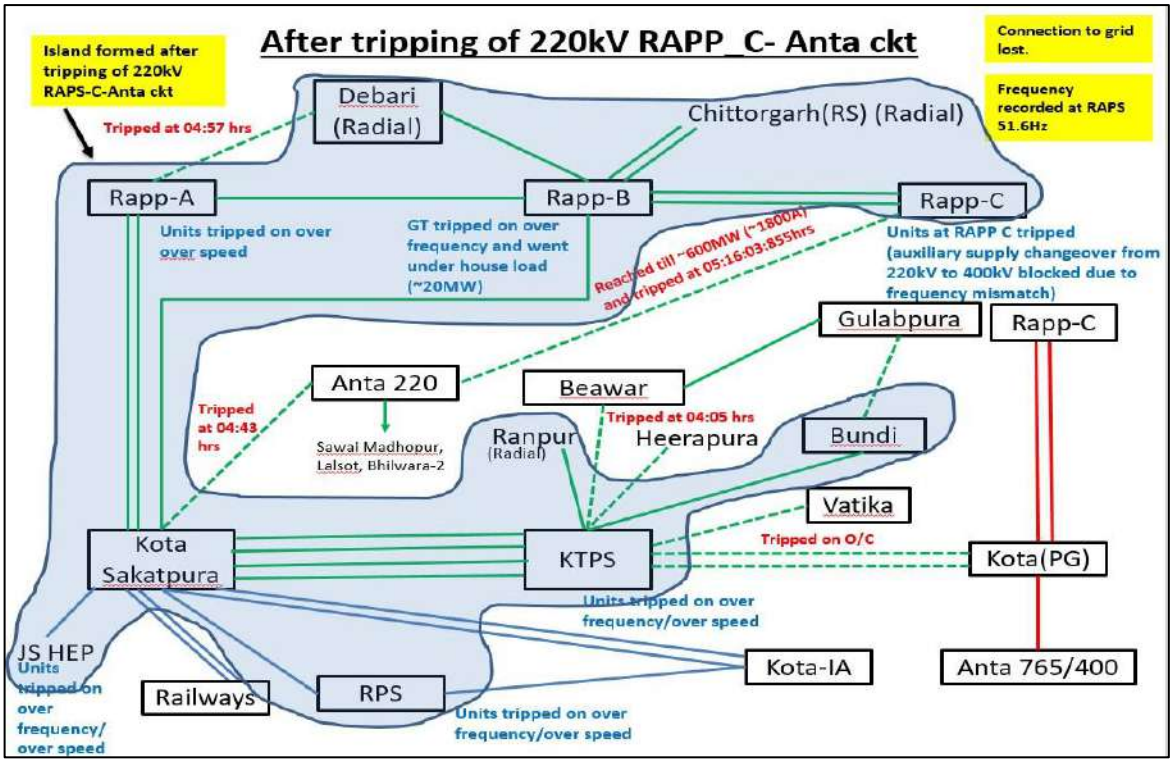


Fig.11 Island formation Scenario

vi. Above load generation scenario led to over frequency in the subsystem. As per details shared by RAPS-B, frequency reached to 51.63Hz.

vii. RAPS-A unit-2 (no provision to come to house load) and KTPS Units also tripped on over frequency protection. Screenshot of digital recording system of RAPS-A during the event is shown in Fig.14.

viii. Subsequently, RAPS-B unit-4 tripped on over frequency (over frequency protection setting is 51.5Hz with 200msec time delay) and came to house load. RAPS-B unit-4 operated on house load for approx. 1.5 hours but couldn't be able to synchronise with the grid due to issue in turbine speeder gear. As per communication received from RAPS-B, MANUAL LOWER command for turbine speeder gear lowering could not be executed due to wiring deficiency. Generation plot of RAPS-B unit-4 (as shared by RAPS) is shown in Fig.13.

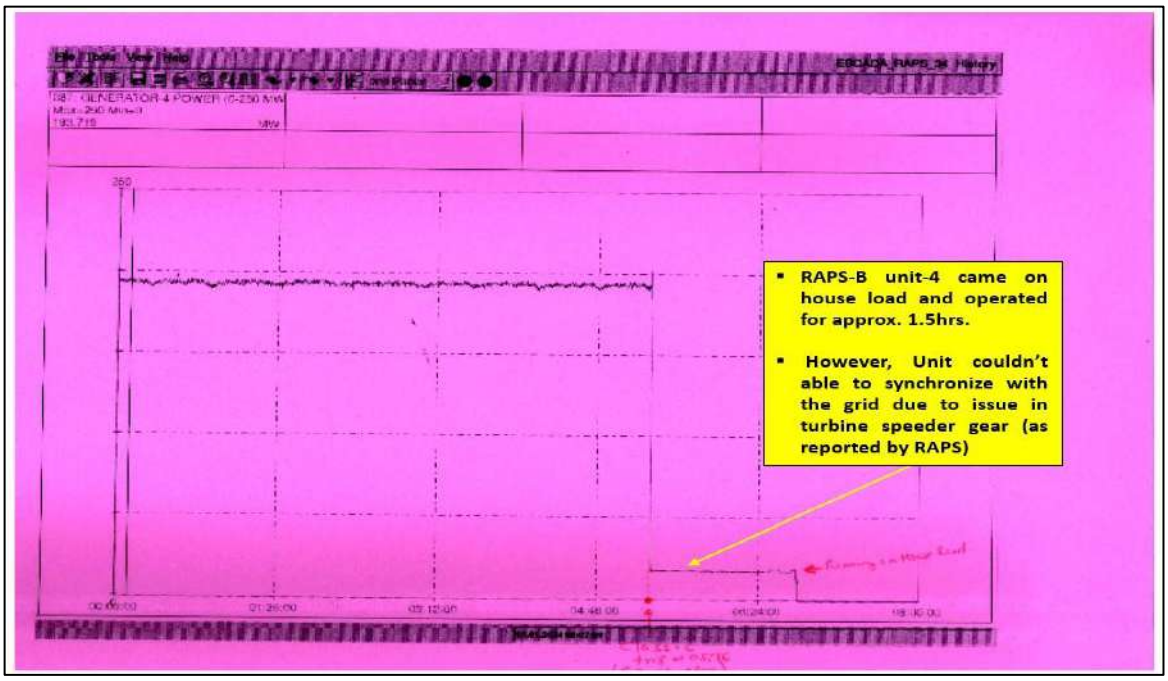


Fig.12 Generation plot of RAPS-B unit-4 (as shared by RAPS)



Fig.13 Digital recording system of RAPS-A during the event (as shared by RAPS)

ix. As reported, at the same time, HV and LV CBs of SUT-5 (connected at 220kV side of RAPS-C) tripped on over frequency protection and 6.6 kV buses of SUT-6 section got de-energised due to tripping of Units at RAPS-A and RAPS-B. RAPS-C unit-5&6 tripped due to loss of auxiliary supply. As reported, auxiliary supply changeover from 220kV to 400kV through Auto Transfer Scheme (ATS) got blocked due to frequency mismatch (frequency of 220 KV system increased to 53.2 Hz while frequency of 400 KV system remain 49.9 Hz).

x. The reactors of Unit-5 and Unit-6 at RAPS-C tripped on PHT pressure high at 05:16:08 hrs and 05:16:12 hrs respectively.

xi. As per PMU, no fault is observed in the system. PMU plot of frequency and phase voltage magnitude at Kota(PG) are shown in Fig.15 and 16 respectively.

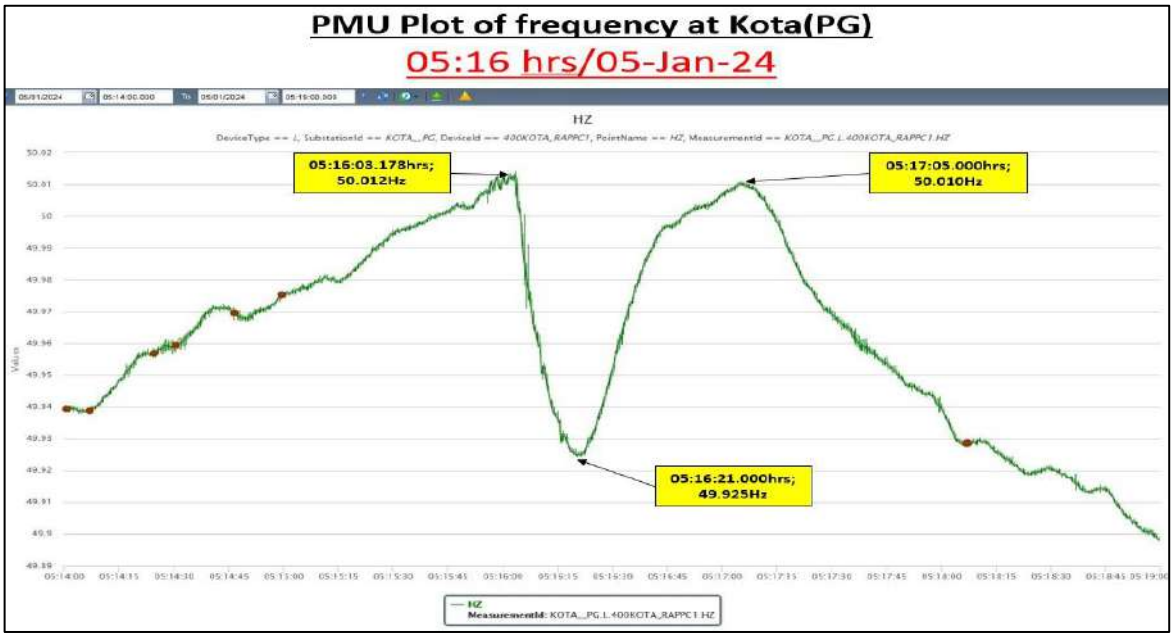


Fig.14 PMU plot of frequency at Kota(PG)

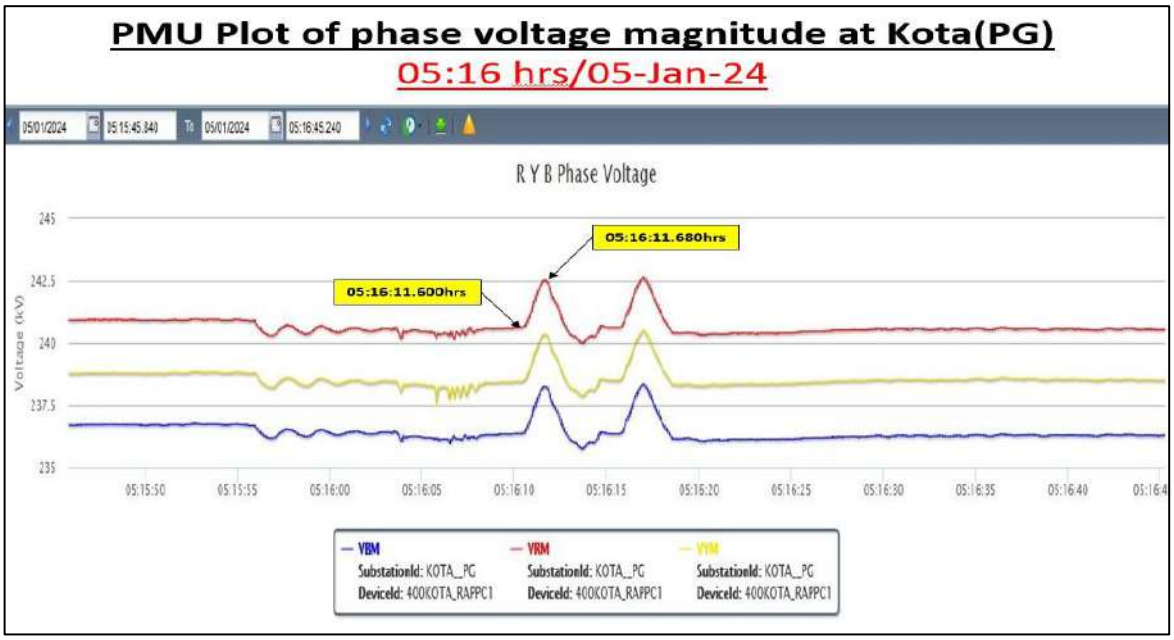


Fig.15 PMU plot of phase voltage magnitude at Kota(PG)

xii. As per SCADA, load loss of approx. 410 MW is observed in Rajasthan control area and total change in generation of approx. 1815MW is observed. SCADA Plot of Rajasthan demand during the event is shown in Fig.17. SCADA Plot of generation of KTPS, RAPS-A, RAPS-B, RAPS-C, RPS HEP and JS HEP during the event are shown in Fig.18, 19, 20, 21, 22, and 23 respectively.

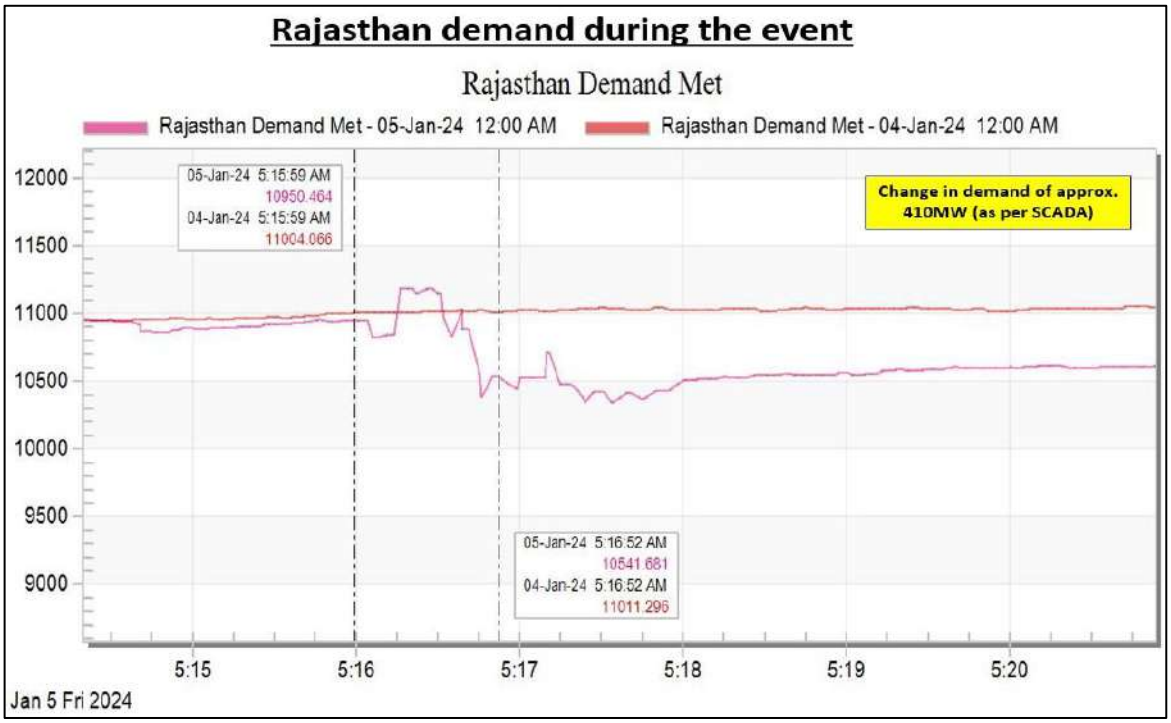


Fig.16 SCADA Plot of Rajasthan demand during the event

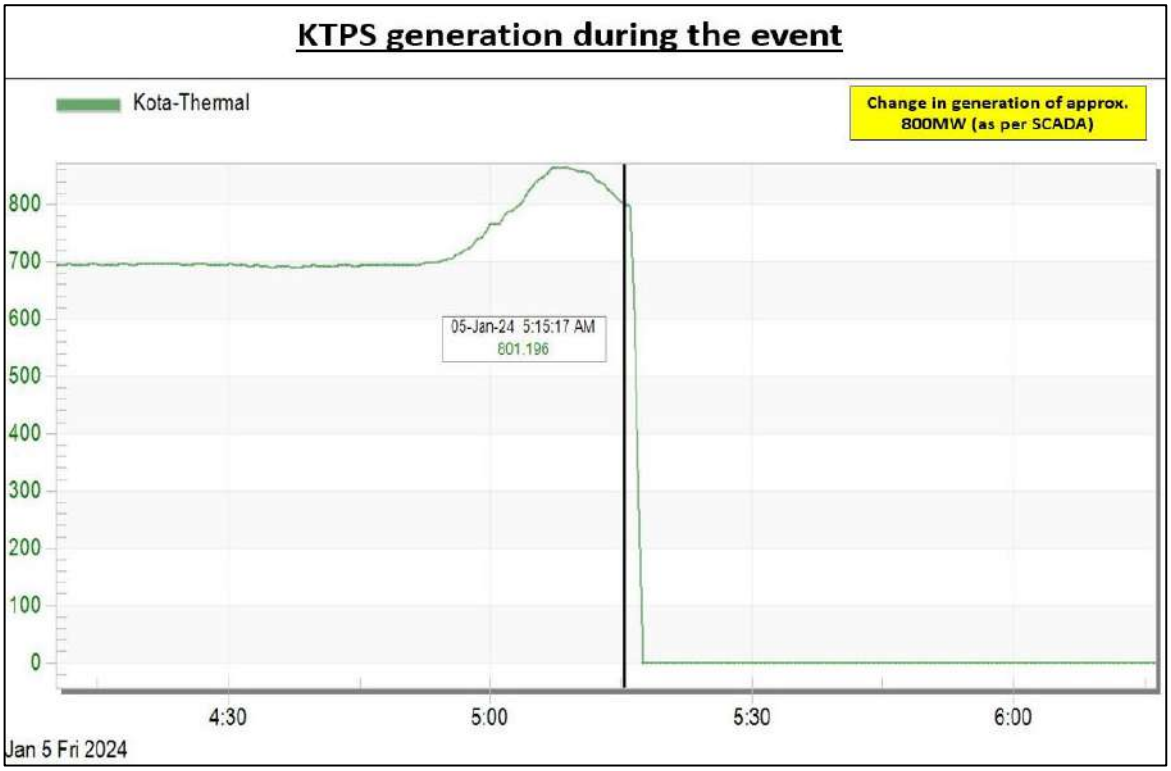


Fig.17 SCADA Plot of KTPS generation during the event

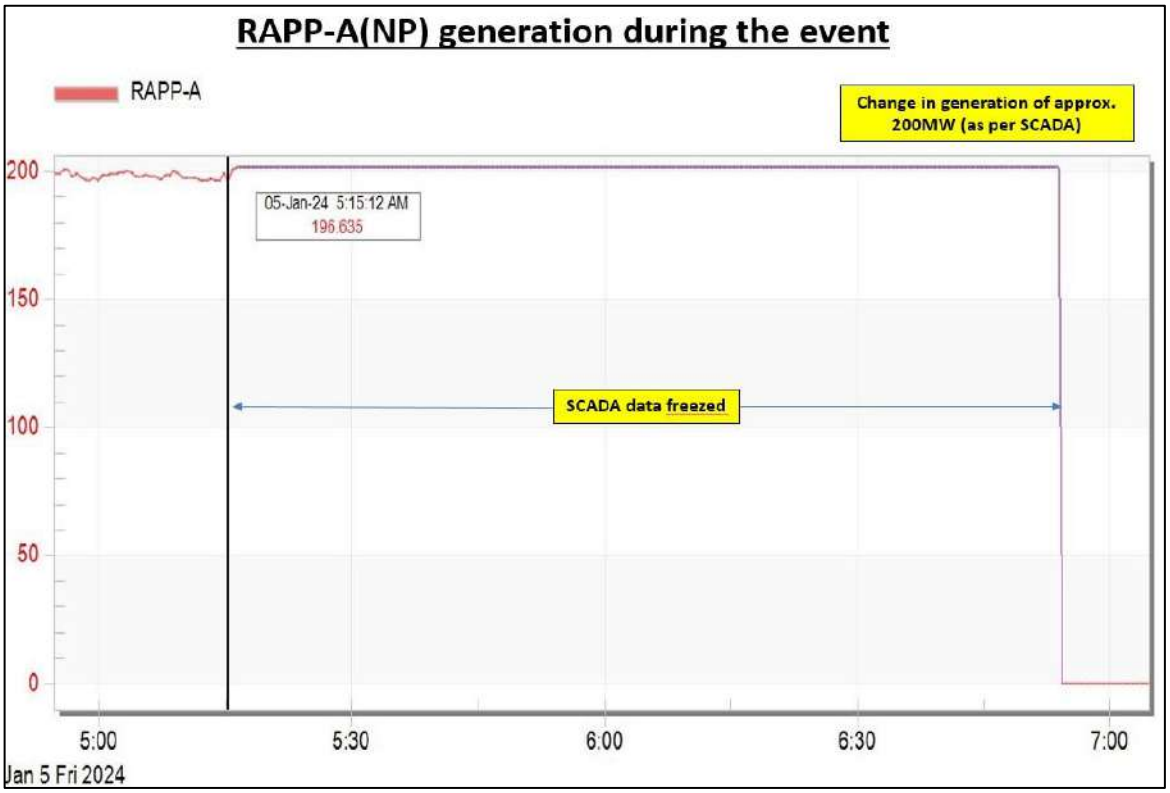


Fig.18 SCADA Plot of RAPS-A generation during the event

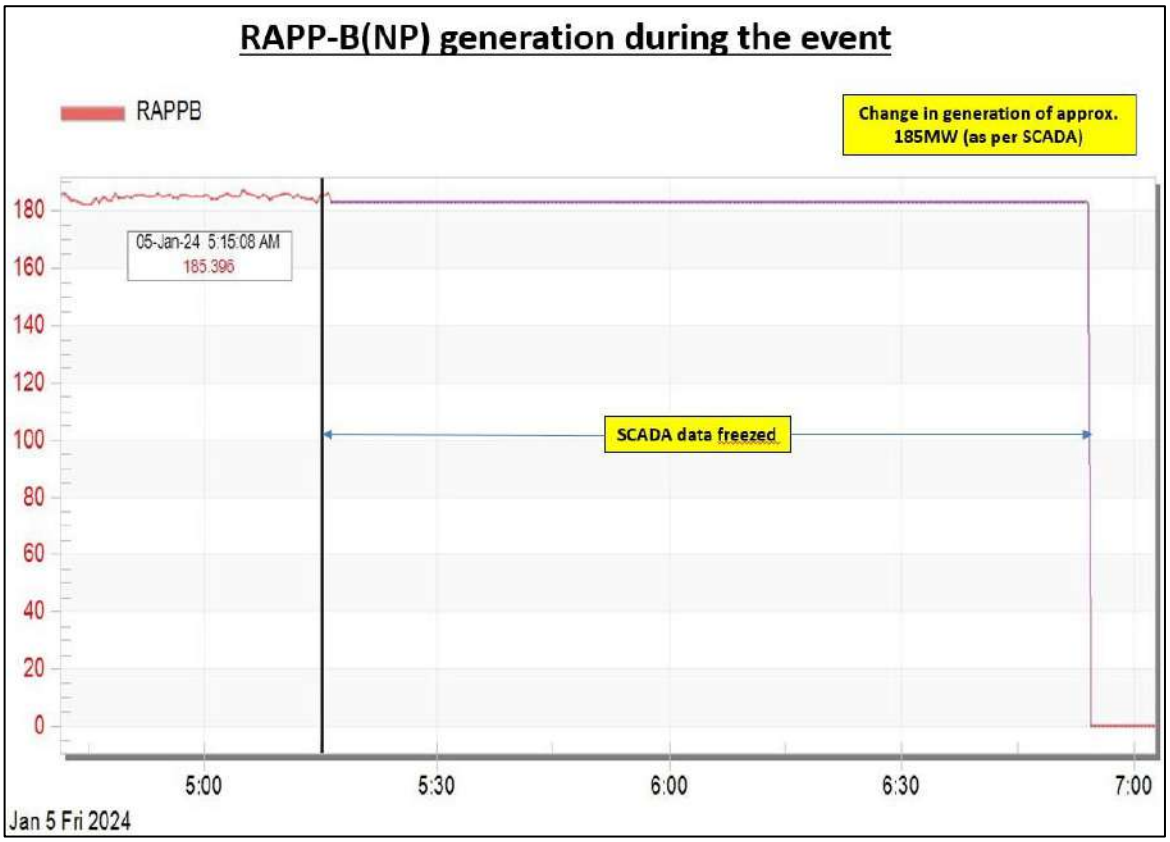


Fig.19 SCADA Plot of RAPS-B generation during the event

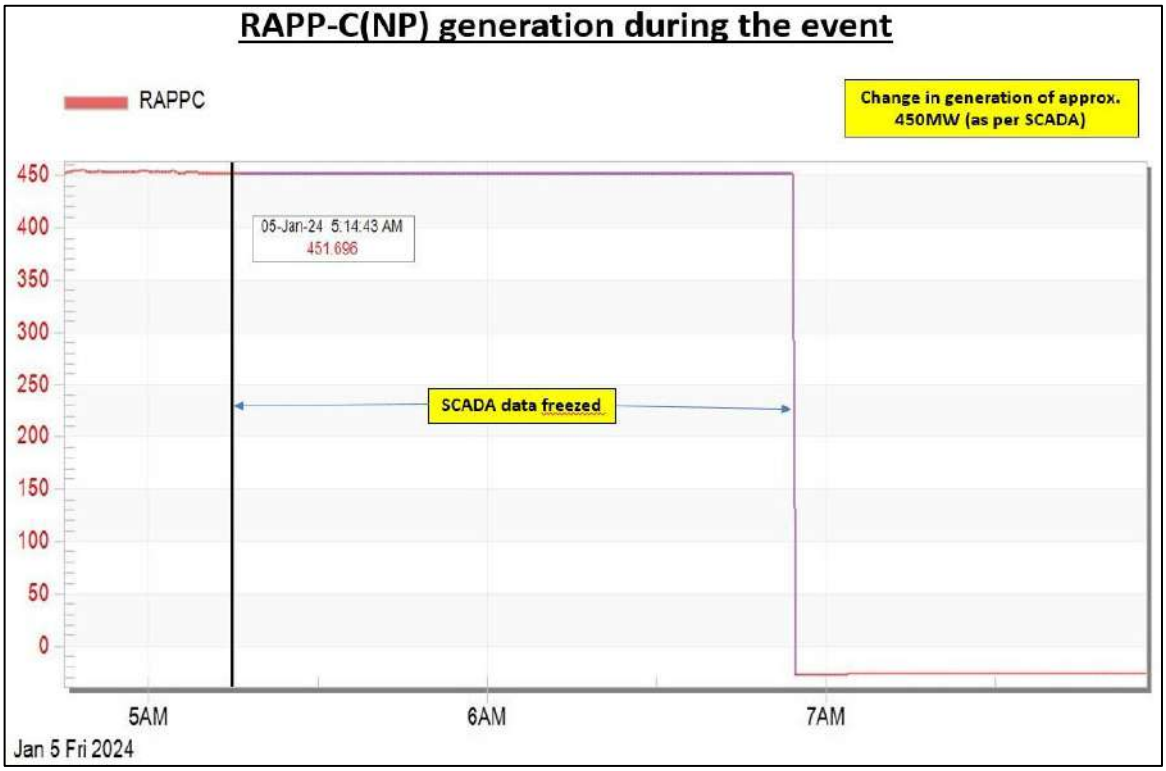


Fig.20 SCADA Plot of RAPS-C generation during the event

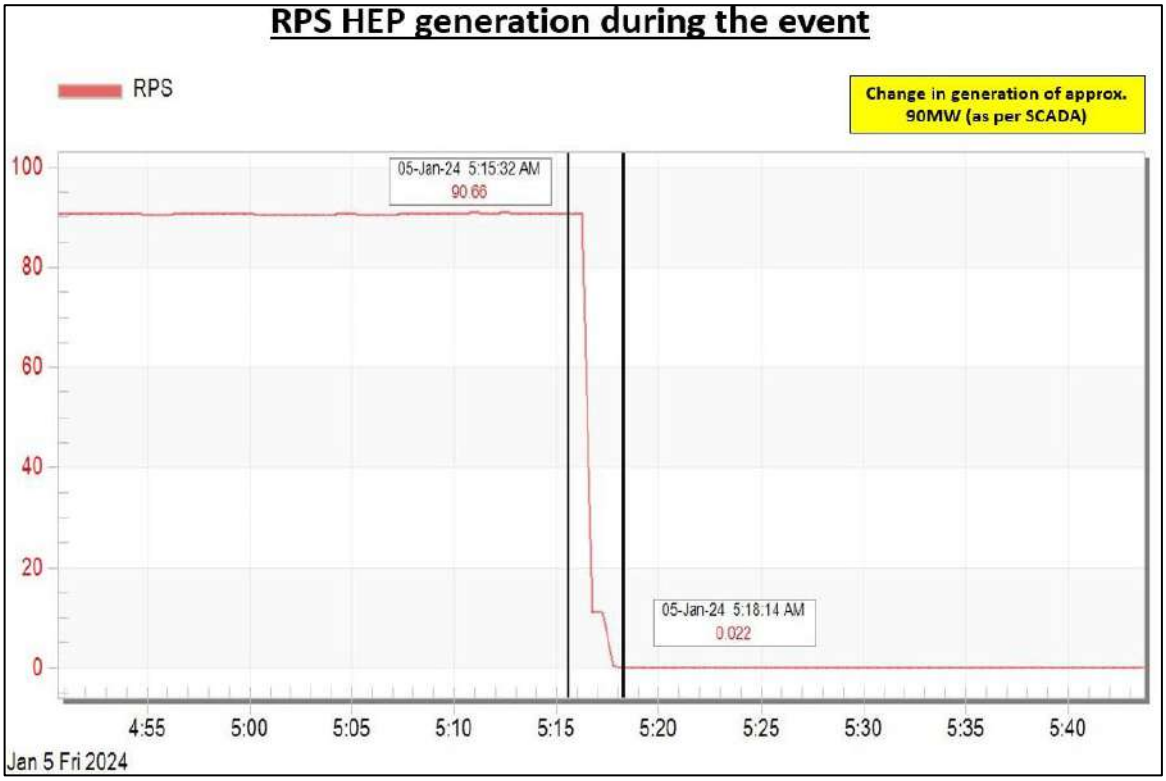


Fig.21 SCADA Plot of RPS HEP generation during the event

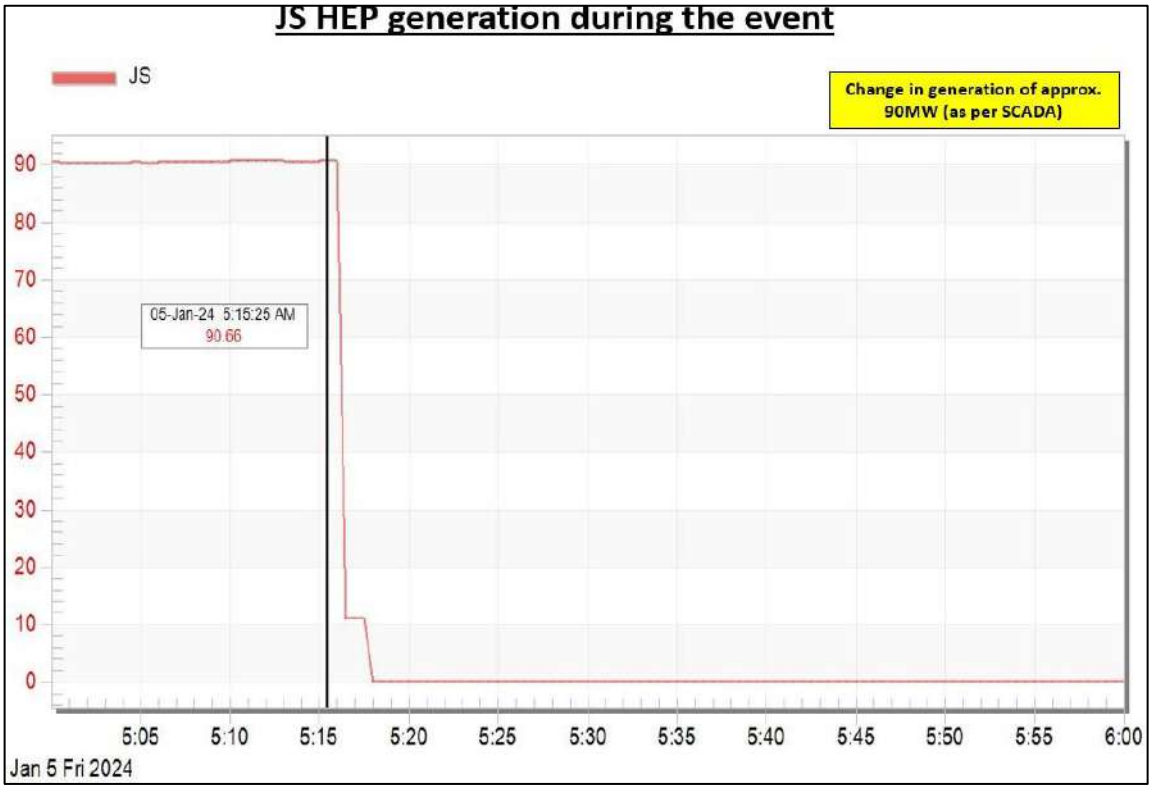


Fig.22 SCADA Plot of JS HEP generation during the event

xiii. During tripping event, auxiliary supply of RAPS-C DC power (DCPS) supply also tripped. And as battery backup of DCPS was not available, data reporting of RAPS-A, RAPS-B and RAPS-C hanged after tripping. (SCADA data of RAPS-A, RAPS-B and RAPS-C is communicating to NRLDC through Fibre optic. There is linear fibre optic between RAPS-A to RAPS-B and RAPS-B to RAPS-C, then from RAPS-C redundant communication path are available). On confirmation with ULDC it was informed that there is issue in DCPS battery bank of NPCIL.

3.2 Grid Event on 29.03.2024 at 20:22 hrs

Again, on 29th March 2024, at 20:22 hrs a grid event (GD-1) of blackout of this complex occurred. During antecedent condition of this grid event Two no of 220kV lines were out on system constraints and one no of line was under shutdown. The complex was connected to the grid with five (no.s) of the 220kV lines. Most of the 220kV lines were operating in radial mode. Total generation in the complex was ~1587 MW i.e., RAPS A: 195 MW, RAPS B: 177 MW, KTPS: 1150 MW, JS HEP: 32 MW and RPS HEP: 40 MW. Triggerring incident was damage of R-ph CT of one of the 220/132kV ICT at 220/132kV Kota Sakatpura S/s of Rajasthan led to the occurrence of bus fault. . Due to non-availbility of bus bar protection at 220kV bus at Kota Sakatpura, multilple 220kV lines tripped on reverse distance protection operation. Thereafter, cascade tripping of grid connected 220kV lines occurred due to overloading. Remaining 220kV lines in the complex were radially connected and thus overfrequency occurred in the compelx due to load generation imbalane (surplus generation). This event had resulted a complete loss of generation in the complex i.e., 2020 MW (1587MW on overfrequeny due to loss of evacuation path

and 433 MW of RAPP C due to failure of ATS at RAPS C).

3.2.1 Antecedent Condition

During the antecedent condition, the following lines were out of service:

i. 220kV Kota(PG)-KTPS(RVUN) (RS) Ckt-1 & 2 (Lines were out since 09th Sept'23, lines were kept out on request of KTPS, as intimated by KTPS, hotspot related issue arises due to heavy import of power from Kota(PG) end).
ii. 220kV KTPS-Vatika ckt was under shutdown.

During antecedent condition, the following units were under service:

i. 110MW Unit-1 & 2, 210MW Unit 3, 4 & 5 and 195MW Unit 6 & 7 at 220kV KTPS (generating total ~1150MW),
ii. 200MW Unit-2 at RAPS-A (generating ~195MW),
iii. 220MW Unit-4 at RAPS-B (generating ~170MW),
iv. 220MW Unit-5 & 6 at RAPS-C (generating total ~433MW),
v. 43MW Unit-1, 3 & 4 at RPS HEP (generating total ~40MW)
vi. 33MW Unit-1, 2 & 3 at JS HEP (generating total ~32MW).

Antecedent scenario of network complex:

During antecedent condition, all 07 units at KTPS were running and generating approx. 1150MW, power was evacuating through 220kV KTPS-Sakatpura ckt-1,2,3 & 4, 220kV KTPS-Beawar ckt, 220kV KTPS-Bundi ckt and 220kV KTPS-Heerapura ckt. 220kV KTPS-Vatika ckt was under shutdown and 220kV KTPS-Kota(PG) D/C was in opened condition. 200MW Unit-2 at RAPS-A was generating 195MW. RAPS-A generation was evacuating through 220kV RAPS-A-Debari ckt and 220kV RAPS-A-RAPS-B tie line. 220MW Unit-3 at RAPS-B was under shutdown and 220MW Unit-4 at RAPS-B was generating approx. 170MW. RAPS-B generation was evacuating through 220kV RAPS-B-Chittorgarh D/C, 220kV RAPS-B-Debari ckt and 220kV RAPS-B-RAPS-C D/C tie lines. RAPS-C is further connected to 220kV Anta. 220/132kV Kota Sakatpura is having double main transfer bus scheme and bus bar protection is not available there. RPS HEP (generating ~40MW) and Jawahar Sagar HEP (generating ~32MW) also connected at 132kV level at Kota Sakatpura.

Antecedent scenario of the network complex is shown in Fig.24.

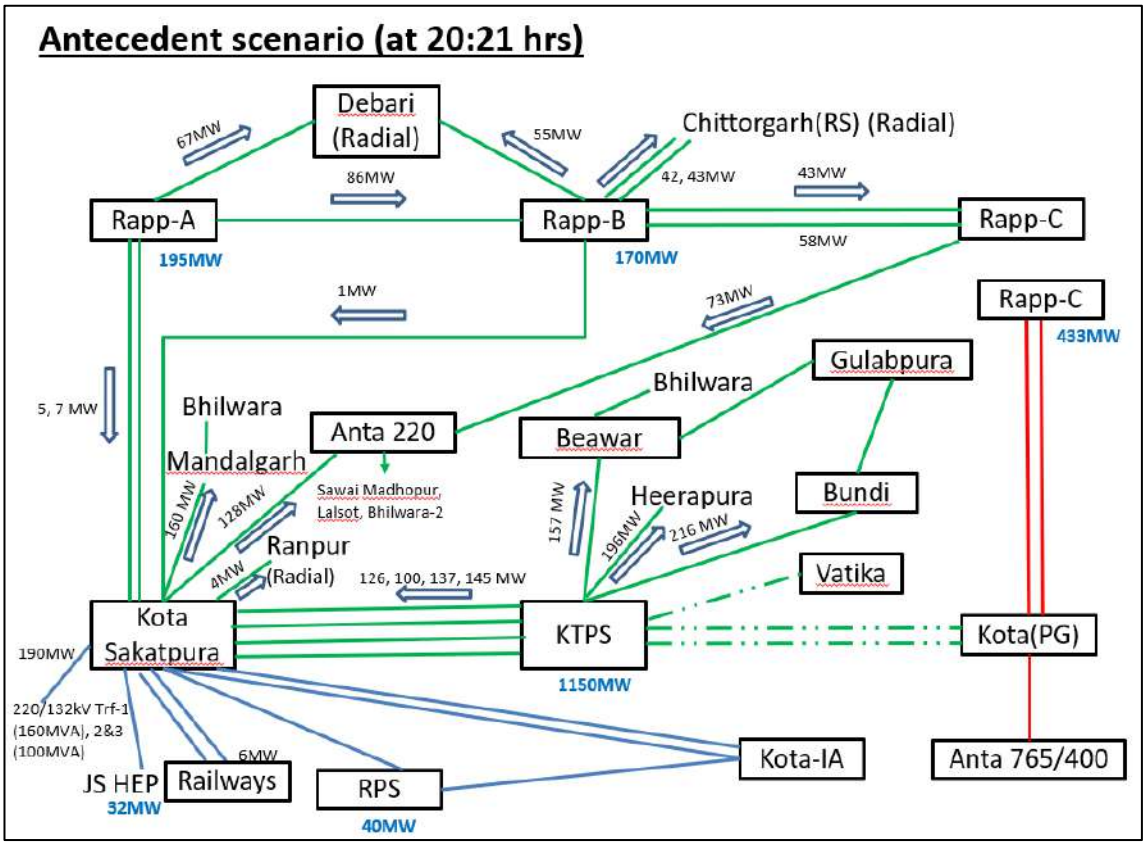


Fig.23 Antecedent scenario of the network complex

3.2.2 Sequence Of Events (SOE) and analysis

i. Sequence of event is mentioned as below:

S. No	Time	Event	Remarks
1	20:21:52 hrs	R-ph CT (220 kV side) of 220 kV/132 kV ICT-1 at Kota Sakatpura blasted and created bus fault. 220kV feeders to RAPS-A-I, Ranpur & Mandalgarh tripped from Kota Sakatpuraend in Z-4 and 220kV KTPS-Sakatpura ckt-1 & 3 tripped from KTPS end in Z-2.	Z-4 time delay setting at Kota Sakatpura:160 msec Z-2 time delay setting at KTPS of 220kV KTPS-Kota Sakatpura lines: 160 msec
2	After tripping of above lines, loading of remaining 220kV lines at KTPS & Kota Sakatpura increased significantly. Within approx. 600-700msec of fault, 220kV KTPS-Heerapura ckt, 220kV KTPS-Beawar ckt, 220kV KTPS-Bundi ckt, 220kV Bundi-Gulabpura ckt and 220kV Kota Sakatpura-Anta ckt tripped. Lines tripped on distance protection oepration during overloading condition /power swing.		
3	220kV RAPS-C-Anta ckt and 220kV RAPS-B-Kota Sakatpura ckt also tripped on Z-1 distance protection operation after power swing detection		
4	20:22:10 hrs	SUT-4 & GT-4 at RAPS-B, SUT-5 & SUT-6 at RAPS-C and KTPS units tripped on over frequency protection operation	Frequency reached above 51.5 Hz due to load generation imbalance
5	Island formed with RAPS-A unit-2 and load at 220kV Debari, 220kV Chittorgarh via 220kV RAPS-A-RAPS-B tie line and load at 220/132kV Kota Sakatpura via 220kV RAPS-A-Kota Sakatpura ckt-2		

6	20:29 hrs	Frequency dropped below 48Hz leading to operation of RAPS-A&B islanding scheme. As per scheme, 220kV RAPS-A-Kota Sakatpura ckt-2 tripped. Subsystem with RAPS-A unit-2 and load at Debari & Chittorgarh got islanded	Frequency recorded 47.8 Hz
7	20:47 hrs	Island collapsed due to tripping of RAPS-A unit-2 turbine generator on over fluxing (~112.5%),	Voltage recorded just before the tripping at RAPS_A was ~282kV

ii. Triggering incident: - R-ph CT (220 kV side) of 220 kV/132 kV ICT-1 at Kota Sakatpura blasted. 220kV feeders to RAPS-A ckt-1, Mandalgarh, KTPS ckt-1&3 and Anta ckt were connected at the same 220kV bus.

iii. Bus bar protection is not available at Kota Sakatpura S/s and Z-4 time delay setting is kept as 160msec. Z-2 time delay setting of 220kV KTPS-Sakatpura ckt-1,2,3 & 4 are also kept as 160msec at KTPS end due to non-availability of bus bar protection at Kota Sakatpura.

iv. On this fault, 220kV feeders to RAPS-A-I, Ranpur & Mandalgarh from Kota Sakatpura tripped on Z-4 distance protection at Kota Sakatpura end within approx. 200msec of fault. 220kV KTPS-Sakatpura ckt-1 & 3 also tripped on Z-2 distance protection operation at KTPS end within approx. 200msec of fault. 220/132kV ICT-1 at Kota Sakatpura also tripped on differential protection operation. Scenario after tripping of mentioned lines is shown in Fig.25. Fault bus also got isolated within ~200msec on tripped of bus sectionalizer on operation of O/C E/F protection.

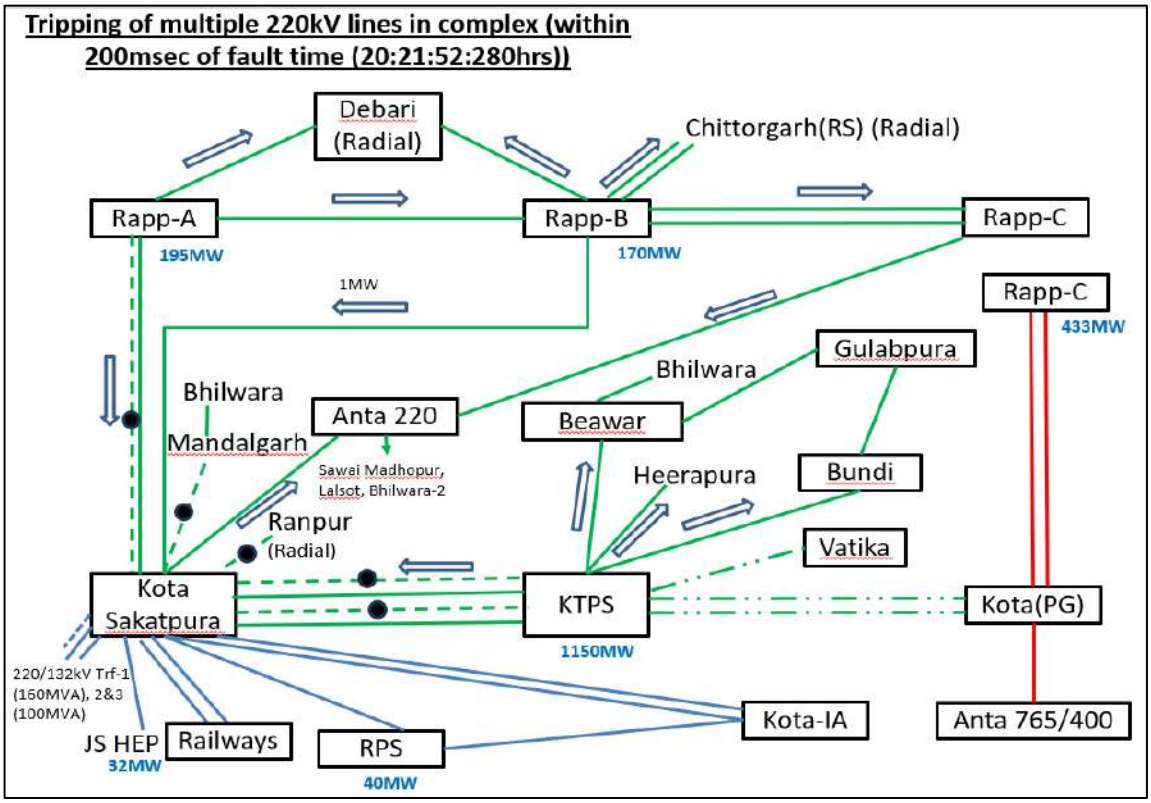


Fig.24 Tripping of multiple 220KV lines within 200msec of fault time

v. As per PMU plot of phase voltage of 220kV KTPS-Heerapura ckt (Fig 26), R-N fault converted into 3-ph fault with delayed clearance of 760msec is observed.

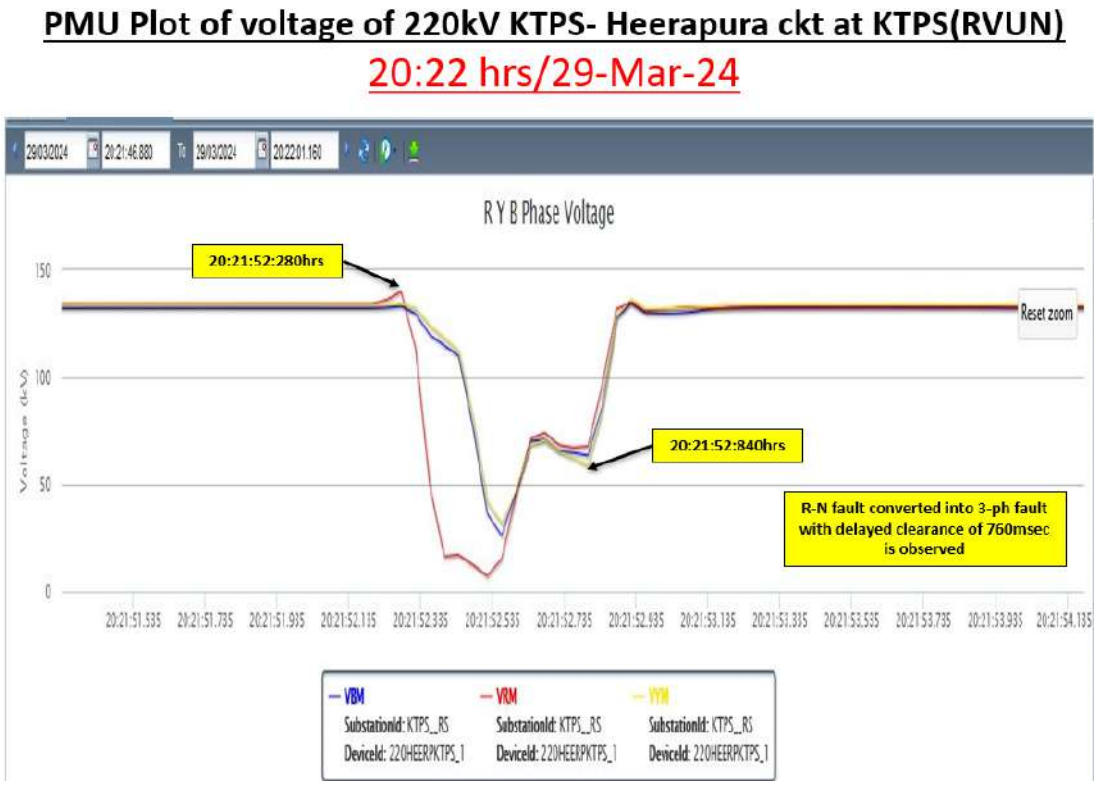


Fig.26 PMU plot of phase voltage of 220kV KTPS-Heerapura ckt

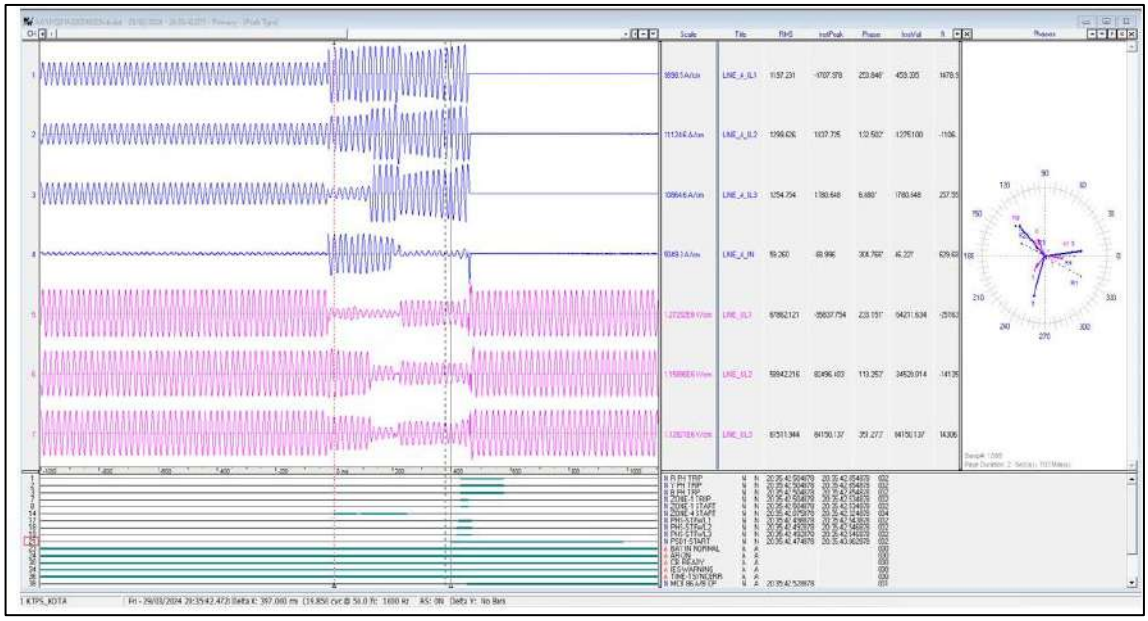


Fig.27 DR of 220kV KTPS-Sakatpura ckt at KTPS end

vi. As per DR of 220kV KTPS-Sakatpura ckt at KTPS end (Fig 27), R-N fault cleared within 200msec. Neutral current also reduced from ~450A to ~40A and distance protection also got reset. However, as remaining lines got significantly overloaded, further voltage dip in all three-phase occurred. Power swing also detected in 220kV lines due to significantly high loading (~400-500MW).

vii. Hence, after analysing PMU & DR data, it is observed that R-N fault cleared within 200msec. Further voltage dip is due to significantly high loading of 220kV lines.

viii. Due to tripping of aforementioned 220kV lines (as shown in Fig 25), loading of remaining 220kV lines at KTPS & Kota Sakatpura increased significantly. Within approx. 600-700msec of fault, 220kV KTPS-Heerapura ckt and 220kV KTPS-Beawar ckt tripped on Z-1 distance protection operation after power swing detection, 220kV KTPS-Bundi ckt & 220kV Bundi-Gulabpura ckt and 220kV Kota Sakatpura-Anta ckt tripped on distance protection operation suspected due to load encroachment. Scenario after tripping of mentioned lines is shown in Fig.28.

ix. Further, 220kV RAPS-C-Anta ckt and 220kV RAPS-B-Kota Sakatpura ckt also tripped on Z-1 distance protection operation after power swing detection (Fig.28).

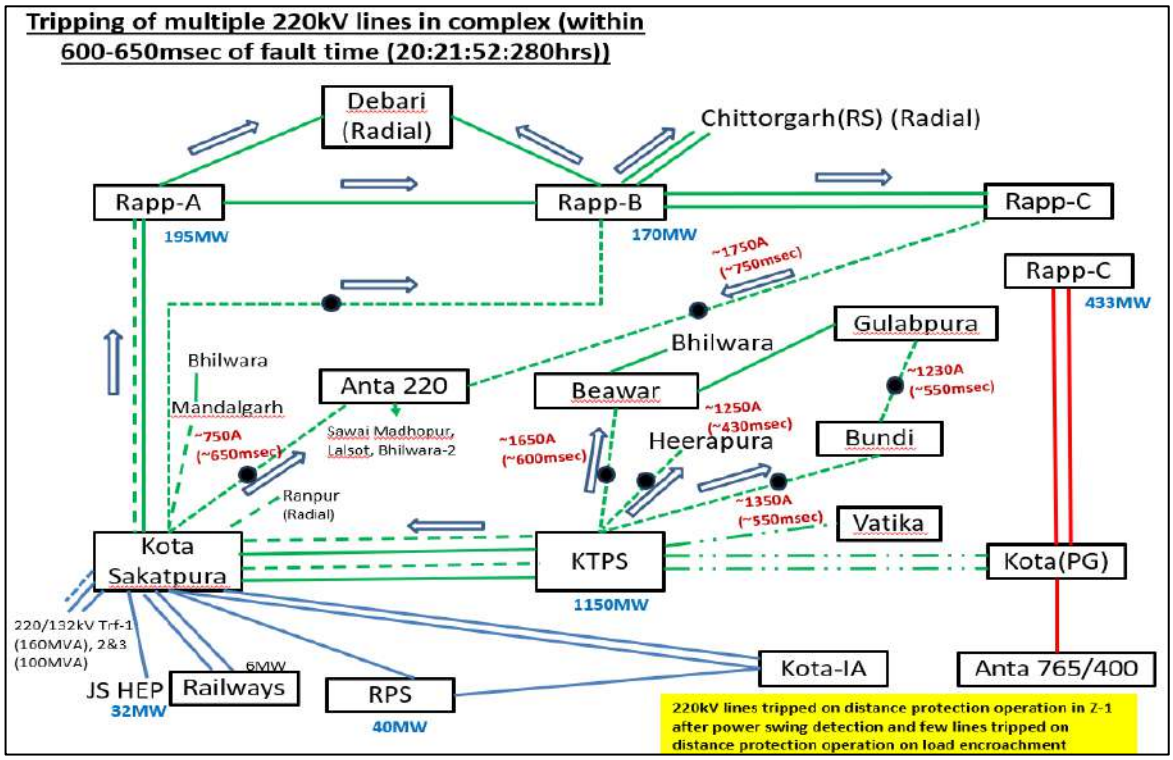


Fig.28 Tripping of multiple 220KV lines within 600-650msec of fault time

x. Further, at approx. 20:22:10hrs, SUT-4 at RAPS-B tripped on over frequency protection operation (setting: 51.5Hz with 200msec delay to initiate the ATS) followed by tripping of GT-4 (setting: 51.5Hz with 500msec delay). Auto transfer initiated however, ATS blocked, resulting in one PCP (Primary Coolant Pump) tripping followed by reactor tripping on PHT (Primary Heat Transport System) pressure high.

xi. At the same time, SUT-5 & SUT-6 at RAPS-C tripped on over frequency (51.5 Hz with 200 msec time delay to initiate the ATS). Auto transfer scheme initiated in both Unit-5 & 6 however it failed due to frequency mismatch between both the side of auxiliary bus. Subsequently reactors of RAPS-5&6 tripped on PHT pressure high. Highest frequency recorded at 220kV side was ~53.16Hz. DR of SUTs showing frequency profile is attached in **Annexure-III.**

xii. At the same time, all seven units of KTPS tripped on over frequency protection operation.

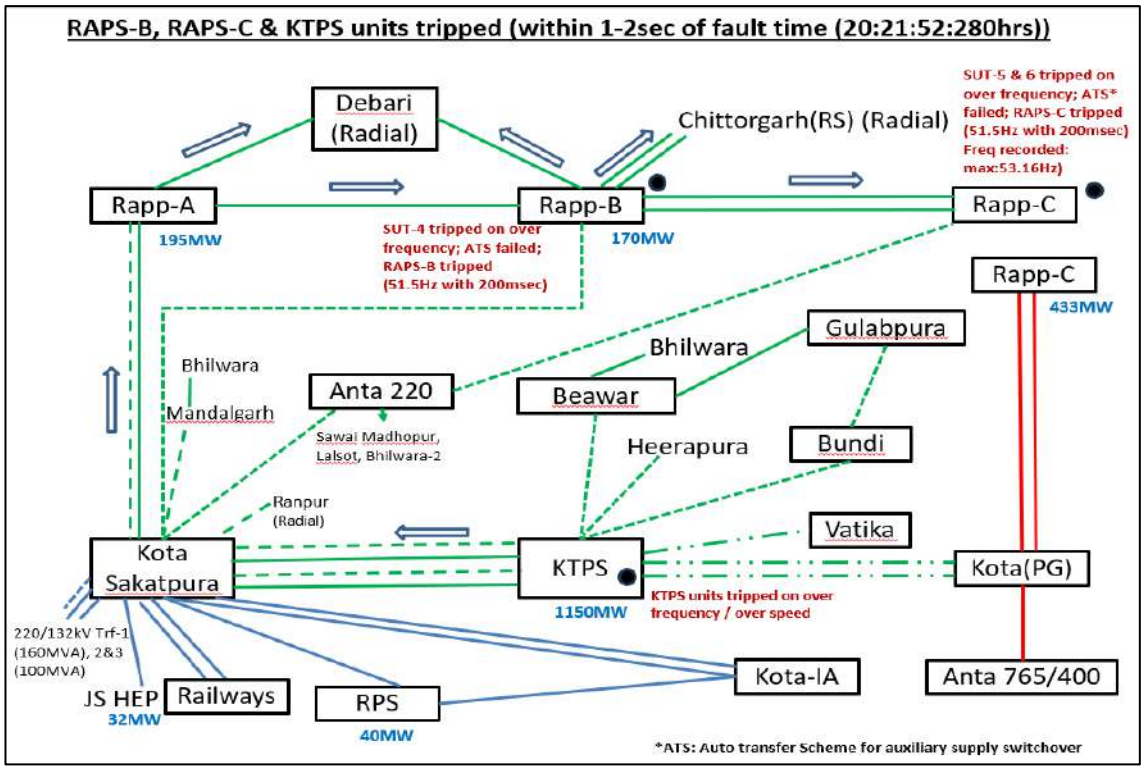


Fig.29 Tripping of units of RAPS-B, RAPS-C & KTPS within 1-2sec of fault time

xiii. After aforementioned trippings, only RAPS-A unit-2 was available which was feeding 220kV Debari, 220kV Chittorgarh via 220kV RAPS-A-RAPS-B tie line and load at 220/132kV Kota Sakatpura via 220kV RAPS-A-Kota Sakatpura ckt-2. It is suspected that this system was operating in island mode as there was no connectivity available with the grid. (Fig 30)

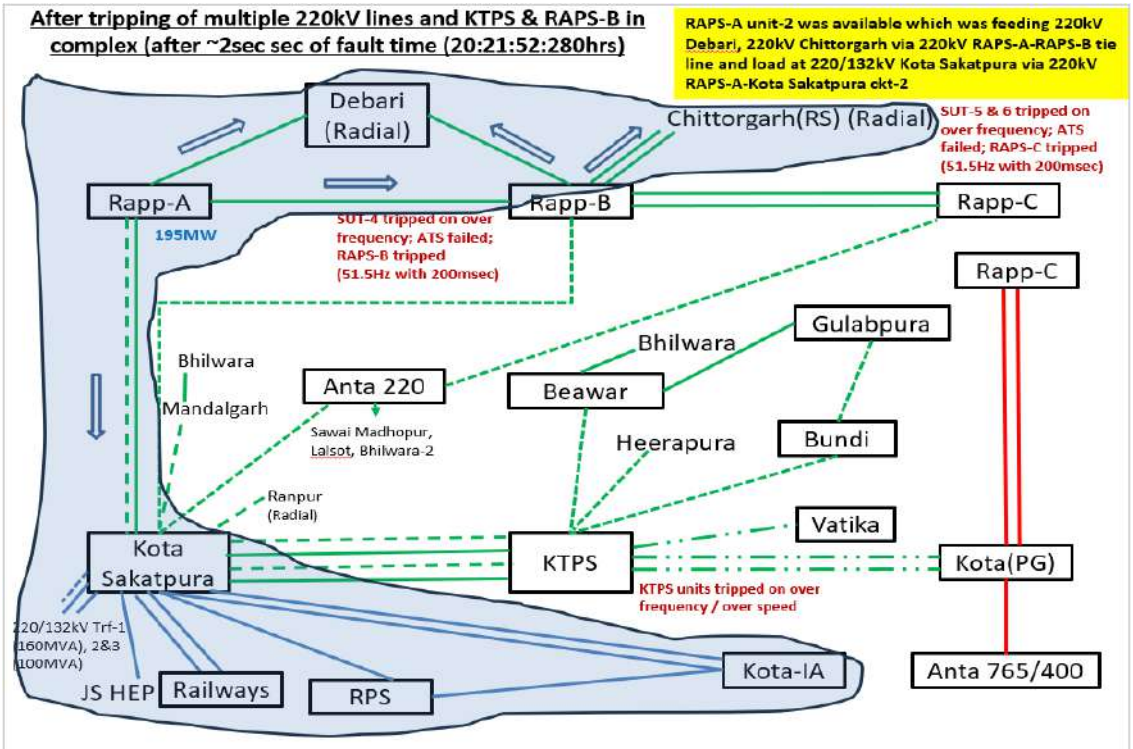


Fig.30 After tripping of RAPS, KTPS generation (after ~2sec of fault)

xiv. Further at 20:29hrs, frequency decreased to 47.8Hz and 220kV RAPS-A-Kota Sakatpura ckt-2 tripped on under frequency as per islanding scheme.

xv. With this tripping, system with RAPS-A unit-2 and load at Debari & Chittorgarh got islanded. RAPS-A generation was reduced to 160MW. Island operated till approx. 20:47hrs, frequency of island was maintained in the range of 51-52Hz and voltage was in the range of 230-240kV. Further, at ~20:47hrs, RAPS-A unit-2 turbine generator tripped on over fluxing (~112.5%), voltage recorded just before the tripping was ~282kV.

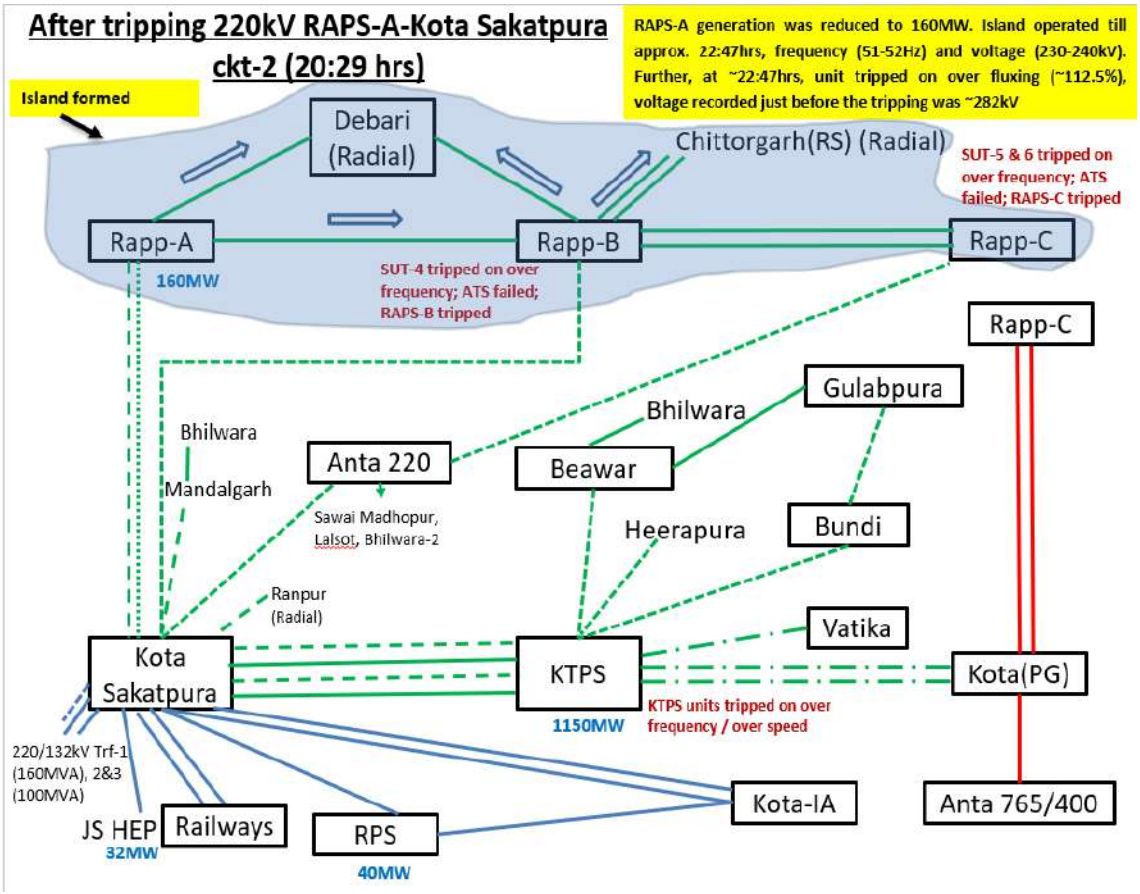


Fig.31 Island formation Scenario

xvi. As per SCADA, load loss of approx. 308 MW is observed in Rajasthan control area and total change in generation of approx. 2020MW is observed. Generation of KTPS, RAPS-A, RAPS-B, RAPS-C, RPS HEP and JS HEP affected during the vent.

DR file of all the tripped elements along with the SCADA & PMU plots w.r.t. both the grid events are attached as Annexure-III.

Chapter 4: Observations from the Grid Events and Action taken

4.1 Observations

i. **Limited connectivity of the complex with grid:**
   a. Most of the load stations were radially fed i.e., 220kV Debari, Chittorgarh, Ranpur.
   b. Complex was connected to grid at node point 220kV Anta and 400/220kV Bhilwara only. 220kV KTPS-Kota(PG) D/C were in opened condition since long which could have provided path for evacuation of generation in the complex during the event.
   c. In case of 1st grid event (05.01.2024), tripping of multiple lines during early morning hours on phase to earth fault (due to fog) further deteriorated the connectivity in the complex.

ii. **Overloading of transmission lines in the complex**
   a. Most of the load stations are connected through single circuit lines i.e., 220kV Vatika, Bundi, Heerapura etc. and feeders were running in overloaded conditions. In case of 1st grid event (05.01.2024), 220kV Bundi and Vatika were loaded at ~288MW & 214MW respectively.
   b. Tripping of adjacent lines in the complex led to cascade tripping during overloading conditions. If line loading would have maintained in permissible range, cascade tripping could be avoided. Timely instruction for generation backdown could also have avoided overloading in the complex.

iii. **Protection system related issues in the complex**
   a. During the 1st event (on 05.01.2024), in most of the lines tripped on single phase to earth fault, A/R operation at one or both the ends also not observed. Healthiness of A/R and its proper operation need to be ensured to avoid tripping of line on transient single phase to earth fault.
   b. During the 2nd event (on 29.03.2024), non-availability of bus bar protection at 220/132kV Kota Sakatpura S/s led to tripping of multiple bus at 220kV Anta Sakatpura S/s which triggered the grid event.
   c. Frequent tripping of 220kV lines evacuating from RAPS-A&B have been observed since long and it has been highlighted at various forums for necessary actions at Rajasthan(RVPNL) end. Poor reliability of evacuating lines from RAPS, affects the security of the complex.

iv. **Auto Transfer Scheme (ATS) and auxiliary supply system at RAPS**
   a. Half of the auxiliary supply of RAPS C (connected at 400kV side) is fed from 220kV side at RAPS B. During both the grid events, RAPS C units also tripped due to disturbance at 220kV side due to unsuccessful ATS operation due to frequency mismatch between 220kV & 400kV side during disturbance. As 220kV side of the complex is not completely stable, auxiliary supply system of RAPS C should be completely shifted from RAPS A & B complex.
   b. During the 1st event (on 05.01.2024), RAPS B unit successfully came to house load and operated for around ~1.5 hours. However, Unit couldn't be able to restore

back to grid mode due to some mechanical / wiring related issue at RAPS end. Provisions for the availability of alarms in the control room for such issues may be explored so that such issues can be attended beforehand and will help in decision making during real time scenario.

c. During the 2nd event (on 29.03.2024), RAPS B unit also couldn't able to come to house load due to unsuccessful switching of auxiliary supply due to issue in ATS operation logic. Operation logic of ATS should be robust, taking care of multiple possible scenarios to get desired feasible outcome through its operation.

v. Island operation scheme of RAPS complex

During the 2nd event (on 29.03.2024), the island scheme of RAPS operated when frequency in the complex touched 47.8Hz during the disturbance. Island operated for ~15 minutes and in islanded mode of operation, RAPP-A generator remained connected to radial load (165 MW) through RAPP-A and RAPP-B tie line with 4 no. of transmission lines (RAPP-A Debari, RAPP-B Debari, RAPP-B chhitorgarth-1 and 2).

a. The reason for island collapse was tripping of TG on over fluxing protection. During investigation, it was found that the instantaneous contact of over fluxing relay of (GTT21) was wired in trip lockout circuit instead of time delay contact.
b. It is also observed that actual connectivity and load operation in the complex differs significantly from the approved islanding scheme. To ensure the successful operation of the islanding scheme, actual connectivity and load profile should match the approved islanding scheme approximately.

vi. Suspected or Incorrect SCADA data

a. It was observed that the SCADA data of RAPS-A, B & C after the event freezed. Tripping status and MW flow value of few of the lines (220kB RAPS_A-Debari line from RAPS-A and 220kV RAPS_A-RAPS_B tie line from RAPS-A end) was showing incorrectly.
b. Tripping of all the elements were also not recorded in SCADA SOE.
c. Incorrect data and status during real time affect the real time decision making and unavailability of SCADA / SOE data of the event affects the grid event analysis.

4.2 Action taken

4.2.1 Review of Auto Transfer Scheme (ATS) at RAPS

In both the events, the role of ATS was important. RAPS-5&6 in both incidents tripped due to unsuccessful Auto Transfer due to frequency difference between the outgoing and incoming sources, i.e. the 220 kV - SUT fed buses were operating at high frequency, whereas Generator – UT fed buses were at nominal frequency.

RAPS-3 was under project mode (planned shutdown) during both incidents. On 5th January 2024, RAPS-4 came on house load, but tripped on process parameter, whereas on 29.03.2024, ATS was successful but subsequently UT LVCB tripped as tie CB between RAPS-4 & RAPS-3 was closed.

As per existing logic, whenever tie CB between units at 6.6 kV levels is closed, the ATS of the unit is blocked. The logic was temporarily modified till RAPS-3 was under project mode. On 26/7/2024 RAPS-3 synchronized to the grid and actual logic is restored.

NPCIL reviewed the ATS scheme and following changes have been incorporated to ensure the successful ATS operation and successful transfer of auxiliary supply shall occur:

i. RAPS-5&6 shall modify the software of BTS-2000 relay to ensure that the ATS shall take places within 200msec:

   The earlier version of BTS software did not attempt any types of transfers if it encountered "BTS not ready" situation at the first instant after the initiation. Whereas, the modified logic continuously checks for BTS permissiveness for the entire BTS period of 700 msec.

   This software upgradation work has been done in ATS system of unit-5 at RAPS C and pending in unit-6 at RAPS C.

ii. Initiation of ATS at RAPS C prior to the suspected major grid events based on following condition:
   a) On over frequency and under frequency or when 220kV RAPS-Anta line gets overloaded up to ~250MW or Anta line trips on load encroachment.
   b) When phase difference between both the auxiliary power supply (6.6kV power supply from SUT (220kV side) and 6.6kV power supply from GT/UT (400kV side)) is less than or equal to 40degree.

   When both the above criteria meet then, ATS will be initiated. This logic has also been implemented in unit-5 at RAPS C and pending in unit-6 at RAPS C. This logic will ensure that transfer of auxiliary supply occur before the major disturbance or parameter variations at 220kV side.

The aforementioned changes in Auto Transfer Scheme (ATS) will enhance the chances of its successful operation. Changes in ATS scheme for one unit of RAPS-C is under design stage by NPCIL.

4.2.2 Action Taken on protection related issues:

i. Generator over flux protection in RAPS-A Unit has been reviewed and corrected.
ii. Bus bar protection at 220kV Kota Sakatpura S/s was commissioned on 09.07.2024.
iii. Time delay setting in Z-2 distance protection in 220kV KTPS-Kota Sakatpura lines have been revised to 200 msec which was earlier 160msec.
iv. Replacement of earth wire and insulators, installation of bird guard are being done by RVPNL in 220kV RAPS_A-Kota Sakatpura D/C and 220kV RAPS_B-Kota Sakatpura line. This will help in minimizing frequent tripping of line.

4.2.3 Action Taken on network re-configuration:

i. Following changes have been done in the complex. It has enhanced the connectivity in the complex and also provided enough paths for evacuation of the generation in complex.
   a. 220kV KTPS-Kota(PG) D/C was closed
   b. 220kV Chittorgarh-Chittorgarh(400/220kV) line was closed along with 220kV Chittorgarh-Sewa Line and 220kV Chittorgarh-Hamirgarh line.
   c. 220 kV Kota Sakatpura-Mandalgarh line was closed and integrated operation at 220 kV GSS Mandalgarh & Bhilwara started
   d. Split bus arrangement at 220 kV GSS Sakatpura (220kV Bus-D is separated from 220 kV Bus-A, B & C)
   e. Load of 220kV Ranpur S/s & Morak S/s are being directly fed from Bhanpura S/s (Western Region). Connectivity of Ranpur from KTPS and Kota Sakatpura has been shifted to separate bus.

ii. Impact of changes done in the complex is described in below table:

S. No	Network changes done	Date of changes done	Impact of network changes in the complex
1.	Closing of 220 kV S/C Sakatpura-Mandalgarh line alongwith integrated operation at 220 kV GSS Mandalgarh & Bhilwara	04.03.2024	i. Previously 220 kV GSS Mandalgarh was radially fed from 400 kV GSS Kota(PG) through 220 kV S/C Kota(PG)-Bhilwara(split bus)-Mandalgarh line. ii. After closing of 220 kV S/C Sakatpura-Mandalgarh line system at Mandalgarh along with integrated operation at Mandalgarh & Bhilwara additional power flow line is available which reduce the power flow from Sakatpura to RAPP generation complex in emergent system conditions.
2.	Closing of 400 kV D/C KTPS-Kota(PG) line (charged at 220 kV voltage level	01.04.2024	i. Thermal Capacity of 400 kV D/C KTPS-Kota(PG) line (charged at 220 KV voltage level) : 476 MVA/ckt (1250 Amp CTs are installed on the line). ii. In emergent system condition by-directional power flow has been observed on 220 kV D/C KTPS-Kota(PG) line which provide the stability in the KTPS & RAPP Generation complex in normal as well as in emergent system conditions.
	Closing of 220kV Chittorgarh-Chittorgarh(400/220kV)		i. This creates 220 kV ring system at 220 kV GSS Chittorgarh and reduces the over loading on 220 kV S/C RAPP(C)-Anta line in

3.	line along with 220kV Chittorgarh-Sewa Line and 220kV Chittorgarh-Hamirgarh line	17.04.2024 & 16.07.2024	normal condition as well as in emergent conditions. ii. Power flow on 220 kV D/C RAPP(B)-Chittorgarh line increased. iii. Previously 220 kV GSS Debari (approx. Load 150-200 MW) and Chittorgarh (approx. Load 150-200 MW) was radially connected from RAPP Complex and in emergent conditions whenever power was flow from Sakatpura to RAPP complex, 220 kV S/C RAPP_C-Anta line was used to trip on overload. Now additional power which is injected in RAPP complex from Sakatpura is distributed/shared in three 220 kV circuits viz. 220 kV D/C RAPP(B)-Chittorgarh line and 220 kV S/C RAPP(C)-Anta line and reduce the possibility of outage of 220 kV S/C RAPP(C)-Anta line on overload which was observed during the incident of 05.01.2024 and 29.03.2024.
4.	Creation of additional 220 kV S/C KTPS-Ranpur (Bus-2)– Sakatpura(Bus-D)- Dahra line by utilizing opened 220 kV S/C KTPS-Ranpur line & 220 kV S/C Ranpur – Sakatpura line and Split bus arrangement at 220 kV GSS Sakatpura (Bus-D is separated from 220 kV Bus-A,B &C)	18.04.2024	i. This creates additional evacuation line from KTPS upto extent of 220 kV GSS Dahra load (150 to 200 MW) ii. Split bus arrangement at 220 kV GSS Sakatpura reduce the no. of outage of 220 kV lines at Sakatpura under in emergent system conditions

Chapter 5: Load Flow Analysis

5.1 A system study on PSSE (load flow and contingency analysis) was done in the complex to review the effect of revised connectivity in the complex. Details of the study conducted is described below.

i. Load flow study and contingency analysis was performed for some emergent system conditions for following two scenarios:
   a. Scenario-A: Without additional connectivity (as per table-1) in KTPS & RAPP generation complex
   b. Scenario-B: With additional connectivity (as per table-1) in KTPS & RAPP generation complex

ii. Parameters considered for base case are as follows:
   a. Rajasthan Demand: 16000 MW
   b. Intra State Solar Power Generation in Rajasthan: 3662.30 MW (IC: 4946.50 MW) (74.03% of IC)
   c. Intra State Wind Power Generation in Rajasthan: 586.57 MW (IC: 4342.94 MW) (13.5% of IC)
   d. Thermal power generation in Rajasthan (excluding Auxiliary consumption): 5989.49 MW (9645.5 MW) (62.09% of IC)
   e. Hydro power generation in Rajasthan (excluding Auxiliary consumption): 68 MW (IC: 411 MW) (16% of IC) Inter State Solar Power Generation in Rajasthan: 10772.03 MW (IC: 17716.906 MW) (60.80% of IC)
   f. Tie line flows in Rajasthan Control area: 4598.9 MW
   g. Generation profile considered in the complex is as per below table:

S. No.	Name of Power PLant	Installed Capacity (MW)	Net Generation (Excluding aux. consumption) (MW)	% Generation	Remark
A	**Kota Thermal Power Station**				
1	Unit-1	110	99	90	-
2	Unit-2	110	99	90	-
3	Unit-3	210	189	90	-
4	Unit-4	210	189	90	-
5	Unit-5	210	189	90	-
6	Unit-6	195	176	90	-
7	Unit-7	195	176	90	-
	Total(A)	**1240**	**1117**	**90**	-
B	**Nuclear Power Stations**				
	RAPP-A				
	Unit-2	200	180	90	-
	RAPP-B				
	Unit-3	220	198	90	-
	Unit-4	220	198	90	-
	RAPP-C				
	Unit-5	220	198	90	-
	Unit-6	220	198	90	-
C	**Anta GAS THERMAL POWER STATION**				
i	Unit-1	88.71	RSD		
ii	Unit-2	88.71	RSD		
iii	Unit-3	88.71	RSD		
iv	Unit-4	153.2	RSD		
v	Anta GTPS Solar Generation	87.5	0 MW		

iii. Study result of different contingencies considered along with the observations for both the scenarios is described in below table:

S. No	Case / Contingency	Scenario	
1.	Base Case	A	i. Power flow from RAPP Complex to Sakatpura: 112 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 0 MW iii. Line loading profile: Loading of all the 220kV Line is within limit
		B	i. Power flow from RAPP Complex to Sakatpura: 108 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 0 MW iii. Line loading profile: Loading of all the 220kV lines is within limit
2.		A	i. Power flow from RAPP Complex to Sakatpura: 0 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 14 MW iii. Line loading profile: Overloading in following lines:

	Outage of 220 KV S/C Sakatpura-Anta GTPS line		a. 220kV S/C RAPP(C)-Anta GTPS line: 300 MW b. 220kV S/C KTPS-Heerapura line: 224 MW c. 220kV S/C KTPS-Bundi line: 239 MW
		B	i. Power flow from RAPP Complex to Sakatpura: 42 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 0 MW iii. Line loading profile: Loading of all the 220kV Line is within limit a. 220kV S/C RAPP(C)-Anta GTPS line: 186 MW b. 220kV S/C KTPS-Heerapura line: 134 MW c. 220kV S/C KTPS-Bundi line: 139 MW
3.	Outage of 220 kV S/C KTPS-Heerapura line	A	i. Power flow from RAPP Complex to Sakatpura: 72 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 0 MW iii. Line loading profile: Overloading in following lines: a. 220kV S/C RAPP(C)-Anta GTPS line: 214 MW b. 220kV S/C KTPS-Bundi line: 248 MW c. 220 KV S/C Sakatpura-Anta GTPS Line: 291 MW
		B	i. Power flow from RAPP Complex to Sakatpura: 72 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 0 MW iii. Line loading profile: Loading of all the 220kV Line is within limit a. 220kV S/C RAPP(C)-Anta GTPS line: 129 MW b. 220kV S/C KTPS-Bundi line: 176 MW c. 220 KV S/C Sakatpura-Anta GTPS Line: 166 MW
4.	Outage of 220 KV S/C KTPS-Beawar line	A	i. Power flow from RAPP Complex to Sakatpura: 92 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 0 MW iii. Line loading profile: Overloading in following lines: a. 220kV S/C KTPS-Bundi line: 247 MW b. 220 KV S/C Sakatpura-Anta GTPS Line: 259 MW

		B	i. Power flow from RAPP Complex to Sakatpura: 98 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 0 MW iv. Line loading profile: Loading of all the 220kV Line is within limit a. 220kV S/C KTPS-Bundi line: 183 MW b. 220 KV S/C Sakatpura-Anta GTPS Line: 159 MW
5.	Outage of all three circuits between Sakatpura-RAPP generation complex	A	i. Power flow from RAPP Complex to Sakatpura: 0 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 0 MW iii. Line loading profile: Overloading in following lines: a. 220 KV S/C Sakatpura-Anta GTPS Line: 286 MW
		B	i. Power flow from RAPP Complex to Sakatpura: 0 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 0 MW iii. Line loading profile: Loading of all the 220kV Line is within limit a. 220 KV S/C Sakatpura-Anta GTPS Line: 171 MW
6.	Outage of 220 kV S/C Sakatpura-Anta GTPS line and 220 kV S/C KTPS-Heerapura line	A	i. Power flow from RAPP Complex to Sakatpura: 0 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 114 MW iii. Line loading profile: Overloading in following lines: a. 220kV S/C RAPP(C)-Anta GTPS line: 399 MW b. 220kV S/C KTPS-Bundi line: 218 MW c. 220 KV S/C KTPS-Beawar line: 214 MW
		B	i. Power flow from RAPP Complex to Sakatpura: 12 MW ii. Reverse power flow (from Sakatpura to RAPP Complex): 0 MW iii. Line loading profile: Loading of all the 220kV Line is within limit a. 220kV S/C RAPP(C)-Anta GTPS line: 196 MW b. 220kV S/C KTPS-Bundi line: 183 MW c. 220 KV S/C KTPS-Beawar line: 88 MW

iv. There was concern that due to closing of 220kV KTPS-Kota(PG) D/C, there would be heavy power import from Kota(PG) to KTPS during some scenarios. This will create the hotspot related issues in KTPS switchyard. To review the same, RVPNL studied the different scenarios, and the observations are as follows:

a) Block wise Power flow on 220 kV KTPS-Kota(PG) D/C line during period of 21.5.2024 to 21.6.2024 (total 3072 blocks) were reviewed. Observation are as follows:

- It was observed that out of 3072 blocks, in 2330 blocks (76%), KTPS was exporting power to Kota(PG) and in 742 blocks (24%), there was power import at KTPS.
- Maximum loading on 220 kV KTPS-Kota(PG) D/C line during export from KTPS observed was 272 MW on 07.06.2024 at 19:30 hrs. and maximum loading during import at KTPS observed was 243 MW on 26.05.2024 at 10.45 hrs.
- Import at KTPS was observed either during outage of units at KTPS or during reduced generation operation.

b) RVPNL also conducted load flow and contingency analysis in the complex to study the effect on loading of 220 kV KTPS-Kota(PG) D/C line. Contingencies considered were outage of units and tripping of 220kV lines in the complex. Observation are as follows:

- Load flow during non solar hours: power export in the range of ~60 MW from KTPS to Kota(PG) is observed.
- Load flow during maximum solar generation and peak demand condition: power import in the range of ~170 MW at KTPS from Kota(PG) is observed.
- Contingency analysis during non solar hours: under outage of one unit at KTPS, power import at KTPS was ~42MW, under outage of two units at KTPS, power import at KTPS was ~146MW and under outage of 220kV lines in the complex, there was export from KTPS.

Load flow and contingency analysis report performed by RVPNL in the complex is attached as **Annexure-IV.**

Chapter 6: Impact during Grid Event in the complex after revision in Network

A multiple elements tripping event occurred on 21.06.2024 during which multiple 220kV lines tripped on fault during inclement weather condition. However, loading of the remaining adjacent 220kV lines remained within limit and no cascade tripping occurred. The recent changes done in the RAPS, KTPS generation complex provided alternate paths for the power evacuation which helped in avoiding overloading of remaining 220kV lines. The load profile of the complex during antecedent condition of the event and post event is shown below in Fig 32.

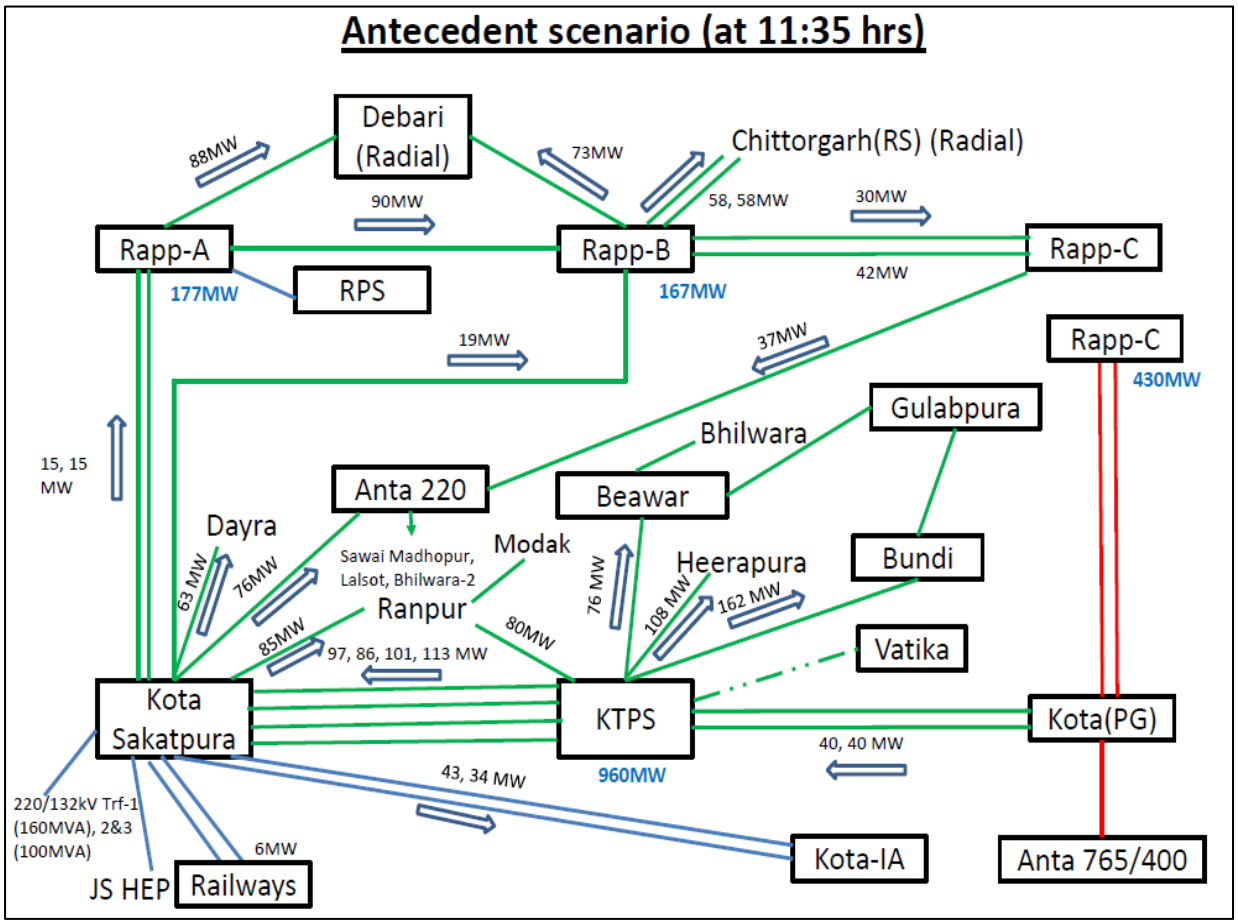


Fig. 32: load profile of the complex during antecedent condition

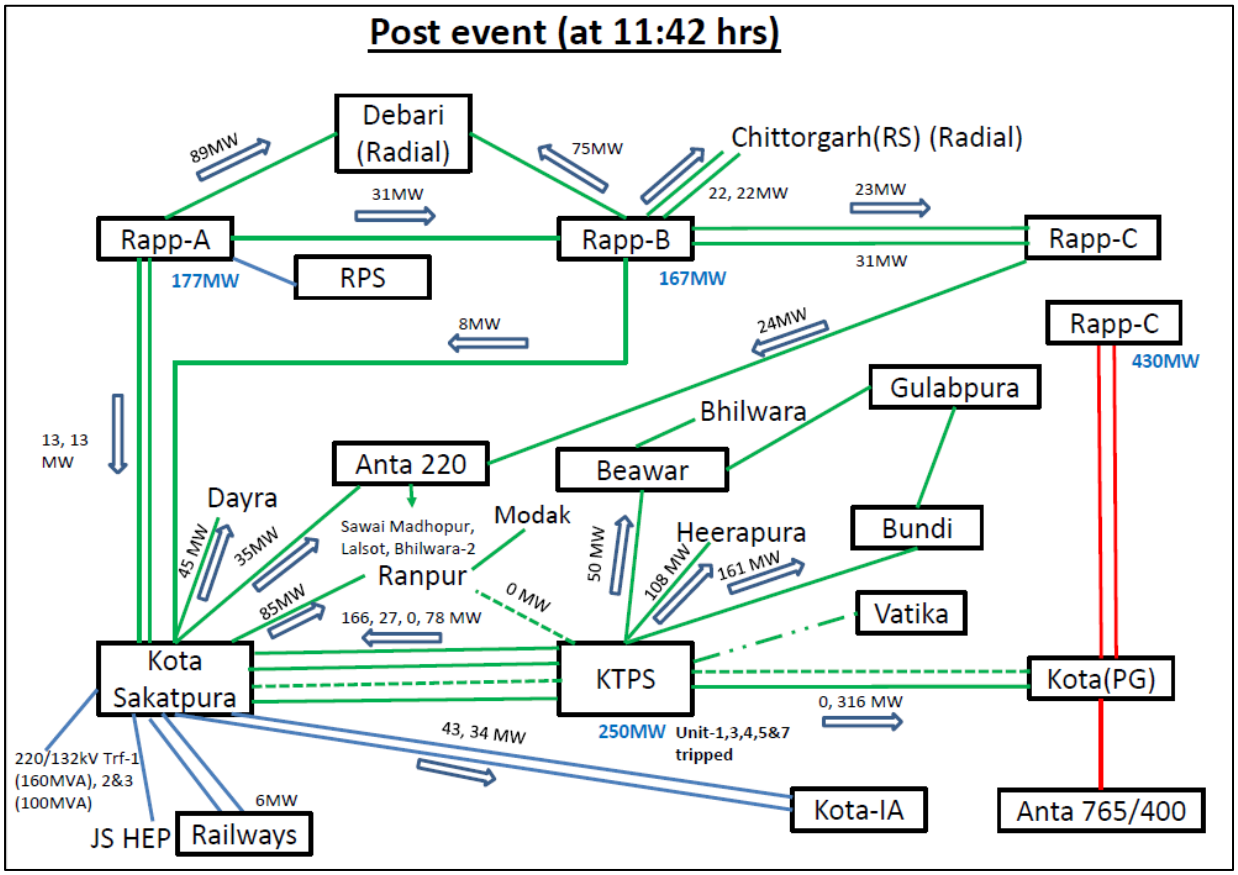


Fig. 33: loading of lines

From the above fig 33, it is evident that loading of the remaining 220kV lines increased however, it was in safe limit. After recent changes in the network, most of the radial loads were connected in grid mode. The changes in the network provided alternate paths for power evacuation i.e., loading of 220kV KTPS-Kota(PG) D/C changed from 80 MW towards KTPS to 316 MW towards Kota(PG). This ensured that loading of tie lines at RAPS remained in safe limit and no major grid event occurred. It shows that recent changes in the network are ensuring the reliability and security of the RAPS, KTPS complex.

Chapter 7: Review of Islanding Scheme in RAPS complex

It is observed that actual connectivity and load operation in the RAPS complex differs significantly from the approved islanding scheme.

During the 2nd event (on 29.03.2024), the island scheme of RAPS operated when frequency in the complex touched 47.8Hz during the disturbance. Island operated for ~15 minutes and in islanded mode of operation, RAPP-A generator remained connected to radial load (165 MW) through RAPP-A and RAPP-B tie line with 4 no. of transmission lines (RAPP-A Debari, RAPP-B Debari, RAPP-B chhitorgarth-1 and 2).

The reason for island collapse was tripping of TG on over fluxing protection. During investigation, it was found that the instantaneous contact of over fluxing relay of (GTT21) was wired in trip lockout circuit instead of time delay contact.

To ensure the successful operation of the islanding scheme, actual connectivity and load profile should match the approved islanding scheme approximately.

Committee in coordination with RVPNL reviewed the previous islanding scheme, analysed the present scenario and the following changes have been proposed:

i. 220kV Chittorgarh has already been connected to the grid. Further, it is proposed to connect the other load stations which are further connected in remote end of Chittorgarh to ensure the availability of sufficient load during any grid event.
ii. Load profile has been reviewed comprehensively. Peak and off-peak hours load profile, average and maximum demand value of 1st seven days of each quarter has been analysed. Average and maximum demand of peak hours are considered to reach the nearest possible load quantum during the island operation.
iii. It is also observed that actual average and maximum demand value was significantly different from what was approved in previous island scheme.
iv. There are many industrial load feeder at load stations which are having their own generation. RVPNL has informed that these industries generally draw the power from their own generation but in case of tripping of their own generation, they start drawing power from grid. Due to inadvertent nature of load demand at these industry feeders, such feeders are proposed to be kept out of island. Other industries with load of constant demand nature are included in the load.
v. RVPNL shall ensure that operative / blocked status of load feeders will be monitored and set as per the planned network condition. This is to ensure generation load balance during island formation.
vi. The brief details of RAPS islanding scheme are as follows:
    e. Island subsystem: Generating units at RAPS A & B and loads of 220kV Debari, Chittorgarh, Sawa, Nimbahera and Hamirgarh.
    f. Island Generation: 640 MW (RAPS A Unit-1: 200 MW, RAPS B Unit 1 & 2: 220 MW each).
    g. Island Load: 577 MW (Load of load stations: 507 MW, Auxiliary load of RAPS-A & B:70 MW (RAPS C auxiliary load excluded)
    h. Island setting: Triggering frequency 48.0 Hz.

Complete details of proposed RAPS islanding scheme in attached as **Annexure**-**V.**

Chapter 8: Committee Recommendations

i. Strong connectivity in the complex:

a) The number of changes in the connectivity in the complex have strengthened the complex. Radial paths have been minimised, and alternate evacuation paths have been made. With the changes in the complex, reliability of the complex has been improved. However, it needs to be ensured that any future changes in the connectivity in the complex should be done after load flow and contingency analysis in the complex.

b) The changes affecting the reliability in the complex should be avoided or to be done after comprehensive discussion among concern stakeholders. SLDC-Rajasthan shall also ensure the proper load management in the complex as per network condition to avoid any cascade tripping.

c) Further, proactive Intrastate Transmission planning for creating transmission adequacy in the complex is needed.

ii. Healthiness of protection system:

a) Protection system and their proper coordination need to be ensured. It is also to be ensured that protection system and their settings are kept in line with the standards and protection philosophy. Any changes in the protection philosophy should only be done after prior approval from NRPC.

b) Necessary preventive and corrective measures need to be taken by RVPNL to minimise the frequent tripping of 220kV lines evacuation from RAPS.

c) As mandated by IEGC, conducting Annual Self Protection Audit and Third-Party Protection Audit also need to be ensured.

iii. Healthiness of SCADA data and telemetry:

a) Telemetry of SCADA data and its healthiness is necessary for decision making during real time grid operation. Non availability of complete SCADA data and issue of wrong / unhealthy data have been observed due to unhealthy RTUs at site. Concerned may take expeditious actions to make all the RTUs in the complex healthy and ensure availability and healthiness of SCADA data of the complex.

b) Further, it is also observed that there is no PMU at RAPS A, B and Rajasthan stations in the complex. Nearest PMU is at Kota(PG) at 400kV level. As this complex is critical and frequent events have also been observed in this complex. Therefore, RAPS and Rajasthan may plan for Installation of PMU at 220kV level in the complex so that high resolution data of the complex may be captured which will be useful in monitoring and event analysis.

iv. Healthiness of ATS, protection & control system at RAPS:

a) The changes done in the ATS i.e., relay software upgradation, ATS logic review etc. will enhance the chances of successful ATS operation. However, the

upgradation in ATS is pending in Unit-6 at RAPS C. Expeditious implementation of necessary changes in ATS in Unit-6 at RAPPS C need to be ensured.

b) Necessary system for alarms / control panel annunciation to alert the control room operators at RAPS regarding any deficiency in control system or auxiliary system may also be explored. It will help in better decision making by control room operators at RAPS. Further, periodic review of ATS also need to be done.

v. Island subsystem and its operation:

a) Load generation balance in RAPS island scheme has been reviewed comprehensively. Necessary changes in network configuration and load profile of island scheme have been done to ensure the feasibility of island subsystem. Further, SLDC-Rajasthan shall ensure that the load generation balance in island subsystem (feasible G/L) is maintained all the time.

b) SCADA display of RAPS island subsystem along with telemetry of all the involved substations need to be ensured. RAPS may also explore the possibility to have the island subsystem network, data telemetry at their control room.

c) Island system and its operational logic also need to be reviewed on periodic basis.

---x---

Annexure-I

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

दिनांक: 06/06/2024

सेवा में,
As per attached list (via e-mail)

विषय:- Constitution of committee to review the protection system and load management in the KTPS, RAPS generation complex-reg.

Reference is invited to discussion held in the 50th PSC meeting (held on 29.04.2024) to review the protection system and load management in the KTPS, RAPS generation complex, wherein, it was decided that a committee may be formed having members from NRPC Secretariat, NRLDC, NLDC, POWERGRID, NPCIL, RVUNL (KTPS) and RVPN.

Based on received nominations, committee is formed having members as below-

1. Sh. Reeturaj Pandey, EE (Protection), NRPC Secretariat
2. Sh. D.K. Jain, SE (Protection Engg.), RVPN
3. Sh. M. P. Sharma, XEN (SOLD), Rajasthan SLDC
4. Sh. Harsh Singh, Superintending Engineer, RVUNL
5. Sh. Raman Jain, Executive Engineer, RVUNL
6. Smt. Jyoti Thakur, DGM, NPCIL
7. Sh. Manas R Chand, DGM, NLDC
8. Sh. Pankaj Pachoori, DGM, POWERGRID
9. Sh. Deepak Kumar, Dy. Mgr., NRLDC

The committee shall comprehensively review the protection system (including power swing blocking settings), load management, islanding scheme, SPS requirement, Auto Transfer Scheme at RAPS, and other related aspects in the RAPS, KTPS complex.

First meeting of the committee has been scheduled on **10.06.2024 (11:00 Hrs.)** via video conferencing. Meeting link shall be shared separately.

Kindly make it convenient to attend the meeting.

Signed by Dharmendra Kumar Meena
Date: 07-06-2024 10:22:40

डी. के. मीणा
अधीक्षण अभियंता (संरक्षण)

List of addressee:

1. Sh. Reeturaj Pandey, EE (Protection), NRPC Secretariat (pandeyr.cea@gov.in)
2. Sh. D.K. Jain, SE (protection Engg.), RVPN (se.prot.engg@rvpn.co.in)
3. Sh. M. P. Sharma, XEN (SOLD), Rajasthan SLDC (se.sold@rvpn.co.in)
4. Sh. Harsh Singh, Superintending Engineer, RVUNL (segmktps@gmail.com)
5. Sh. Raman Jain, Executive Engineer, RVUNL (raman_49559@rvun.in)
6. Smt. Jyoti Thakur, DGM, NPCIL (jyotidahiya@npcil.co.in)
7. Sh. Manas R Chand DGM, NLDC (manas@grid-india.in)
8. Sh. Pankaj Pachoori, DGM, POWERGRID (pankaj.pachoori@powergrid.in)
9. Sh. Deepak Kumar, Dy. Mgr., NRLDC (deepak.kr@grid-india.in)

TCR response.

A.19.7 POWERGRID representative stated that they will take up with the GE whether such feature can be enabled in Active Power Control mode. It was also informed that some modification in TCR software has been done which will try to damp out the oscillations. Regarding installation of PMU for TCR, POWERGRID stated that they will plan to install the PMU for TCR at Kurukshetra.

Decision taken by Forum:

Forum requested POWERGRID to take effective remedial actions to avoid tripping of 800kV HVDC Champa-Kurukshetra inter-regional link which is very important link for fulfilling the Northern Region demand requirement.

A.20. Review of protection system and load management in KTPS, RAPS generation complex in view of event of complete outage of the complex on 5th Jan24 & 29th Mar24 (agenda by NRLDC)

A.20.1 NRLDC representative apprised that on 29th March at 20:22hrs, multiple elements tripping occurred in RAPS, KTPS generation complex. KTPS, RAPS-A, RAPS-B & RAPS-C generation station got blackout during this incident. Initiating incident was blast of R-ph CT at 220kV side of 220/132kV 160MVA ICT-1 at Kota Sakatpura (Raj). As bus bar protection is not available at Kota Sakatpura S/s, few of the 220kV lines tripped on Z-4 protection operation and Z-2 protection operation at Kota Sakatpura & KTPS respectively. Simultaneously, the remaining 220kV lines got significantly overloaded and tripped on distance protection operation during power swing. Thereafter due to lack of evacuation path, over frequency occurred in systems and KTPS units tripped on over frequency. SUTs at RAPS-B tripped for initiation of house load operation but it failed. SUTs of RAPS-C also tripped for switching of auxiliary supply to UTs but it also failed due to mismatch in frequency. It resulted in the tripping of RAPS-B & C units. Island formed with RAPS-A unit with the load of Debari and Chittorgarh which operated till 20:47hrs and later collapsed due to tripping of turbine generator on over fluxing. Detail analysis report of the tripping event is available on the link https://nrldc.in/Websitedata/Docs/Documents/Tripping%20Report/Preminilary%20Report/2024/03%20Mar/2024_03_29_KTPS_RAPS_%20Grid%20event.pdf

A.20.2 He added that similar events of blackout in KTSP, RAPS generation complex occurred on 05th Jaunuary'24. Frequent disturbance in this complex having significant quantum of nuclear generation is serious issue. Necessary remedial actions at RAPS, KTPS and RVPN end need to be expedited to avoid any such event in future. Detail analysis report of the tripping event is available on the link https://nrldc.in/Websitedata/Docs/Documents/Tripping%20Report/Preminilary%20Report/2024/01%20Jan/2024_01_05_Grid%20event%20at%20%20KTPS_RAPS_Rajasthan.pdf

A.20.3 Deliberation on 05th January'24 event was done during 216 OCC meeting. KTPS, RAPS & Rajasthan are requested to take necessary remedial actions to take necessary remedial actions share the details of remedial actions taken as agreed during discussion in 216 OCC meeting. Further, an online meeting was conducted on 05th April 2024, RAPS, KTPS & SLDC-Rajasthan agreed to take following remedial actions:

RAPS:

i. Over flux protection in generator at RAPS-A was 112.5% instantaneously. Now, the time delay has been kept as 4sec on recommendation of NPCIL design team.

ii. During the event, when frequency reached 51.5Hz, SUT of unit-4 at RAPS-B tripped and ATS breaker closed successfully. However, it got blocked as there is tie breaker connected to auxiliary bus feeding unit-3 auxiliary supply.

On recommendation of design team, a logic has been implemented in which tie breaker will also trip along with SUT incomer breaker so that ATS scheme will not get blocked. Further review of ATS logic at RAPS-B is being done by NPCIL design team.

iii. SUT-5&6 tripped on over frequency (51.5Hz with 200msec delay) and initiated the ATS to shift the total auxiliary load on UTs. However, due to mismatch in frequency at both the side of auxiliary bus, ATS failed and units at RAPS-C tripped. Review of ATS logic at RAPS-C is being done by NPCIL design team.

iv. RAPS-C will explore the possibility of keeping total auxiliary load at 400kV side.

v. RAPS will take necessary remedial actions to ensure the healthiness and availability of SCADA data.

Rajasthan:

i. Commissioning of bus bar protection at 220/132kV Kota Sakatpura S/s will be expedited. (Rajasthan informed that material has been arrived, commission is getting delayed to workmanship. It will be commissioned in 2.5-3 months).

ii. 220kV KTPS-Kota (PG) D/C will be kept in closed condition. Rajasthan will prepare a SOP for monitoring of import/export through these lines for any decision making required.

iii. Rajasthan will connect the 220kV Chittorgarh with the 400/220kV Chittorgarh. It will strengthen the connectivity of RAPS with the grid. The possibility to operate 220kV Debari in ring may also be explored. (During 219th OCC meeting, Rajasthan informed that 220kV Chittorgarh has been connected with 400/220kV Chittorgarh on 17th April).

iv. Separate display of RAPS, KTPS generation complex to be made at SLDC control room for effective decision monitoring and decision making. (During 219 OCC meeting, Rajasthan informed that separate display of RAPS, KTPS complex has been made and effective monitoring is being done.).

v. Faulty RTUs also need to be rectified at the earliest to ensure the healthiness and availability of SCADA data.

vi. Rajasthan will further explore the possible load management in this complex to avoid high overloading of 220kV lines.

A.20.4 NRLDC representative stated that in view of aforementioned grid disturbances in this complex, wherein all the reactors at RAPS-A, B & C tripped and went under poison out state, review of protection system and load management in the KTPS, RAPS generation complex (KTPS, RAPS-A, B & C and 220/132kV Kota Sakatpura) needs to be done. Implementation of suitable SPS in KTPS evacuation lines may be explored to address the high loading issue during contingencies in this complex. A separate committee may be formed at RPC forum to review the protection system and load management in the KTPS, RAPS generation complex and to recommend necessary remedial actions to avoid such major grid disturbance in this complex in future.

A.20.5 NPCIL representative stated that on outage of 220kV KTPS-Kota (PG) lines, power flow in 220kV lines from Kota Sakatpura to RAPS-A & B get reversed (towards RAPS) which leads to overloading of 220kV lines at RAPS. Necessary protection scheme may be implemented on the basis of power flow in these lines towards RAPS to actuate the ATS at RAPS-B & C before creation of over frequency scenario in this

complex. As RAPS Unit-7 would also probably commission by end of this year and RAPS Unit-8 during next year, strengthening of protection system in this complex is very much necessary. In addition, island scheme implemented in this complex also need to be reviewed.

A.20.6 RVPNL representative informed that there was O/C E/F protection implemented on bus sectionalizer of Bus-A&B with reduced operating time to isolate the bus during bus fault as bus bar protection is not there. However, it was leading to loss of evacuation path for generation. Now, tripping of bus sectionalizer on O/C E/F has been disabled. Implementation of bus bar protection is in process, same will be expedite.

Decision taken by Forum:

Forum decided to constitute a dedicated committee having members from NRPC, NLDC, NRLDC, NPCIL, RVUN (KTPS), RVPN and POWERGRID. The committee shall comprehensively review the protection system, load management, islanding scheme, SPS requirement, Auto Transfer Scheme at RAPS and other related aspects in the RAPS, KTPS complex. Committee shall visit the sites and submit the detailed report along with their findings/observations.

A.21. Grid disturbance in 220kV Kunihar, Baddi complex during Feb'24 (agenda by NRLDC)

A.21.1 NRLDC representative apprised that frequent event of multiple elements trippings have been reported in recent past (on 02nd Feb, 08th Feb and 16th Feb) in HP control area. Major affected substations were 220kV Kunihar, Baddi and Bhabha. Significant quantum of load in the range of 400-700MW affected during these grid events. Brief of events are attached as **Annexure- XXVIII**.

A.21.2 During Aug-Sept 2023 also, Grid events at Kunihar area were reported. Those events were discussed in 48th PSC meeting and PSC forum had recommended third party protection audit of Kunihar S/s. However, no update on the same have received and multiple events in recent past indicates that issues related to protection system and their coordination at these affected stations are still existing.

A.21.3 DR/EL and detail analysis of any of these events have not received from HP. Therefore, HP is requested to analyse the tripping events in detail and share following details w.r.t. all three grid events occurred in Feb'24:

II. RAPS-A/B islanding scheme

RAJASTHAN RAJYA VIDYUT PRASARAN NIGAM LIMITED.
[Corporate Identity Number (CIN):U40109RJ2000SGC016485]
(Regd. Office: Vidyut Bhawan, Jan Path, Jyoti Nagar, Jaipur - 302 005)
OFFICE OF THE SUPERINTENDING ENGINEER (PROJECT & PLANNING)
✆ +91-141-2740623,Fax:+91-141-2740794;
e-mail: se.pp@rvpn.co.in; website:www.rvpn.co.in

RVPN
An ISO 9001:2000 Certified Company

No. RVPN/SE(P&P)/XEN-2(P&P)/AE-2/ F. /D 846 Jaipur, Dt. 19/2022

Member Secretary
Northern Regional Power Committee,
18-A, Shaheed Jeet Singh Marg, Katwaria Sarai,
New Delhi-110016

Sub: Updated Revised Islanding Schemes for the Rajasthan Atomic Power Station (RAPS-A & B) units.

Ref: 1. Email of NRPC dated 29.07.2021 addressed to the SE(SO&LD), RVPN, Jaipur and communicated to this office vide letter no. 623 dated 10.08.2021.
2. No. RVPN/SE(P&P)/XEN-2(P&P)/AE-2/D. 490 dated 06.06.2022

Dear Sir,

In reference to the above captioned subject and email dated 29.07.2021, revised Islanding Schemes for the Rajasthan Atomic Power Station (RAPS-A & B) units for consideration and approval was submitted to your office vide above referred letter dated 06.06.2022. This islanding scheme is updated after incorporating the suggestion and inputs received in the meeting held on dated 06.07.2022. Please find attached the updated revised Islanding Schemes for the Rajasthan Atomic Power Station (RAPS-A & B) units for consideration and approval.

Encl: as above

Your's faithfully,

(K. K. Meena)
Additional Chief Engineer (PP&D)

Copy to the following for information and necessary action please:-

1. The General Manager, NRLDC, 18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016.
2. The Chief Engineer (LD/MPT&S), RVPN, Heerapura/Jaipur.
3. The Plant Head, Rajasthan Atomic Power Station (RAPS-A & B), Rawatbhata, Chittorgarh, Rajasthan.
4. The Superintending Engineer (Communication-Corporate Office/Automation) , RVPN, Heerapura/Jaipur.
5. The Superintenting Engineer (Opration), Northern Regional Power Committee, 18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016.

Encl: as above

Additional Chief Engineer (PP&D)

REVISED ISLANDING SCHEME FOR RAPS-A&B

A. Objective: The Existing Islanding Scheme for RAPS-A&B was planned in 2013 but due to change in configuration of transmission lines and loads of the GSS, it is proposed to review and also revise the Islanding scheme for RAPS-A&B power plants.

B. Generation Details

a. RAPS-A

- The total generation of Unit-II is around 200 MW.
- Auxiliary load plus load of Heavy Water Plant is 30 MW.
- Net generation of unit-II is 170 MW.

b. RAPS-B

- The generation of Unit-III and Unit-IV is each around 220 MW. The total generation is around 440 MW if both units are running.
- Auxiliary load is 20 MW per unit, i.e. total 40 MW for both units of RAPS-B. Auxiliary consumption of 40 MW of the RAPS-C units is also fed from the RAPS-B units. Hence, total auxiliary consumption of RAPS-B & C is 80 MW.
- Net generation is 400 MW if both units of RAPS-B unit are running. Auxiliary load of RAPS-C (40 MW) is considered as load for RAPS-B units.

c. Auxiliary Load of RAPS-B, C & D

- Total auxiliary load includes the auxiliary load of both the units of RAPS-B + auxiliary load of the units of RAPS-C & RAPP-D (in future).
- Total auxiliary load will consists of 40 MW (RAPS-B both units) + 40 MW (RAPS-C) + 140 MW (RAPP-D in near future by 2025). This auxiliary consumption does not include auxiliary consumption of RAPS-A (40 MW).
- RAPP-D auxiliary consumption is higher because its each generating unit capacity is 700 MW.
- Total auxiliary consumption of RAPS-B & C for current scenario is 80 MW.
- Total auxiliary consumption of RAPS-A, B & C and heavy water plant for current scenario is 110 MW
- Total auxiliary consumption of RAPS-B, C & D for the scenario of 2025 will be 220 MW. Further, total auxiliary consumption of RAPS-A, B, C & D for the scenario of 2025 will be 250 MW.

C. Transmission System at RAPP-A&B

- 220 kV S/C RAPS-A - RAPS-B Line (3.00 km)
- 220 kV S/C RAPS-A - 220 kV GSS Debari line (192.70 km)

- 220 kV S/C RAPS-A - 220 kV GSS Kota (Sakatpura) Ckt-I (42.50 km)
- 220 kV S/C RAPS-A - 220 kV GSS Kota (Sakatpura) Ckt-II (42.50 km)
- 220 kV S/C RAPS-B - 220 kV GSS Debari line (198.00 km)
- 220 kV S/C RAPS-B - 220 kV GSS Chittorgargh line Ckt-I (95.00 km)
- 220 kV S/C RAPS-B - 220 kV GSS Chittorgargh line Ckt-II (95.00 km)
- 220 kV S/C RAPS-B - 220 kV GSS Kota (Sakatpura) Line (41.00 km)
- 220 kV S/C RAPS-B – RAPP-C Tie Line-I (2.00 km)
- 220 kV S/C RAPS-B – RAPP-C Tie Line-II (1.80 km)
- 220 kV S/C RAPS-C – Anta (80 km)
- 220 kV Switchyard for RAPS-C generators and RAPS-D generators is common.

D. Load Details

The identified load for island of RAPS-A&B is 508.94 MW which is placed at **Annexure-A.** Additional **40 MW load** on 220 kV bus of RAPS-C&D is also considered to represent the auxiliary load of RAPS-C. Additional load of **229.35 MW** is also identified which can be considered for lean load period. There are heavy seasonal variations of load in the region. Similarly, day and night load variations are also high in the region. Hence, islanding scheme is planned considering some of the transmission lines with both operative/blocked modes so that SLDC, Rajasthan can monitor and decide upon mode of the lines so as to match the load with generation in the island. Further, additional lines with blocked/operative status are also identified which helps to manage the load-generation during the lean load period.

E. Proposed Islanding Scheme

1. Islanding shall take place at 48.0 Hz without time delay.
2. Islanding is designed for the current scenario for load of 508.94 MW (including system losses) and additional 40MW auxiliary load of RAPS-C when all three units of RAPS-A&B are running. Further, if generation is low then load generation balance may be maintained by changing the blocked/operative status of the identified transmission lines depending on the available generation.
3. All the transmission lines with operative status may be operated at 48.0 Hz instantaneous to form Island.
4. Tie lines between RAPS-A & RAPS-B and RAPS-B & RAPS-C will be kept blocked during island formation.
5. If load in the network of island is very high and frequency is going further down then at RAPS-B unit-3 & unit-4 will come to house load at (47.5Hz + 5sec)* or 47.2 Hz instantaneous. Similarly, at RAPS-A, unit-2 will come to house load at 47.5 Hz+10 sec or 47.1 Hz instantaneous. If load is not managed as per requirement of RAPS units within 10

minute to 20 minute time period after taking the units on house load then RAPS units will be switched off.

6. If load in the network of island is very low and frequency is increasing after island formation then one or more units will be taken on house load at (51.5 Hz + 0.5 sec.)*. If load is not managed as per requirement of RAPS units within 10 minute to 20 minute time period after taking the units on house load then RAPS units will be switched off.
7. Blocked and operative status of all transmission lines of 220 kV and 132 kV voltage levels considered for the islanding are placed at **Annexure-B**. During the condition of light loads, the load-generation balance is to be maintained by changing the blocked/operative status of the additional lines which have also been identified to include additional GSS in the island.
8. A single line diagram of 400 kV network, 220 kV & 132 kV network is at **Annexure-C.**

* This is based on the reference document of RAPS for "Operating procedure for infrequent Event" indicating unit operation under high/low grid frequency (Copy enclosed for reference at **Annexure-D**).

F. Results of Load Flow Study

A load flow study is carried out considering the blocked and operative status of line included in **Annexure-B** as per SLD diagram indicated in **Annexure-C** for a total load of **508.94 MW** and considering **40 MW load** on 220 kV bus RAPS-C to represent the auxiliary load of RAPS-C. Including auxiliary load of RAPS-C, total load is **548.94 MW**. Power flow plot of the network included in the island is placed at **Exhibit-1**. The results of load flow study indicate the following load-generation balance:-

Generation	=	574.0786 MW
Load	=	546.84085 MW
Losses	=	27.2378 MW

It is observed that loading on all the lines and transformers included in the island of RAPS-A&B is normal and overloading is not observed.

G. Conclusion

Proposed islanding scheme is designed after detailed discussion with the field officers and officers from the MPT&S, Communications, Automations, LD and representative of RAPS-A&B plant. Based on the feedback/inputs of Officers and results of load flow studies, it is concluded that:

- Results of load flow study indicate that load generation balance can be maintained in the network considered for the island of RAPS-A & B.

- All the transmission lines included in the island will be equipped with under frequency relays (UFRs) and additional transmission lines are considered for the island to manage the load generation balance for different load scenario considering the large seasonal variations of load in the region.
- Proposed islanding scheme can be practically implemented on the transmission network of RVPN for the current scenario for load of **508.94 MW** (including system losses) when all three units of RAPS-A&B are running. However, continuous monitoring of load-generation balance is required and action to change status of UFRs from blocked to operative and vice-versa will be needed for load-generation balance during the event of change in generation and load.
- Islanding scheme is designed considering total auxiliary load of 110 MW which consists of 20 MW (Unit-II of RAPS-A) + 10 MW (Heavy water plant) + 40 MW (RAPS-B both units) + 40 MW (RAPS-C).
- Islanding scheme needs to be reviewed after commissioning of RAPP-D with auxiliary load of 140 MW (RAPP-D is expected to be commissioned in near future by 2025).

Annexure-A

Load on GSS considered in Islanding Scheme for RAPP-A&B

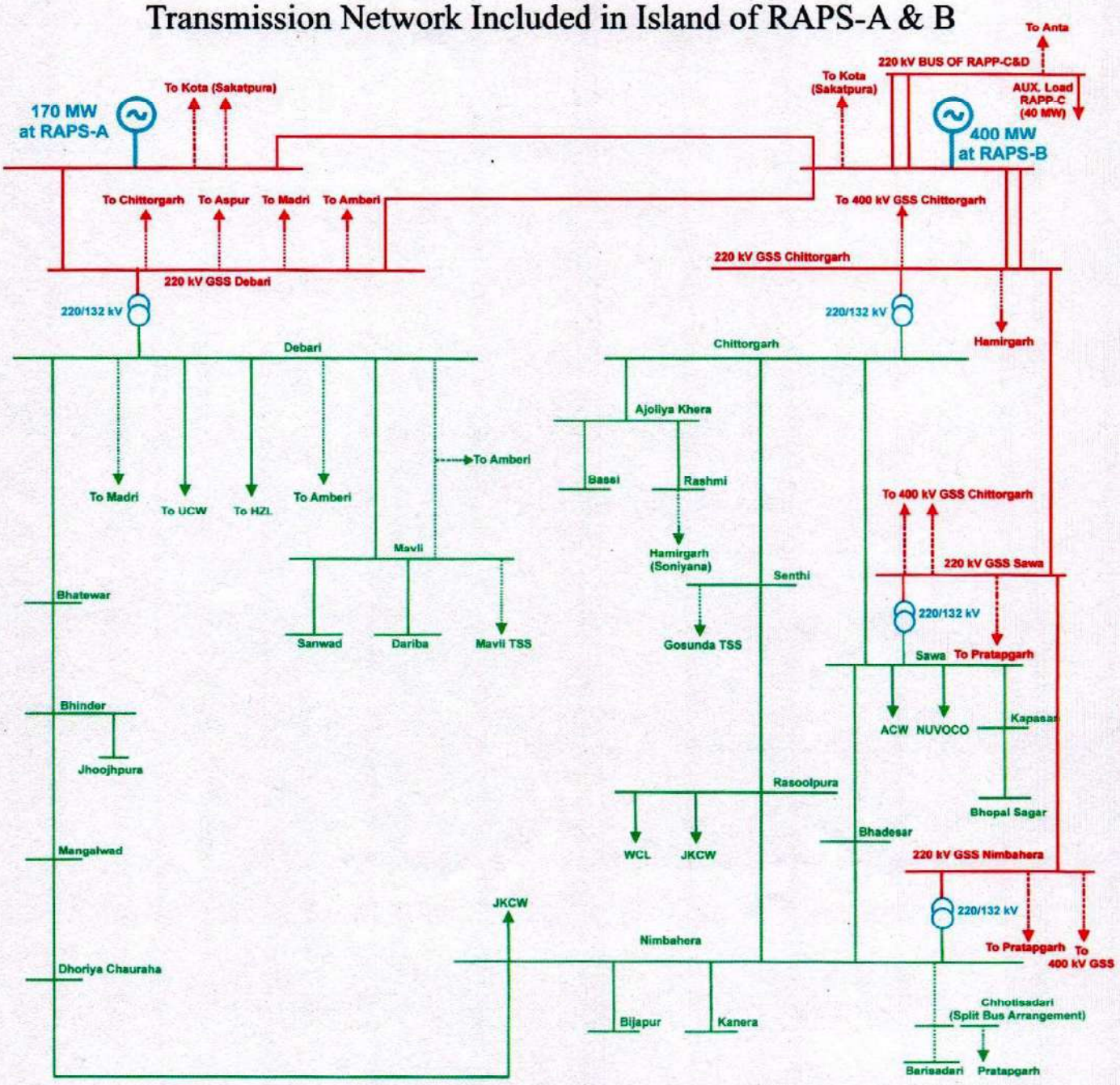
S. No.	Name of GSS	Maximum Load (MW)	Average Load (MW)
A	Gourp-A for 370 MW		
A.1	Load at 220 kV GSS Debari		
1	220 KV GSS Debari	26	16
2	132 KV GSS Mavli	26.28	12
3	132 KV GSS Sanwad	21.85	13
4	132 KV GSS Dariba	24.43	15
5	132 KV Hindustan Zinc Limited (Industry)	41	24.7
6	132 KV GSS Bhatewar	39.31	24.1
7	132 KV GSS Bhinder	23.09	14.37
8	132 KV GSS Jhojhpura	19.52	12.1
9	132 KV GSS UCW (Industry)	11	6.57
	Total (A.1)	**232.48**	**137.84**
A.2	Load at 220 kV GSS Chittorgarh		
10	220 KV GSS Chittorgarh	52	32
11	132 kV GSS Ajoliya Khera	38.35	24.41
12	132 kV GSS Rashmi	34.78	21.31
13	132 KV GSS Bassi	33.63	21.87
14	132 KV GSS Senthi	37.96	14
	Total (A.2)	**196.72**	**113.59**
A.3	Load at 220 kV GSS Sawa		
15	220 kV GSS Sawa	27	17
16	132 kV ACW at Sawa	16	10
17	132 kV NUVOCO at Sawa	21.5	13
18	132 kV GSS Kapasan	43.44	27.29
19	132 kV GSS Bhopal Sagar	14.88	9.09
20	132 kV GSS Bhadesar	37.19	23.32
	Total (A.3)	**160.01**	**99.7**
	Total (A)	**589.210**	**351.13**
B	Group-B		
B.1	Load at 220 kV GSS Nimbahera		
21	220 kV GSS Nimbahera	52.704	31.52
22	132 kV GSS Rasoolpura	15.55	10.22
23	132 kV WCL at Rasoolpura	45.52	28
24	132 kV JKCW at Rasoolpura	29.52	18.2
25	132 kV GSS Kanera	13.75	7.42
26	132 kV JKCW at Nimbahera	25.588	16.078
27	132 kV GSS Bijapur	15.55	10.52
28	132 kV GSS Mangalwad	39.73	24.25
29	132 kV GSS Dhoriya Choraha	19.29	11.6
	Total (B.1)	**313.982**	**157.808**
	Total (B)	**313.982**	**157.808**
	Total load (A+B)	**936.612**	**508.94**
C	Auxiliary load of RAPS-C	40.00	40.00
	Total load (A+B+C)	**976.61**	**548.94**
D	**Additional Load**		
30	132 kV GSS Barisadari	56.78	45.82
31	220 kV GSS Hamirgarh	85.02	71.74
32	132 kV line of RSWM Industries at 132 kV GSS Hamirgarh	6.65	6.41
33	132 kV GSS RIICO Growth Centre	22.78	14.37
34	132 kV line of Nitin Industries at 132 kV GSS Hamirgarh	22.49	16.58
35	132 kV GSS Chhotisadari	40.8	33.43
36	Gogunda TSS (connected to 132 kV GSS Senthi)	16	16
37	Mavli TSS (connected to 132 kV GSS Mavli	25	25
	Total C	**275.52**	**229.35**
	Total load (A+B+C)	**1252.13**	**778.29**

Annexure-B

	Transmission Lines and Status of Under Frequency Relays for RAPP-A&B Island	
S. No.	**Name of Line**	**Status**
A.	**Transmision Lines at RAPP-A**	
1	220 kV S/C RAPS-A-Kota (Sakatpura)Line Ckt-I	Operative
2	220 kV S/C RAPS-A-Kota (Sakatpura)Line Ckt-II	Operative
3	132 kV S/C RAPS-A to RAPS-B Line	Blocked
4	220 kV S/C Debari-RAPS-A Line	Blocked
B.	**Transmision Lines at RAPP-B**	
5	220 kV S/C RAPS-B-Kota (Sakatpura)Line Ckt-III	Operative
6	220 kV S/C RAPS-B-RAPS-C Tie line Ckt-I	Blocked
7	220 kV S/C RAPS-B-RAPS-C Tie line Ckt-II	Blocked
8	220 kV S/C RAPS-C-Anta line	Operative
9	220 kV S/C Chittorgarh (220 kV GSS)-RAPS-B line Ckt-I	Blocked
10	220 kV S/C Chittorgarh (220 kV GSS)-RAPS-B line Ckt-II	Blocked
11	220 kV S/C Debari-RAPS-B Line	Blocked
C.	**Transmision Lines at 220 kV GSS Debari**	
12	220 kV S/C Debari-Chittorgarh (400 kV GSS) Line	Operative
13	132 kV S/C Debari-Mavli Ckt-I Line	Blocked
14	132 kV S/C Debari-Nathdwara line with T-off at Mavli	Operative
15	132 kV S/C Debari-Bhatewar Line	Blocked
16	132 kV S/C Debari-Madri Line	Operative
17	132 kV S/C Debari-Amberi Line	Operative
18	132 kV S/C Debari-UCW Line	Blocked
19	132 kV S/C Debari-HZL Line	Blocked
20	132 kV S/C Mavli-Sanwad Line	Blocked
21	132 kV S/C Mavli-Dariba Line	Blocked
22	132 kV S/C Mavli-TSS Line	Operative
23	132 kV S/C Bhatewar-Bhinder Line	Blocked
24	132 kV S/C Bhinder-Jhoojhpura Line	Blocked
D.	**Transmision Lines at 220 kV GSS Chittorgrah**	
25	220 kV S/C Chittorgarh (220 kV GSS)-Hamirgarh line	Operative
26	220 kV S/C Chittorgarh (220 kV GSS)-Sawa line	Blocked
27	220 kV S/C Chittorgarh (440 kV GSS)-Chittorgarh (220 kV GSS) line	Operative
28	132 kV S/C Chittorgarh-Ajoliya Khera Line	Blocked
29	132 kV S/C Ajoliya Khera-Bassi Line	Blocked
30	132 kV S/C Ajoliya Khera-Rashmi Line	Blocked
31	132 kV S/C Rashmi-Hamirgarh (Soniyana) Line	Operative
32	132 kV S/C Chittorgarh-Senthi Line	Blocked
33	132 kV S/C Senthi-Gosunda TSS Line	Operative
34	132 kV S/C Senthi-Rasoolpura Line	Blocked
35	132 kV S/C Chittorgarh-Sawa Line	Blocked
E.	**Transmision Lines at 220 kV GSS Sawa**	
36	220 kV D/C Sawa-Chittorgarh (400 kV GSS) Line	Operative
37	220 kV S/C Sawa-Nimbahera Line	Blocked
38	132 kV S/C Sawa-BhadesarLine	Blocked

39	132 kV S/C Sawa-Kapasan Line	Blocked
40	132 kV S/C Kapasan-Bhopal Sagar Line	Blocked
41	132 kV S/C Sawa-ACW Line	Blocked
42	132 kV S/C Sawa-NUVOCO Line	Blocked
F.	**Transmision Lines at 220 kV GSS Nimbahera**	
43	220 kV S/C Nimbahera-Pratapgarh Line	Operative
44	220 kV S/C Nimbahera-Chittorgarh (400 kV GSS) Line	Operative
45	132 kV S/C Nimbahera-Bhadesar Line	Blocked
46	132 kV S/C Nimbahera-Rasoolpura Line	Blocked
47	132 kV S/C Rasoolpura-WCL Line	Blocked
48	132 kV S/C Rasoolpura-JKCW Line	Blocked
49	132 kV S/C Nimbahera-Kaneri Line	Blocked
50	132 kV S/C Nimbahera-JKCW Line	Blocked
51	132 kV S/C Nimbahera-Bijapur Line	Blocked
52	132 kV S/C Nimbahera-Chhotisadari Line	Operative
53	132 kV S/C Nimbahera-Dhoriya Chouraha Line	Blocked
54	132 kV S/C Dhoriya Chouraha-Mangalwad Line	Blocked/Operative
55	132 kV S/C Mangalwad-Bhinder Line	Blocked
Additional Lines to Install Under Frequency Relays		
56	220 kV S/C Hamirgarh-Bhilwara line	Blocked/Operative
57	132 kV S/C Hamirgarh-RIICO Bhilwara line	Blocked/Operative
58	132 kV S/C Hamirgarh (220 kV GSS)-RIICO Growth Centre line	Blocked/Operative
59	132 kV S/C Chhotisadari- Badisadari line	Blocked/Operative
60	132 kV S/C Chhotisadari-Pratapgarh line	Blocked/Operative
61	132 Kv S/C RIICO Growth (Hamirgarh)-Nitin Industries Line	Blocked/Operative
62	132 Kv S/C Hamirgarh(220 kV GSS)-RSWM Line	Blocked/Operative
Note:	At 220 kV GSS Debari, 220 kV Bus is split with 220 kV 2xS/C lines from RAPS-A&B alongwith 470 MVA, 220/132 kV transformer on one bus and rest of 220 kV lines on another bus. Therefore, 220 kV GSS Aspur, Madri and Amberi and 400 kV GSS Chittorgarh is not included in the island. If buses M1 and M2 at 220 kV GSS Debari are integrated then UFR relays are also required on following lines	
63	220 kV S/C Debari-Aspur Line	Operative
64	220 kV S/C Debari-Madri Line	Operative
65	220 kV S/C Debari-Amberi Line	Operative
Note:	Units of atomic power plant are critical generation units, hence it is required that all lines in the island with blocked status may also be equipped with UFR relay. This will help to shorten the boundary of the island during light load conditions.	

Transmission Network Included in Island of RAPS-A & B



	NUCLEAR POWER CORPORATION OF INDIA LIMITED RAJASTHAN ATOMIC POWER STATION		
	OPERATING PROCEDURE FOR INFREQUENT EVENT	USI: 50000	
		OPIE No. 15	Rev. 03
	UNIT OPERATION UNDER HIGH/LOW GRID FREQUENCY	Issue In: April 2019	
		Next Rev. Due: April 2024	

1.0 PURPOSE:

These guidelines are for unit operation during high or low grid frequency conditions (reference: station instruction no. 39B,). Variations in grid frequency away from normal band of operation (i.e. 49.8-50.2 Hz) occur due to change in demand/supply condition in grid (ie generating station connected to grid or tripping of generating station / load pickup or tripping), grid transients etc.

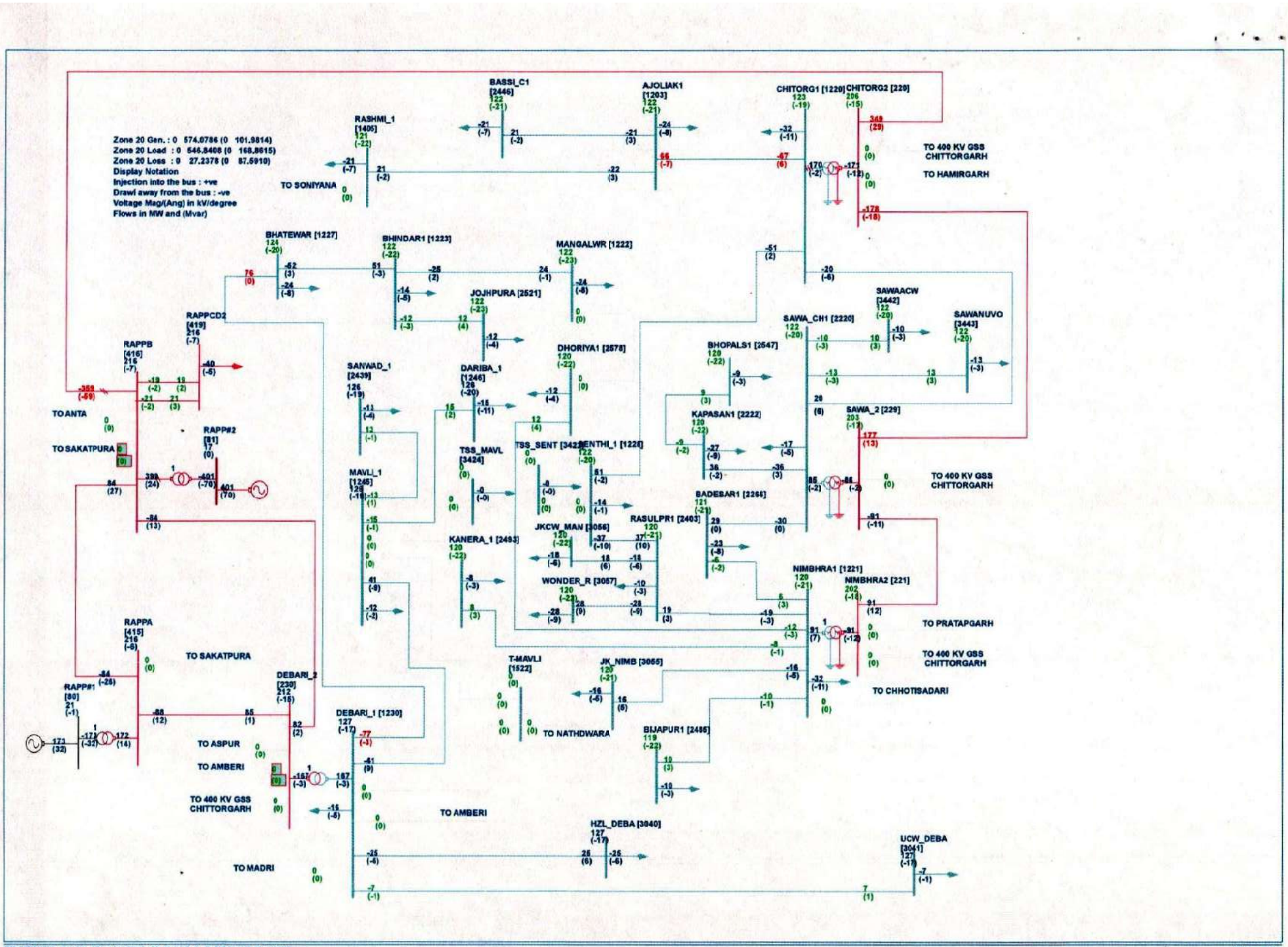
2.0 EFFECT ON STATION:

2.1 AUTO ACTIONS ON HIGH FREQUENCY

S. No.	Frequency (O/F Scenario)	Unit-3	Unit-4
1.	51.2Hz, INST	"412-Generator under/over frequency alarm" Alarm initiates	"412-Generator under/over frequency alarm" Alarm initiates
2.	51.5 Hz, INST	"Gen. over frequency trip timer initiated" alarm initiated	"Gen. over frequency trip timer initiated" alarm initiated
3.	51.5 Hz + 0.2 sec	SUT HV CB trip & ATS will initiate	SUT HV CB trip & ATS will initiate
4.	51.5 Hz + 0.5 sec	Class -C trip initiates	Class -C trip initiates
5.	51.5 Hz + 15 sec	Class -B trip initiates	---
6.	51.5 Hz + 20 sec	---	Class-B trip initiates

2.2 AUTO ACTIONS ON LOW FREQUENCY

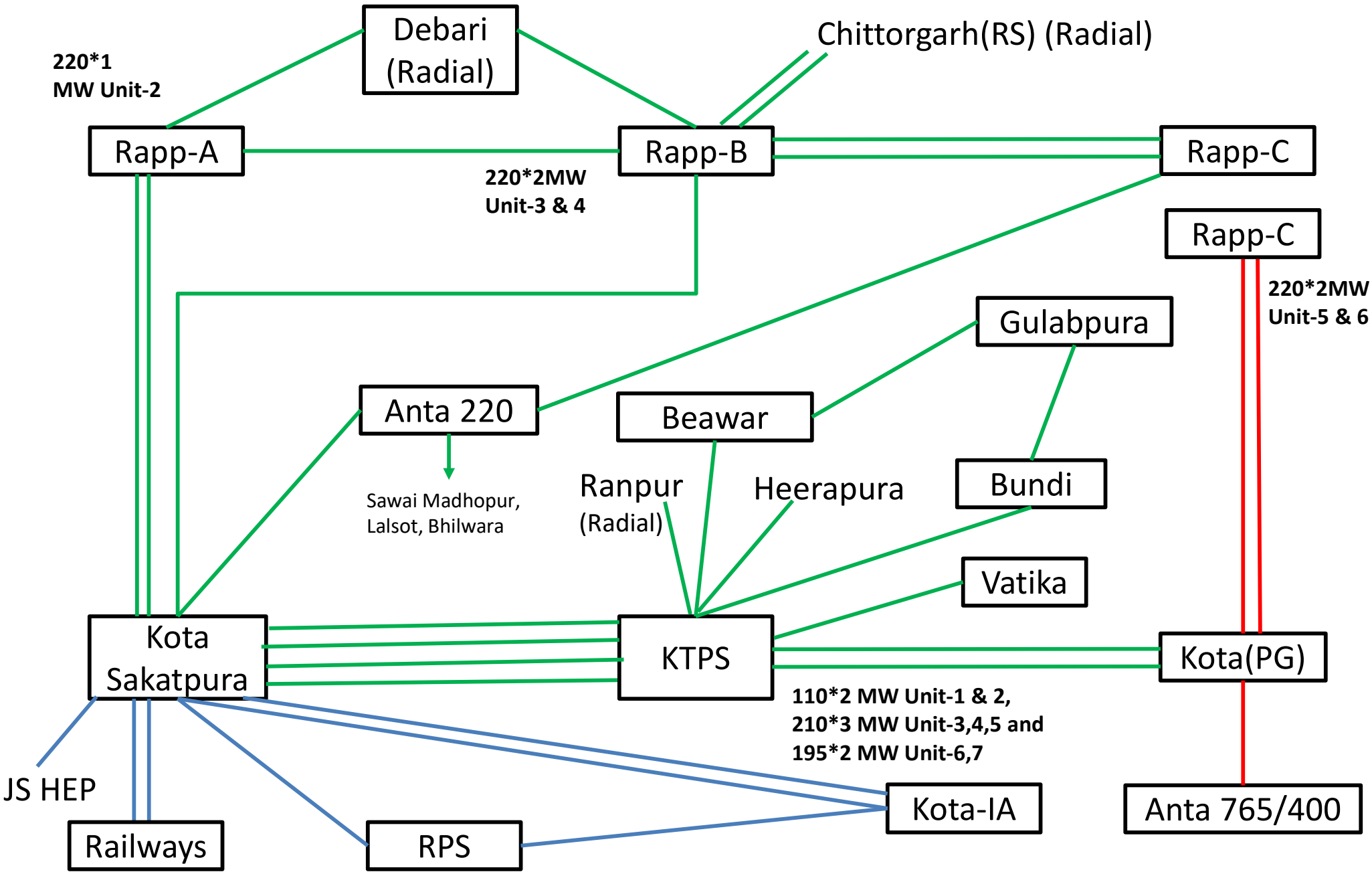
S. No.	Frequency (U/F Scenario)	Unit-3 & Unit-4
1.	48 Hz, INST	U/F Alarm initiates and Kota Line Will Trip and Anta Line Will Trip at RRS 5&6 End Rajasthan sub system separates from Northern grid (Chittor Ckt 1,Chittor Ckt 2 ,Udaipur Line and RRS 5&6 Tie Line Will remain Close)
2.	47.7 Hz + 5 Sec or 47.5 Hz, INST.	Speeder auto signal gets cut off.
3.	47.5 Hz + 3 Sec	SUT HV CB trips & ATS will initiate (Islanding unsuccessful, Prepares for House-load operation)
4.	47.5 Hz + 5 Sec	Class -C trip initiates (For House-load operation)


Zone 20 Gen. : 0 574.0786 (0 101.9814)
Zone 20 Load : 0 546.8408 (0 168.8615)
Zone 20 Loss : 0 27.2378 (0 87.5910)
Display Notation
Injection into the bus : +ve
Drawl away from the bus : -ve
Voltage Mag/(Ang) in kV/degree
Flows in MW and (Mvar)
BASSI_C1 [2446]
AJOLIAK1 [1203]
CHITORG1 [1220]
CHITORG2 [220]
RASHMI_1 [1405]
TO SONIYANA
TO 400 KV GSS CHITTORGARH
TO HAMIRGARH
BHATEWAR [1227]
BHINDAR1 [1223]
MANGALWR [1222]
JOJHPURA [2521]
SAWAACW [3442]
SAWANUVO [3443]
SAWA_CH1 [2220]
SAWA_2 [229]
RAPPCD2 [419]
RAPPB [416]
TO ANTA
SANWAD_1 [2439]
DARIBA_1 [1246]
DHORIYA1 [2578]
BHOPALS1 [2547]
KAPASAN1 [2222]
TSS_SENT [3423]
SENTHI_1 [1220]
TSS_MAVL [3424]
MAVLI_1 [1245]
BADESAR1 [2266]
RAPP#2 [81]
TO SAKATPURA
JKCW_MAN [3056]
RASULPR1 [2403]
KANERA_1 [2493]
WONDER_R [3057]
NIMBHRA1 [1221]
NIMBHRA2 [221]
TO PRATAPGARH
RAPPA [415]
T-MAVLI [1522]
JK_NIMB [3055]
DEBARI_2 [230]
RAPP#1 [80]
DEBARI_1 [1230]
TO NATHDWARA
BIJAPUR1 [2485]
TO CHHOTISADARI
TO ASPUR
TO AMBERI
HZL_DEBA [3040]
UCW_DEBA [3041]
TO MADRI

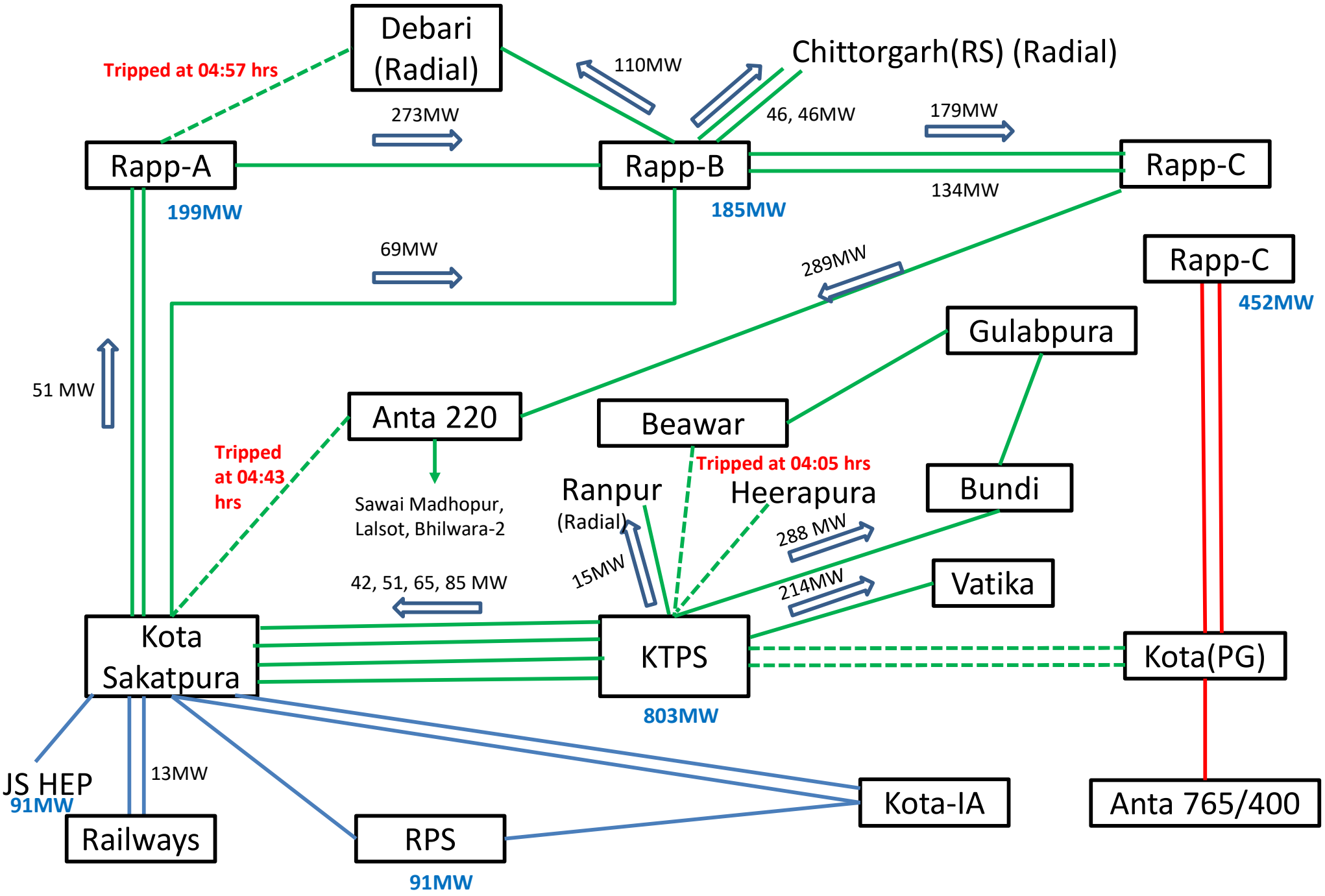
MULTIPLE ELEMENTS TRIPPING AT KTPS(RS), RAPP-A, RAPP-B AND RAPP-C

AT 05:16HRS ON 05TH JAN'2024

Connection Diagram between KTPS, RAPP-A, RAPP-B & RAPP-C

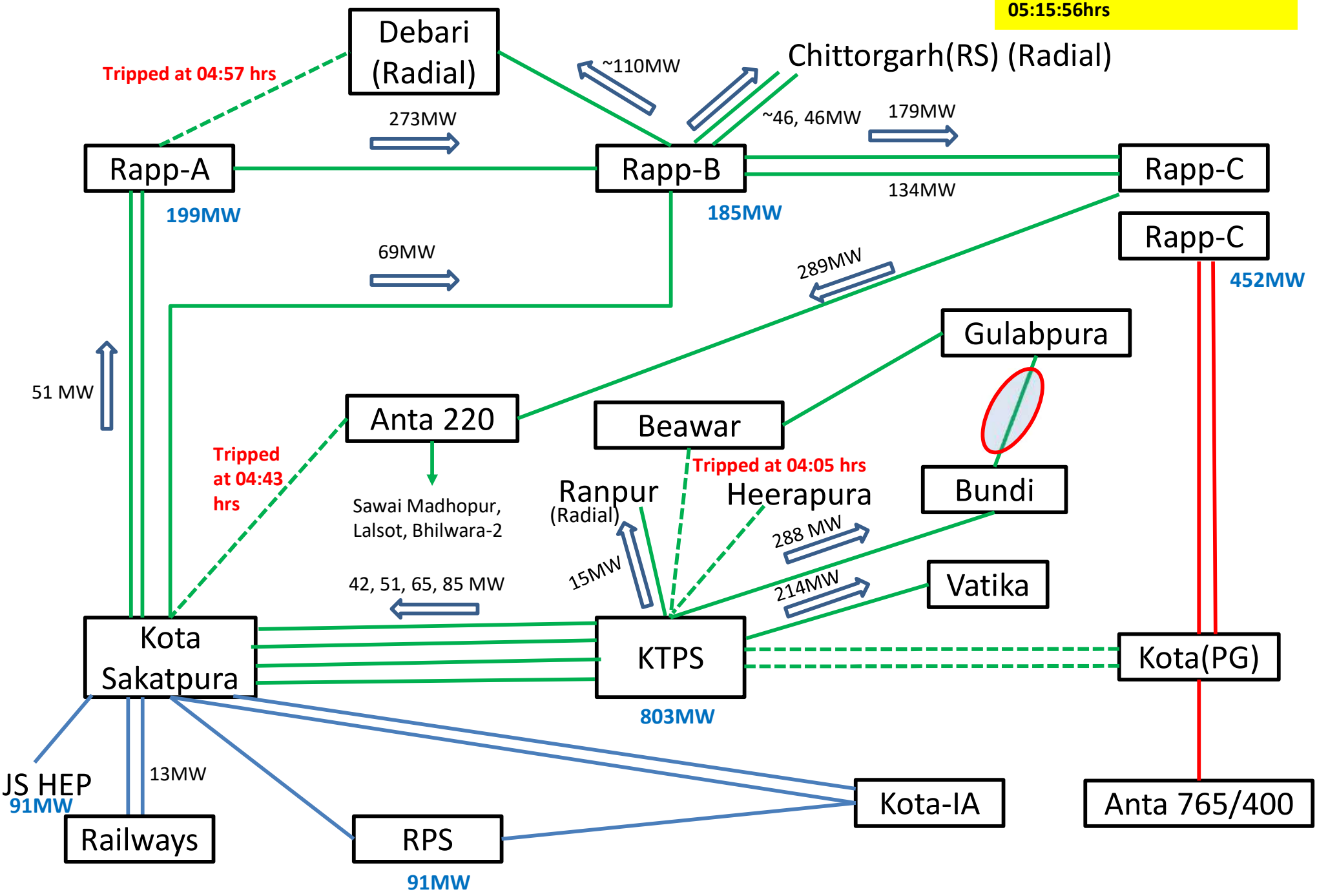


Antecedent scenario (at 05:15 hrs)



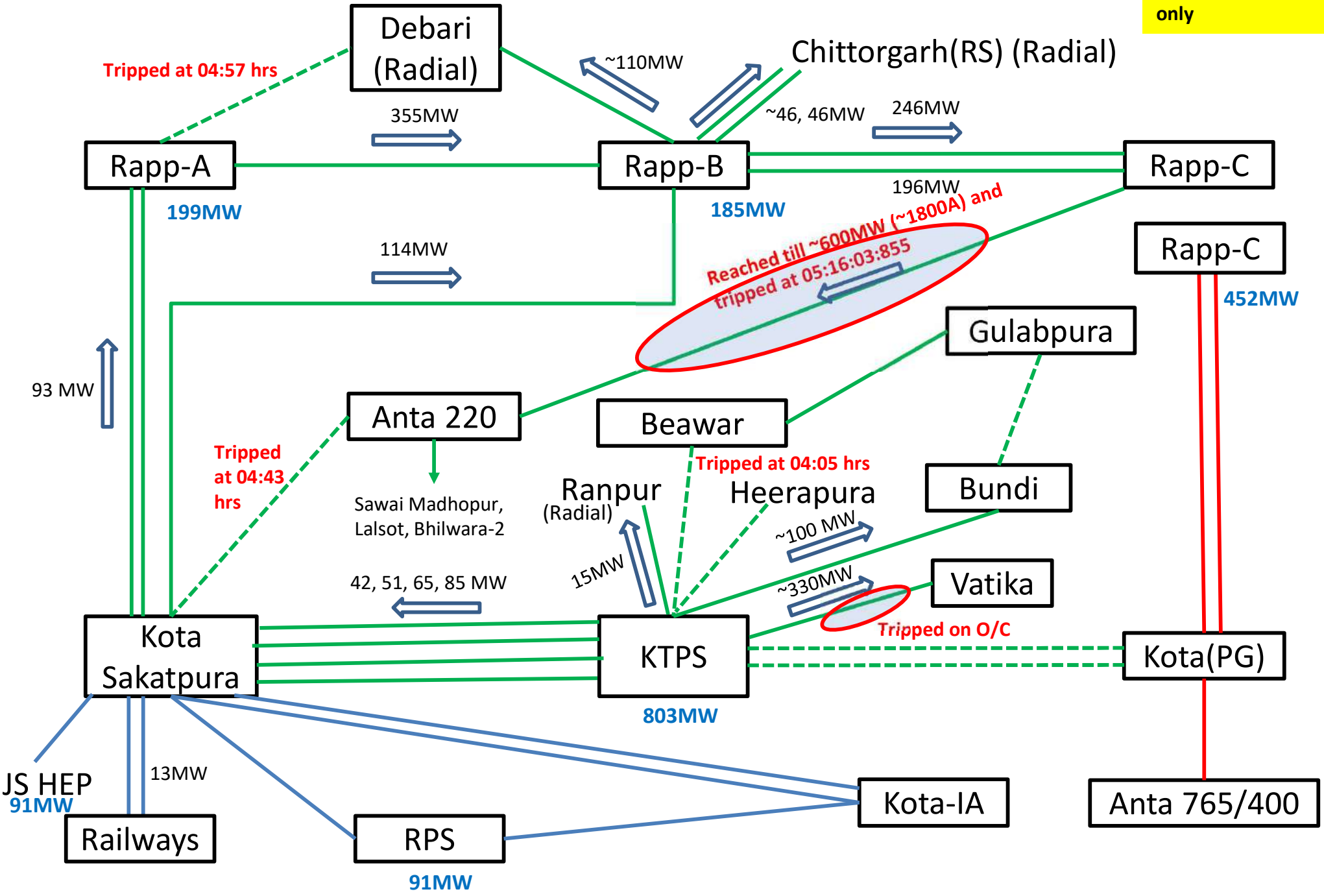
Triggering incident

Triggering incident: opening of 220kV Bundi-Gulabpura ckt at 05:15:56hrs



After opening of 220kV Bundi-Gulabpura ckt

System was connected to grid via Anta and Vatika only

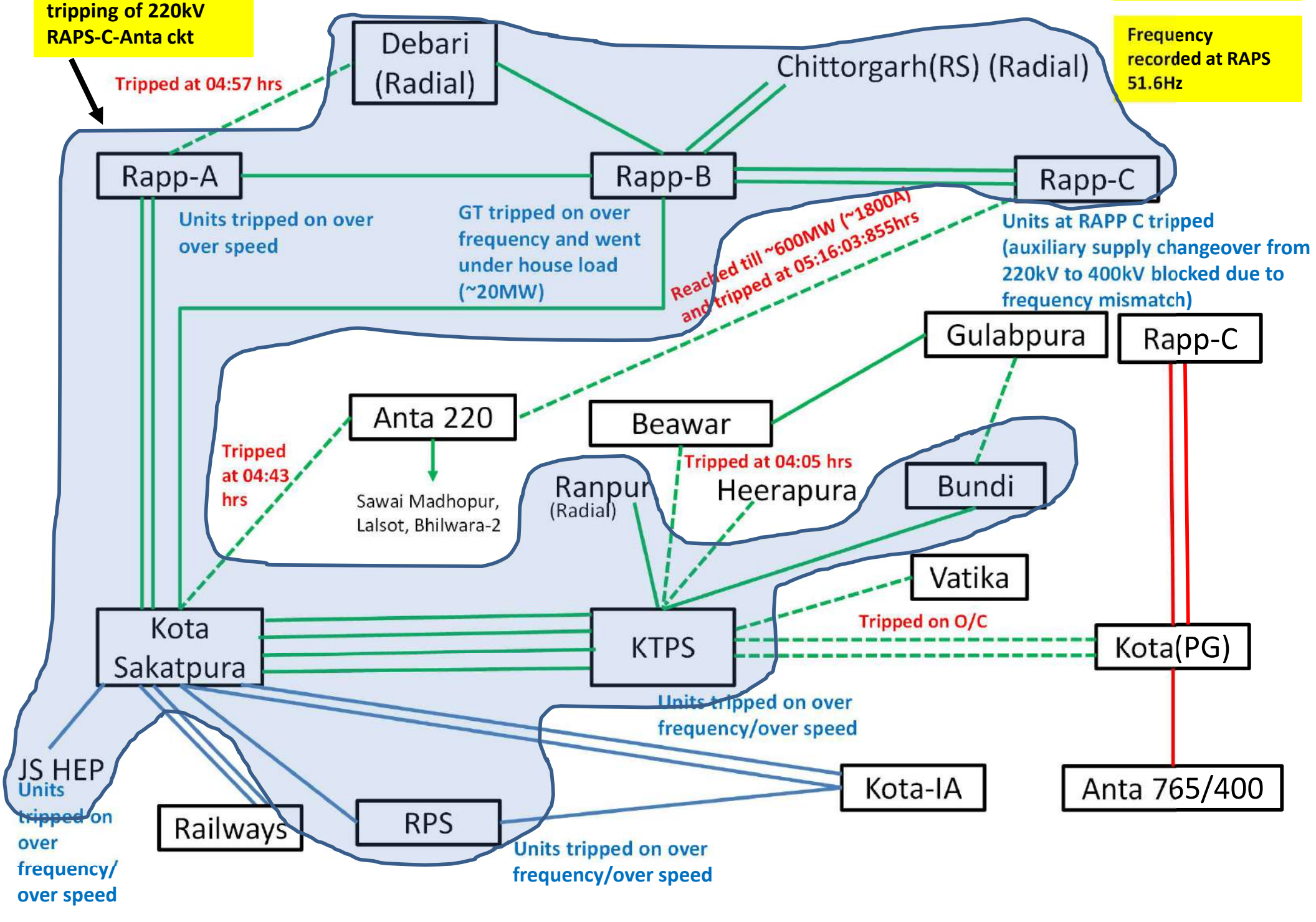


After tripping of 220kV RAPP_C- Anta ckt

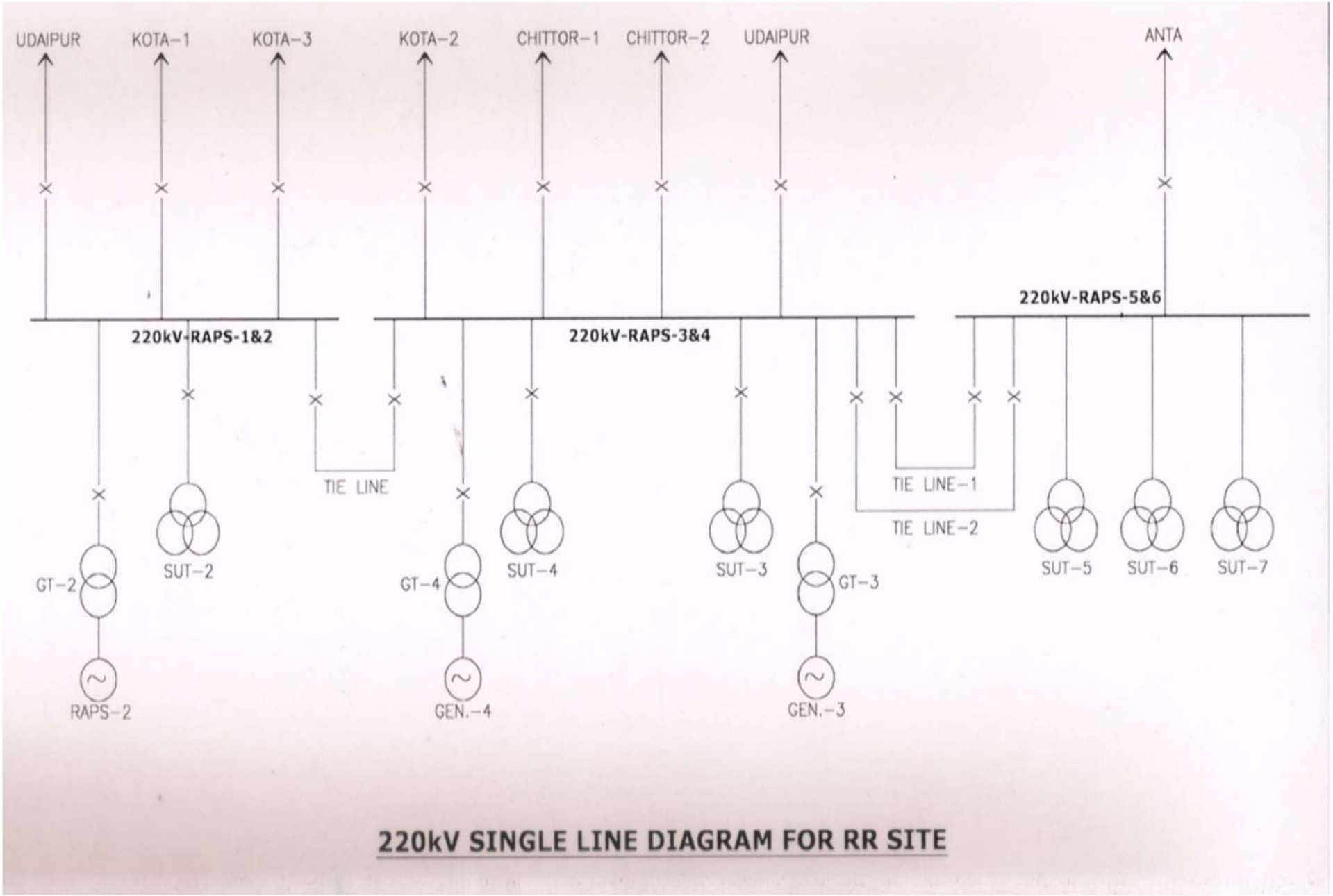
Island formed after tripping of 220kV RAPS-C-Anta ckt

Connection to grid lost.

Frequency recorded at RAPS 51.6Hz



SLD and connectivity of RAPS- A, RAPS-B & RAPS-C

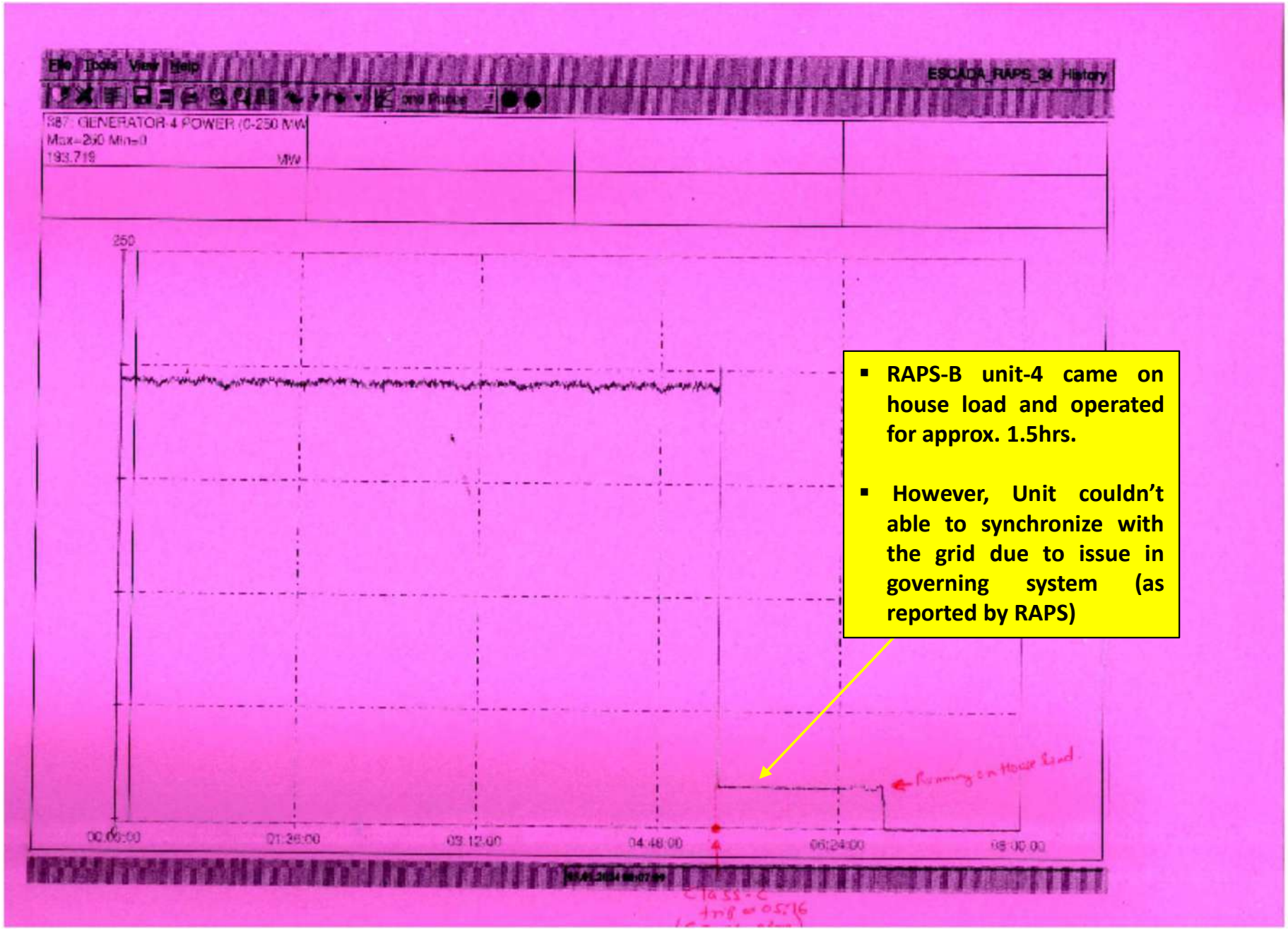


220kV SINGLE LINE DIAGRAM FOR RR SITE

Digital recording system of RAPS-A during the event (shared by RAPS)

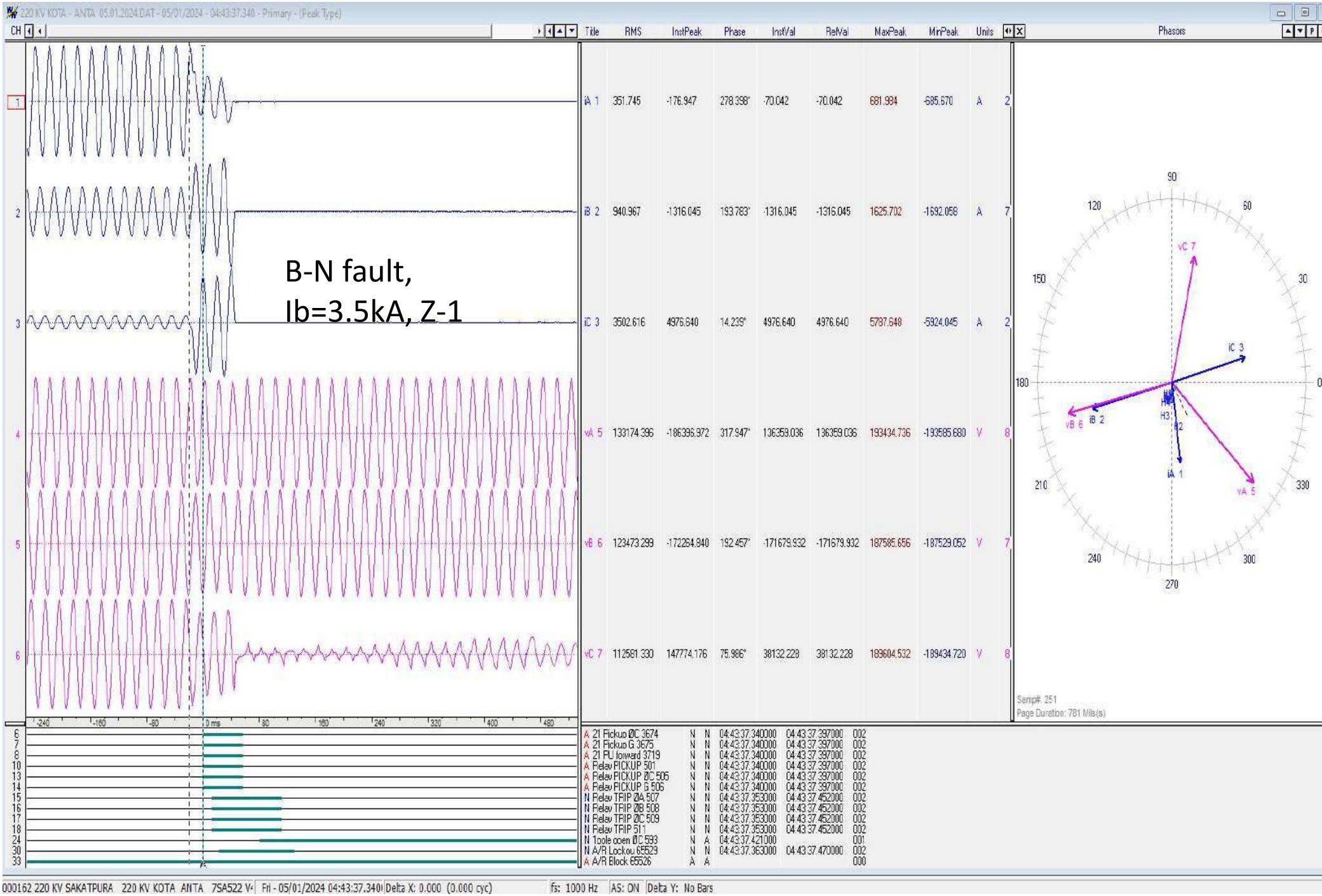


Generation plot of RAPS-B unit-4 (shared by RAPS)

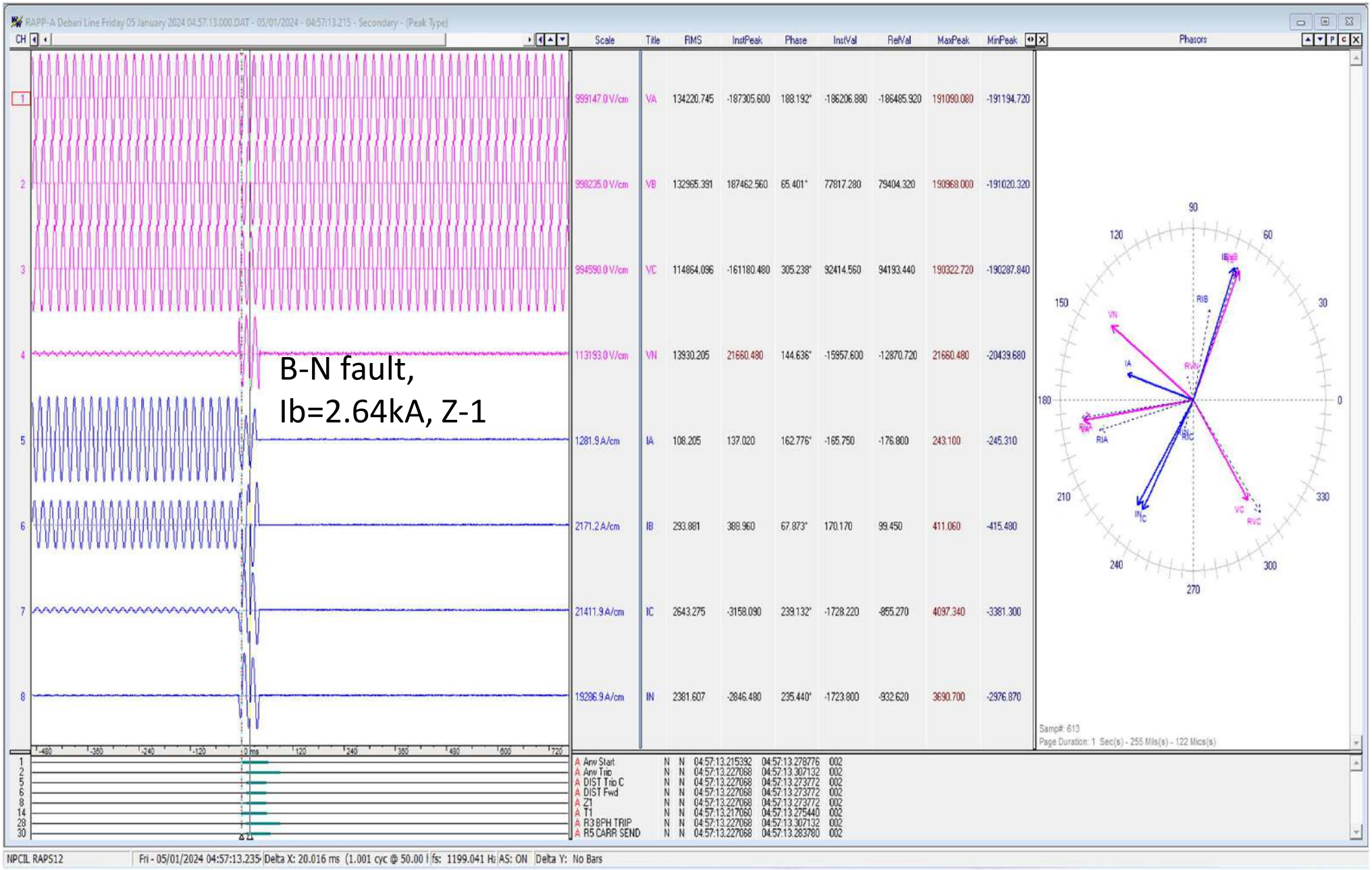


- **RAPS-B unit-4 came on house load and operated for approx. 1.5hrs.**
- **However, Unit couldn't able to synchronize with the grid due to issue in governing system (as reported by RAPS)**

DR of 220kV Anta-Sakatpura(end) ckt (04:43hrs)

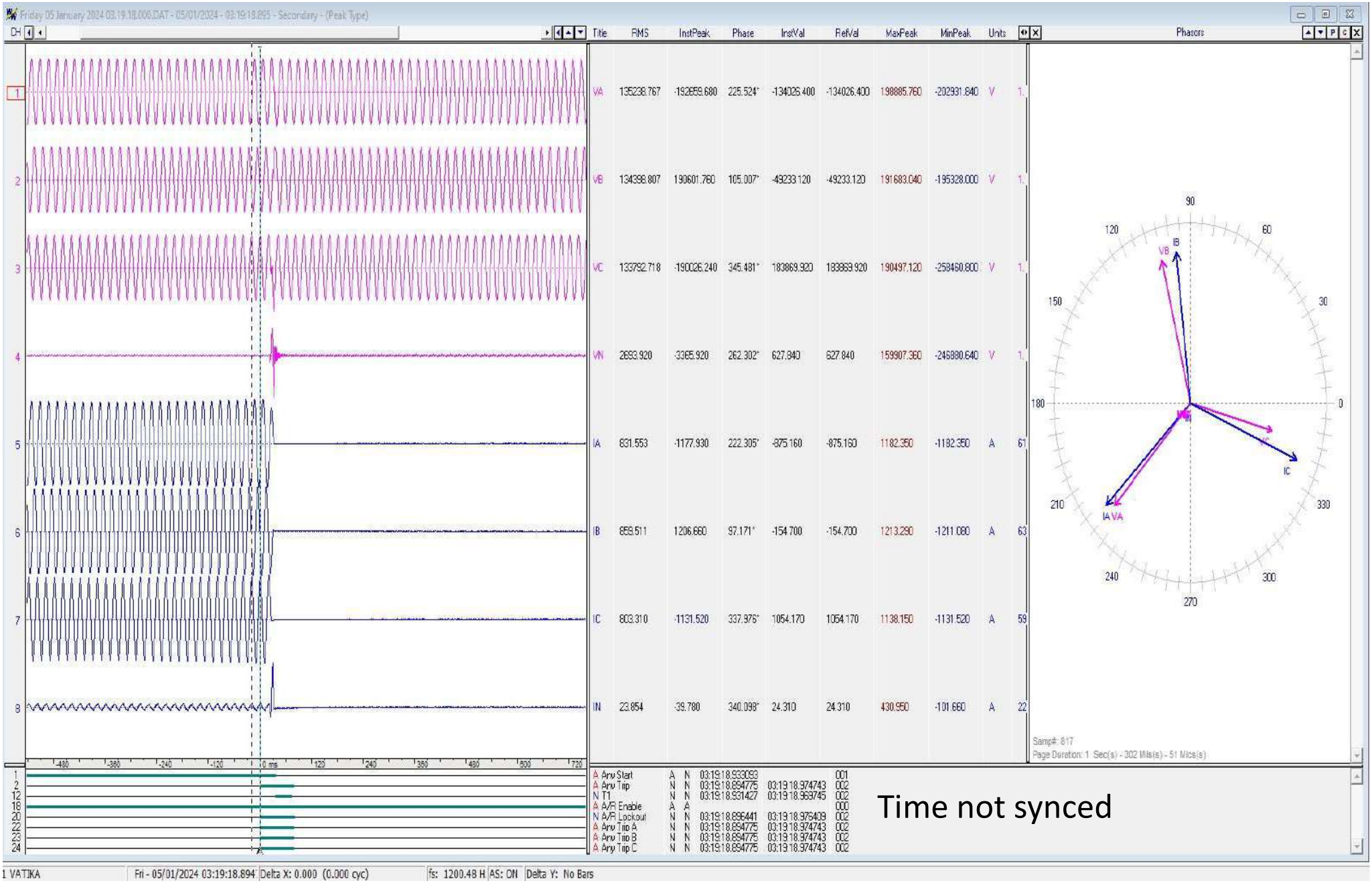


DR of 220kV RAPS_A(end)-Debari ckt



Tripping time: **04:57:13:227**; B-N fault, Z-1, Ib: 2.6kA; (A/R operation is OFF in line)

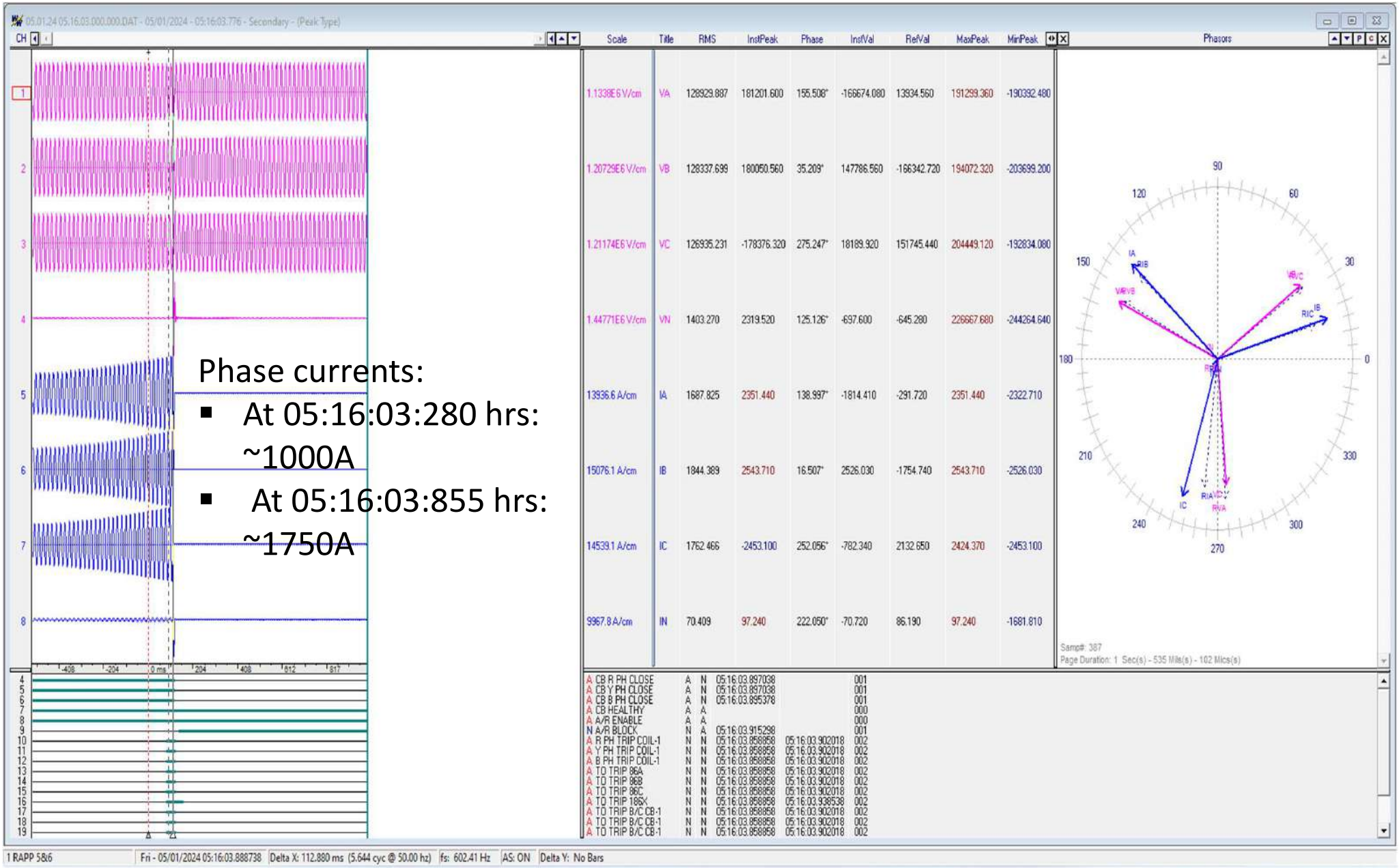
DR of 220kV KTPS-Vatika(end) ckt



Time not synced

Antecedent loading just before the tripping: **~324MW (as reported, tripped on O/C)**

DR of 220kV RAPS_C(end)-Anta ckt



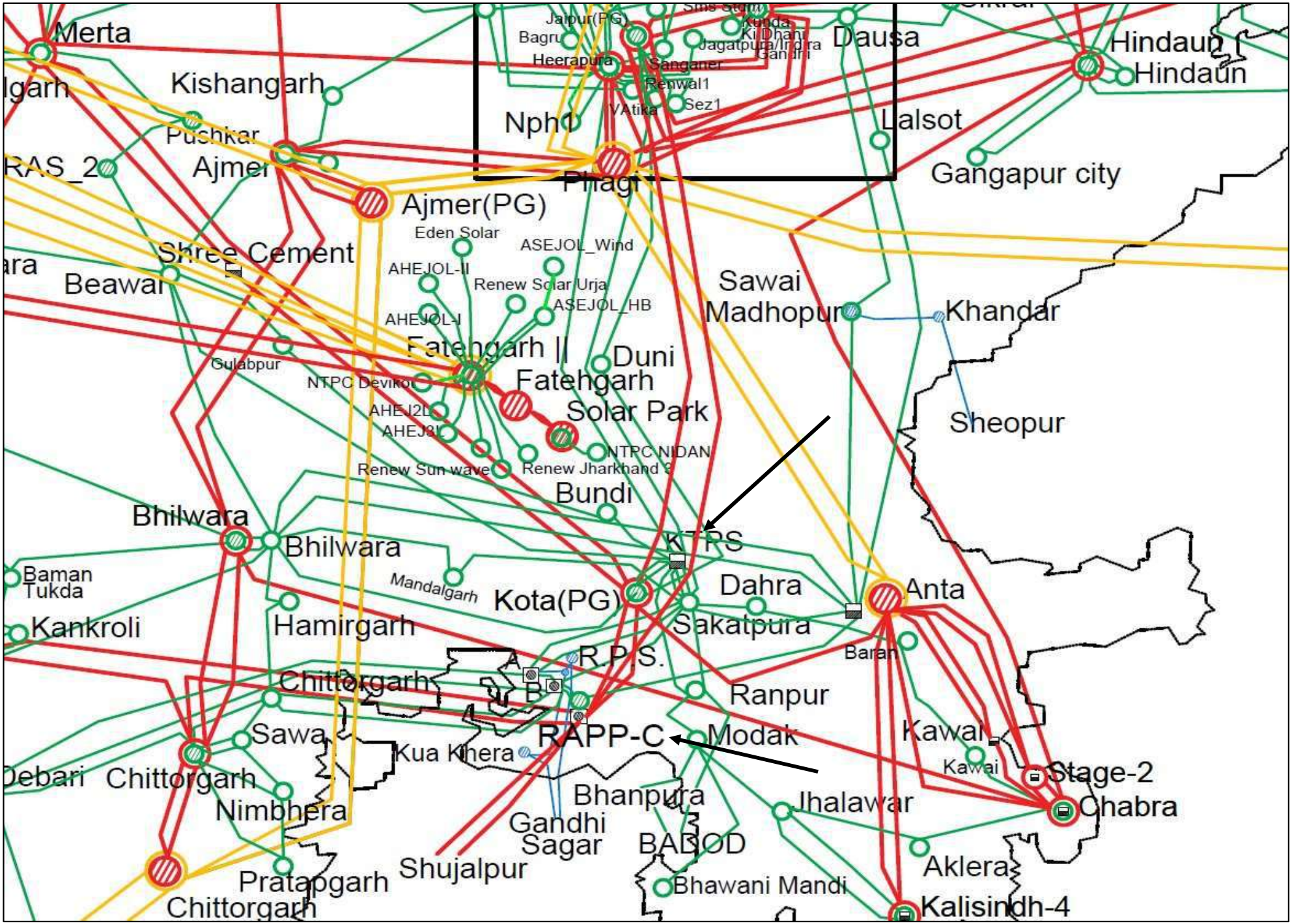
Tripping time: **05:16:03:855**; Antecedent loading just before the tripping: **~660MW**

SCADA SOE

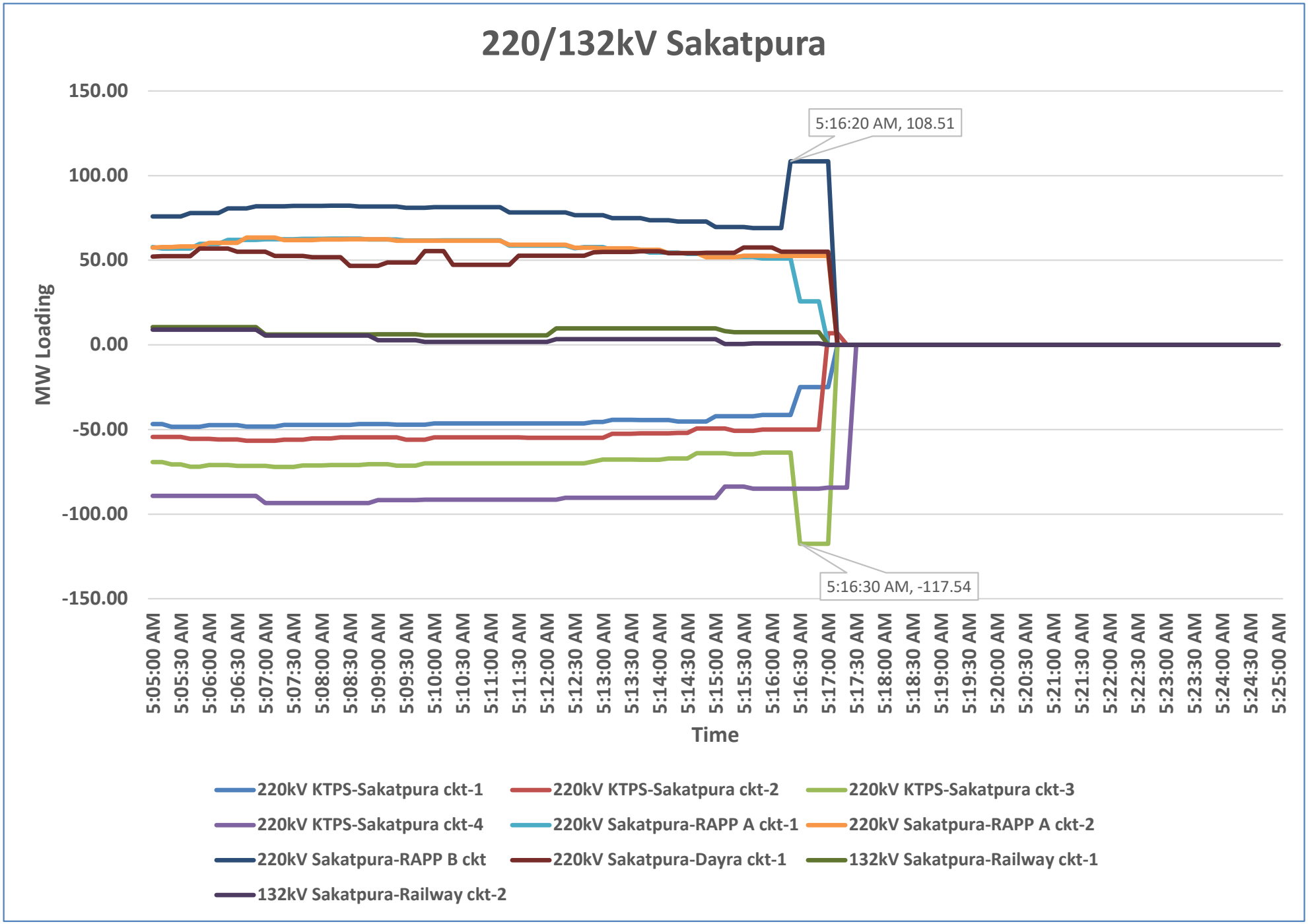
Time	Station Name	Voltage	Element Name	Element Type	Element Status	Remarks
05:15:55,853	GULPR_RS	220kV	02KTPS1	Circuit Breaker	disturbe	
05:15:56,058	GULPR_RS	220kV	02KTPS1	Circuit Breaker	Open	Line CB at Gulabpura(RS) end of 220kV Bundi(RS)-Gulabpura(RS) Ckt opened
05:16:03,939	RAPPC_NP	220kV	02ANTA	Circuit Breaker	Open	Line CB at Rapp-C(NP) end of 220kV RAPP-C(NP)-Anta(NT) Ckt opened
05:16:04,983	RAPPB_NP	220kV	07SUTR4	Circuit Breaker	Open	Line CB at Rapp-B(NP) end of 220kV RAPP-B(NP)-SUT4 Ckt opened
05:16:05,233	RAPPB_NP	220kV	06G4	Circuit Breaker	Open	CB at 220kV side of 220MW Unit-4 at Rapp-B(NP) opened
05:16:06,049	RAPPA_NP	220kV	11G2	Circuit Breaker	Open	CB at 220kV side of 220MW Unit-2 at Rapp-A(NP) opened
05:16:07,774	DYRA__RS	132kV	06ANTA	Circuit Breaker	disturbe	
05:16:08,572	DYRA__RS	132kV	11IA	Circuit Breaker	Open	Line CB at Dahara(RS) end of 132kV Dahara(RS)-Kota IA Ckt opened
05:16:08,609	DYRA__RS	220kV	04KOTAS	Circuit Breaker	disturbe	
05:16:08,611	DYRA__RS	220kV	02BARAN	Circuit Breaker	Open	Line CB at Dahara(RS) end of 220kV Dahara(RS)-Baran Ckt opened
05:16:08,742	RPS___RS	132kV	06MBC	Circuit Breaker	Open	Bus coupler CB at 132kV RPS(RS) opened
05:16:12,851	UCMNT_RS	132kV	02DEBAR1	Circuit Breaker	disturbe	
05:16:12,859	UCMNT_RS	132kV	02DEBAR1	Circuit Breaker	Open	Line CB at UCW(RS) end of 132kV UCW(RS)-Debari(RS) Ckt opened
05:16:15,666	RPS___RS	132kV	09U3	Circuit Breaker	Open	CB at 132kV side of 43MW Unit-3 at RPS(RS) opened
05:16:16,104	RPS___RS	132kV	10U4	Circuit Breaker	Open	CB at 132kV side of 43MW Unit-4 at RPS(RS) opened
05:16:22,001	RPS___RS	132kV	04U1	Circuit Breaker	Open	CB at 132kV side of 43MW Unit-1 at RPS(RS) opened

SLD/Network and Graphs

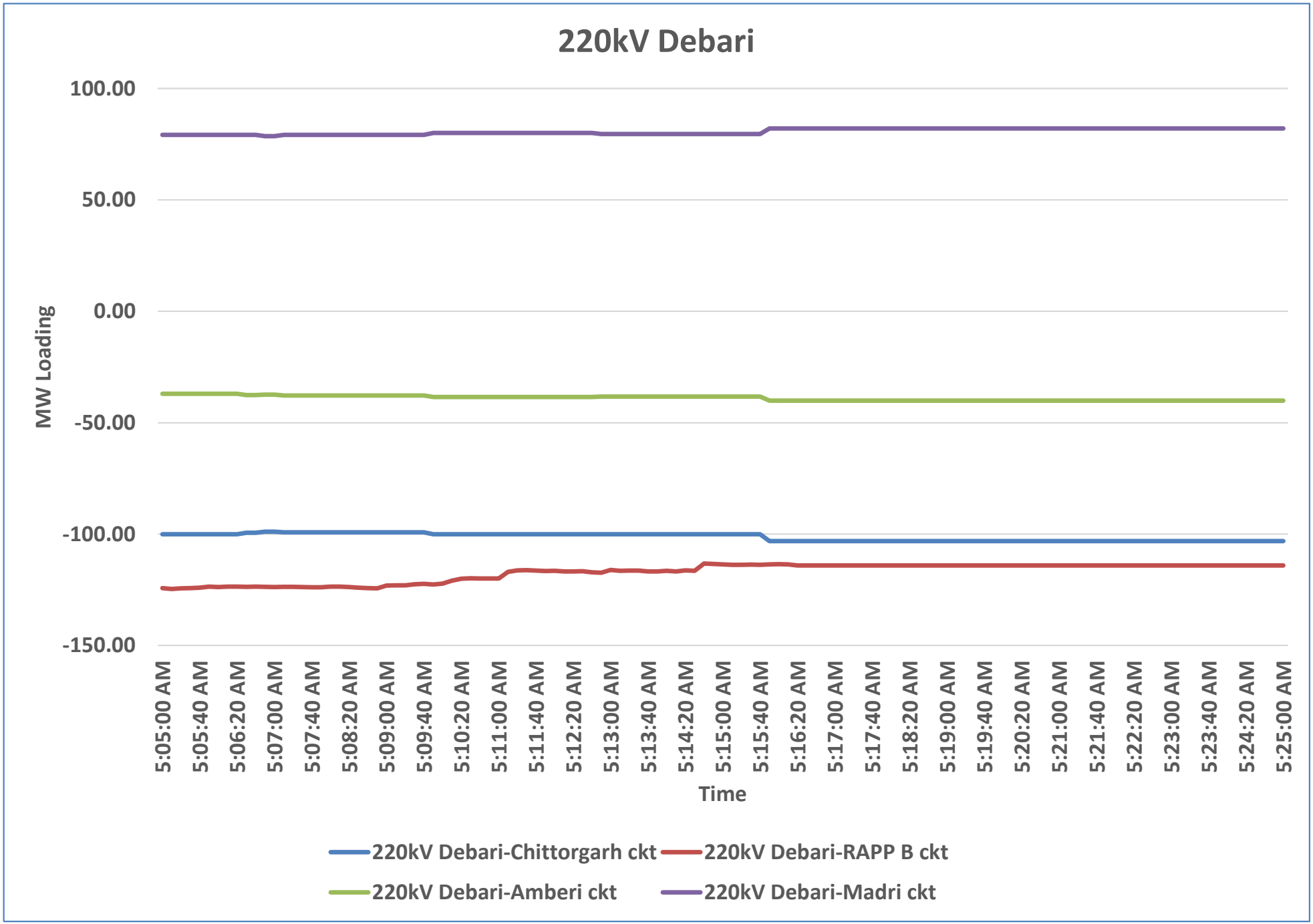
Network Diagram



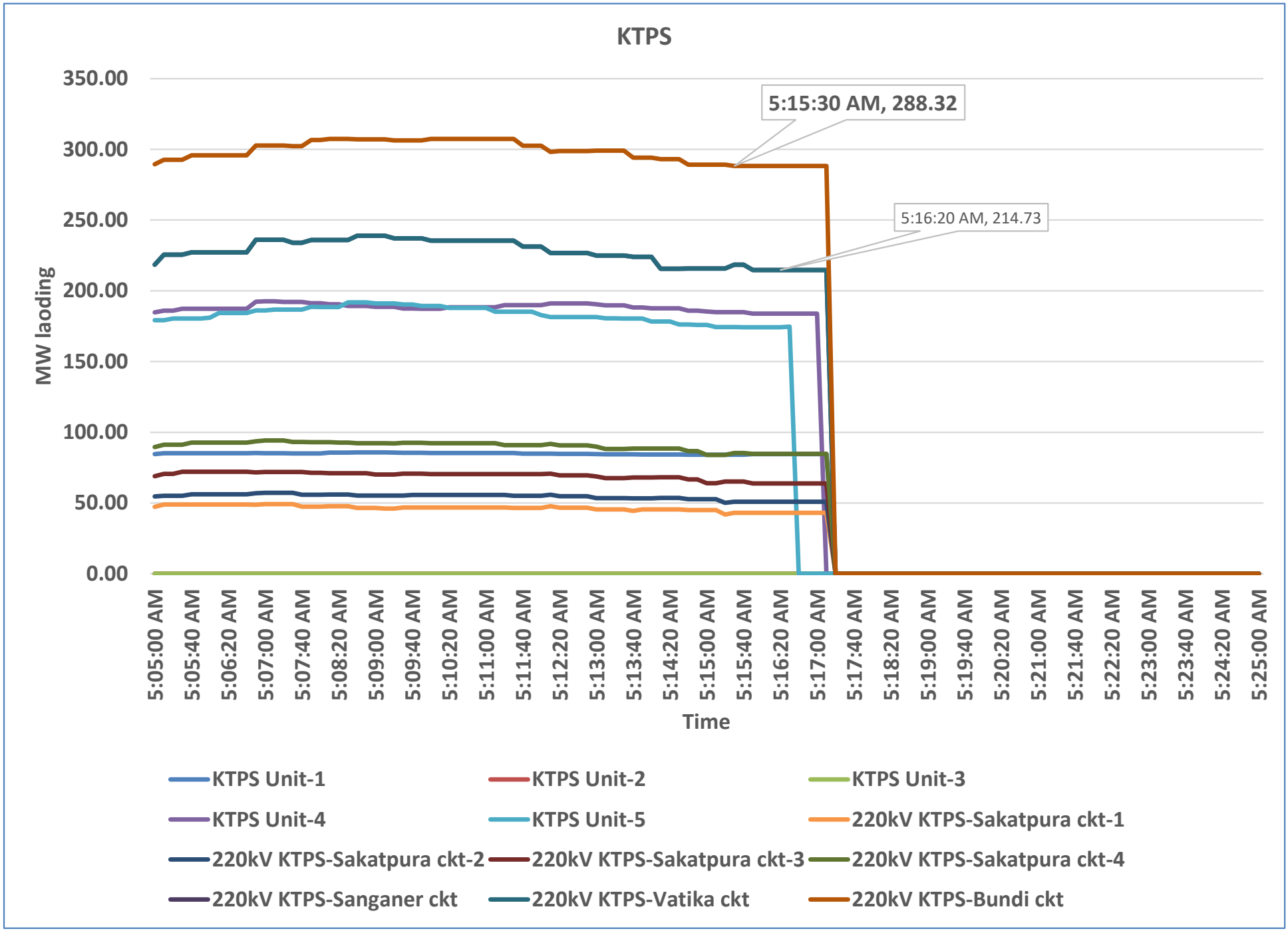
Element wise MW load flow



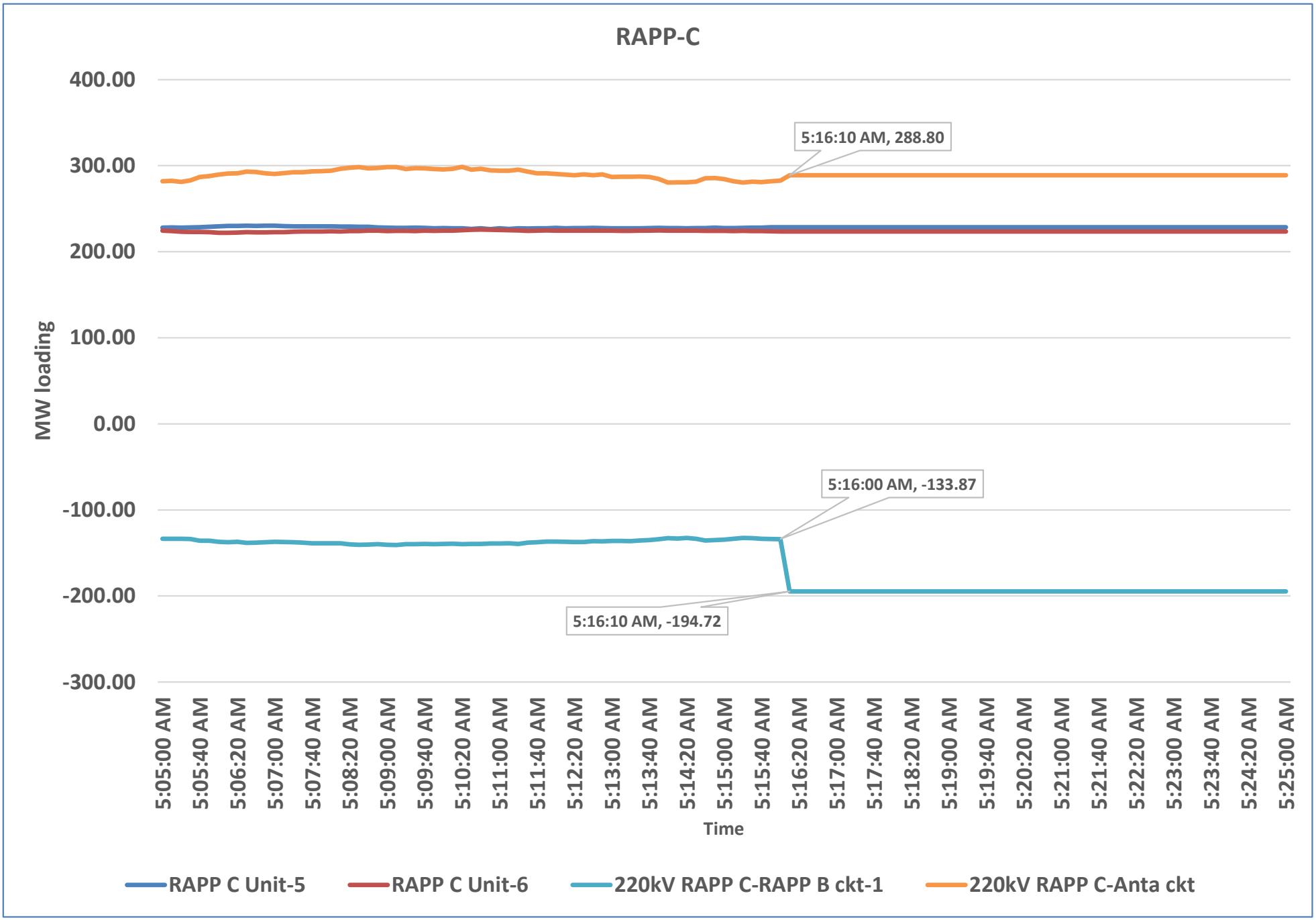
Element wise MW load flow



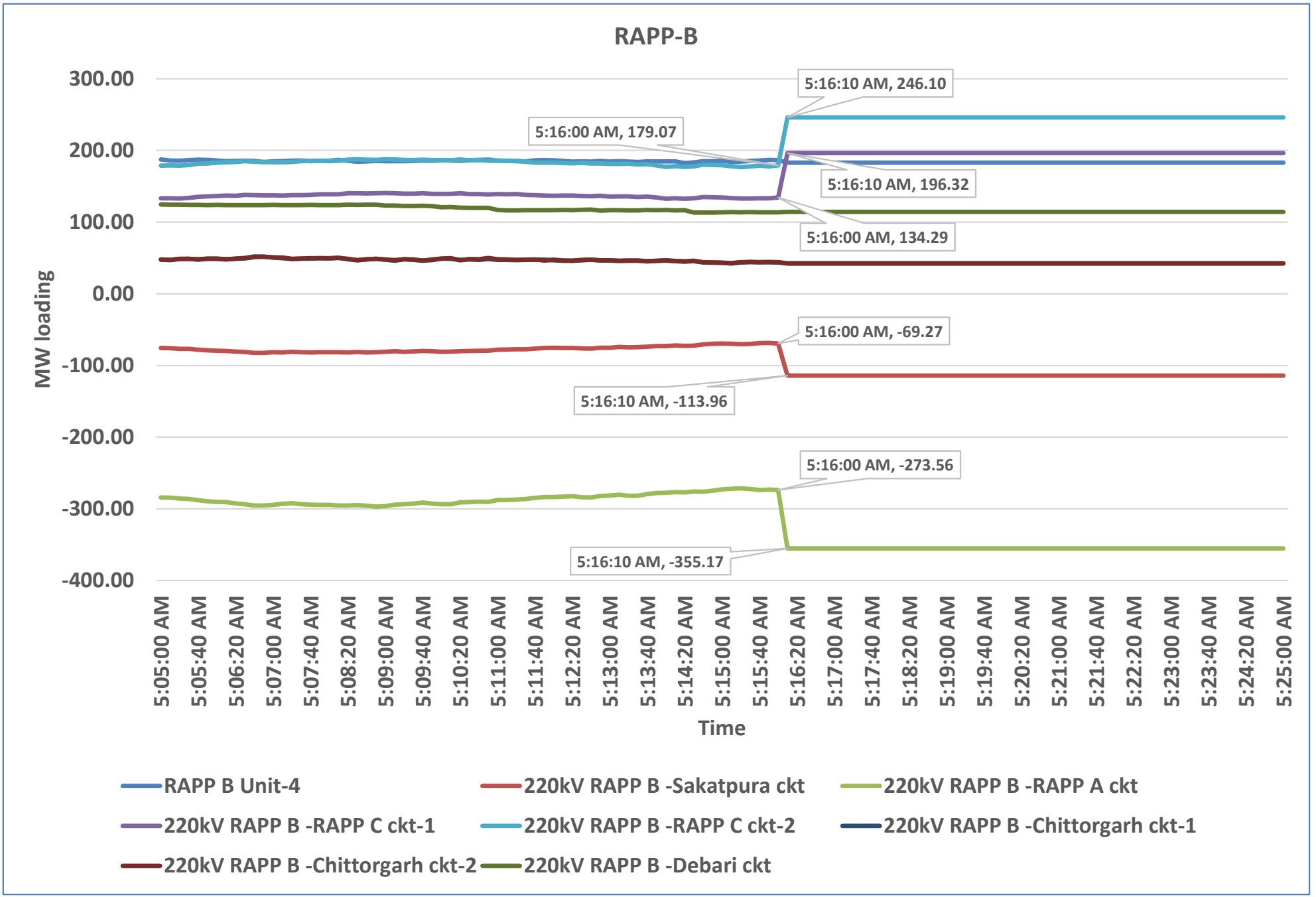
Element wise MW load flow



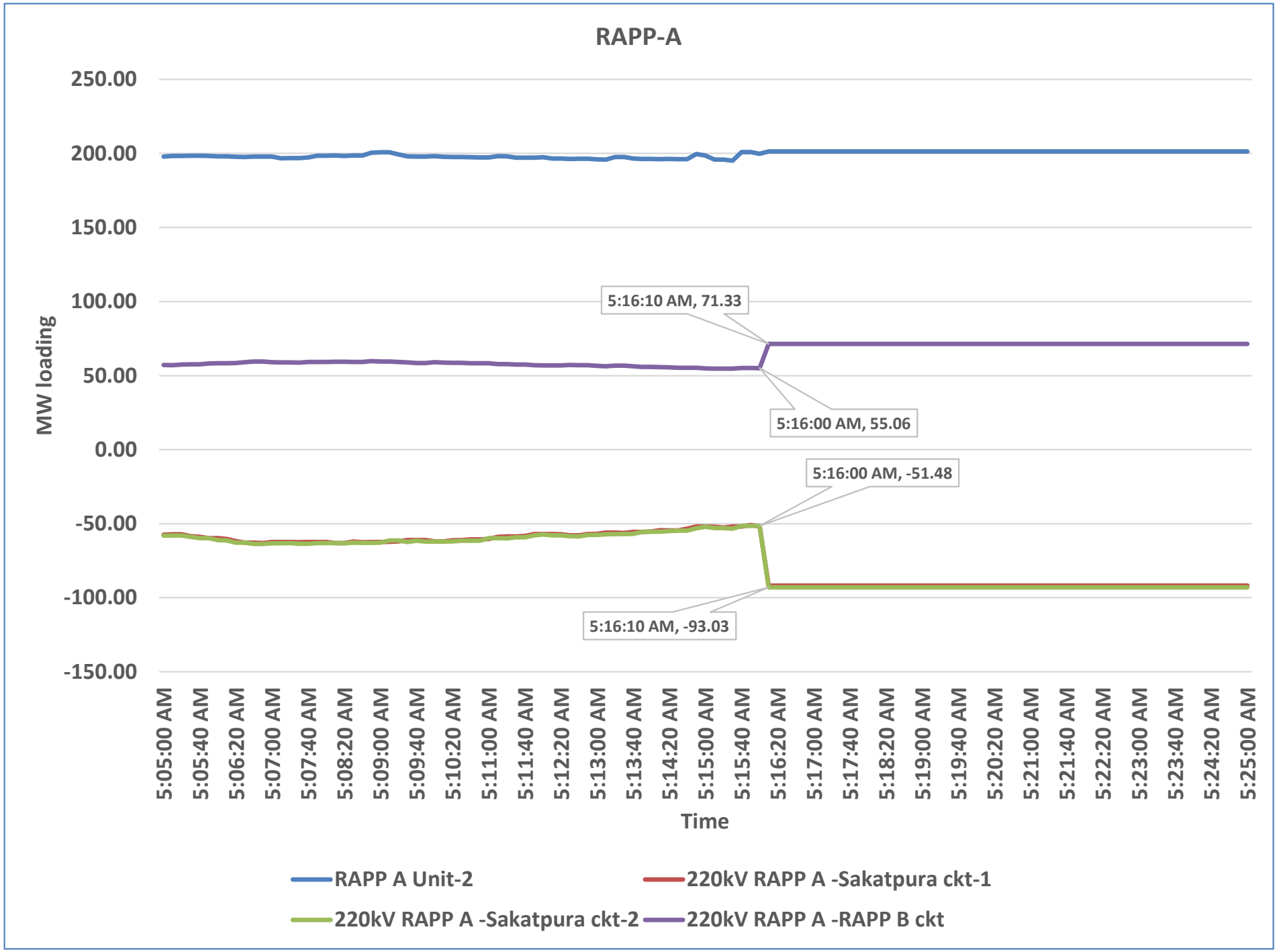
Element wise MW load flow



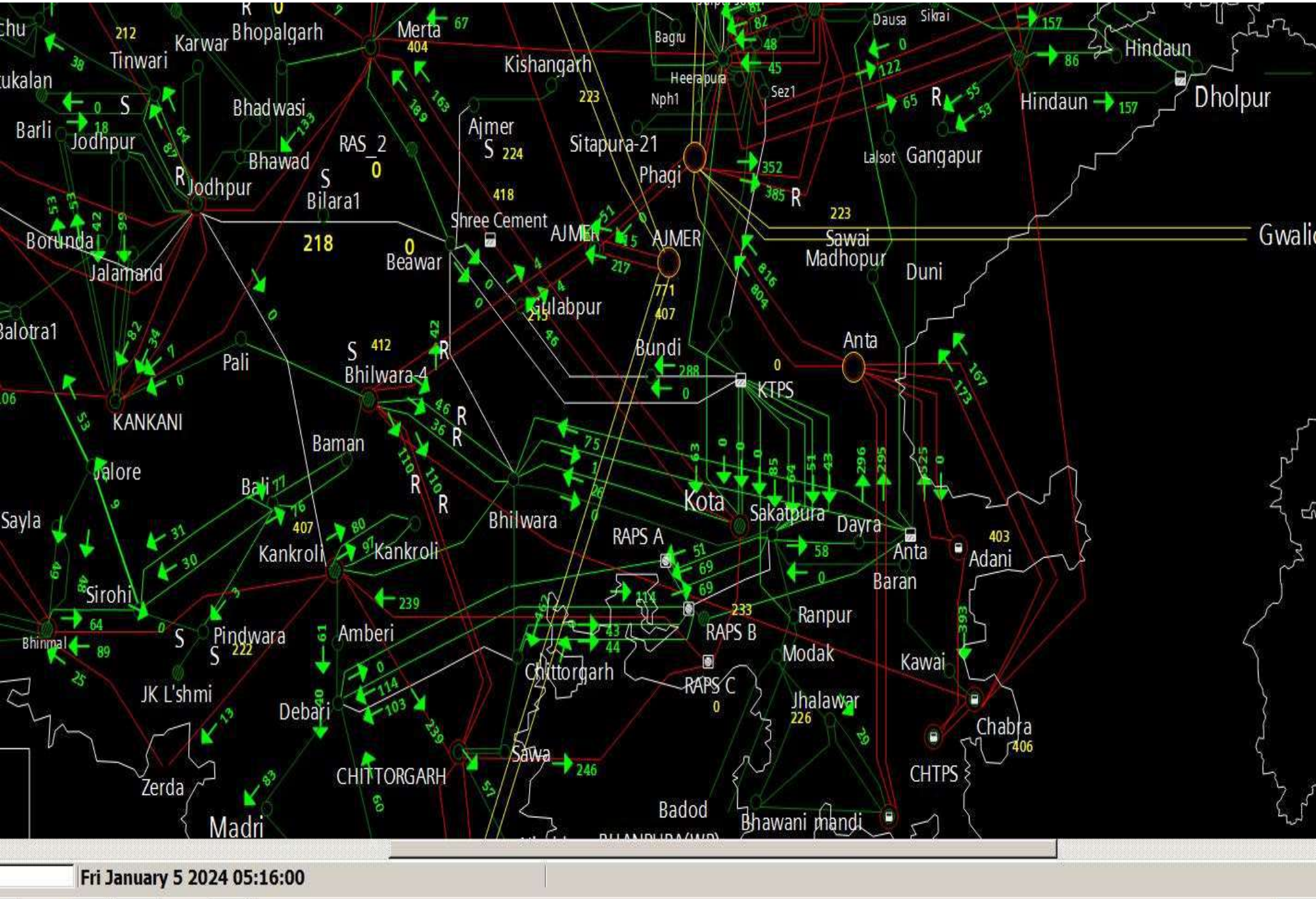
Element wise MW load flow



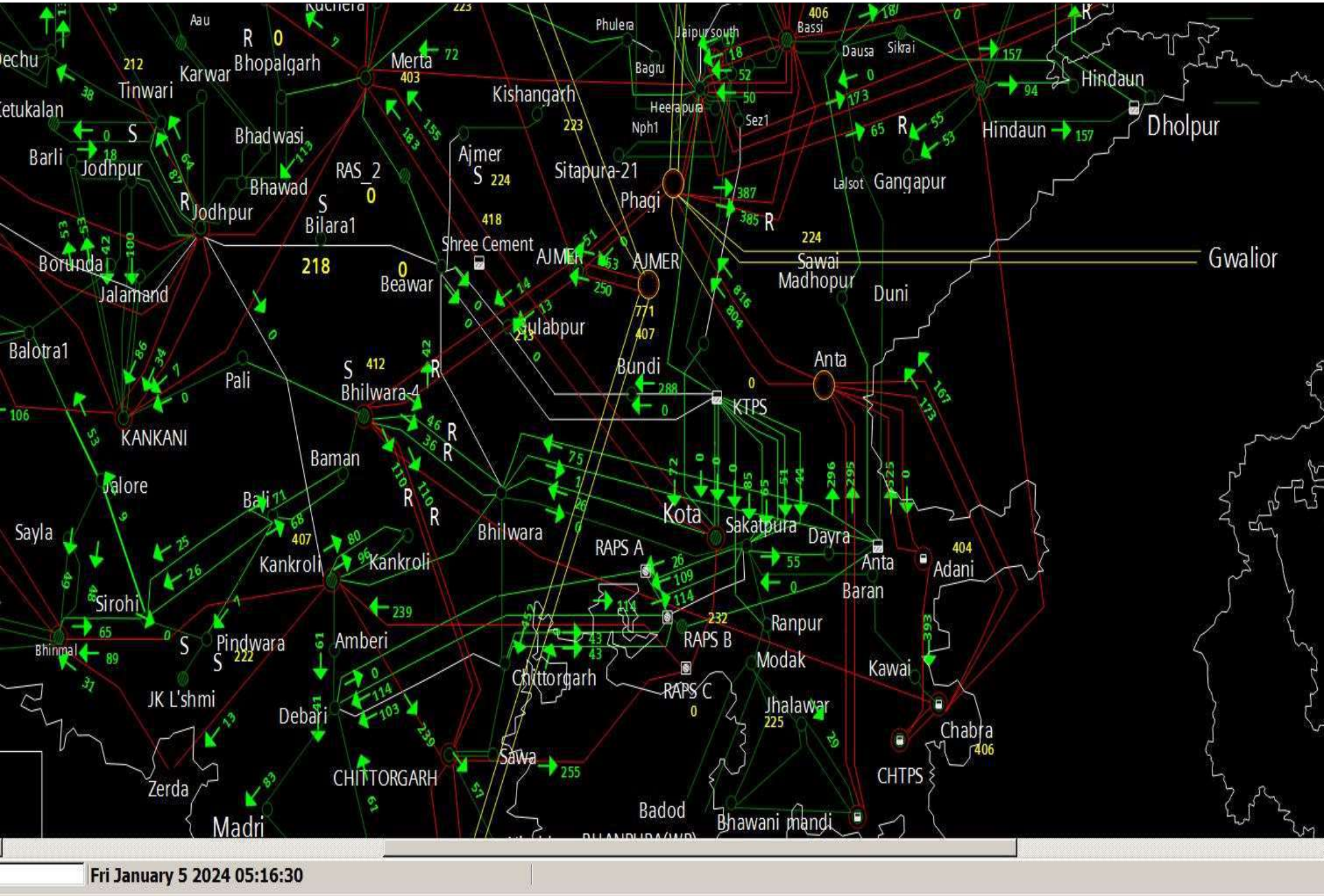
Element wise MW load flow



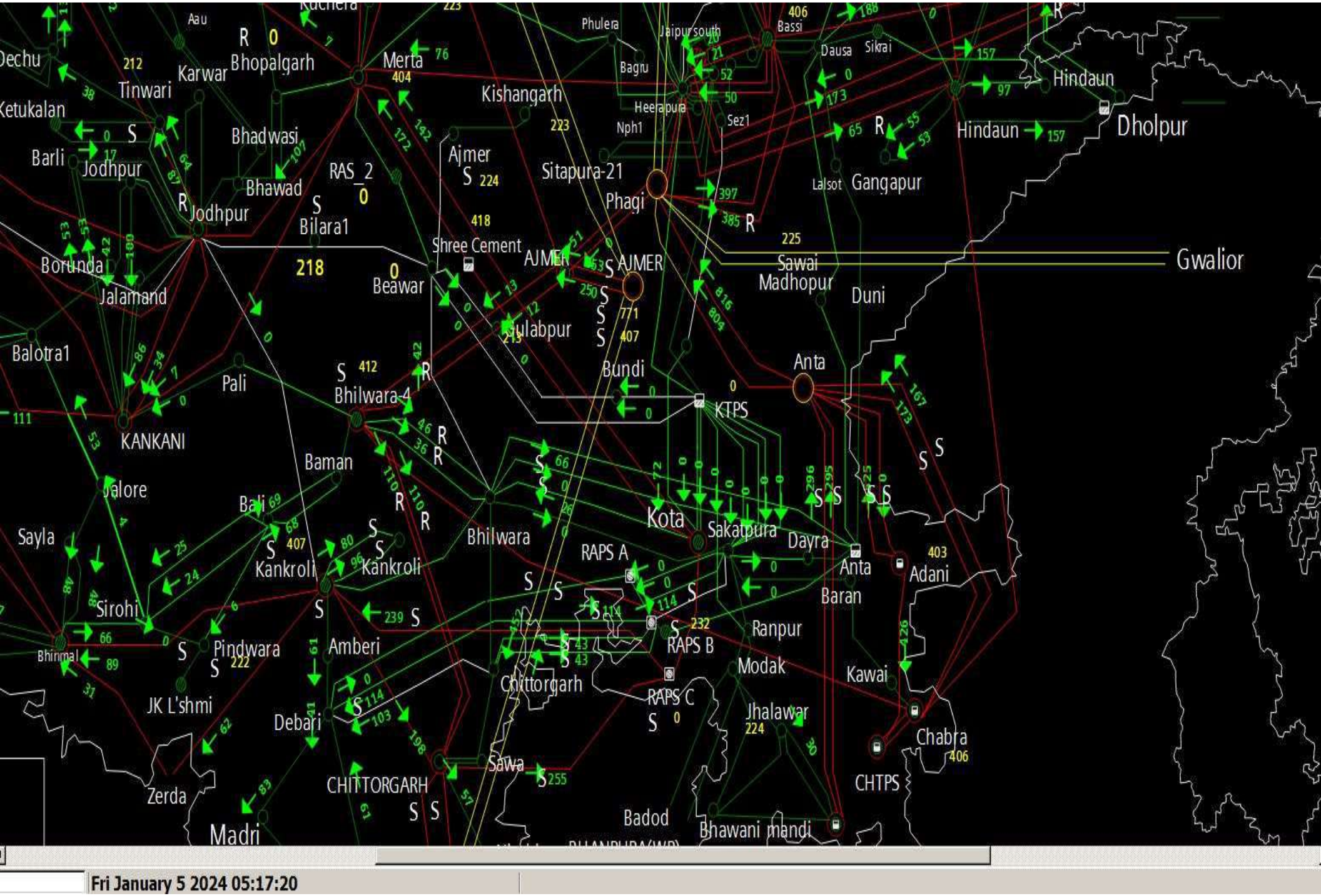
Network diagram @05:16:00hrs



Network diagram @05:16:30hrs

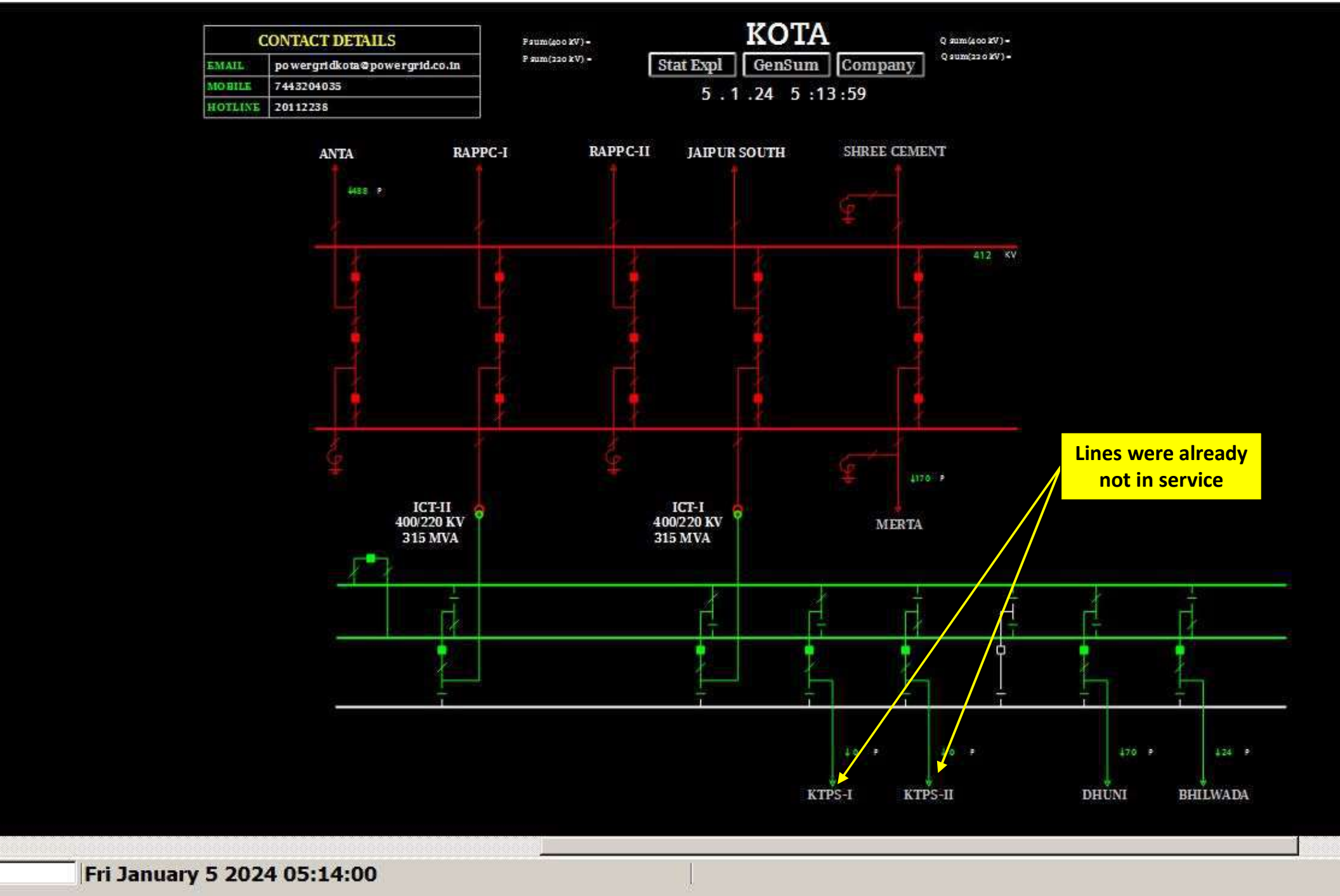


Network diagram @05:17:20hrs

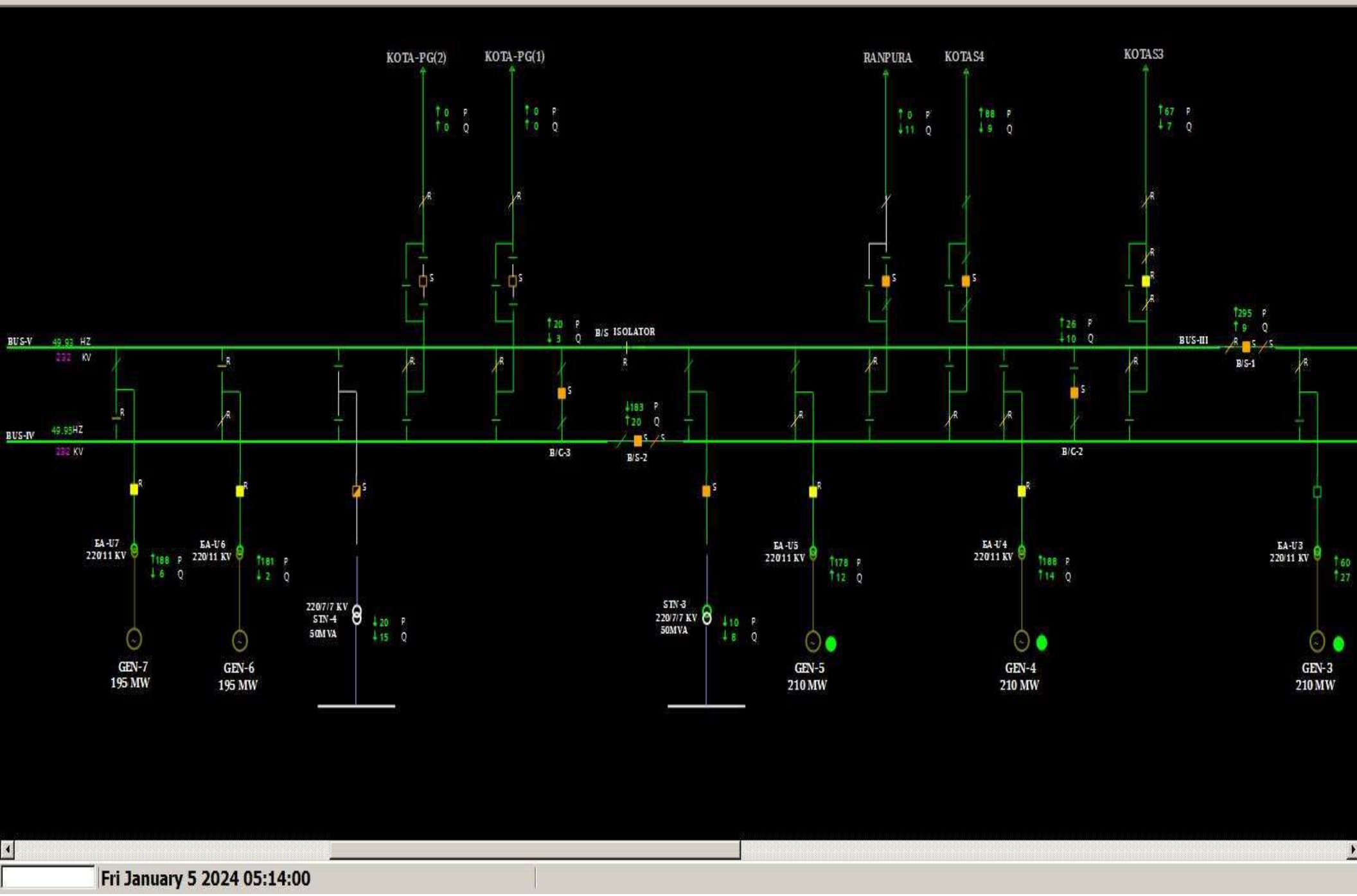


Fri January 5 2024 05:17:20

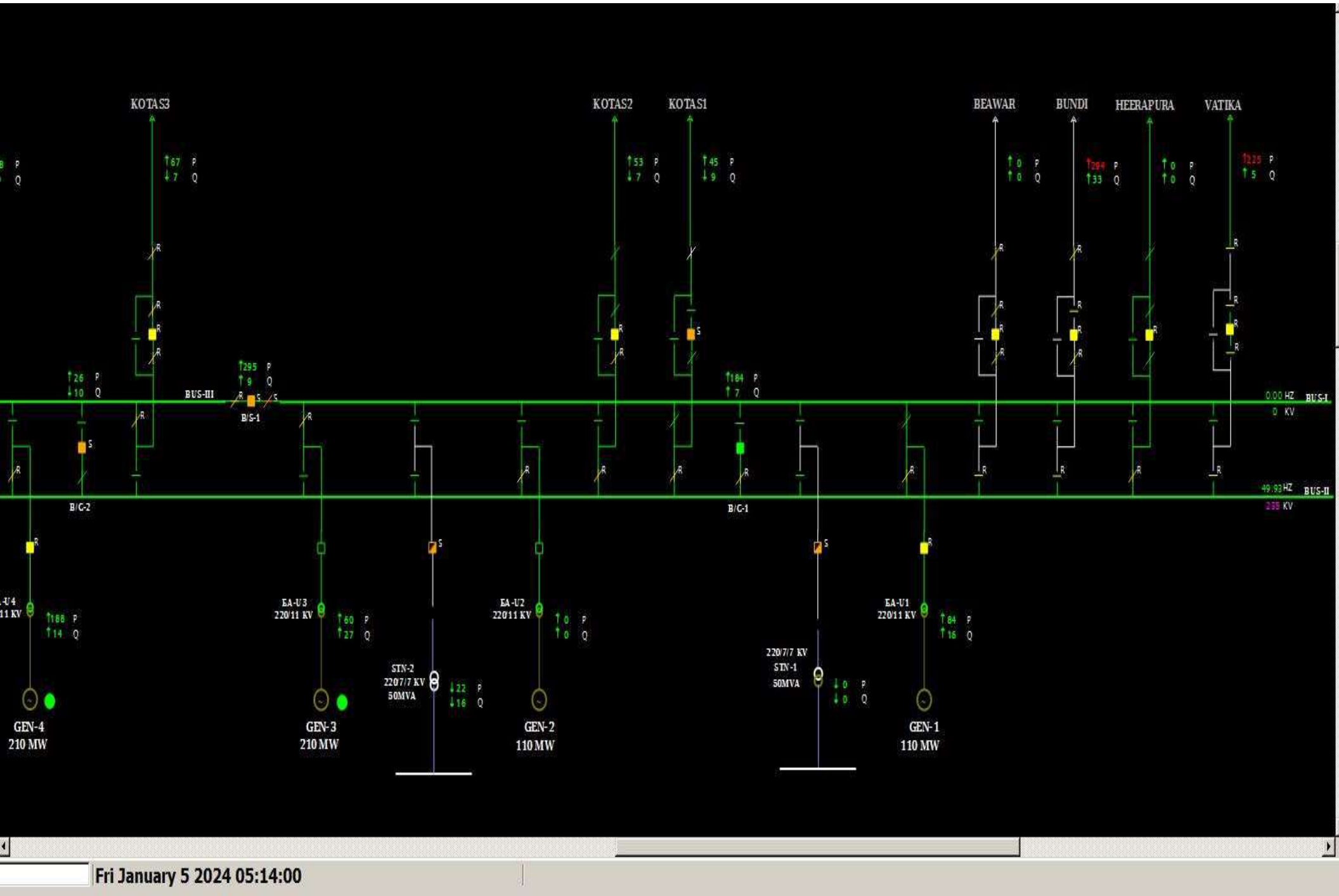
SLD of 400/220kV Kota(PG) before the event



SLD of 220kV KTPS before the event (1/2)

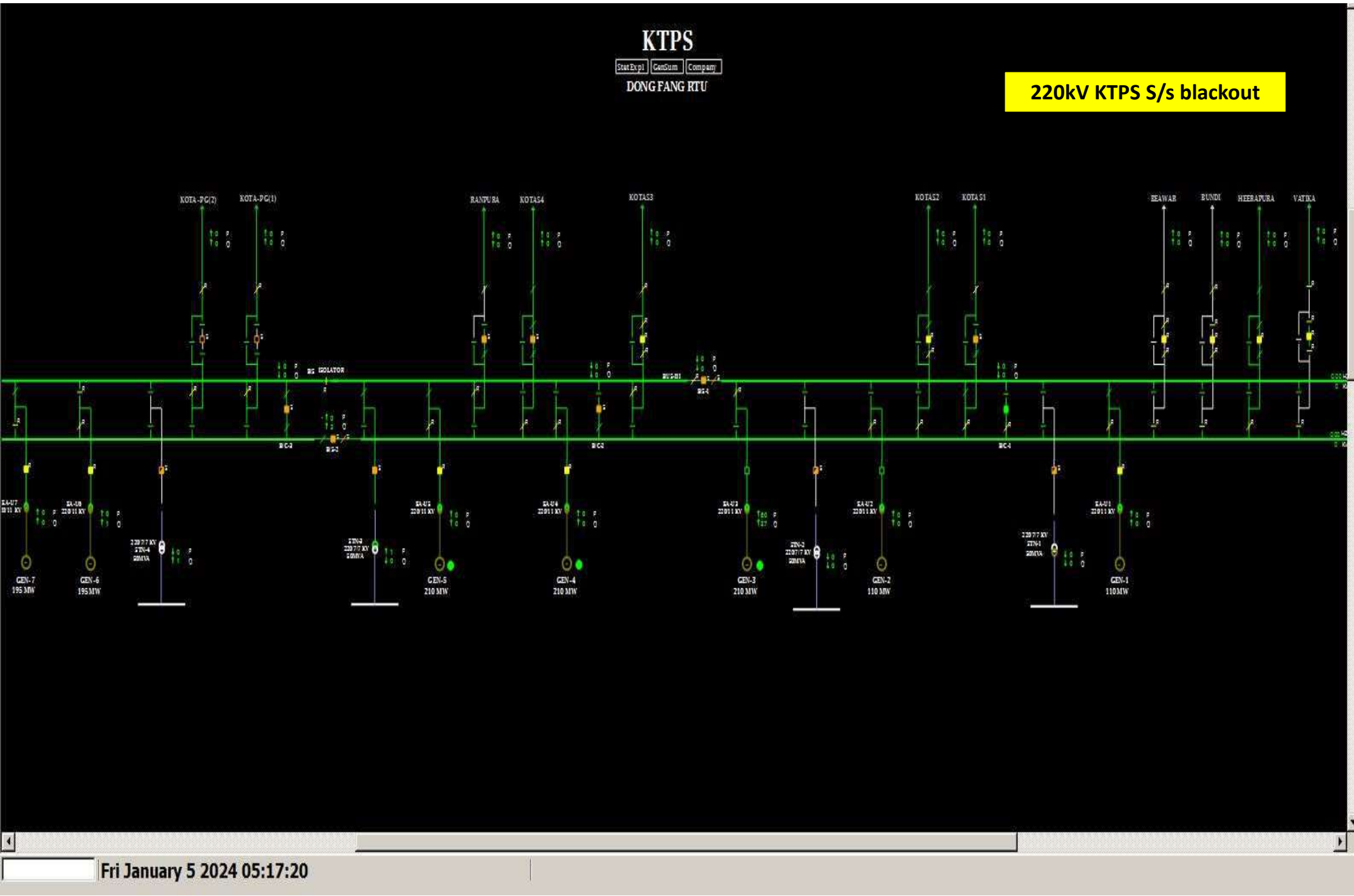


SLD of 220kV KTPS before the event (2/2)

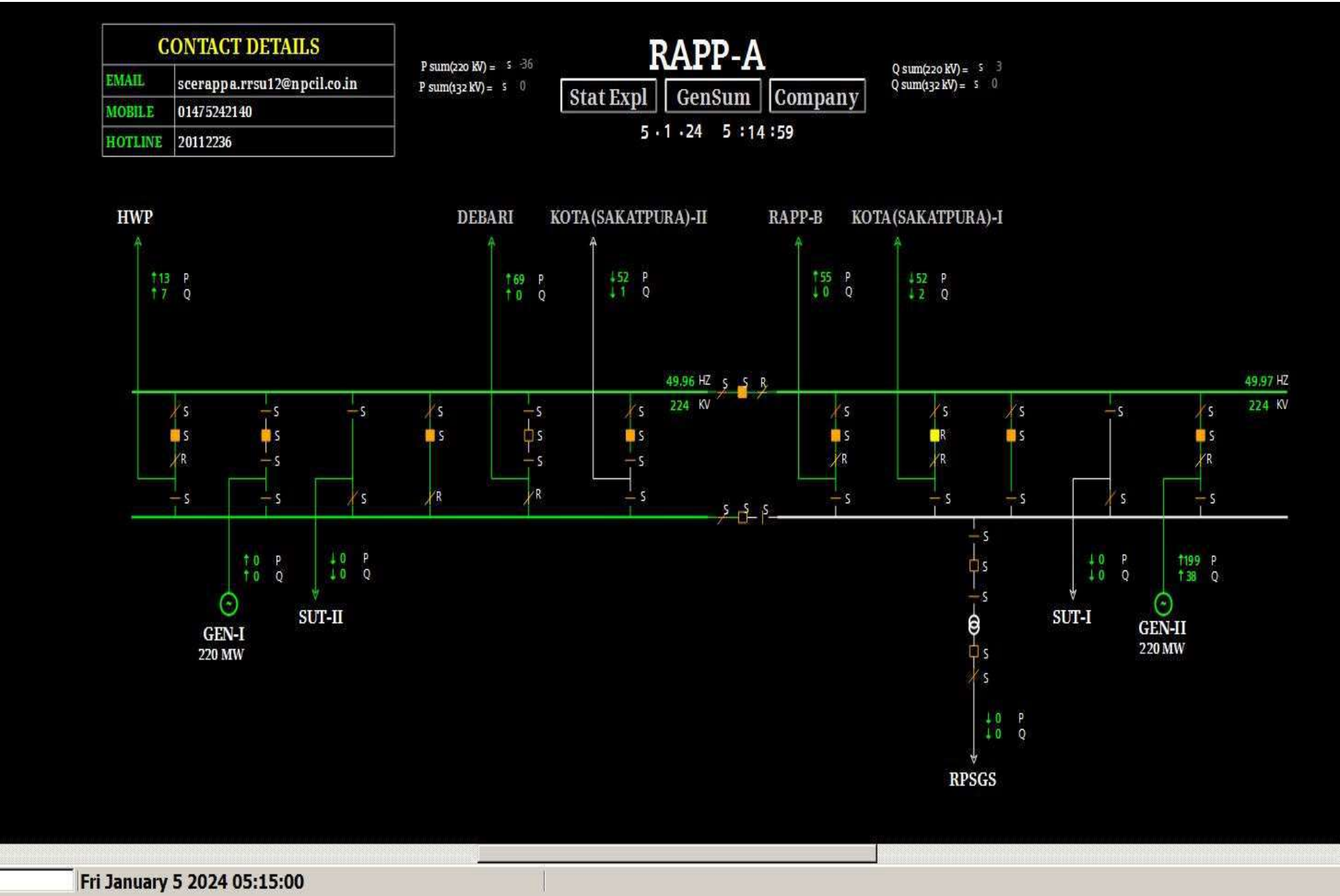


Fri January 5 2024 05:14:00

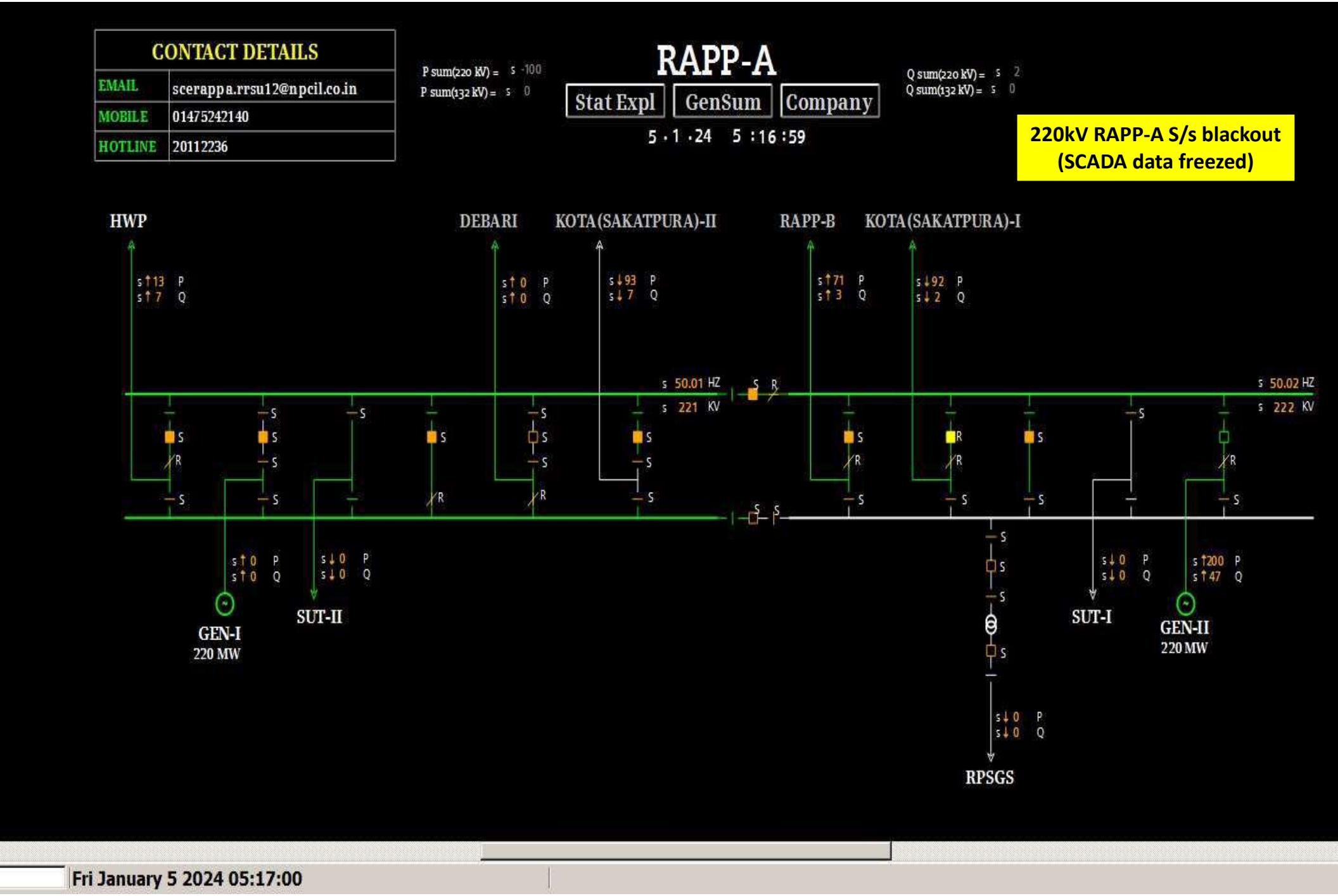
SLD of 220kV KTPS after the event



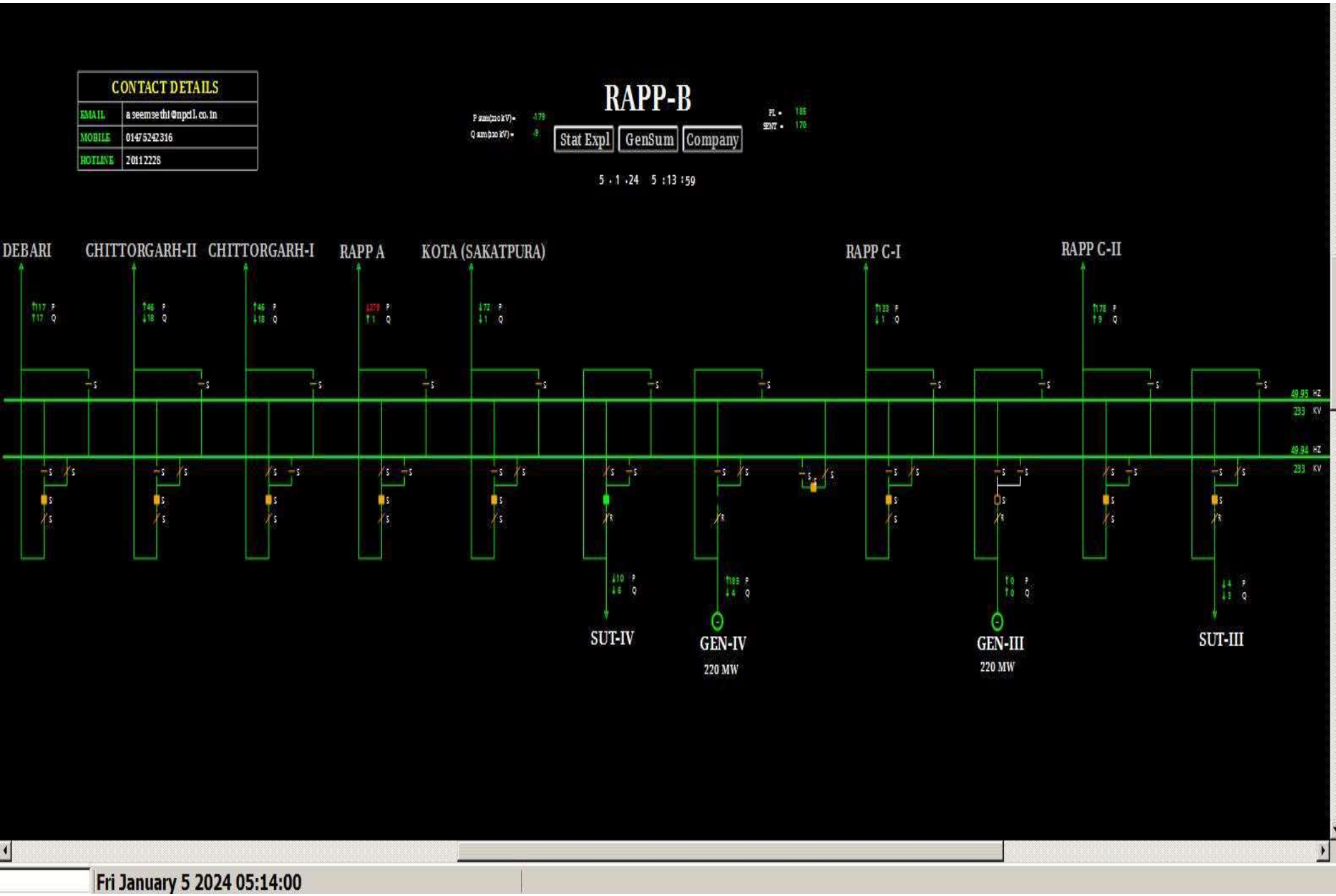
SLD of 220kV RAPP-A(NP) before the event



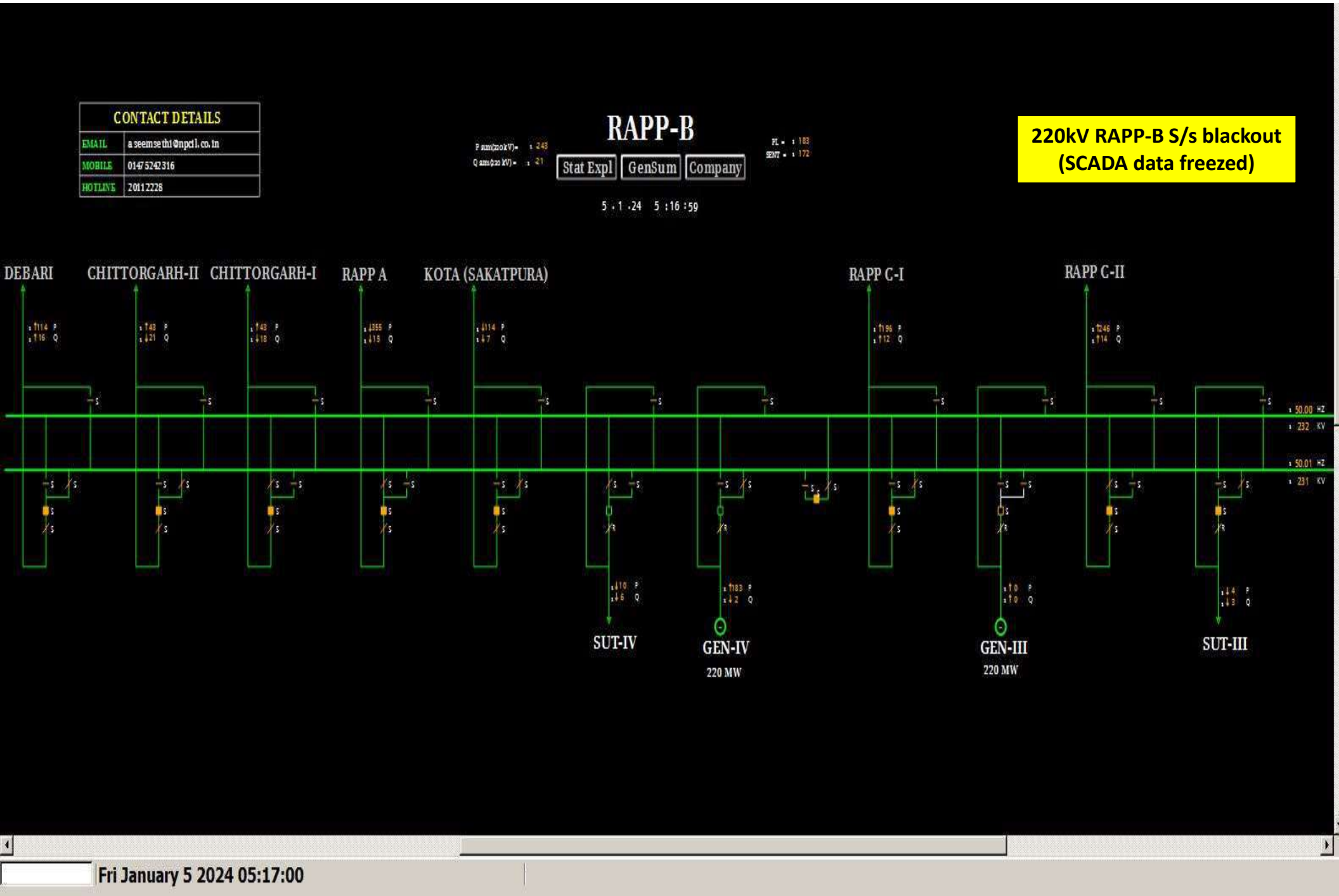
SLD of 220kV RAPP-A(NP) after the event



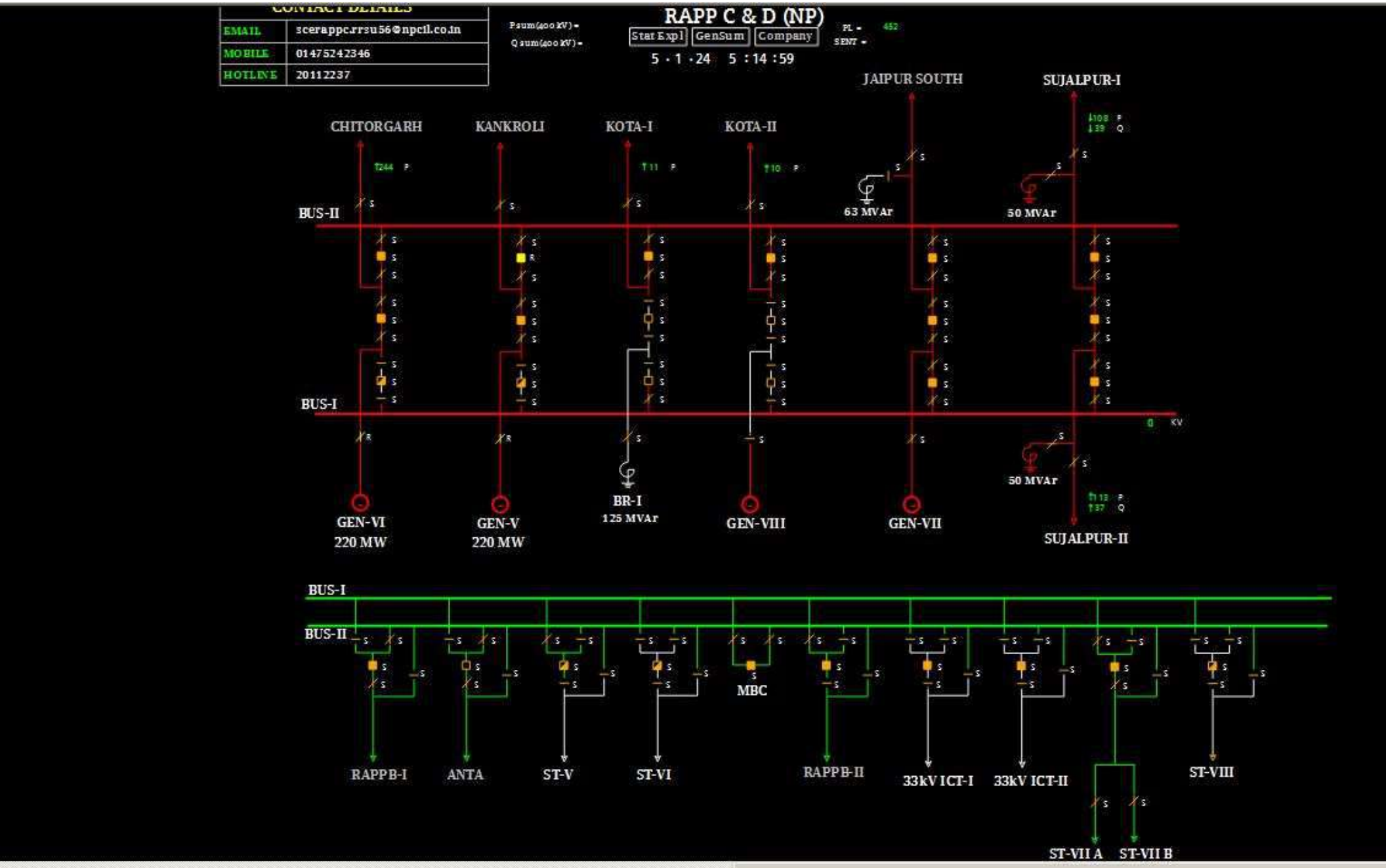
SLD of 220kV RAPP-B(NP) before the event



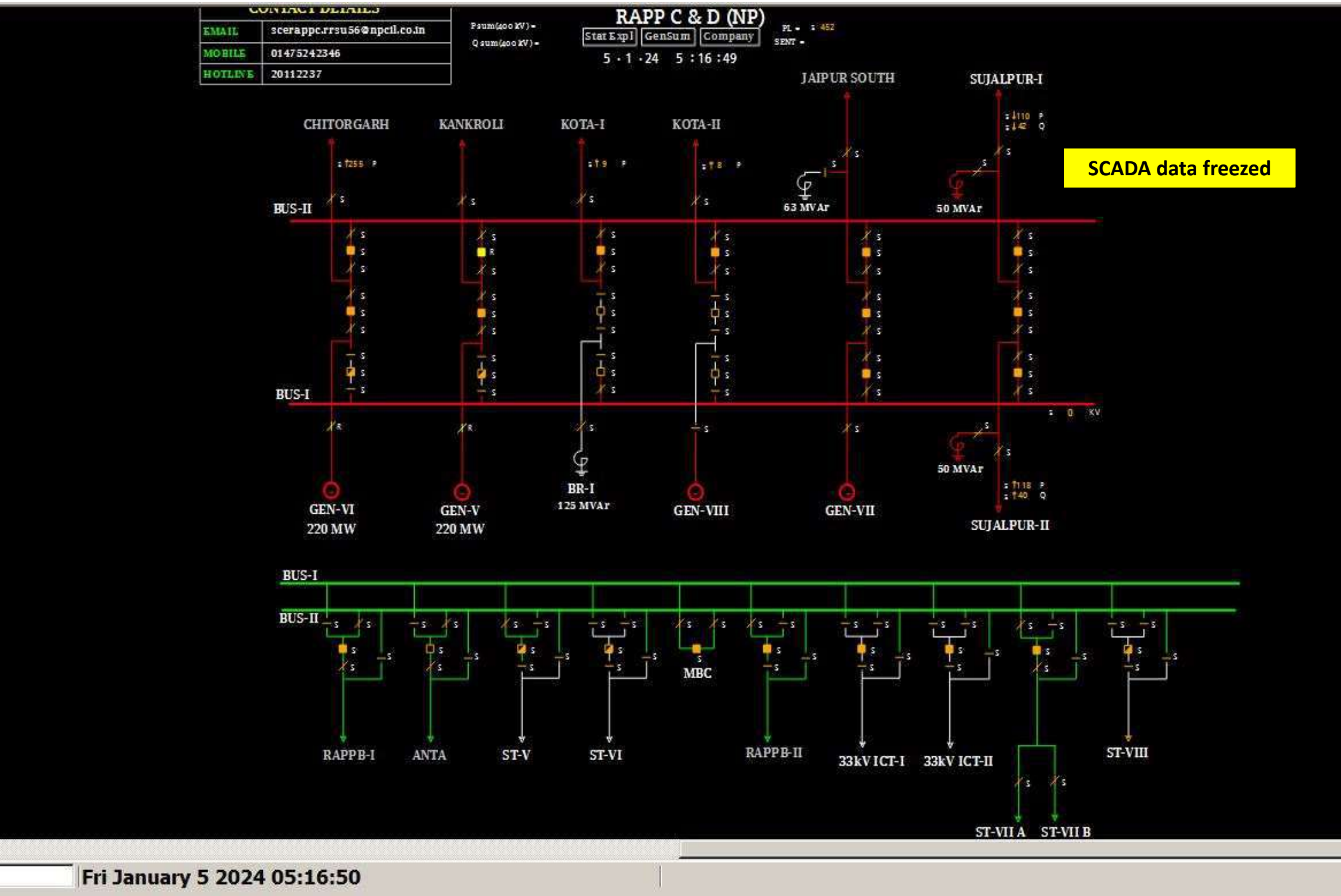
SLD of 220kV RAPP-B(NP) after the event



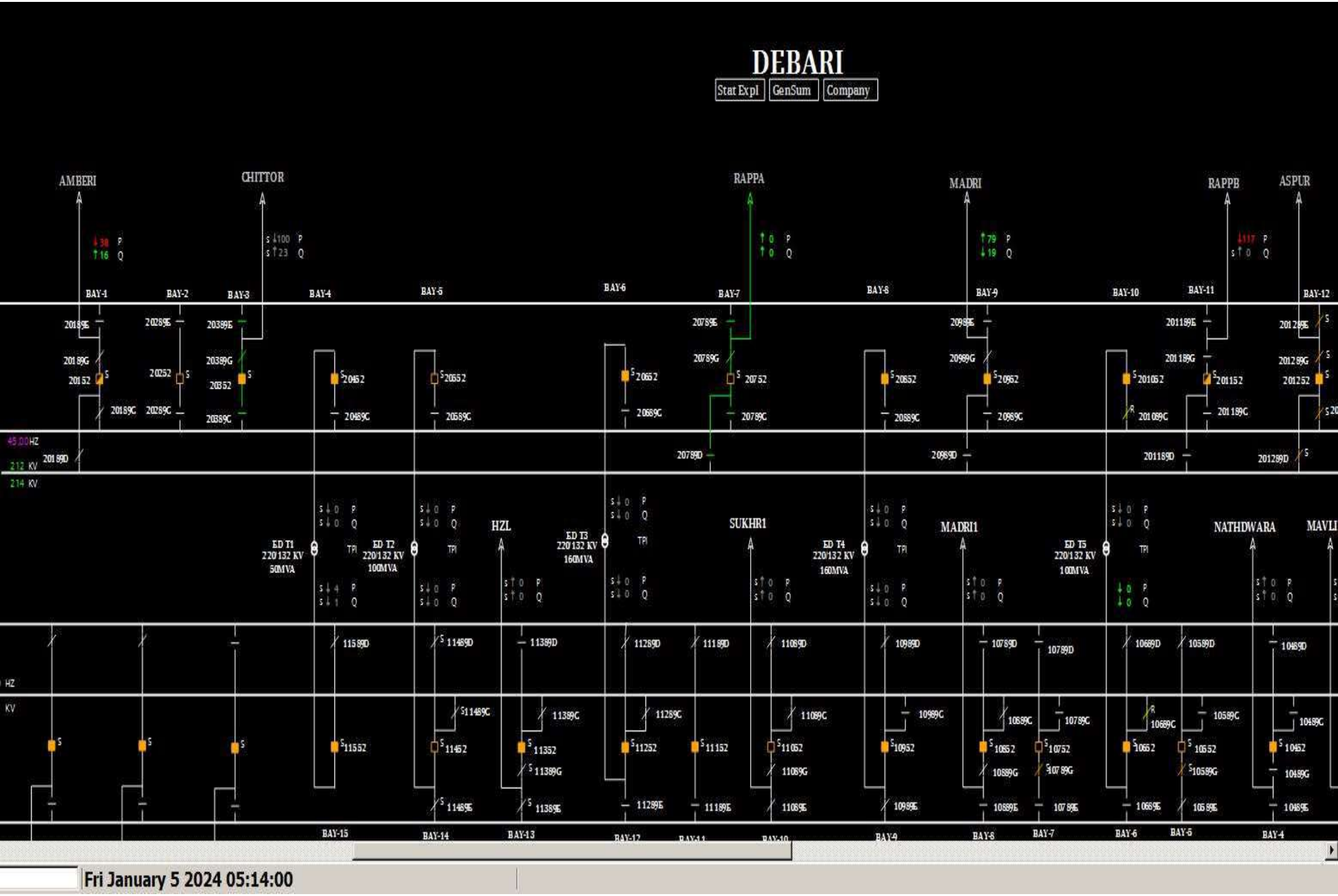
SLD of 400/220kV RAPP-C(NP) before the event



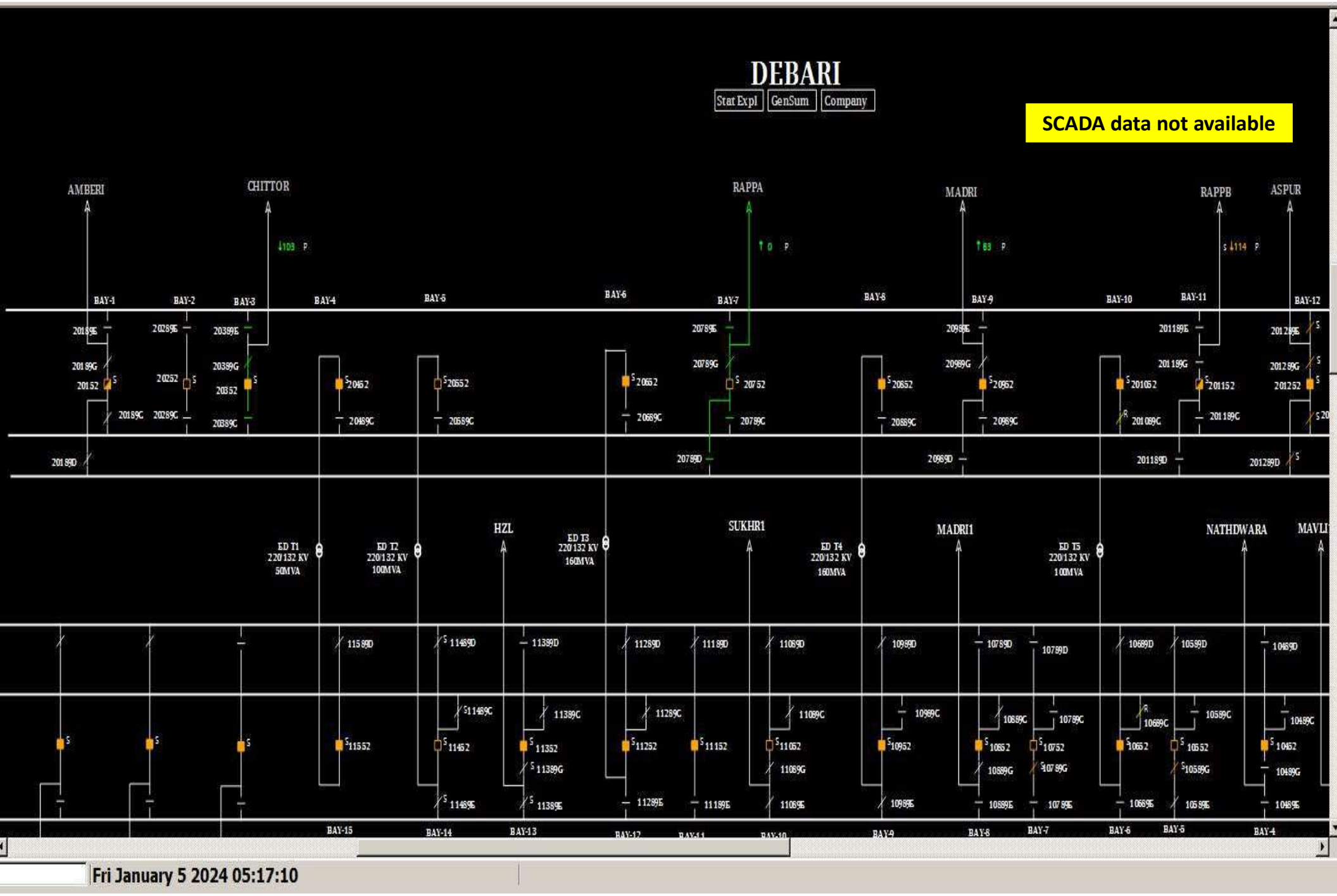
SLD of 400/220kV RAPP-C(NP) after the event



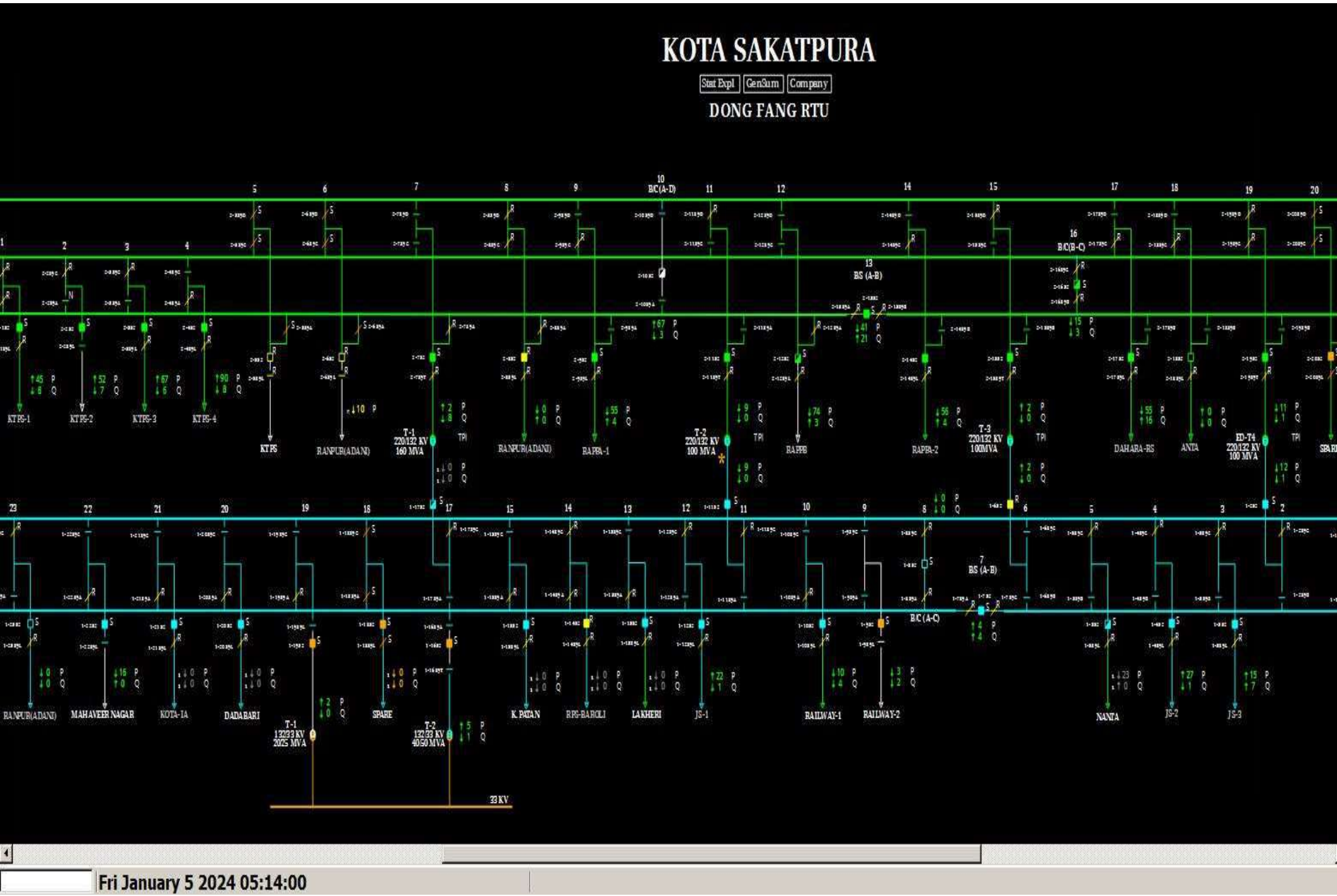
SLD of 220/132kV Debari(RS) before the event



SLD of 220/132kV Debari(RS) after the event

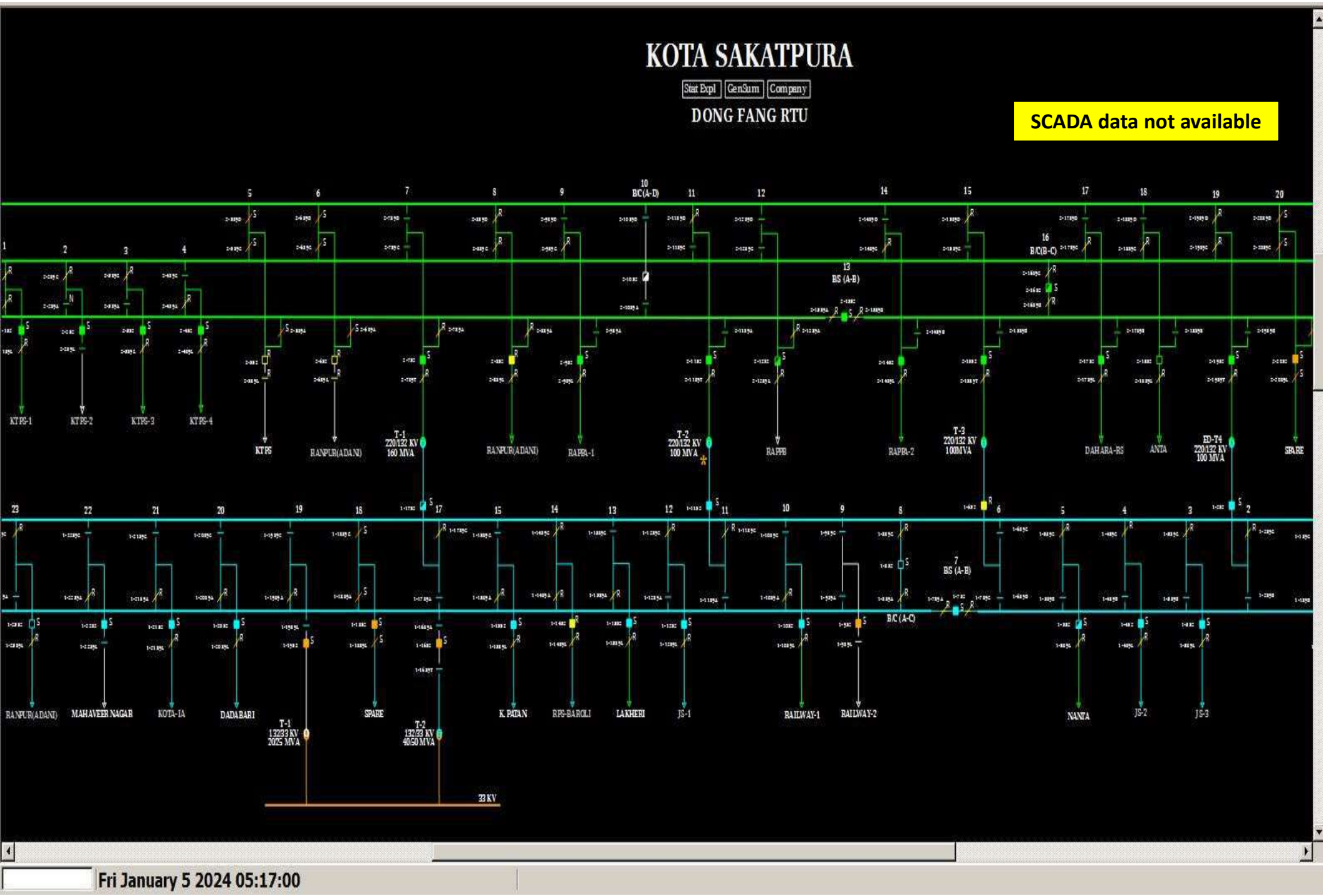


SLD of 220/132kV Kota Sakatpura(RS) before the event



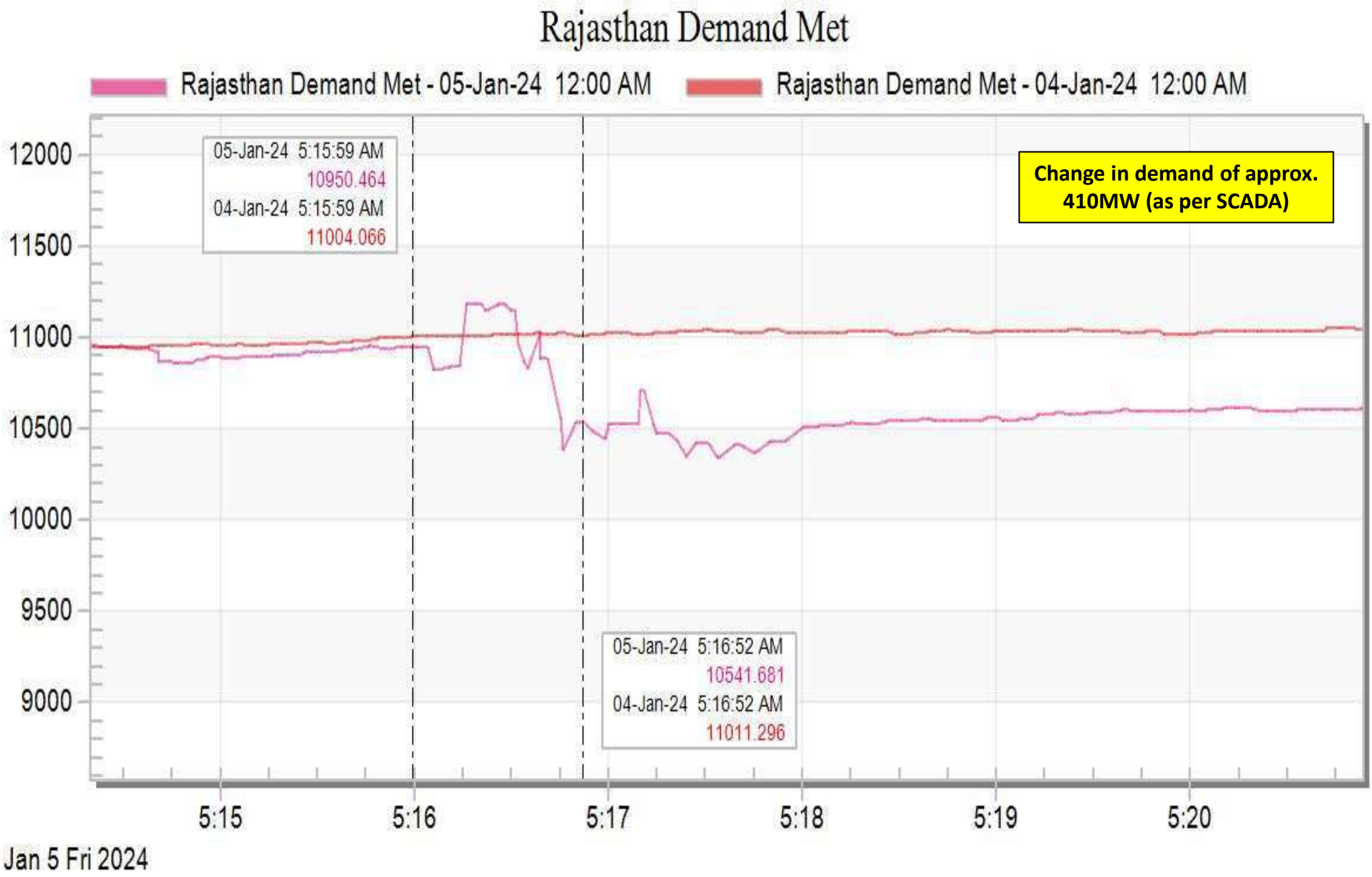
Fri January 5 2024 05:14:00

SLD of 220/132kV Kota Sakatpura(RS) after the event

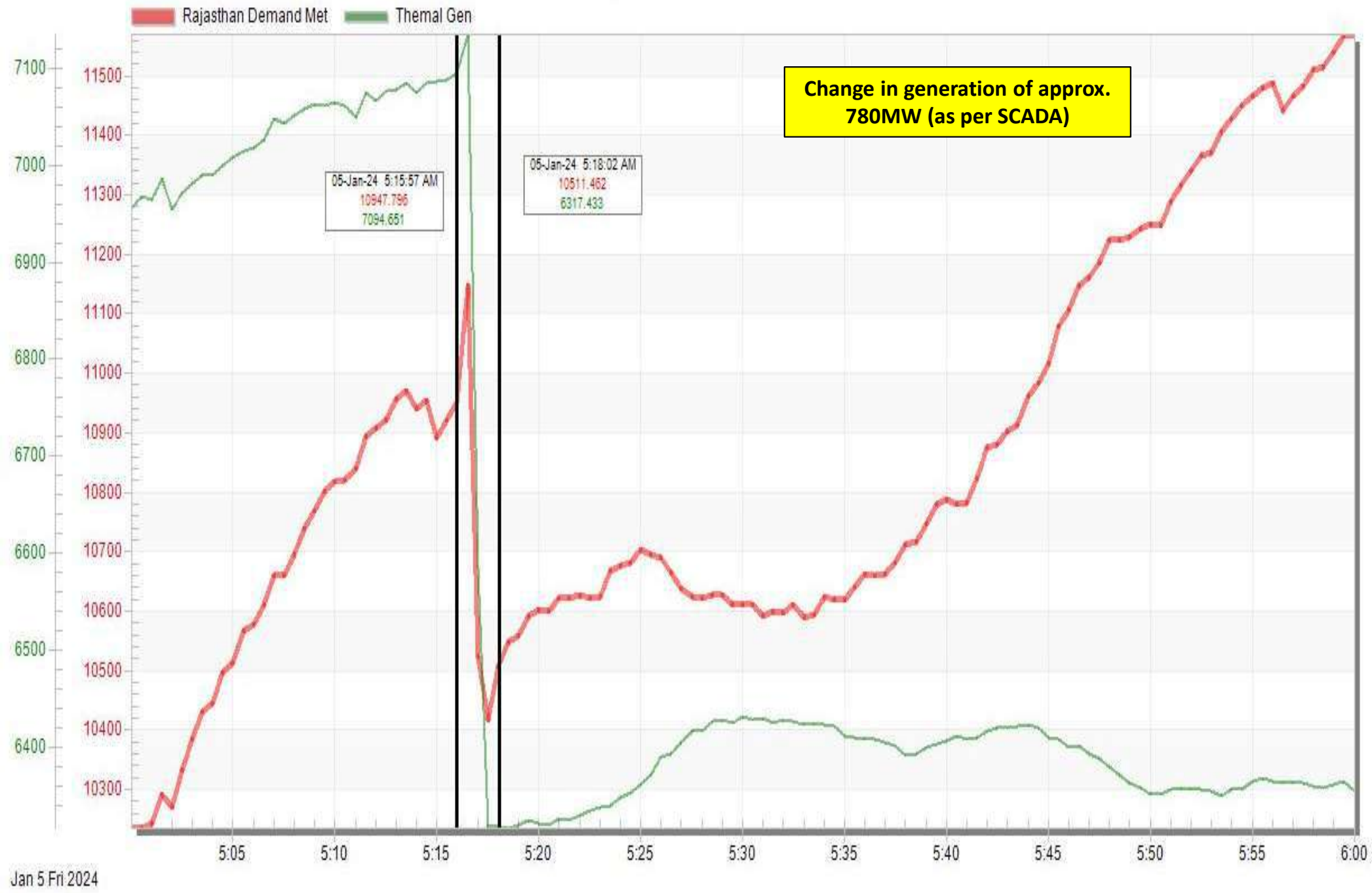


Fri January 5 2024 05:17:00

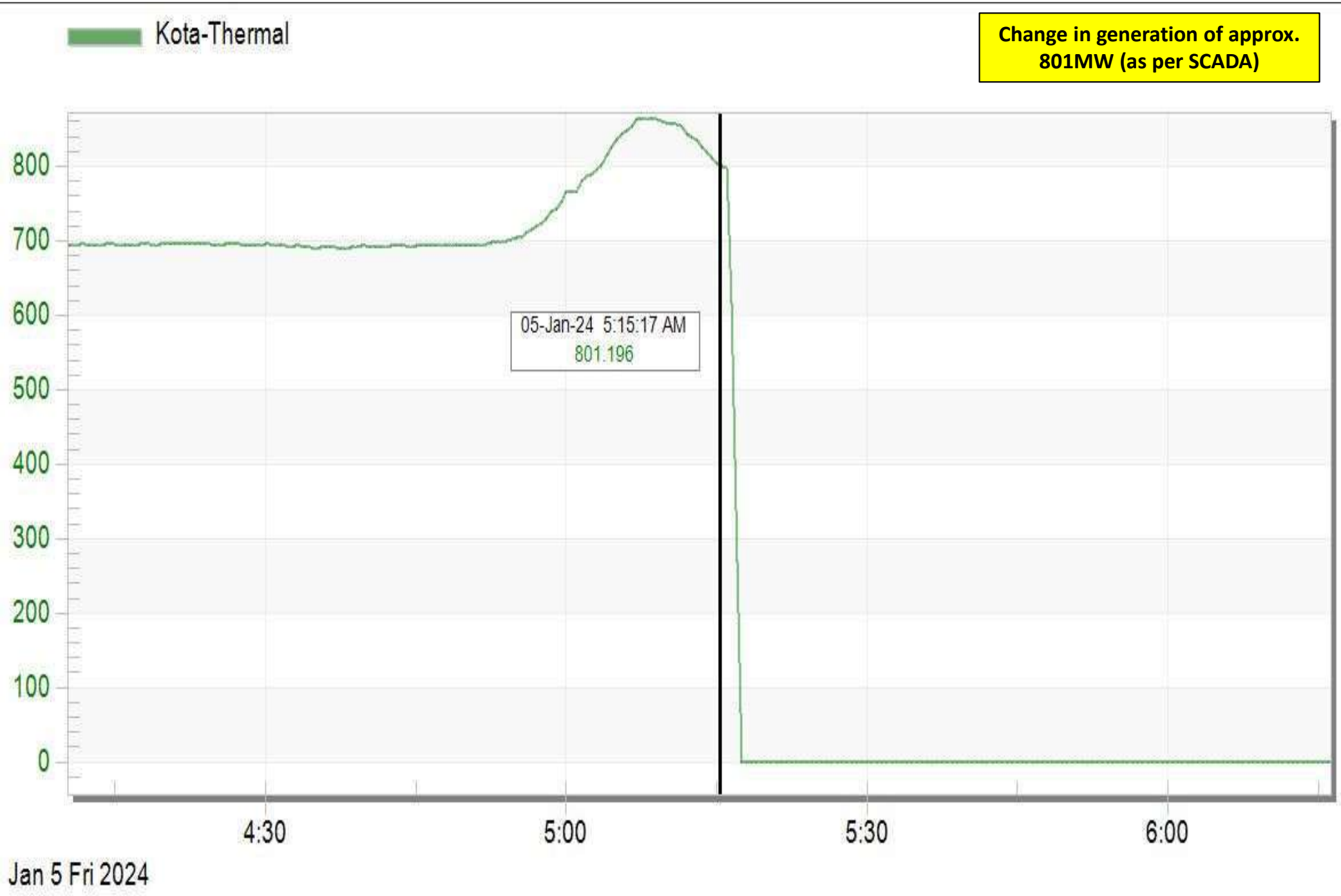
Rajasthan demand during the event



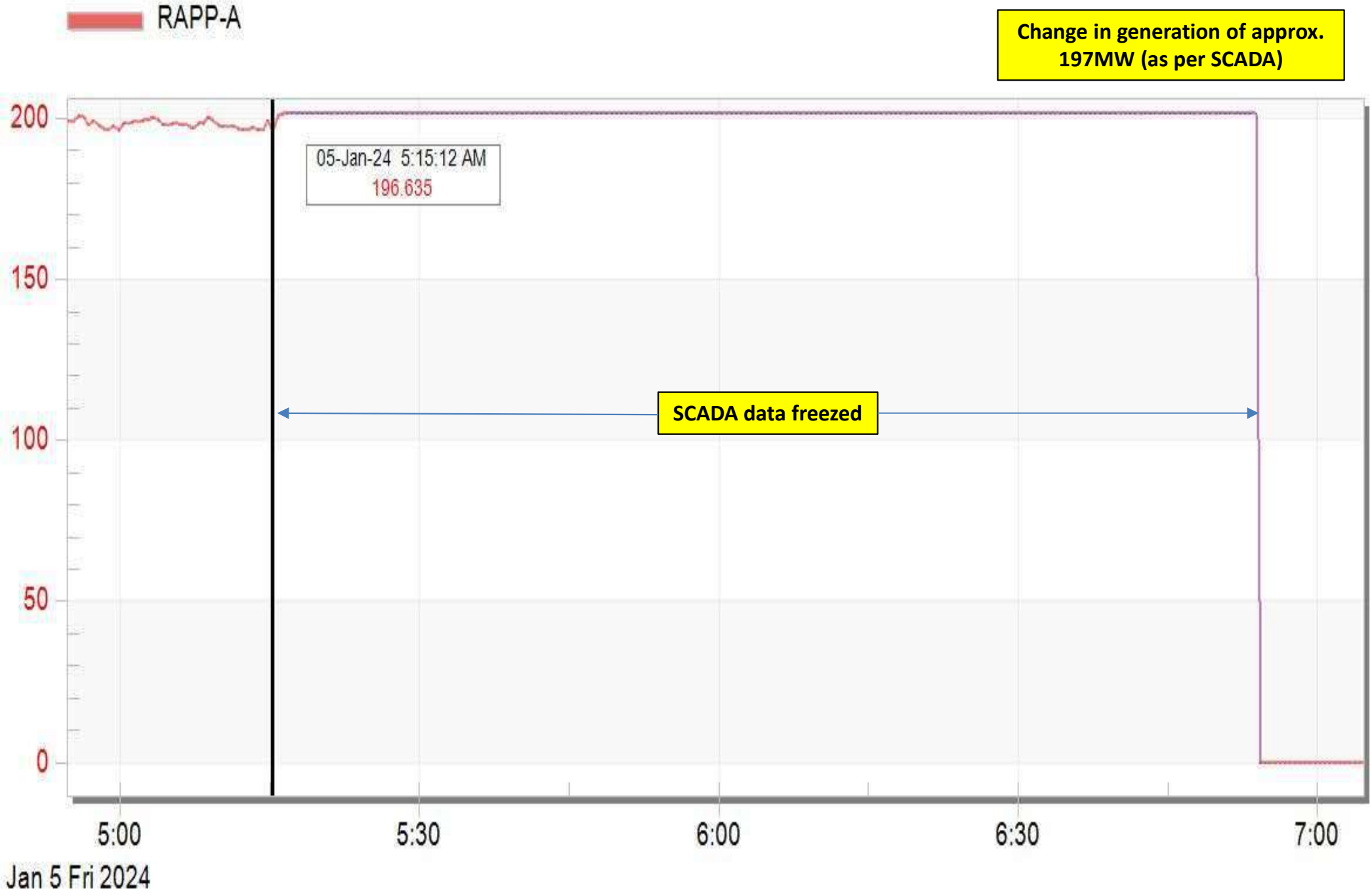
Rajasthan demand vs generation during the event



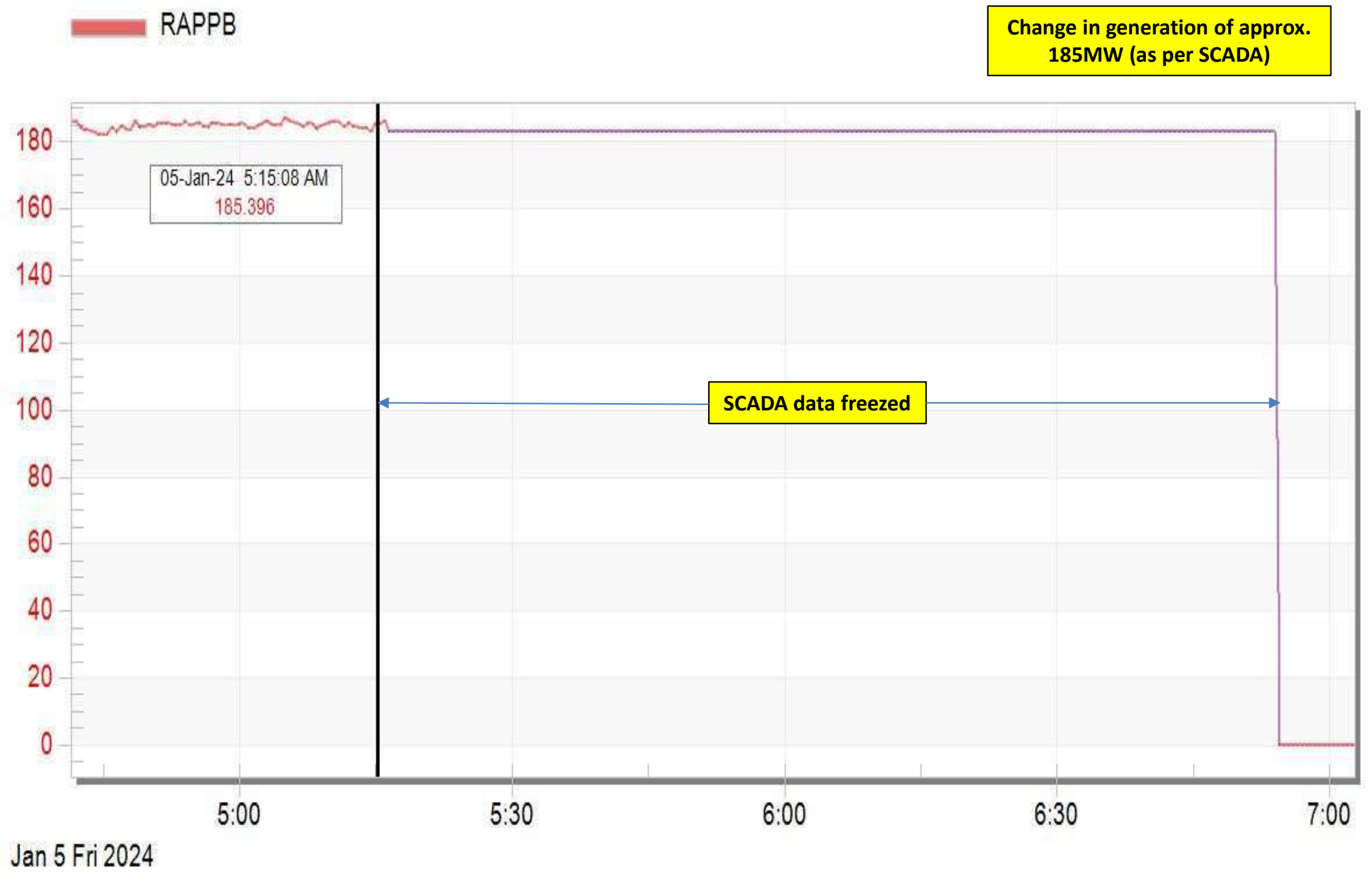
KTPS generation during the event



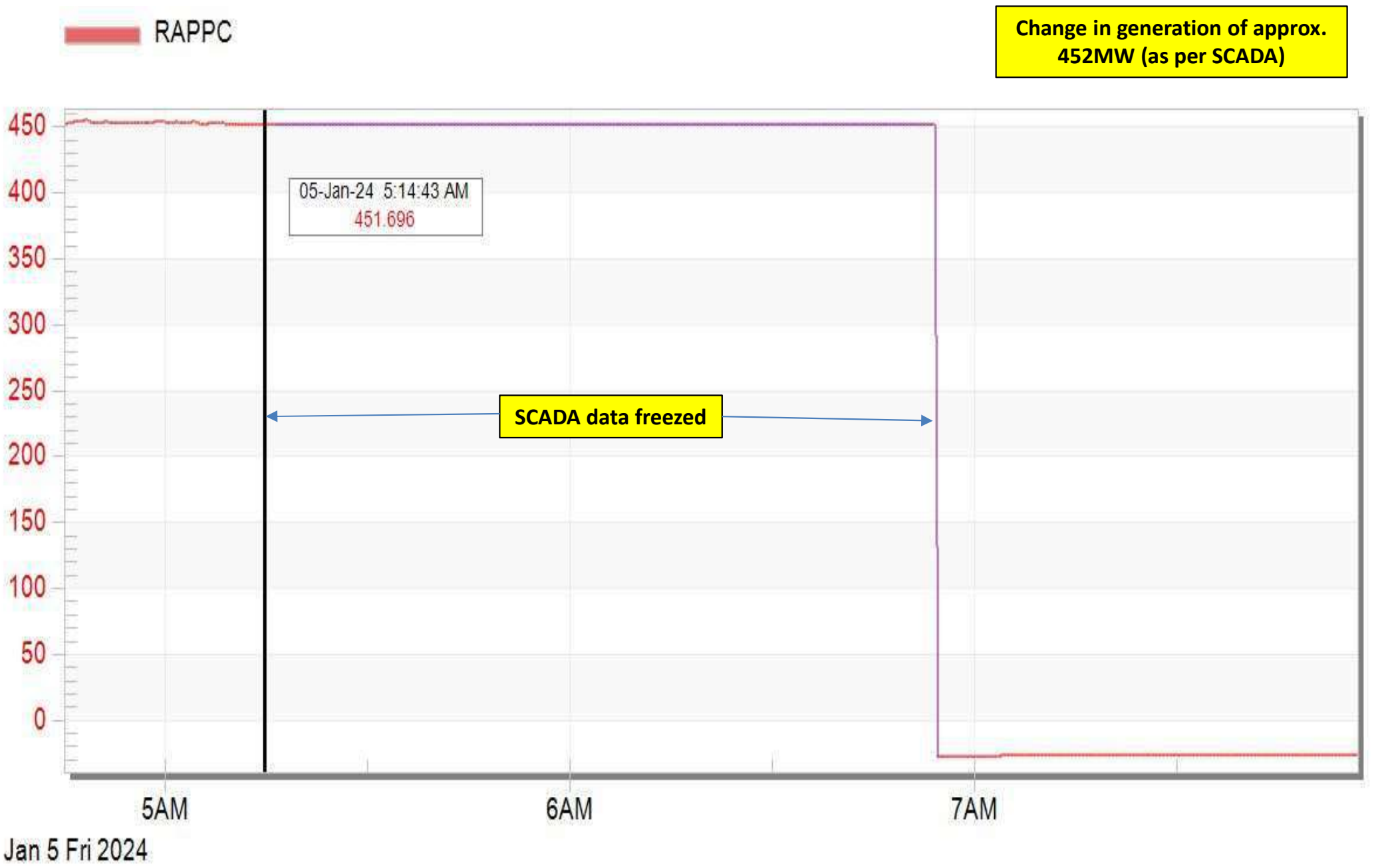
RAPP-A(NP) generation during the event



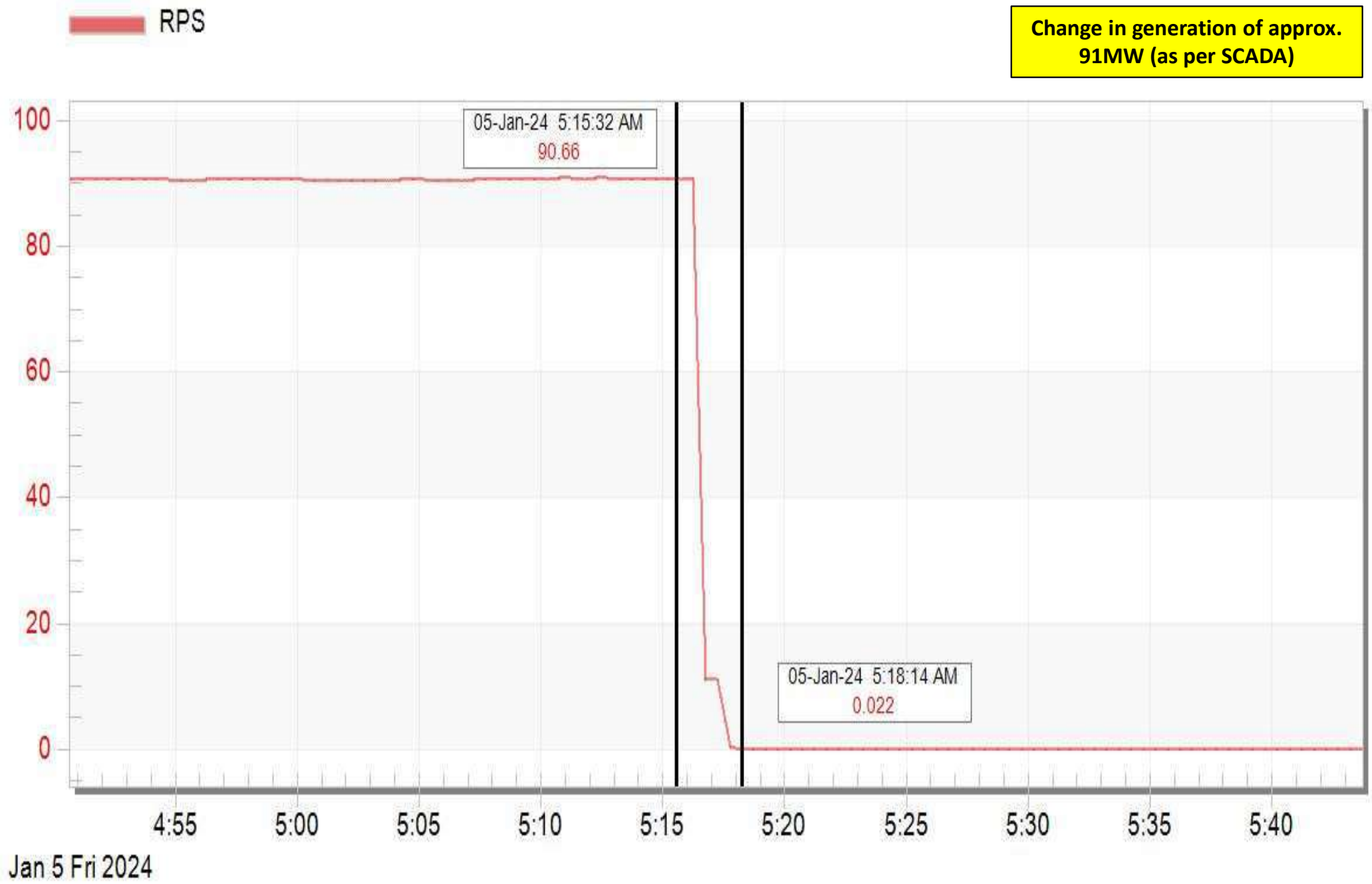
RAPP-B(NP) generation during the event



RAPP-C(NP) generation during the event

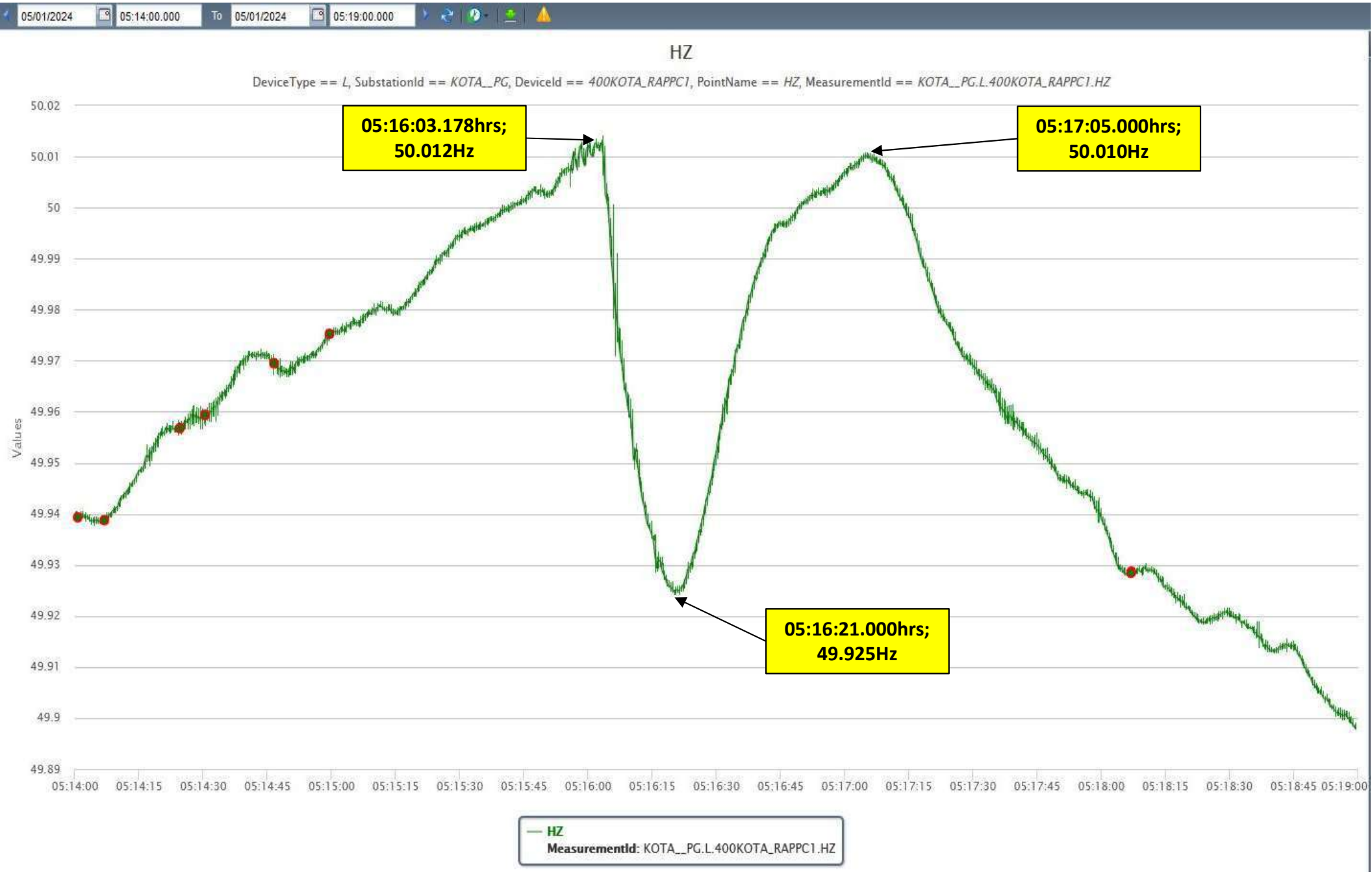


RPS HEP generation during the event



PMU Plot of frequency at Kota(PG)

05:16 hrs/05-Jan-24



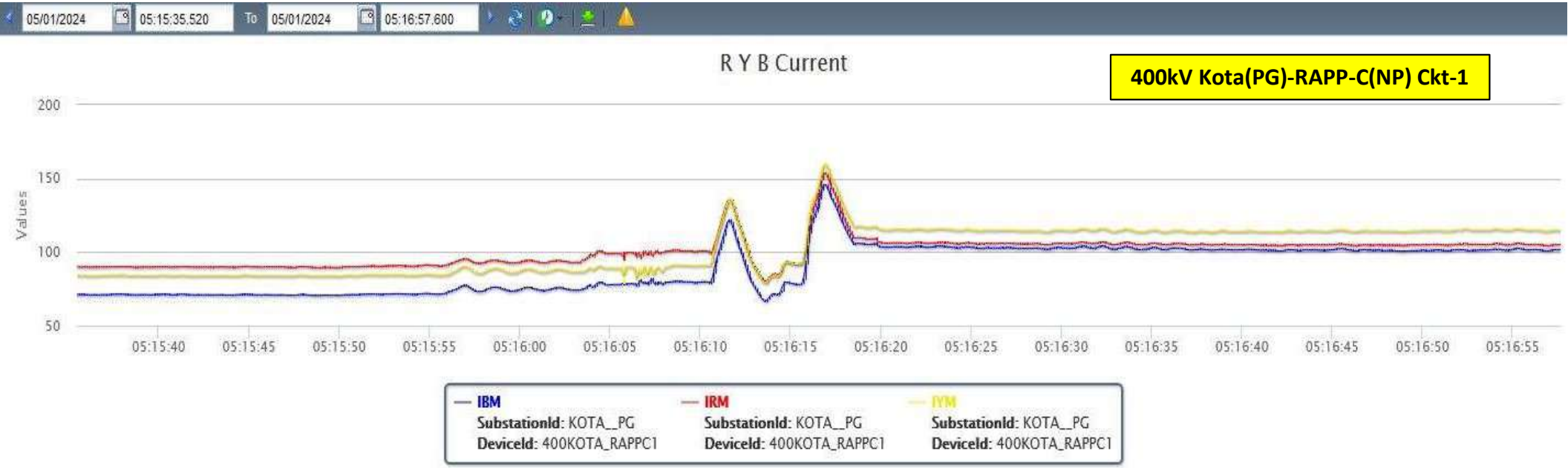
PMU Plot of phase voltage magnitude at Kota(PG)

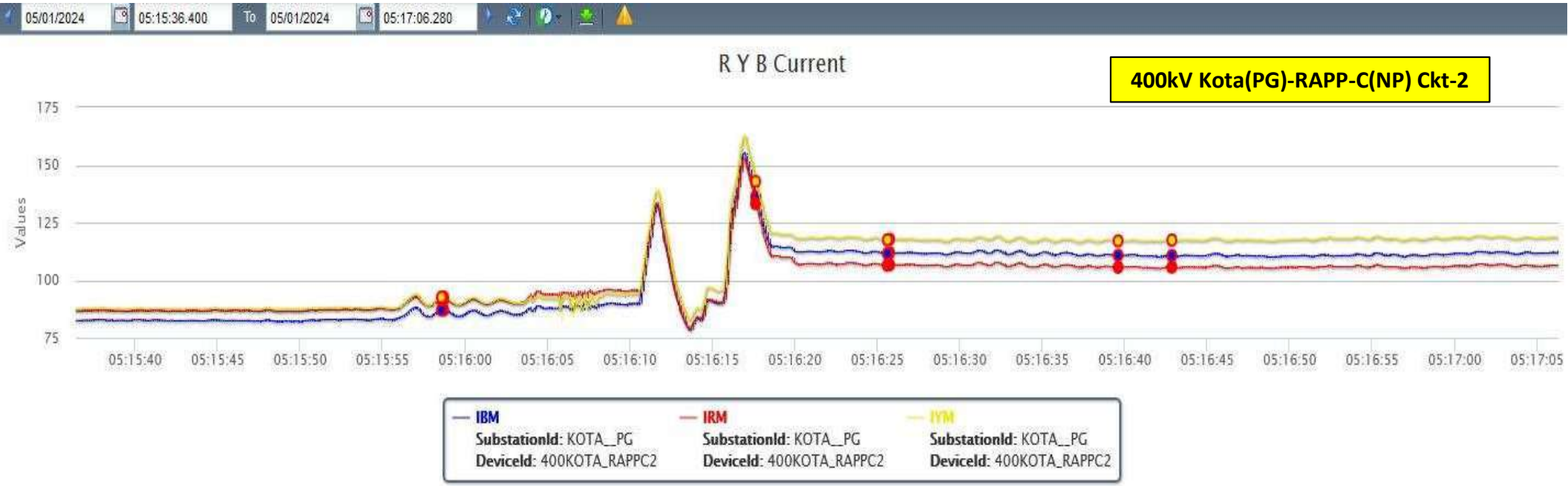
05:16 hrs/05-Jan-24



PMU Plot of phase current magnitude at Kota(PG)

05:16 hrs/05-Jan-24

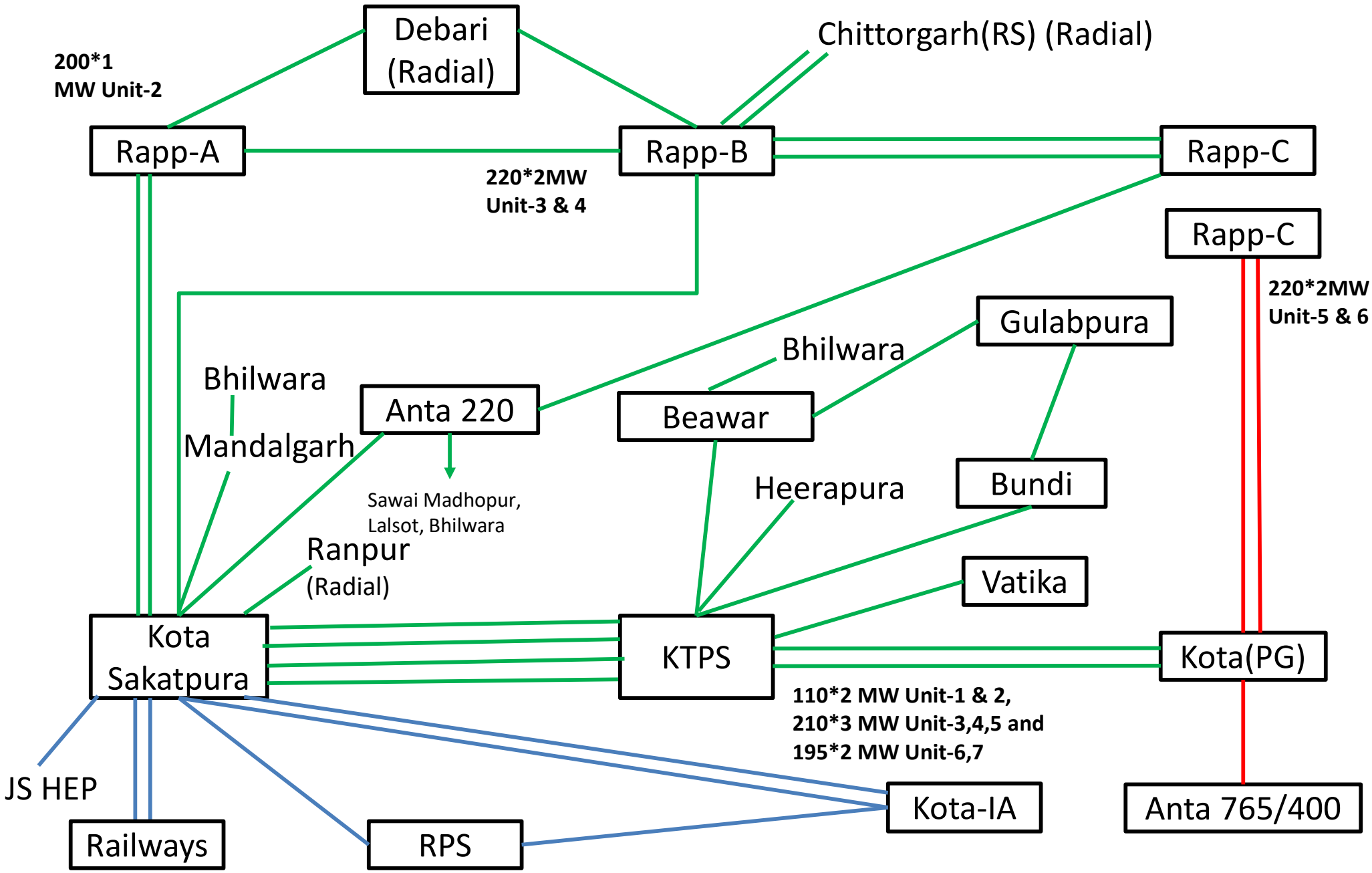




MULTIPLE ELEMENTS TRIPPING AT KTPS(RS), KOTA SAKATPURA, RAPP-A, RAPP-B AND RAPP-C

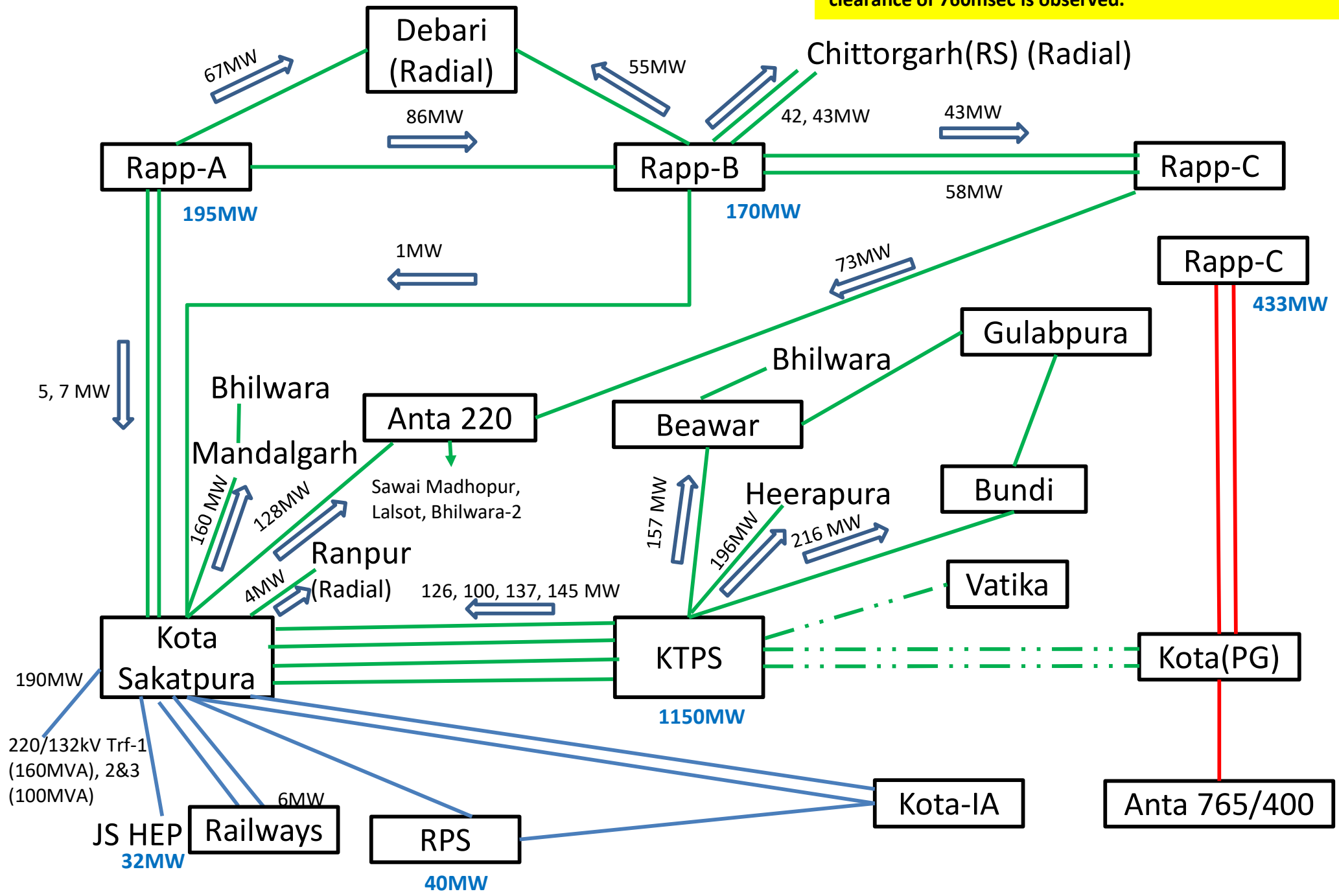
AT 20:22HRS ON 29TH MAR'2024

Connection Diagram between KTPS, RAPS generation complex



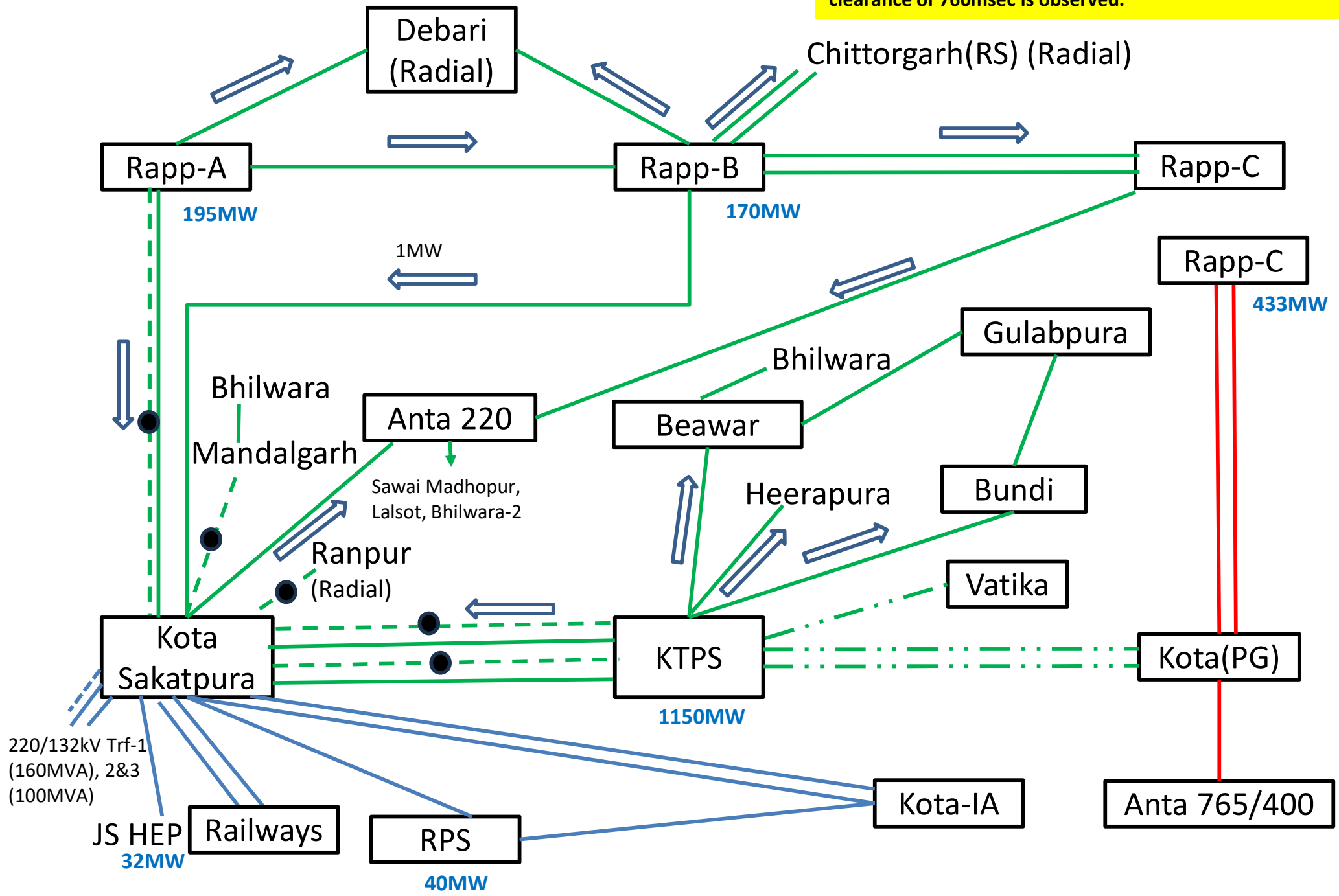
Antecedent scenario (at 20:21 hrs)

Triggering incident: R-ph CT (220 kV side) of 220 kV/132 kV ICT-1 at Kota Sakatpura blast. As per PMU, R-N fault at 20:21:52:280hrs converted into 3-ph fault with delayed clearance of 760msec is observed.



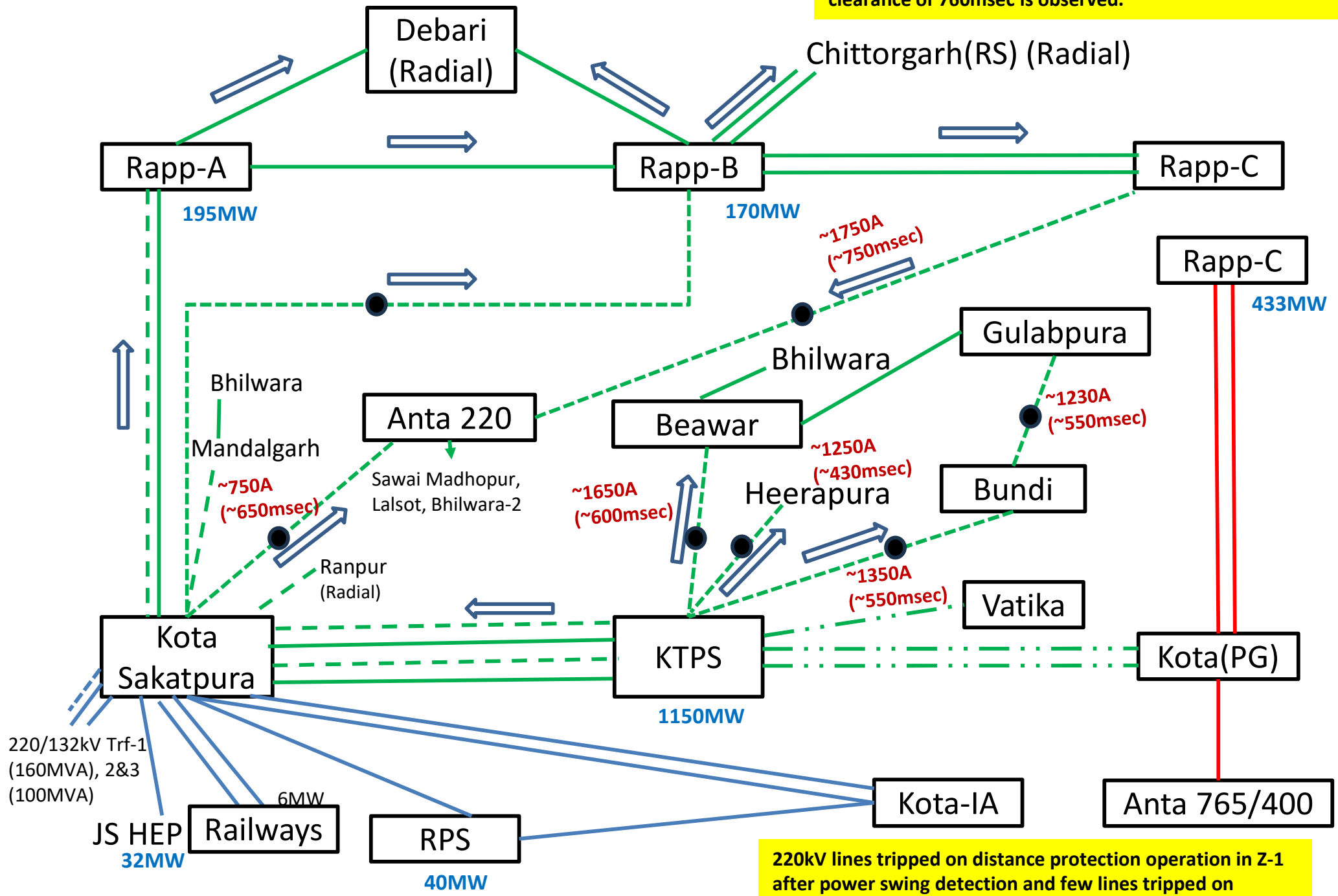
Tripping of multiple 220kV lines in complex (within 200msec of fault time (20:21:52:280hrs))

Triggering incident: R-ph CT (220 kV side) of 220 kV/132 kV ICT-1 at Kota Sakatpura blast. As per PMU, R-N fault at 20:21:52:280hrs converted into 3-ph fault with delayed clearance of 760msec is observed.



Tripping of multiple 220kV lines in complex (within 600-650msec of fault time (20:21:52:280hrs))

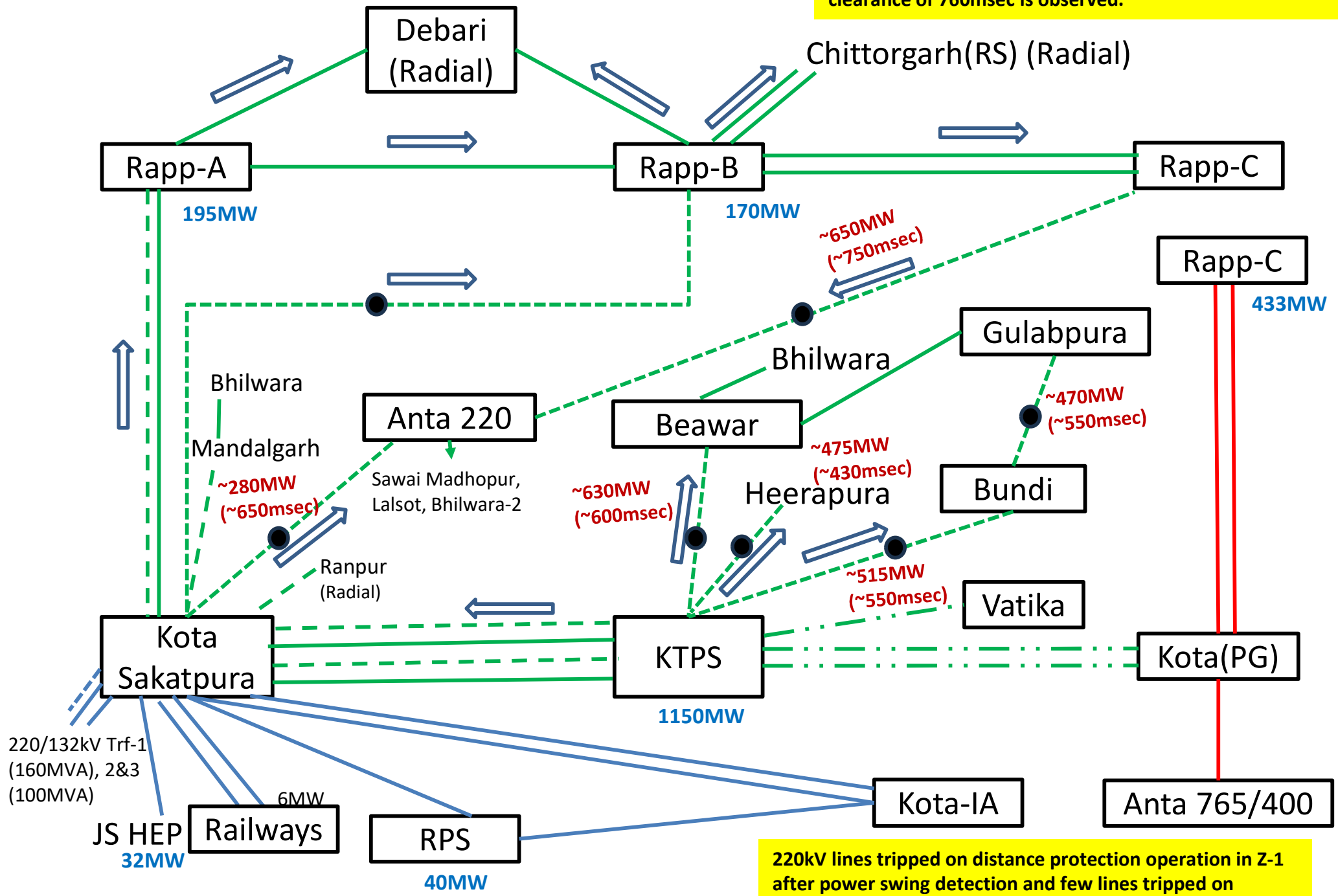
Triggering incident: R-ph CT (220 kV side) of 220 kV/132 kV ICT-1 at Kota Sakatpura blast. As per PMU, R-N fault at 20:21:52:280hrs converted into 3-ph fault with delayed clearance of 760msec is observed.



220kV lines tripped on distance protection operation in Z-1 after power swing detection and few lines tripped on distance protection operation on load encroachment

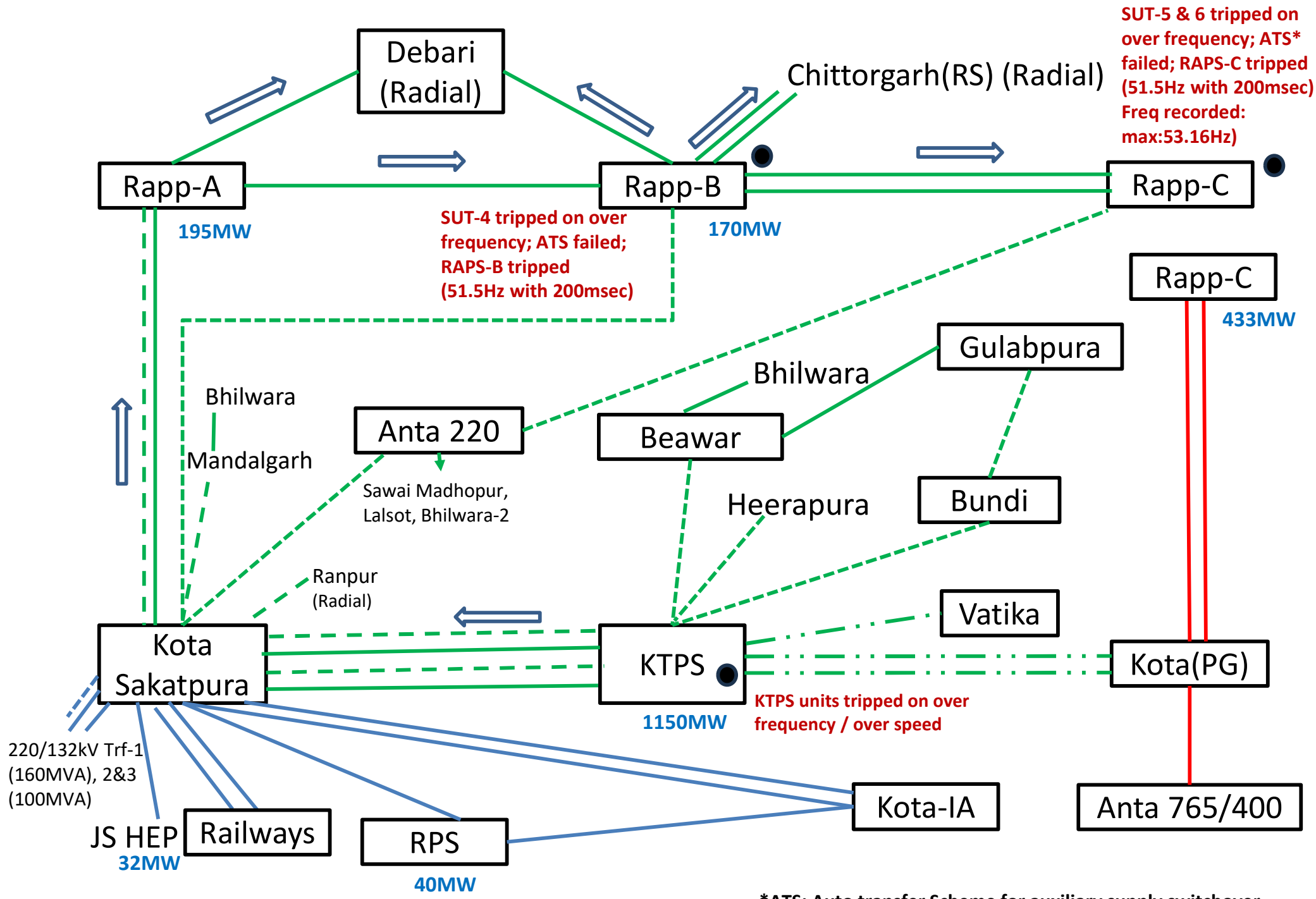
Tripping of multiple 220kV lines in complex (within 600-650msec of fault time (20:21:52:280hrs))

Triggering incident: R-ph CT (220 kV side) of 220 kV/132 kV ICT-1 at Kota Sakatpura blast. As per PMU, R-N fault at 20:21:52:280hrs converted into 3-ph fault with delayed clearance of 760msec is observed.



220kV lines tripped on distance protection operation in Z-1 after power swing detection and few lines tripped on distance protection operation on load encroachment

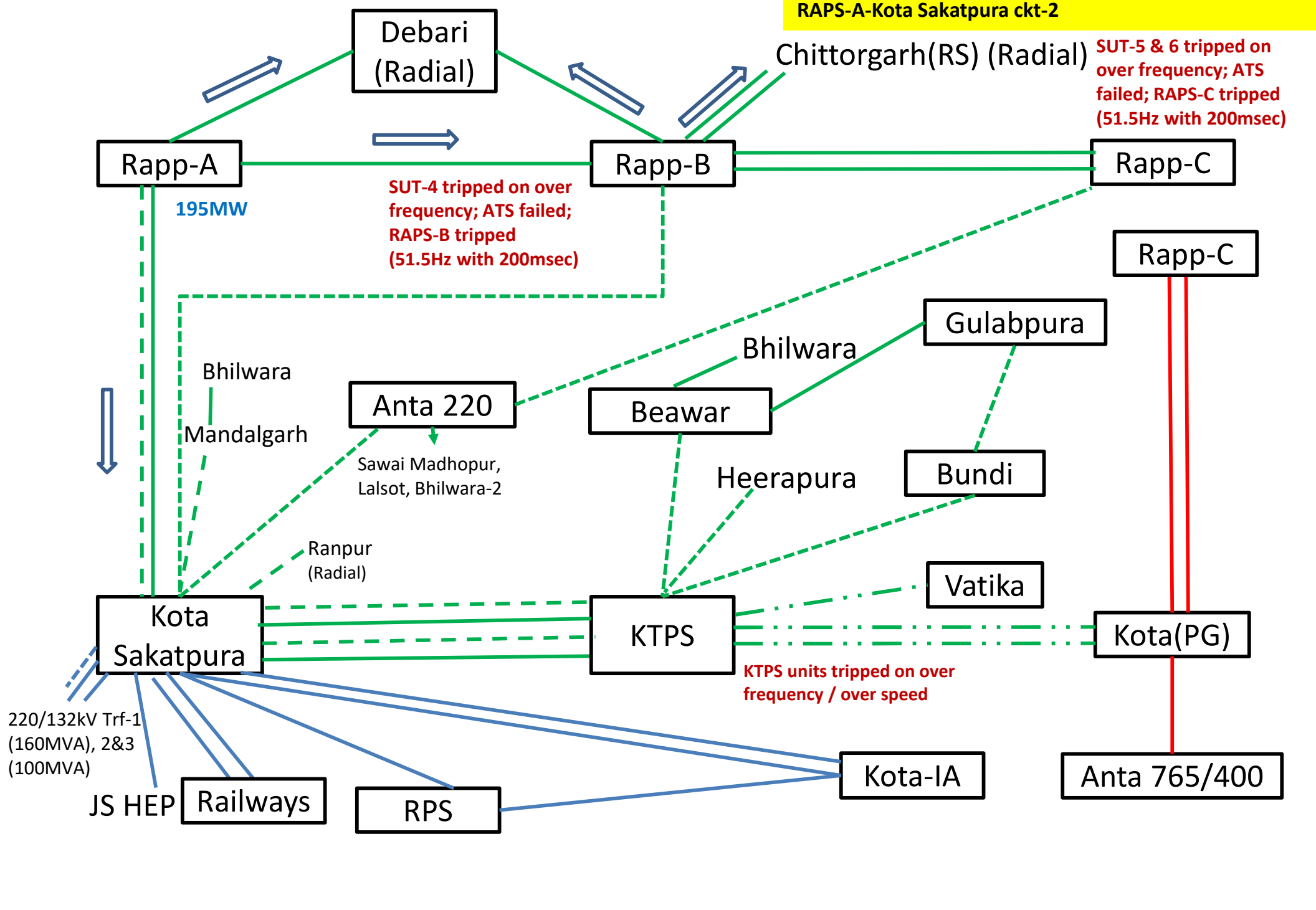
RAPS-B, RAPS-C & KTPS units tripped (within 1-2sec of fault time (20:21:52:280hrs))



*ATS: Auto transfer Scheme for auxiliary supply switchover

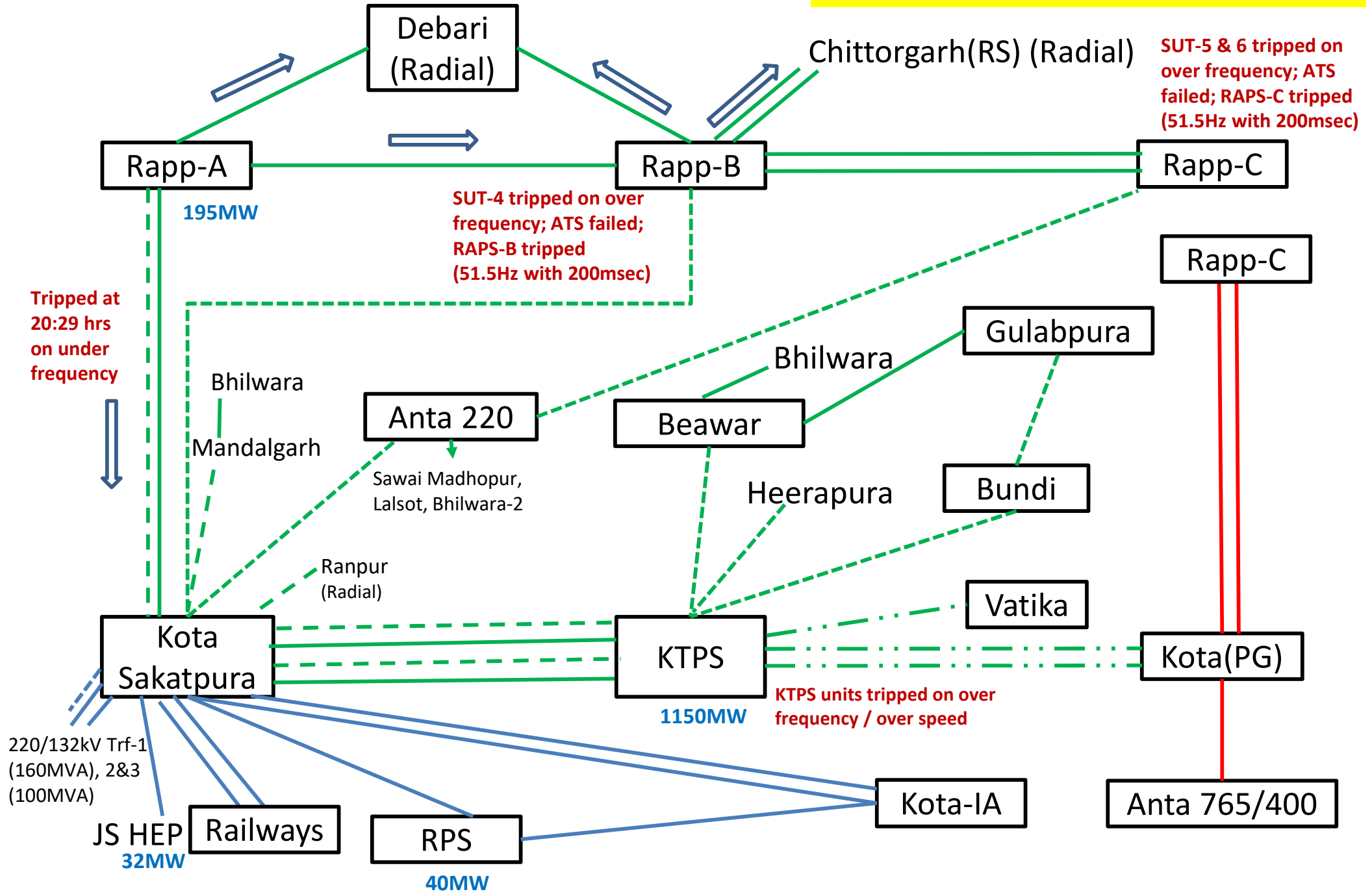
After tripping of multiple 220kV lines and KTPS & RAPS-B in complex (after ~2sec sec of fault time (20:21:52:280hrs)

RAPS-A unit-2 was available which was feeding 220kV Debari, 220kV Chittorgarh via 220kV RAPS-A-RAPS-B tie line and load at 220/132kV Kota Sakatpura via 220kV RAPS-A-Kota Sakatpura ckt-2



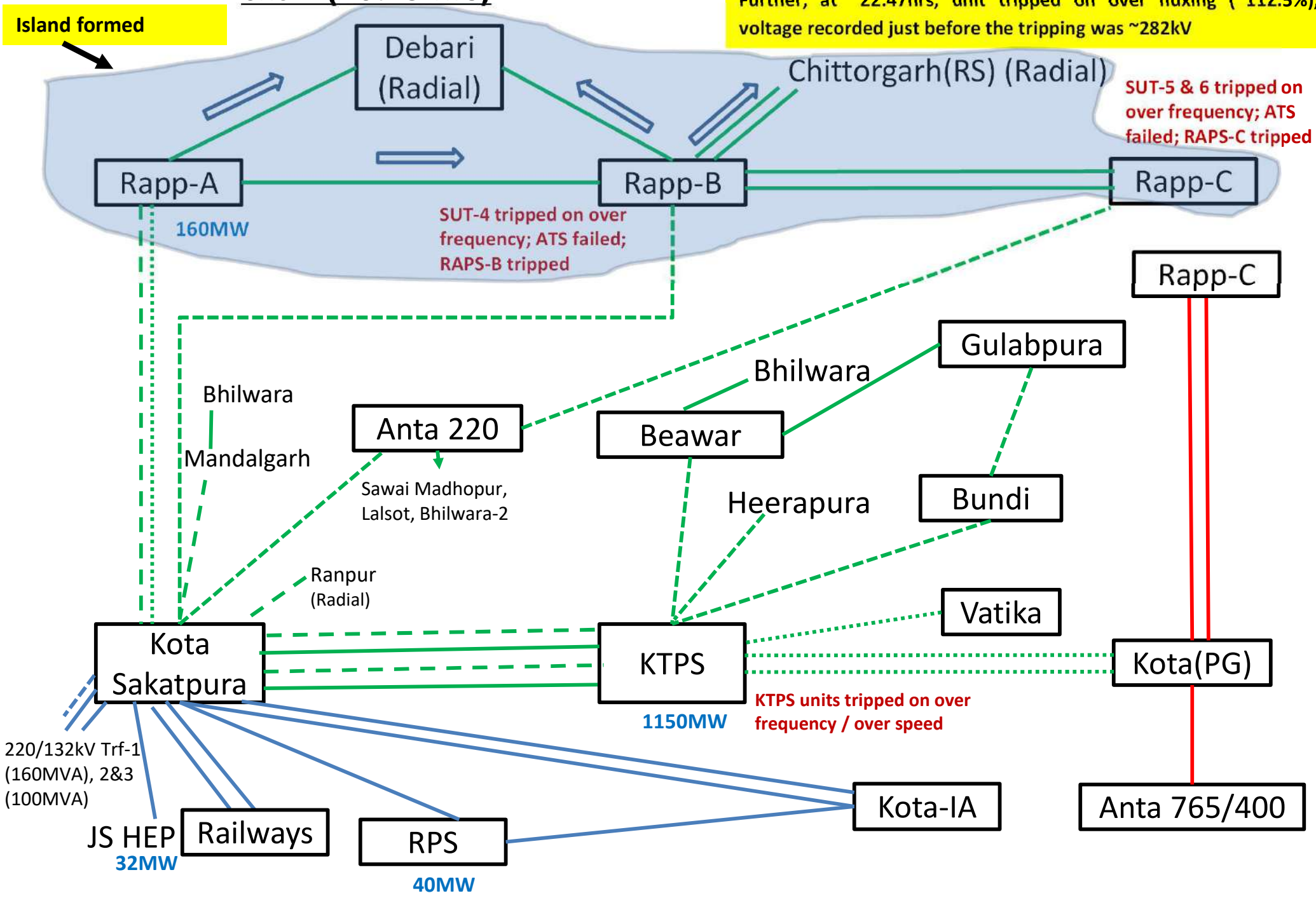
After tripping of multiple 220kV lines and KTPS & RAPS-B in complex (after ~2sec sec of fault time (20:21:52:280hrs)

Further at 20:29hrs, frequency decreased to 47.8Hz and 220kV RAPS-A-Kota Sakatpura ckt-2 tripped on under frequency as per islanding scheme.

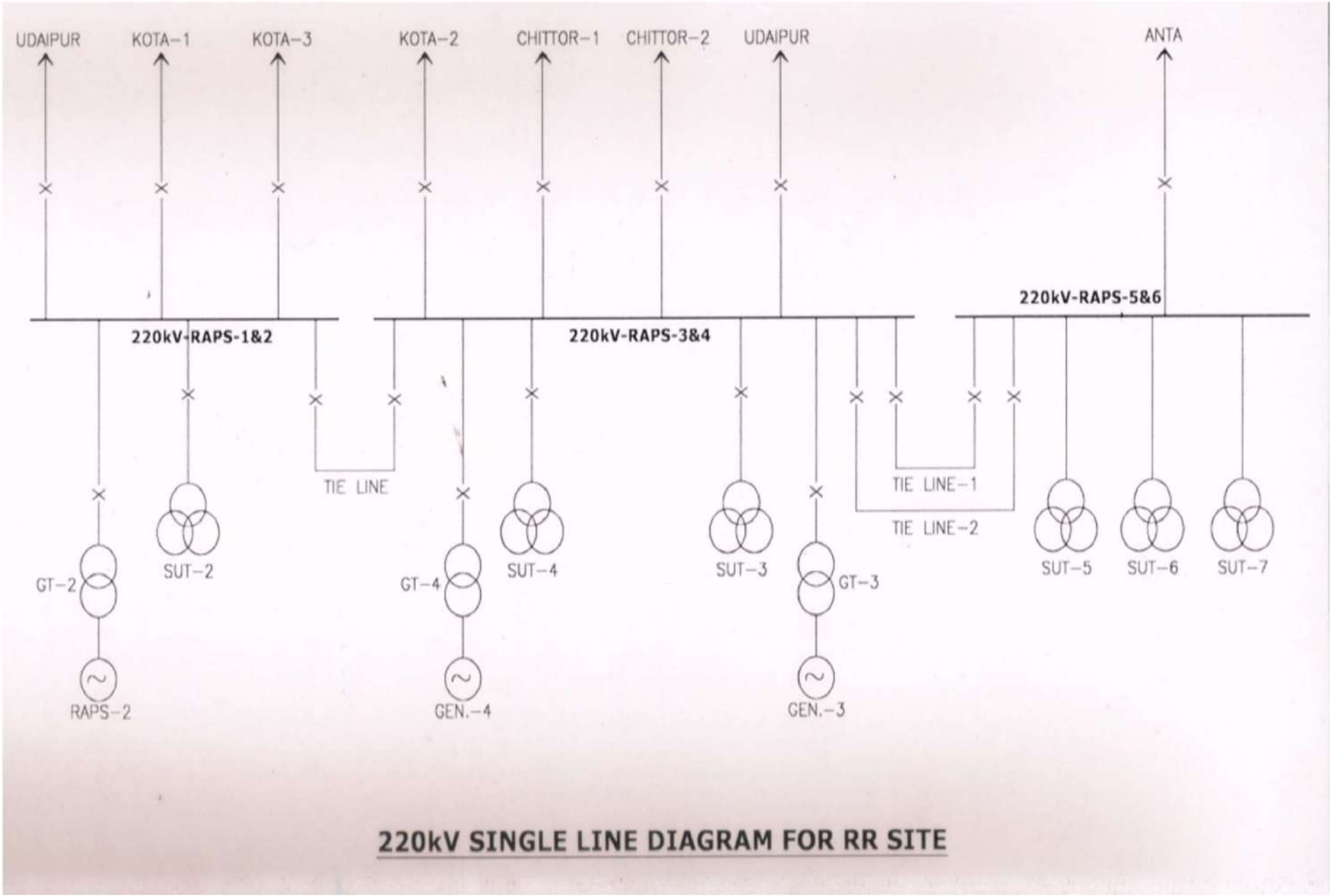


After tripping 220kV RAPS-A-Kota Sakatpura ckt-2 (20:29 hrs)

RAPS-A generation was reduced to 160MW. Island operated till approx. 22:47hrs, frequency (51-52Hz) and voltage (230-240kV). Further, at ~22:47hrs, unit tripped on over fluxing (~112.5%), voltage recorded just before the tripping was ~282kV

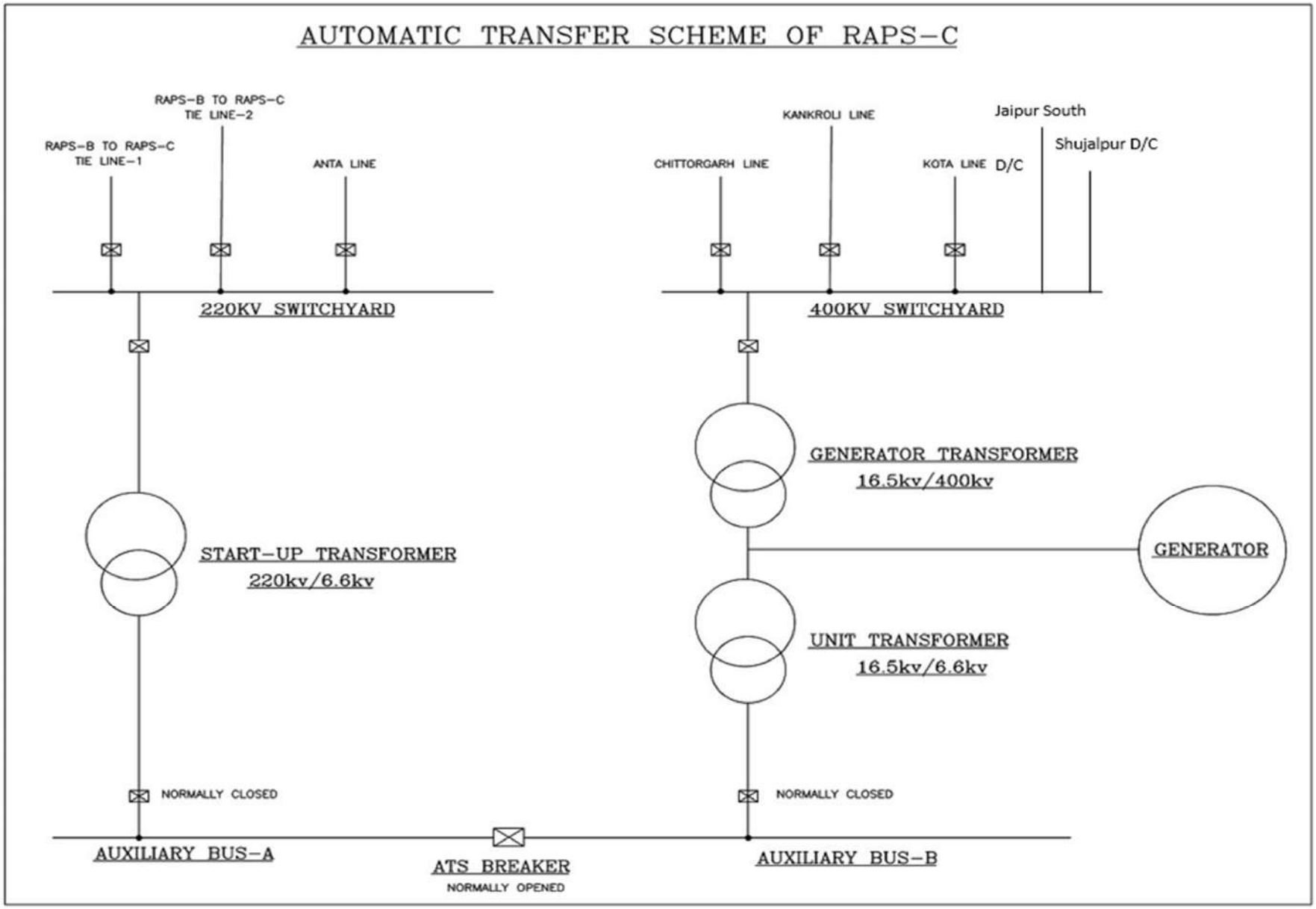


SLD and connectivity of RAPS- A, RAPS-B & RAPS-C

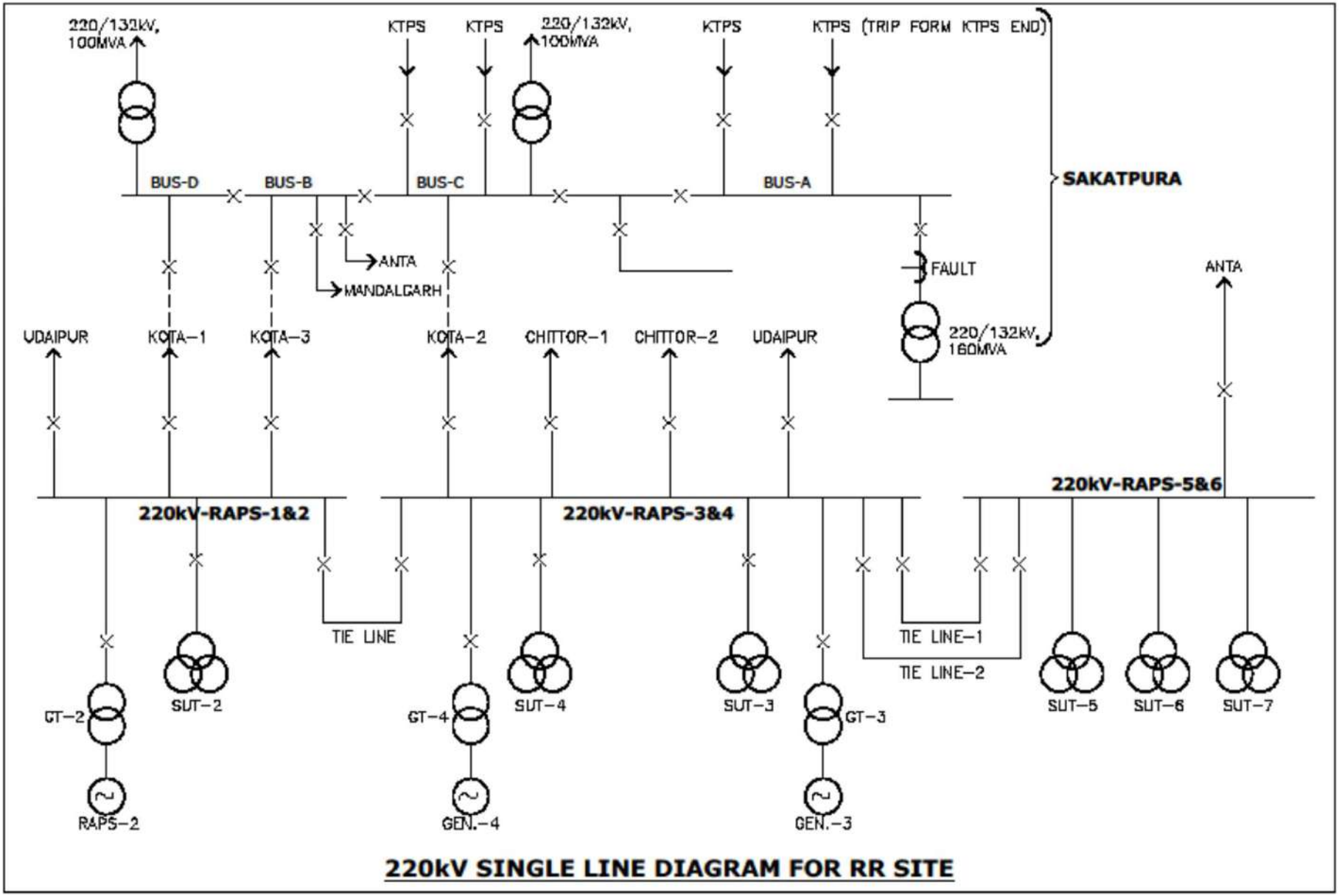


220kV SINGLE LINE DIAGRAM FOR RR SITE

Auto Transfer Scheme at RAPS-C

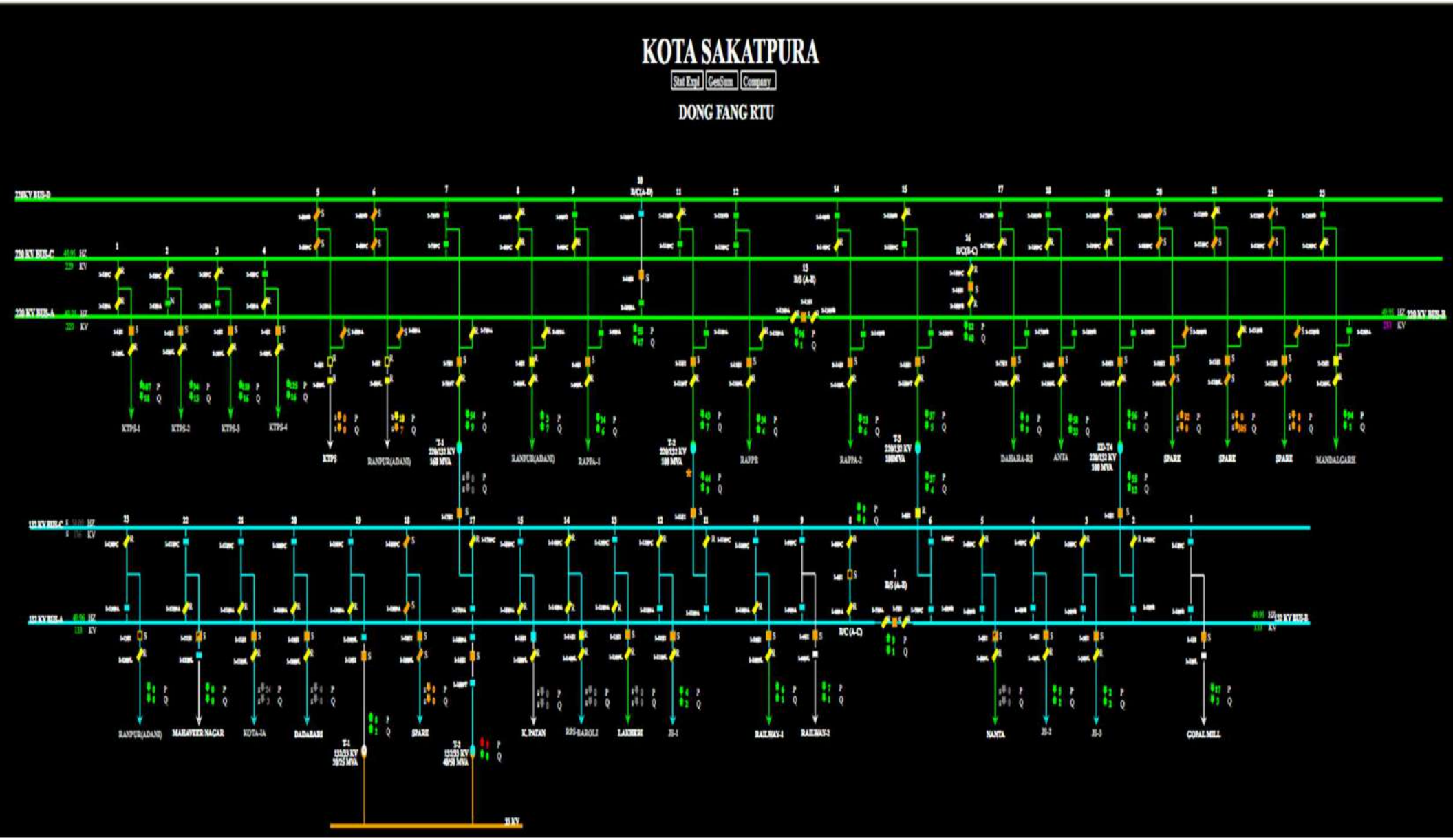


Auto Transfer Scheme at RAPS-C

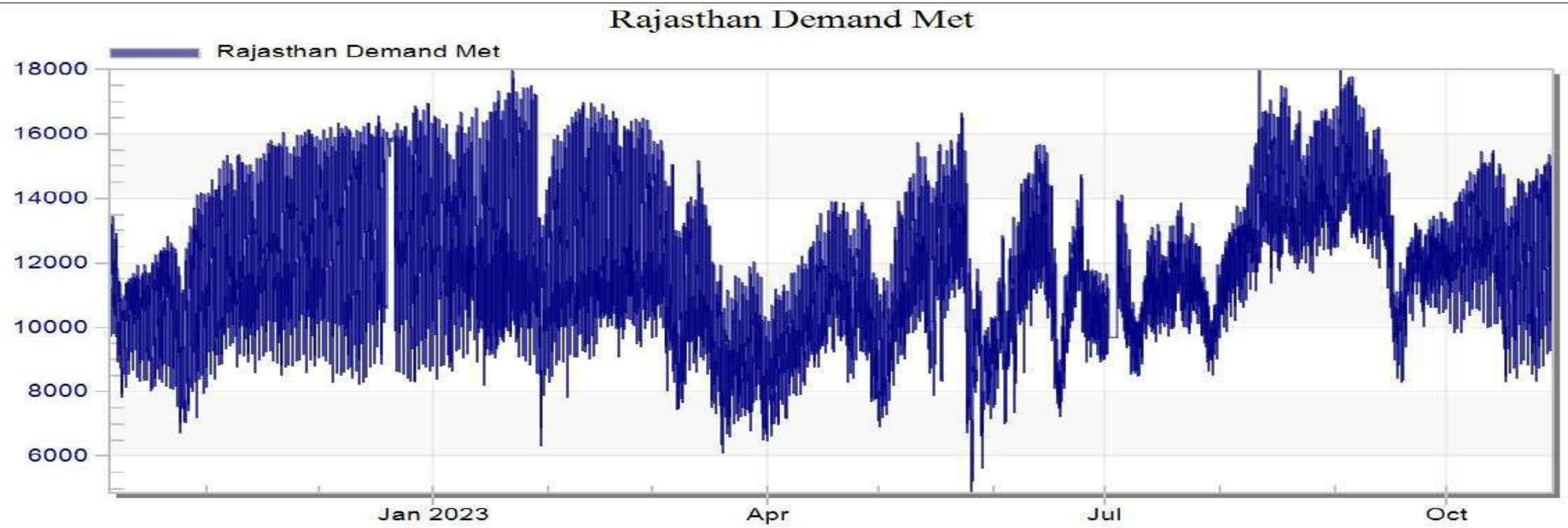


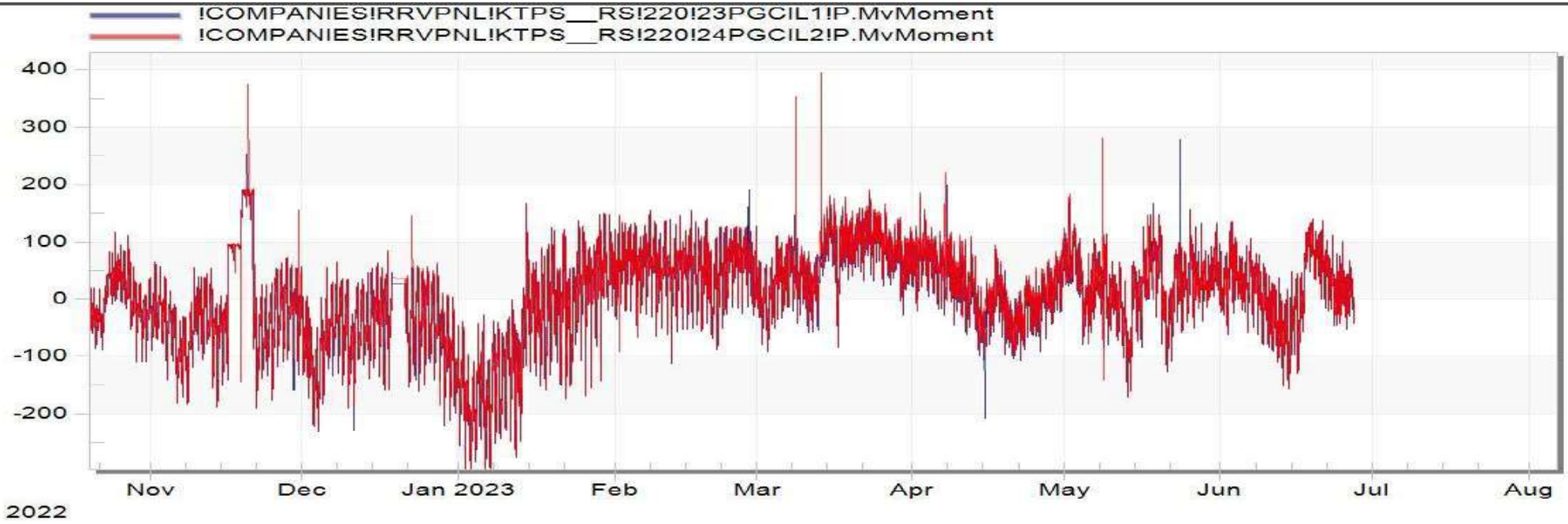
220kV SINGLE LINE DIAGRAM FOR RR SITE

SLD of 220/132kV Kota Sakatpura

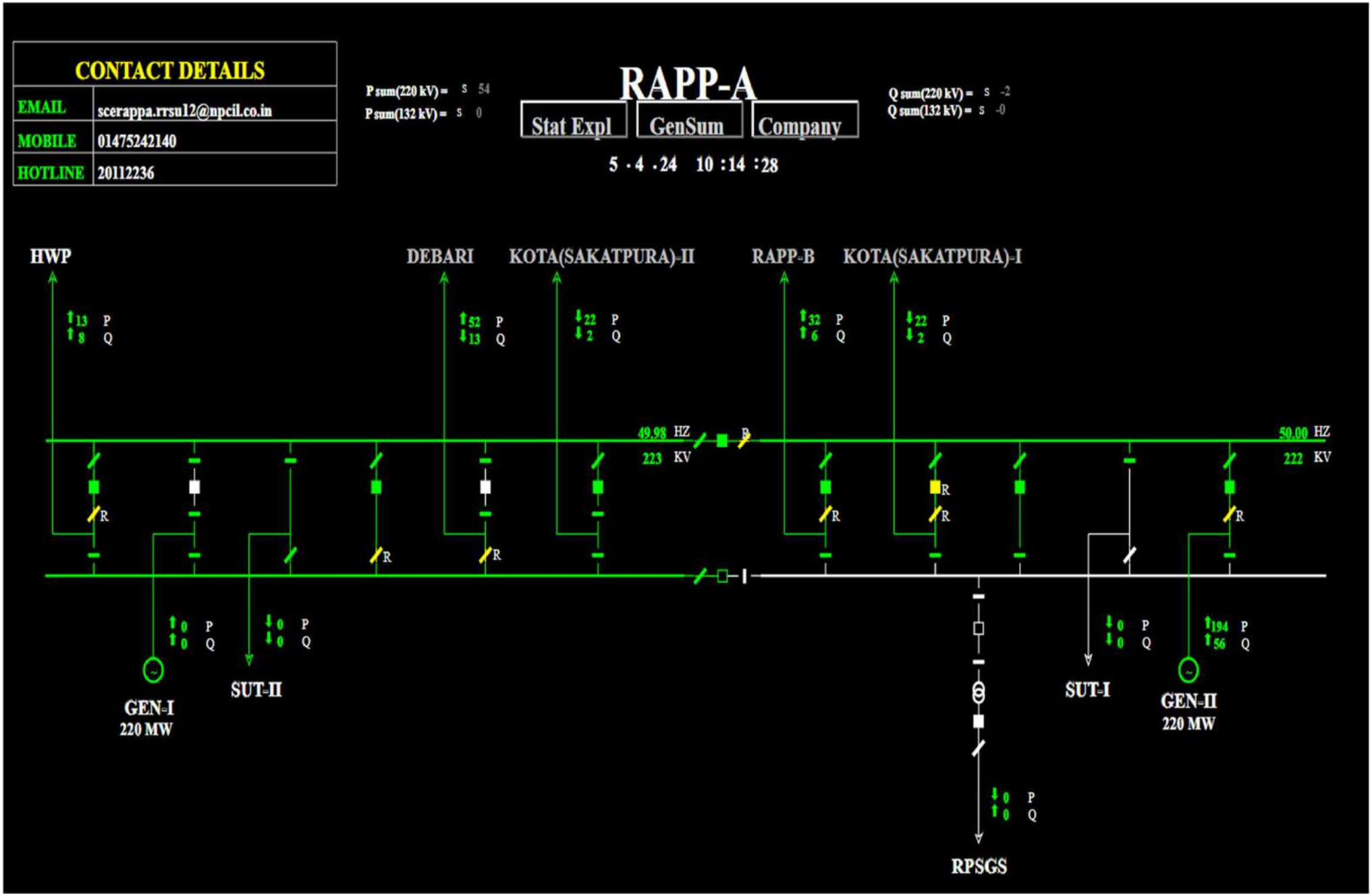


Loading pattern of 220kV KTPS-Kota(PG) D/C

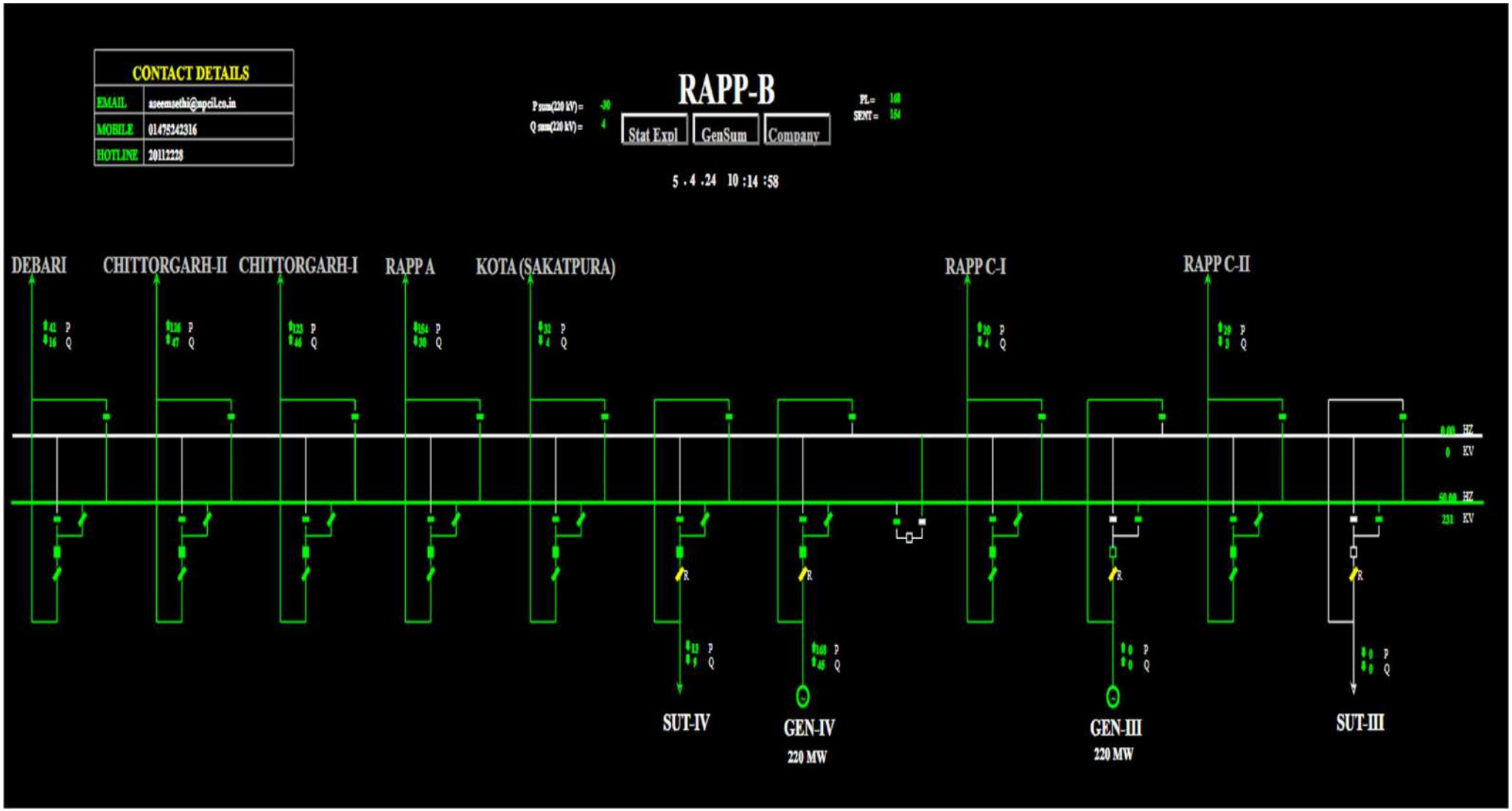




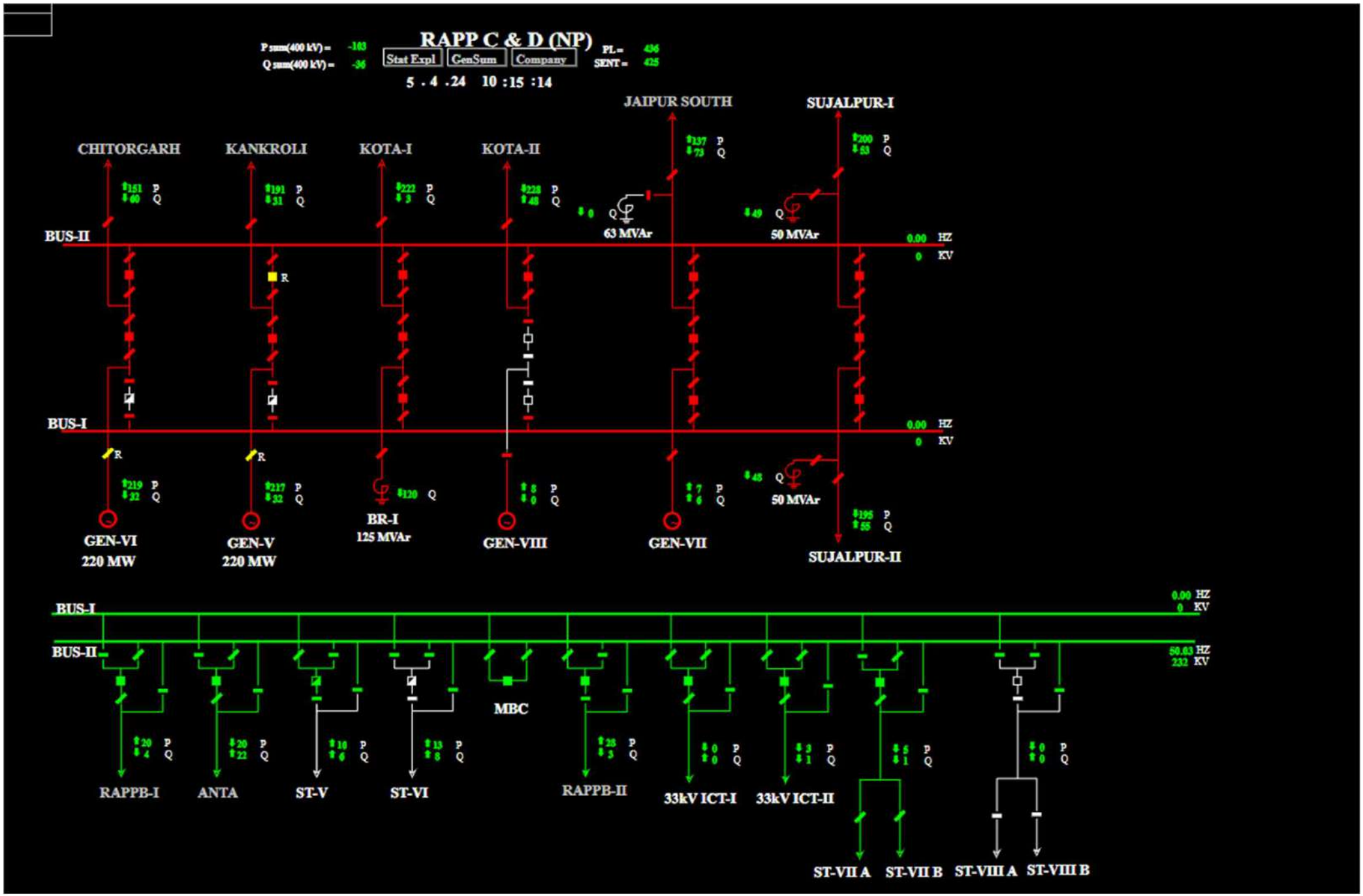
SLD of 220kV RAPS-A(NPCIL)



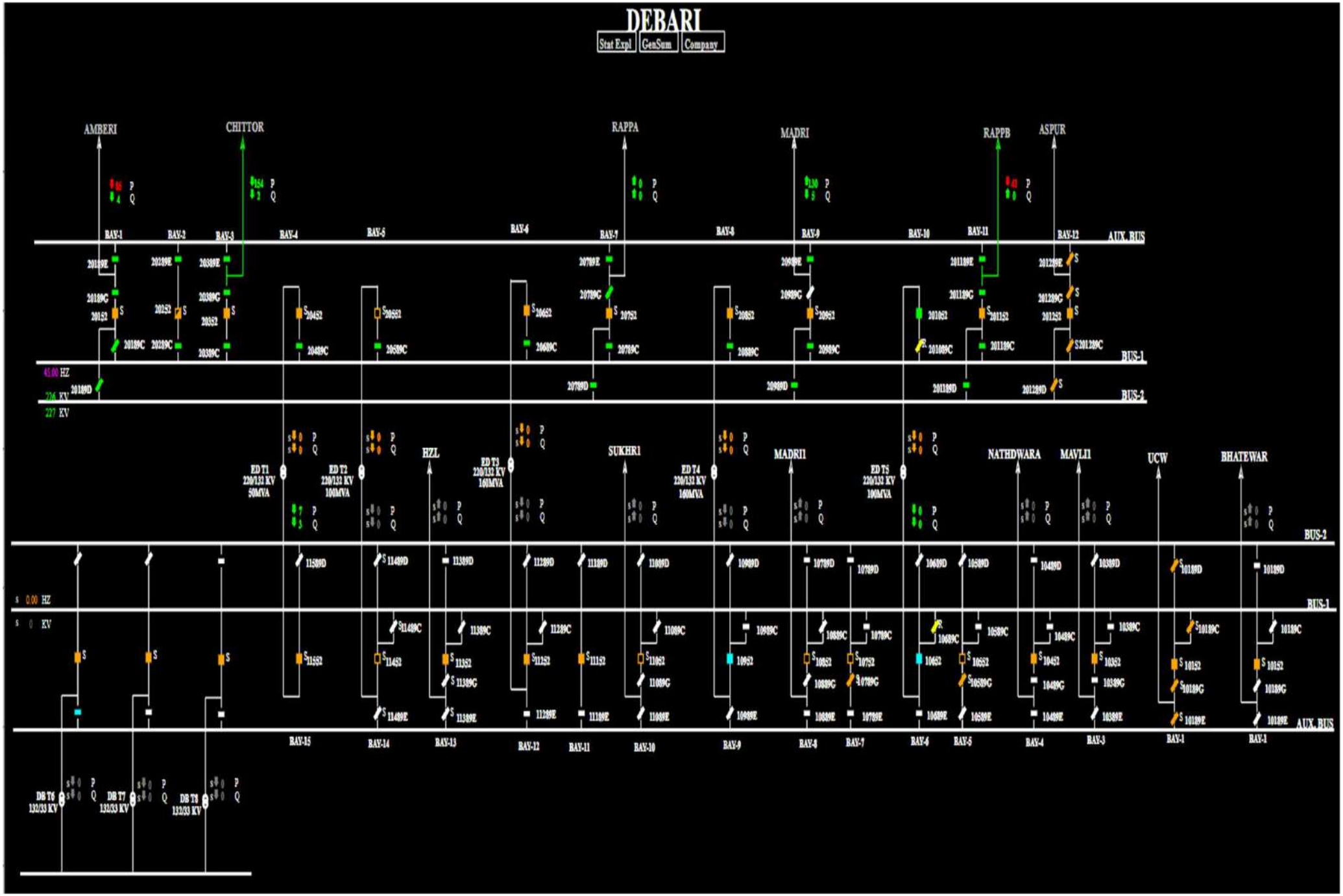
SLD of 220kV RAPS-B(NPCIL)



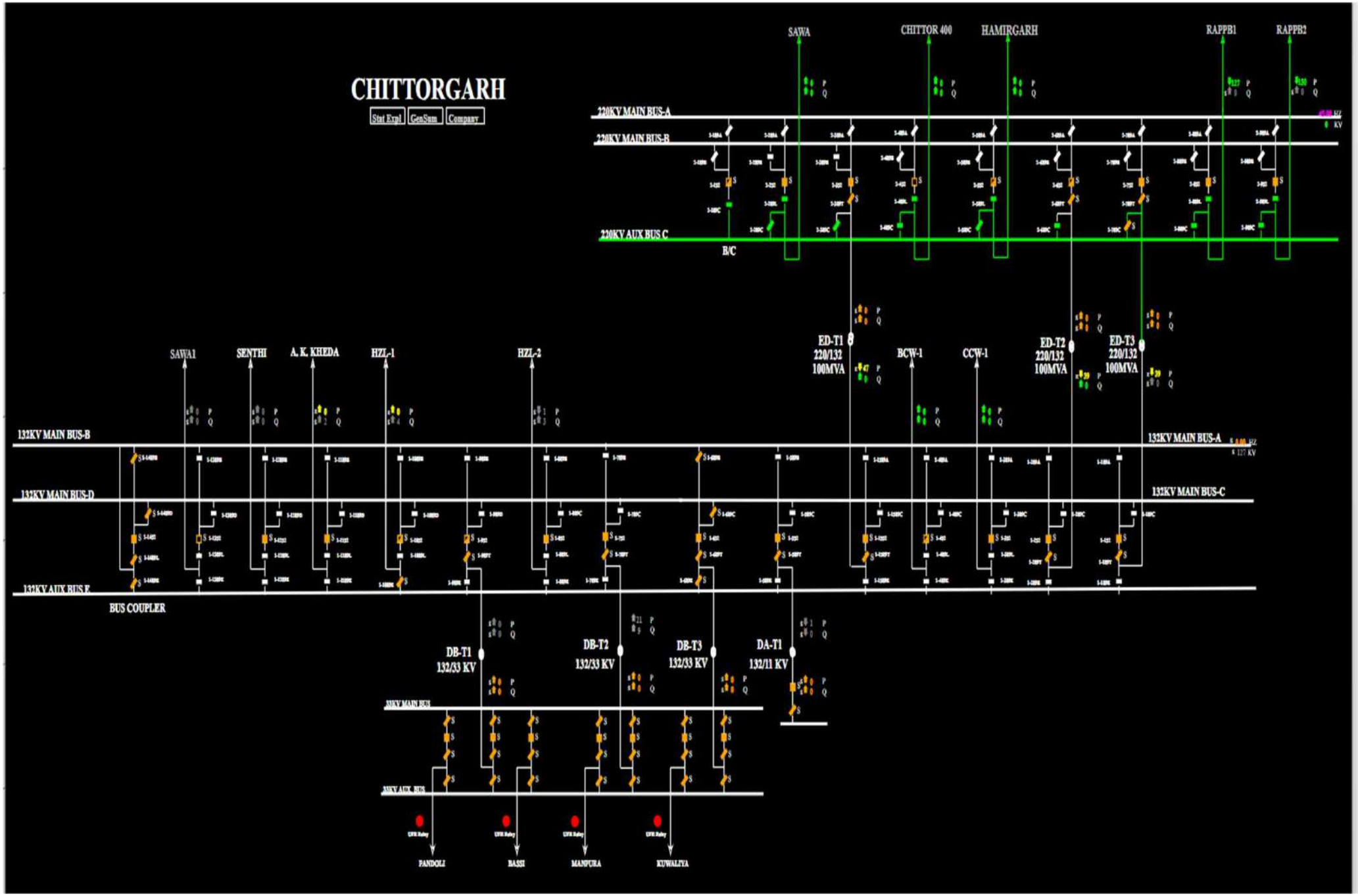
SLD of 220kV RAPS-C(NPCIL)



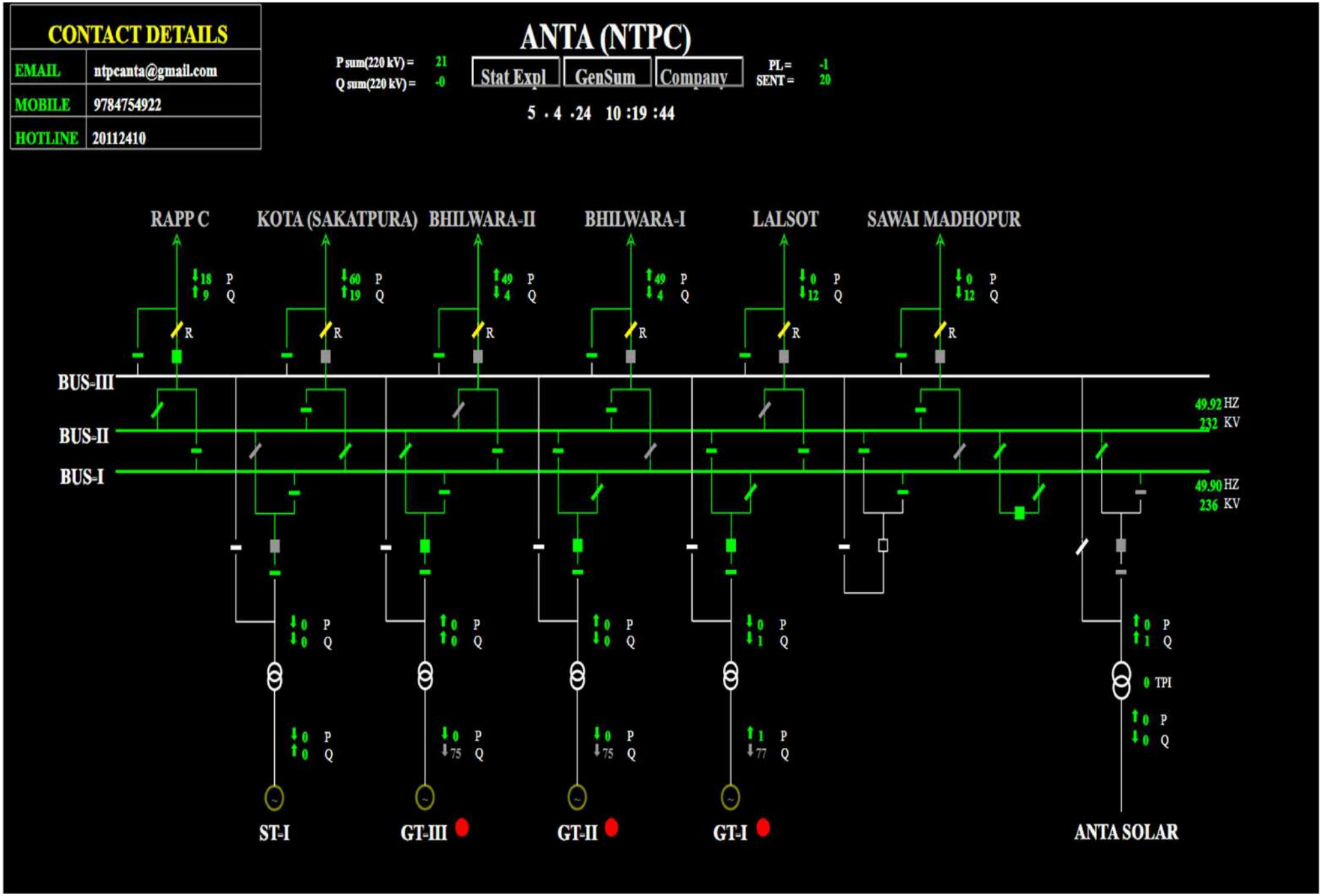
SLD of 220/132kV Debari



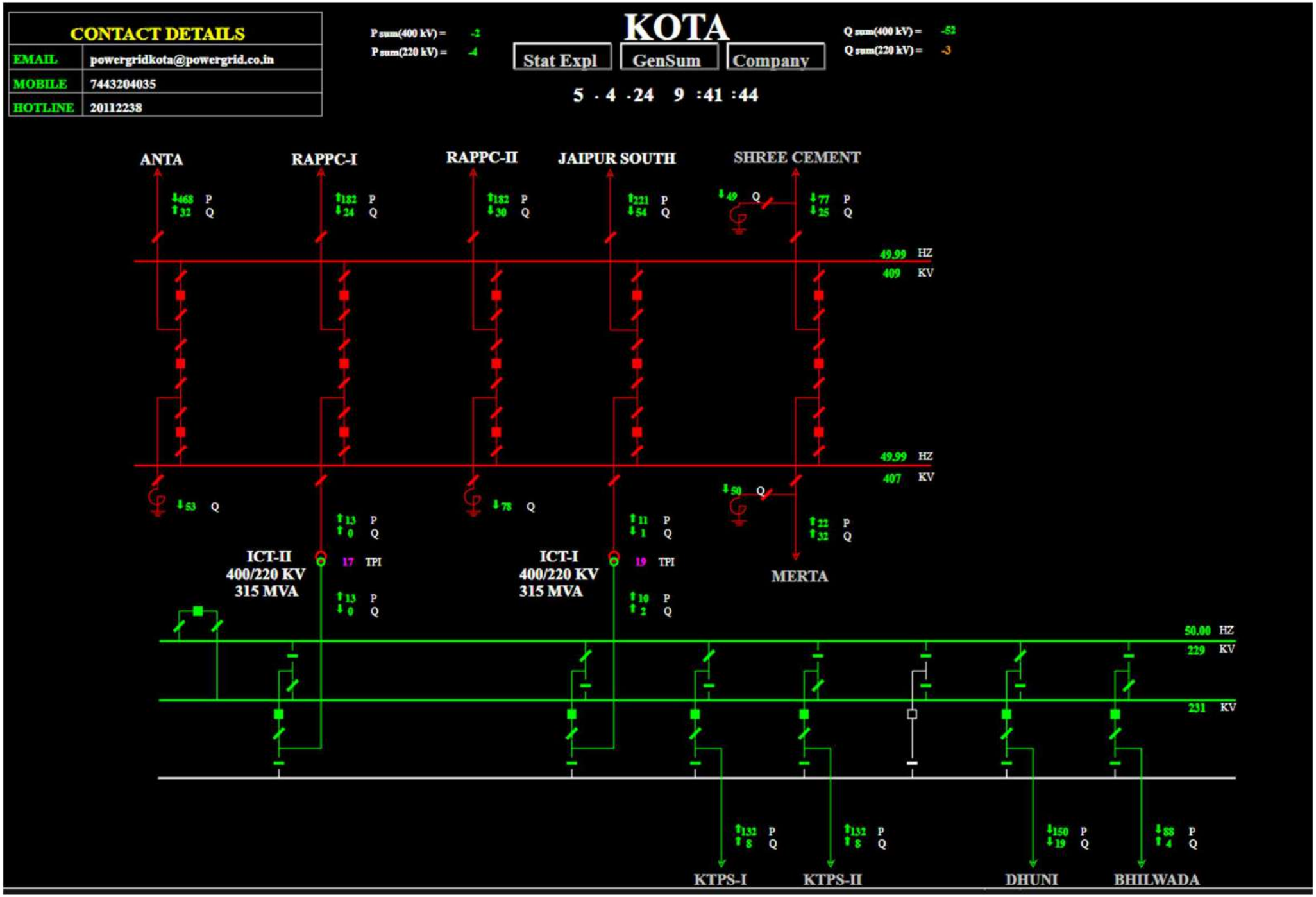
SLD of 220/132kV Chittorgarh



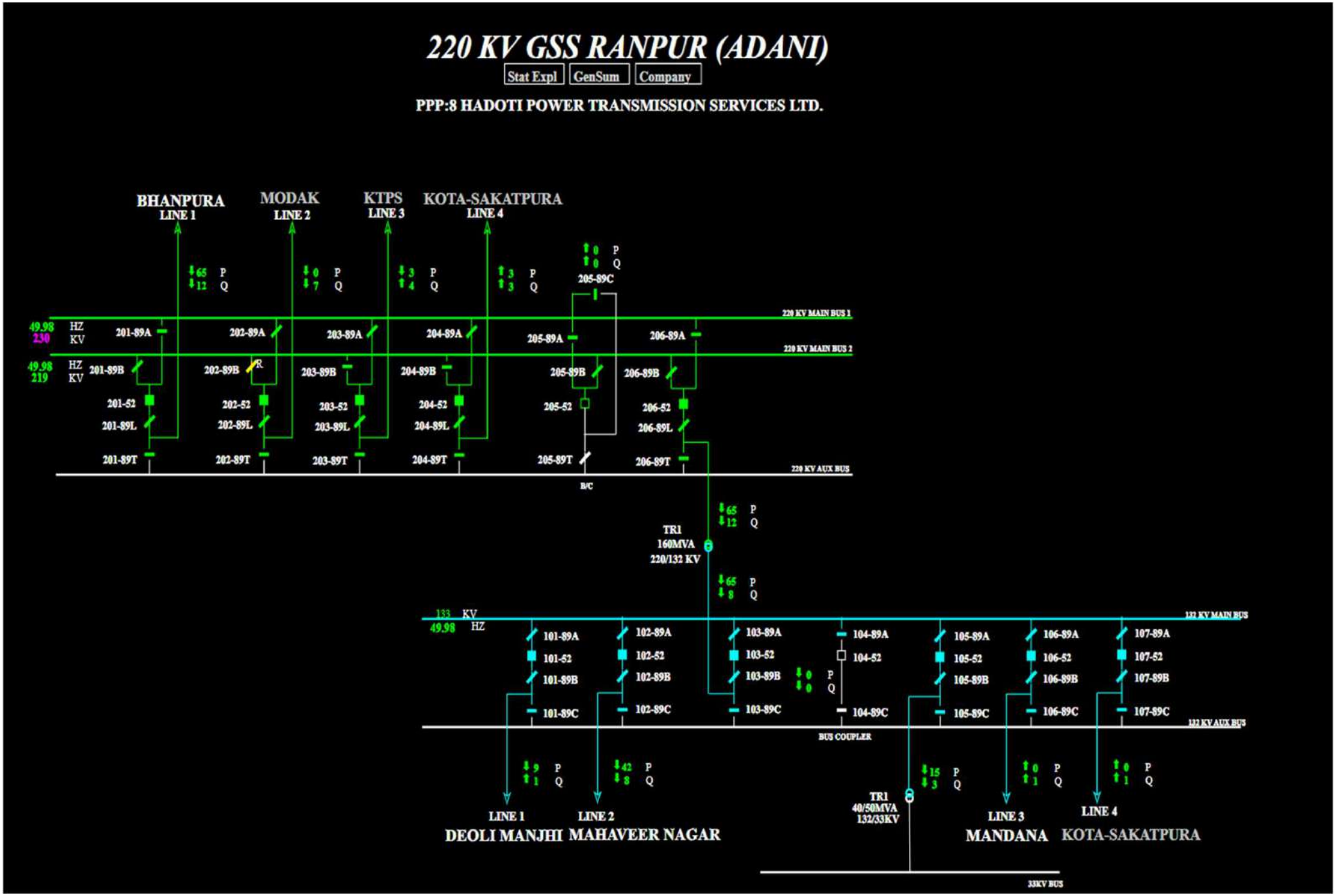
SLD of 220kV Anta(NTPC)



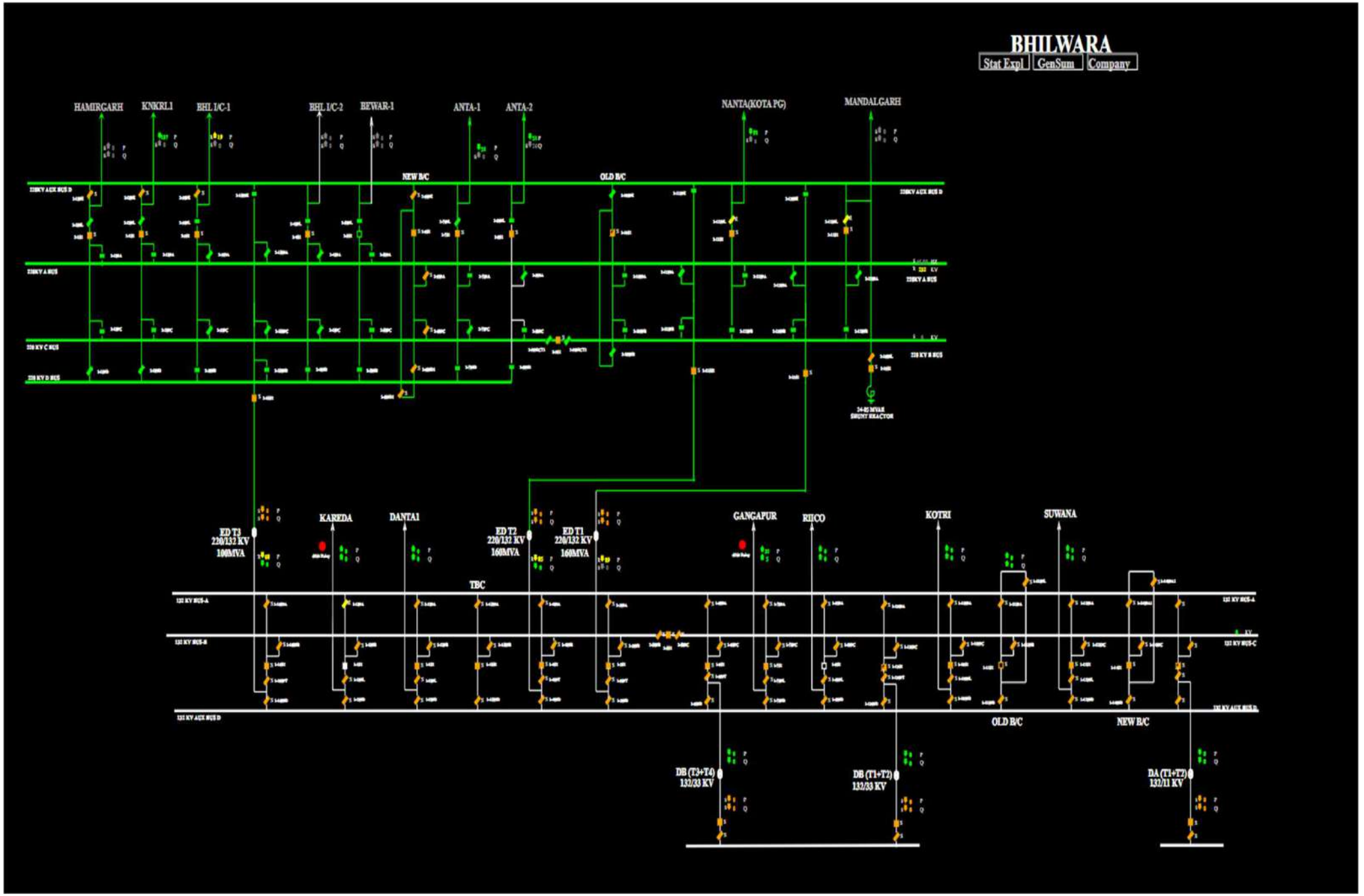
SLD of 400/220kV Kota(PG)



SLD of 220/132kV Ranpur

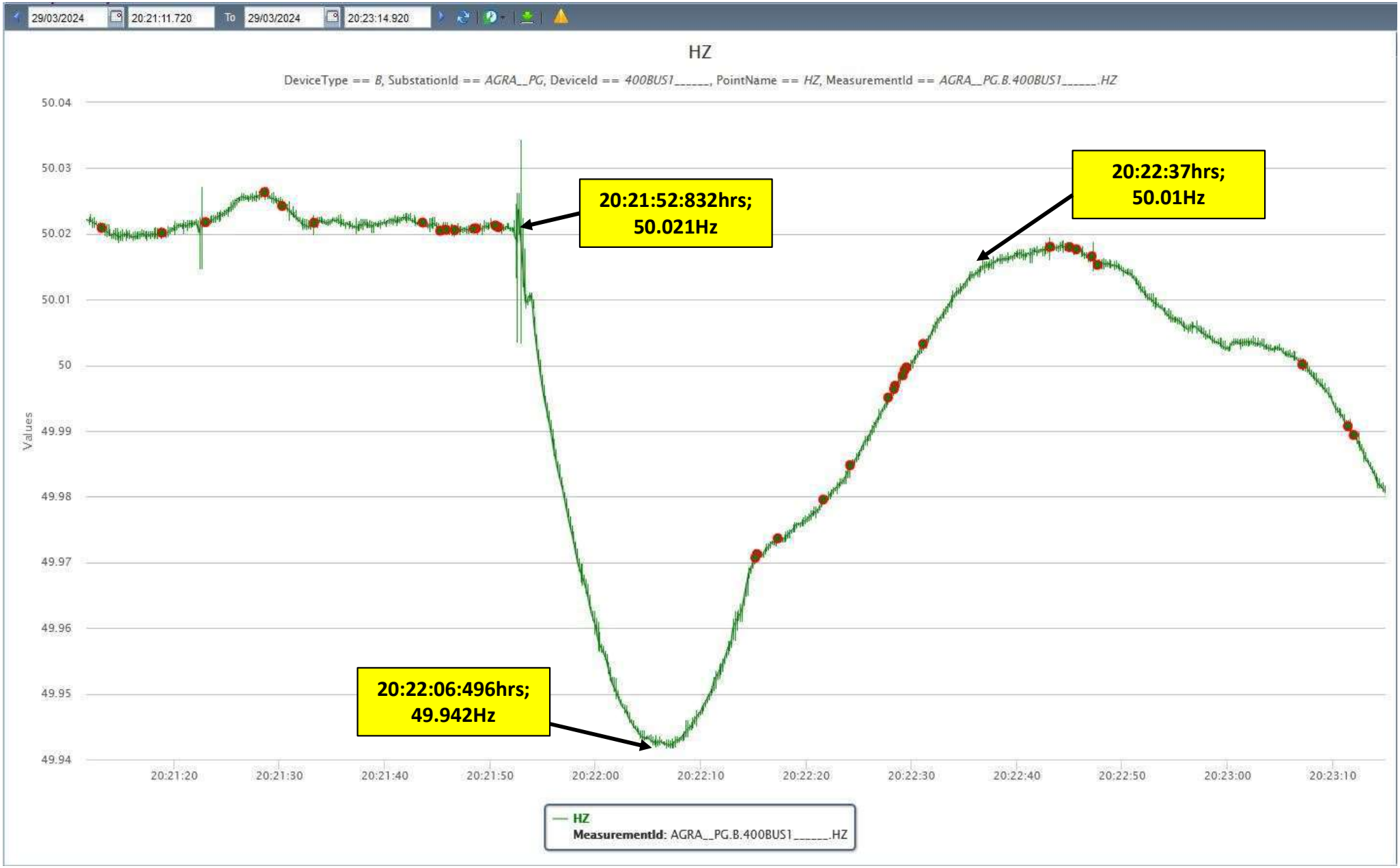


SLD of 220/132kV Bhilwara



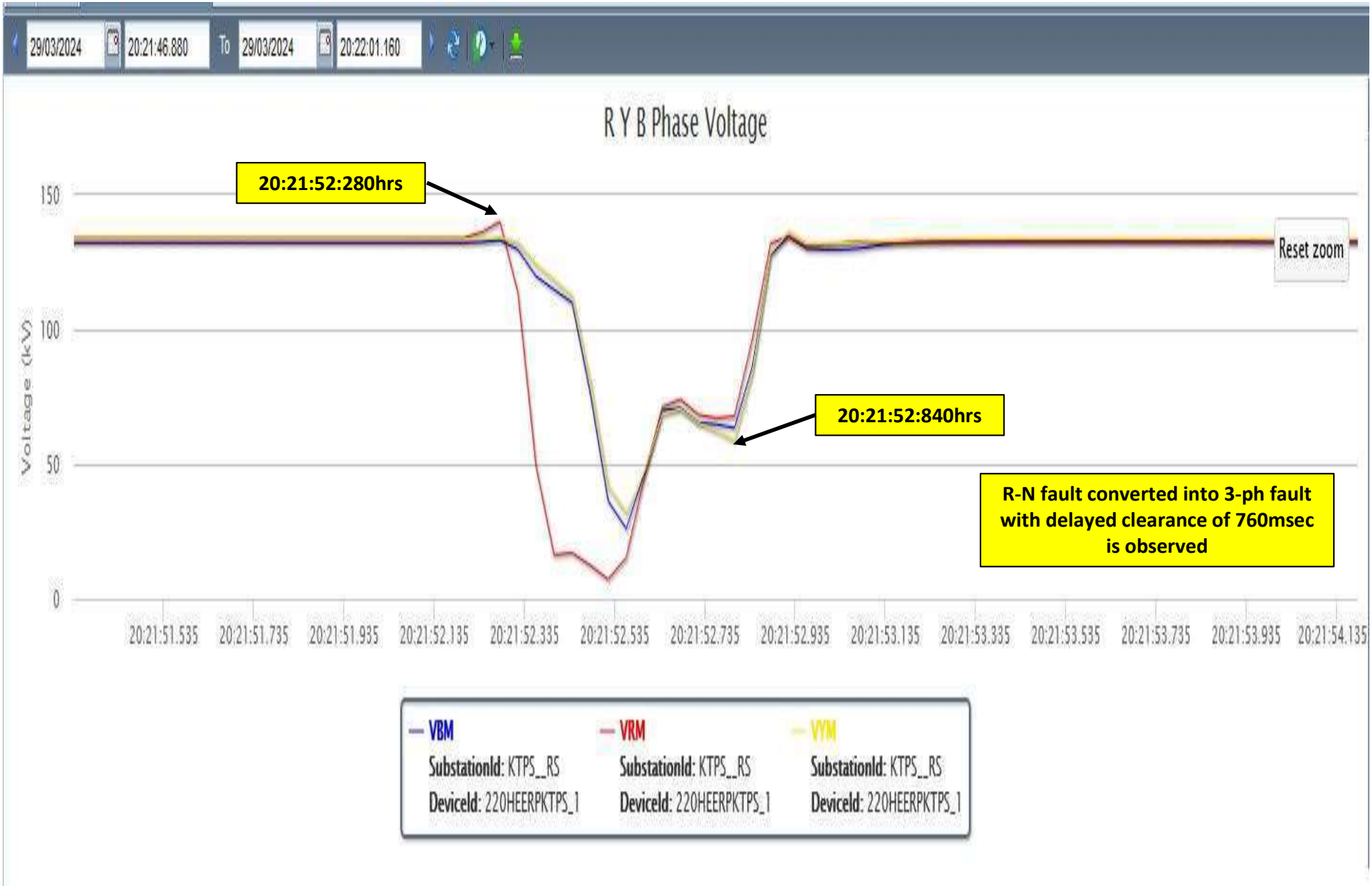
PMU Plot of frequency at Agra(PG)

20:22 hrs/29-Mar-24

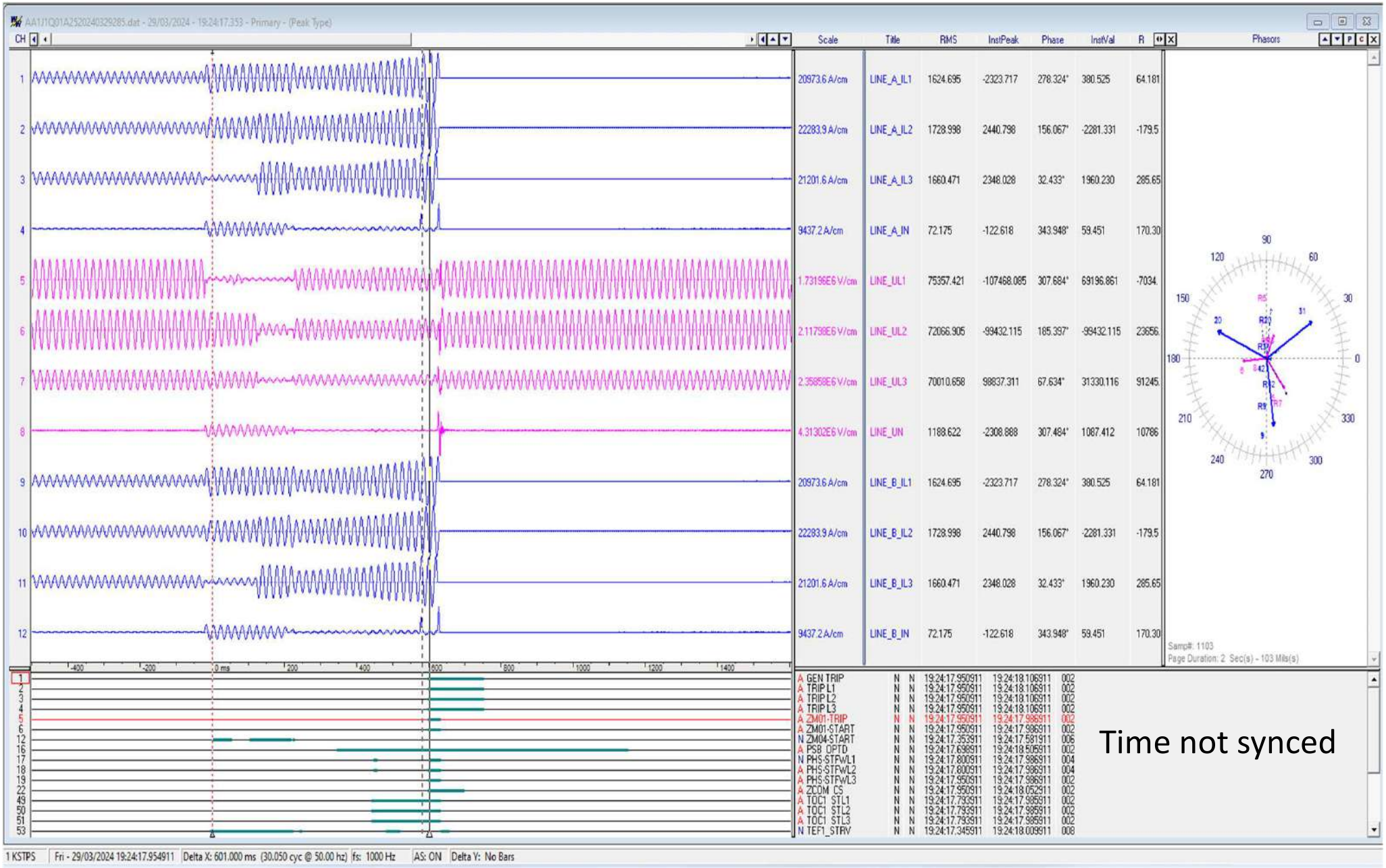


PMU Plot of voltage of 220kV KTPS-Heerapur ckt at KTPS(RVVN)

20:22 hrs/29-Mar-24



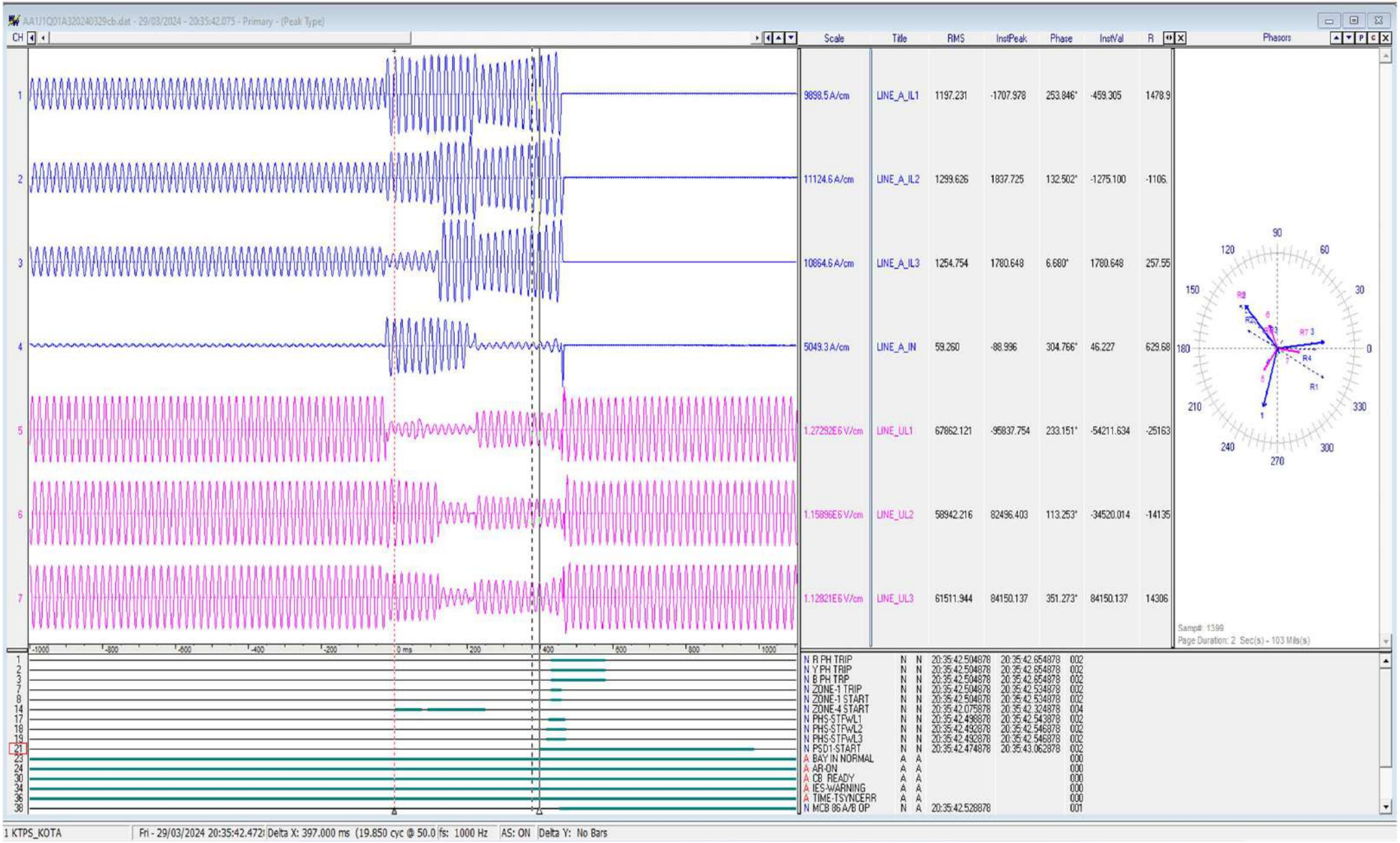
DR of 220kV KTPS(end)-Beawar ckt



Time not synced

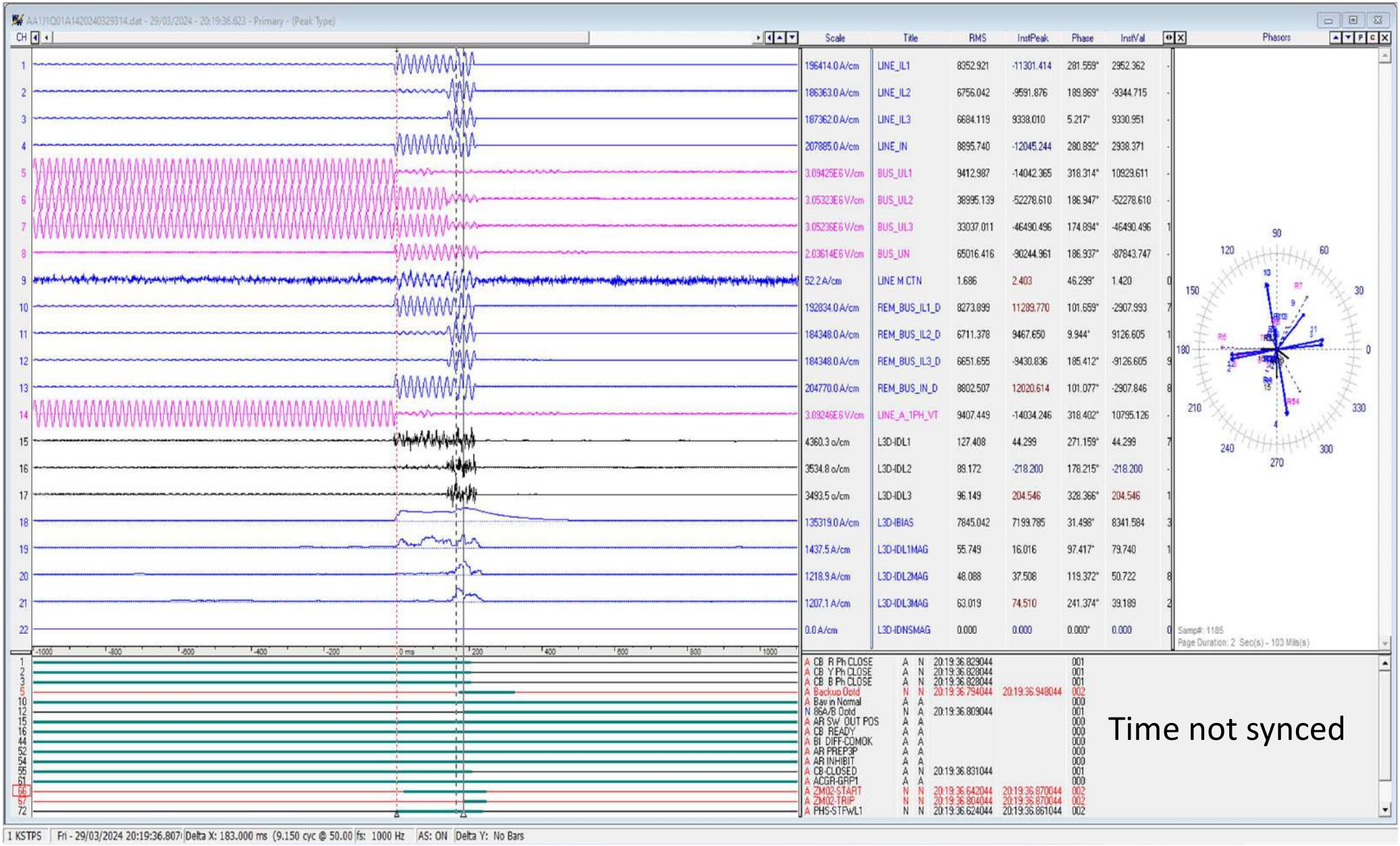
After ~350msec of R-N fault, power swing blocking operated and ~600msec of R-N fault, line tripped on Z-1 distance protection operation.

DR of 220kV KTPS(end)-Heerapura ckt



After ~400msec of R-N fault, power swing blocking operated and ~430msec of R-N fault, line tripped on Z-1 distance protection operation. Time not synced

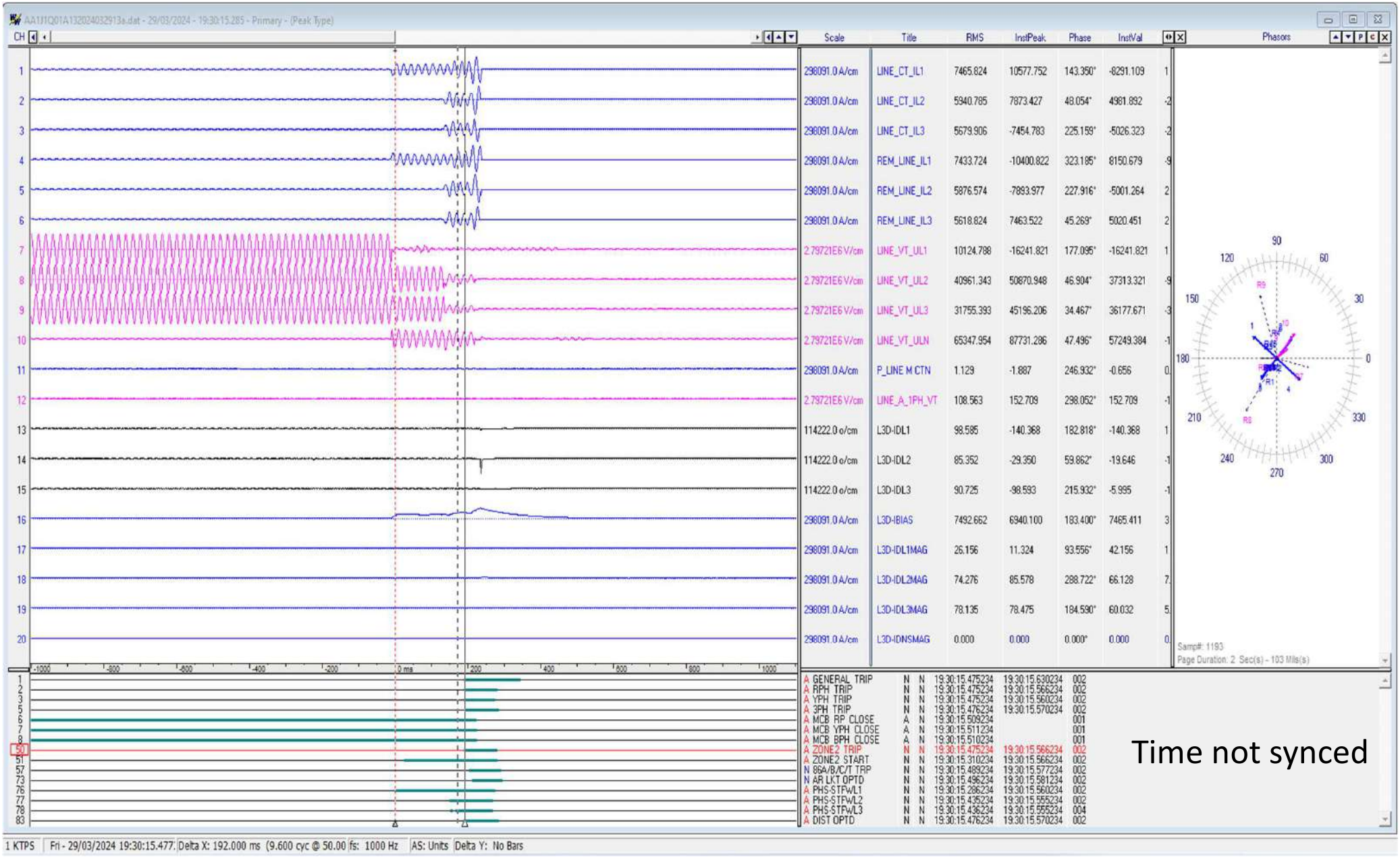
DR of 220kV KTPS(end)-Kota Sakatpura ckt-1



Time not synced

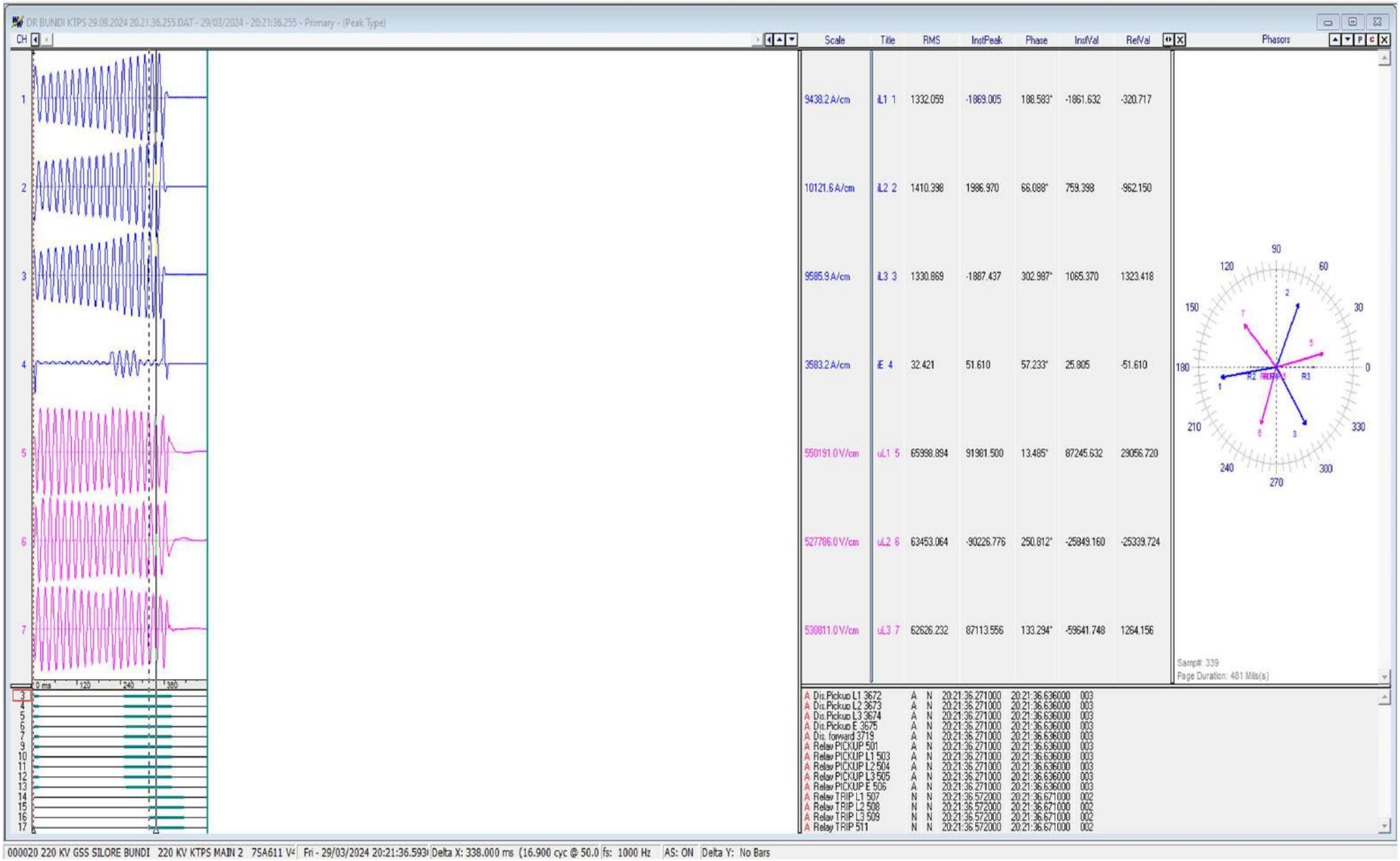
After ~20msec of R-N fault, distance protection sensed fault in Z-2 and after ~200msec of R-N fault, line tripped on Z-2 distance protection operation.

DR of 220kV KTPS(end)-Kota Sakatpura ckt-3



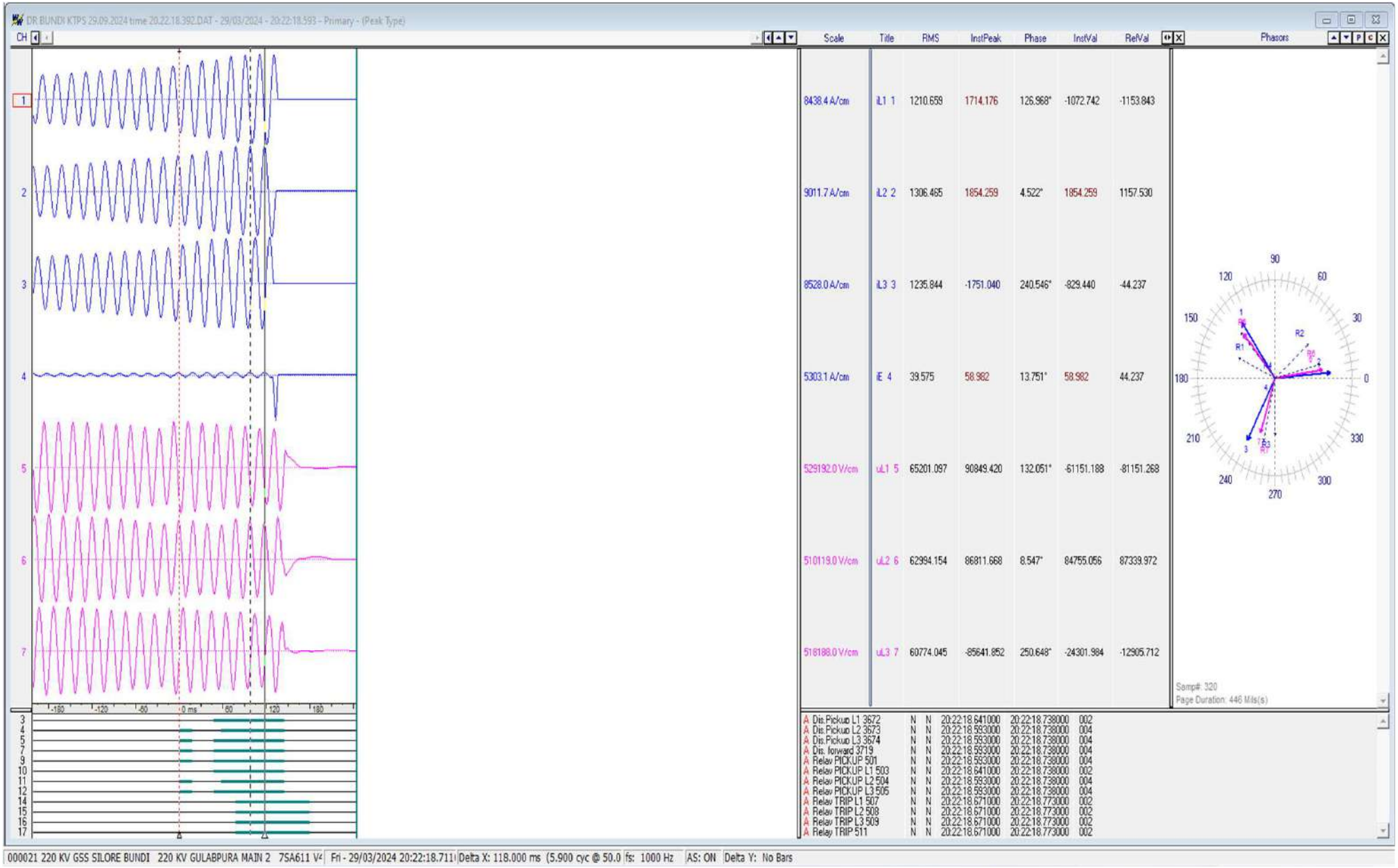
After ~20msec of R-N fault, distance protection sensed fault in Z-2 and after ~200msec of R-N fault, line tripped on Z-2 distance protection operation.

DR of 220kV KTPS-Bundi(end) ckt



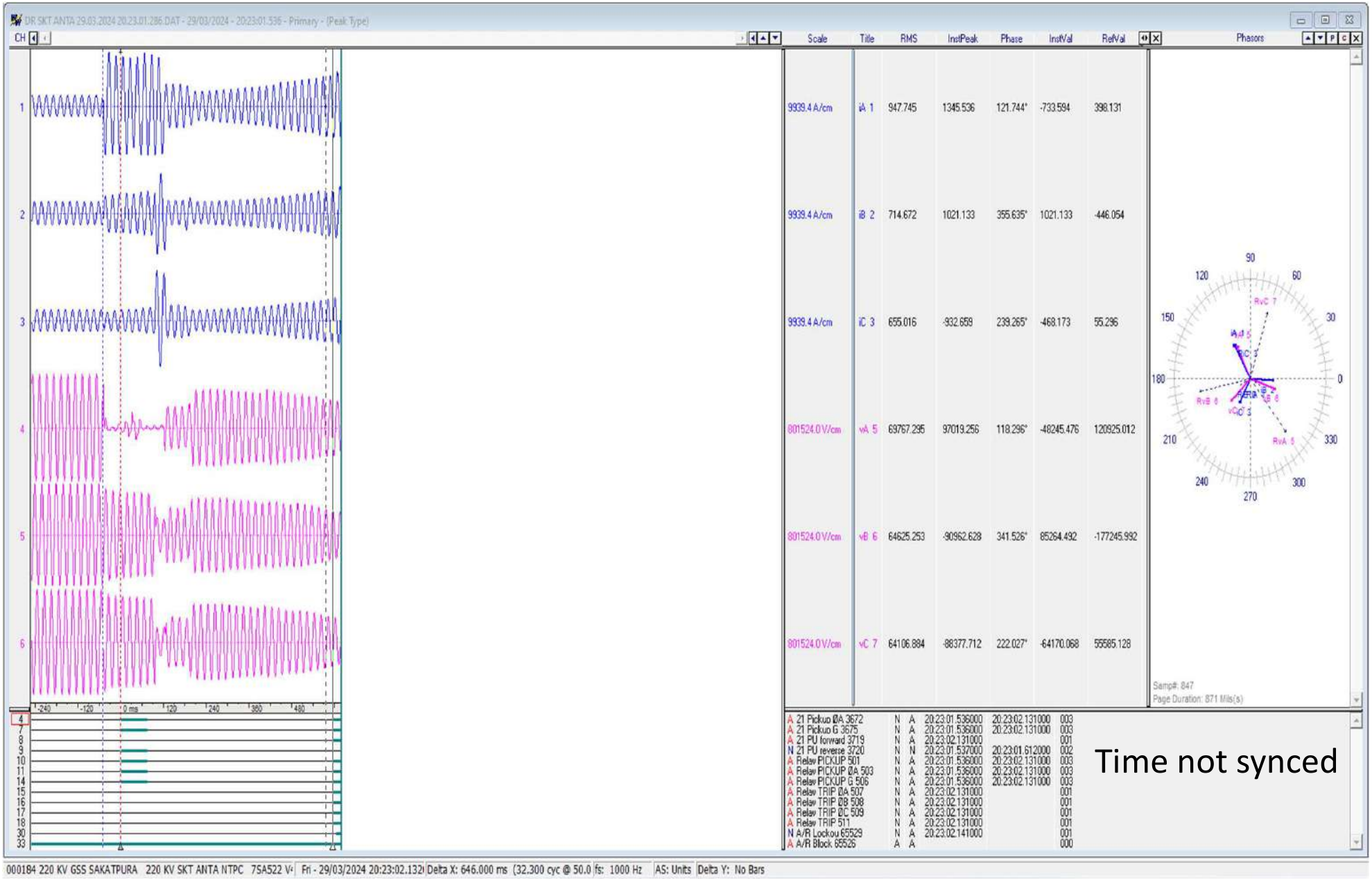
After ~550msec of R-N fault detection, line tripped on distance protection operation; phase currents in the range of 1330-1410A.

DR of 220kV Bundi(end)-Gulabpura ckt



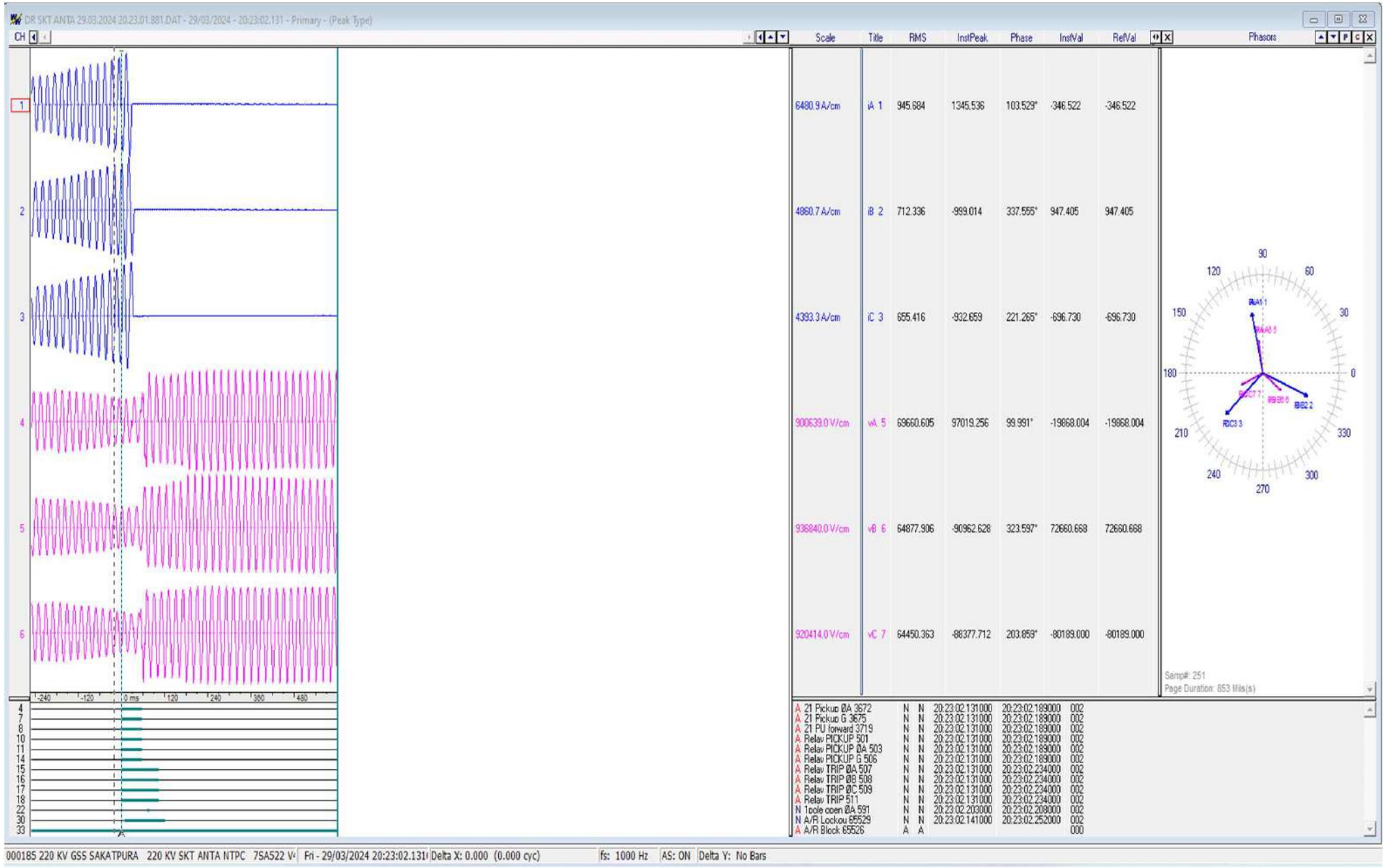
Line tripped on distance protection operation; phase currents in the range of 1200-1300A.

DR of 220kV Kota Sakatpura(end)-Anta ckt



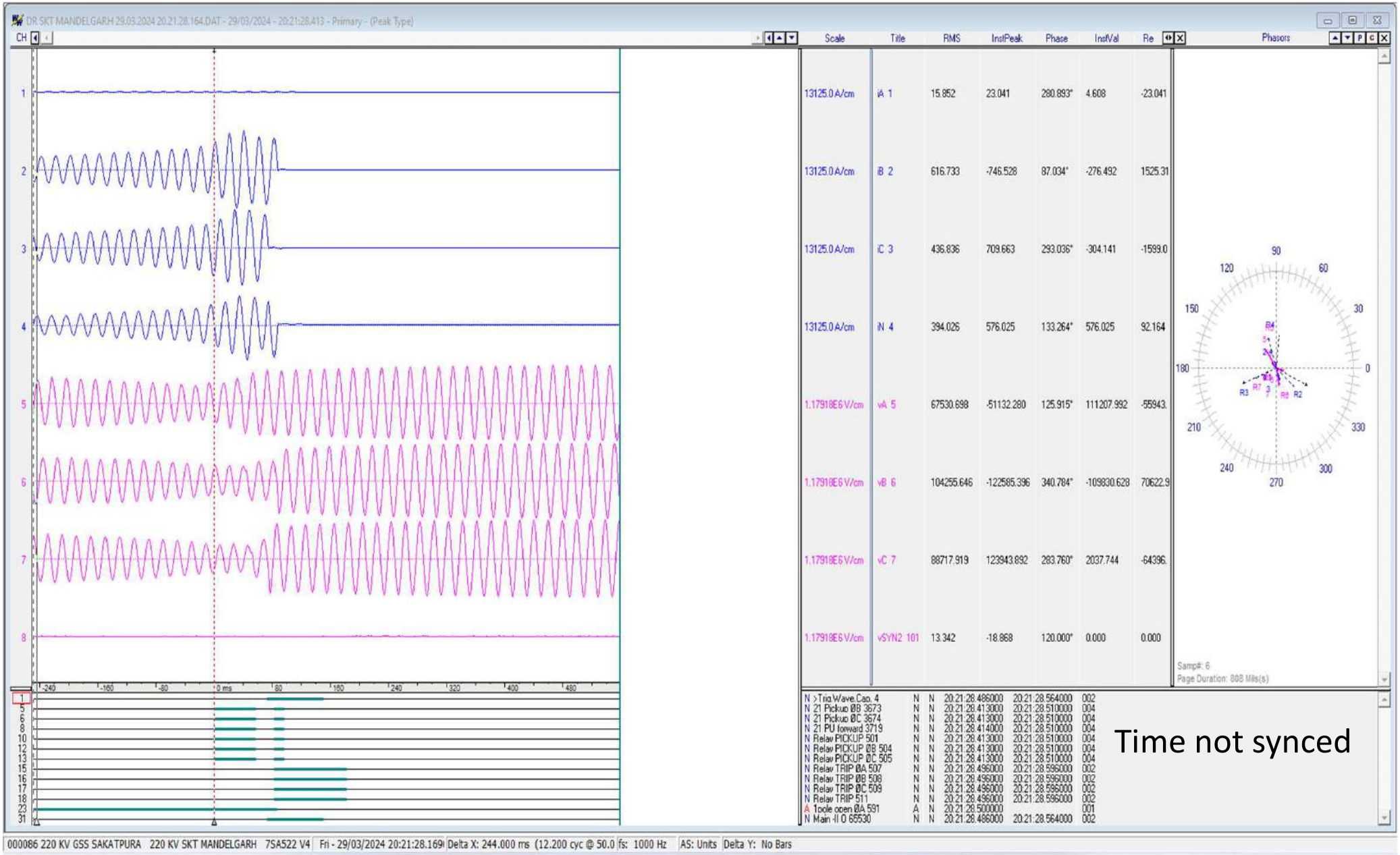
Sensed fault in Z-4 and reset and after ~650msec of R-N fault, line tripped on distance protection operation.

DR of 220kV Kota Sakatpura(end)-Anta ckt



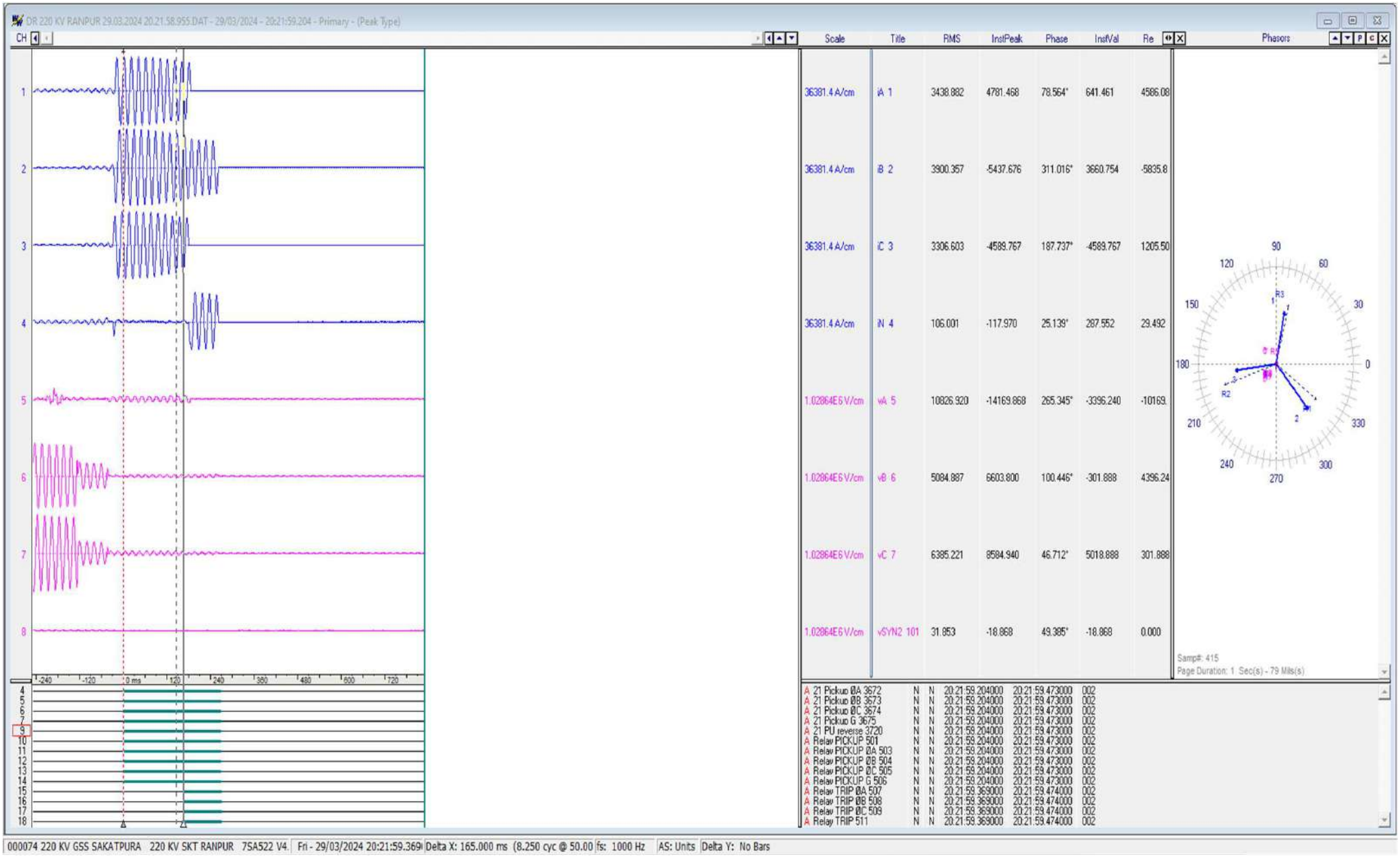
Sensed fault in Z-4 and reset and after ~650msec of R-N fault, line tripped on distance protection operation.

DR of 220kV Kota Sakatpura(end)-Mandalgarh ckt



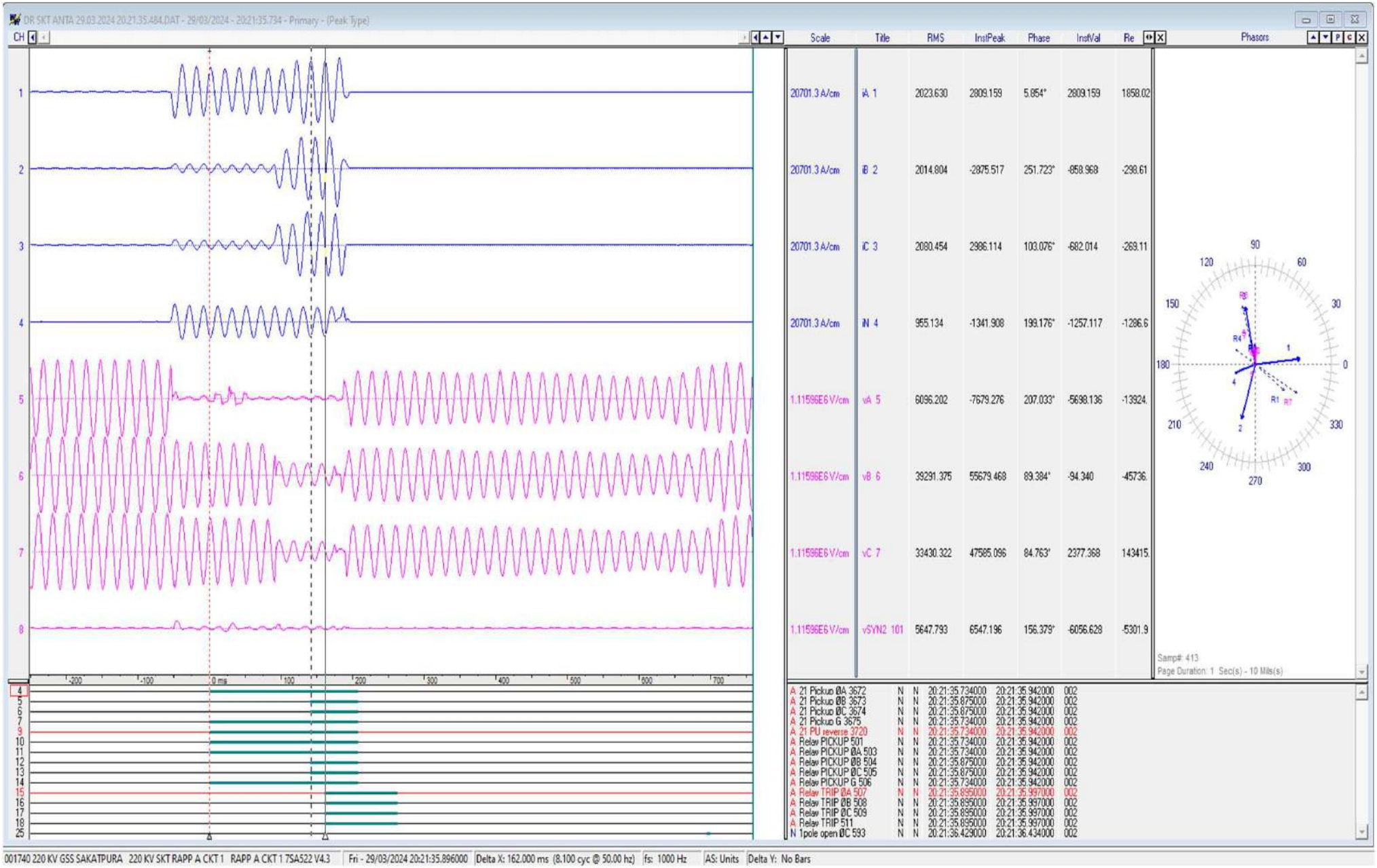
R-ph pole tripping followed by 3-ph trip observed.

DR of 220kV Kota Sakatpura(end)-Ranpur ckt



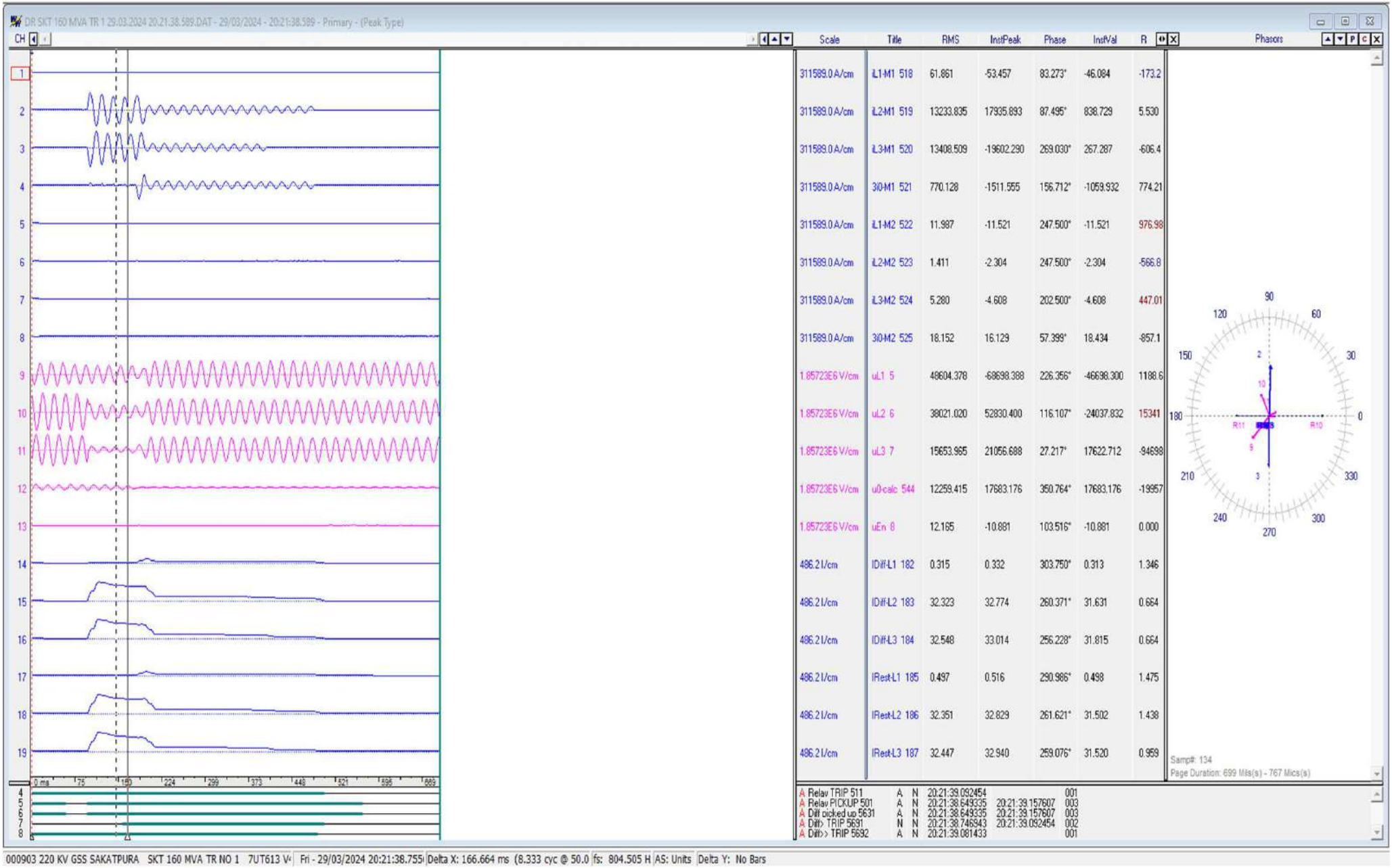
Fault sensed in Z-4, 3-ph trip after ~160msec of fault is observed.

DR of 220kV Kota Sakatpura(end)-RAPS-A ckt-1



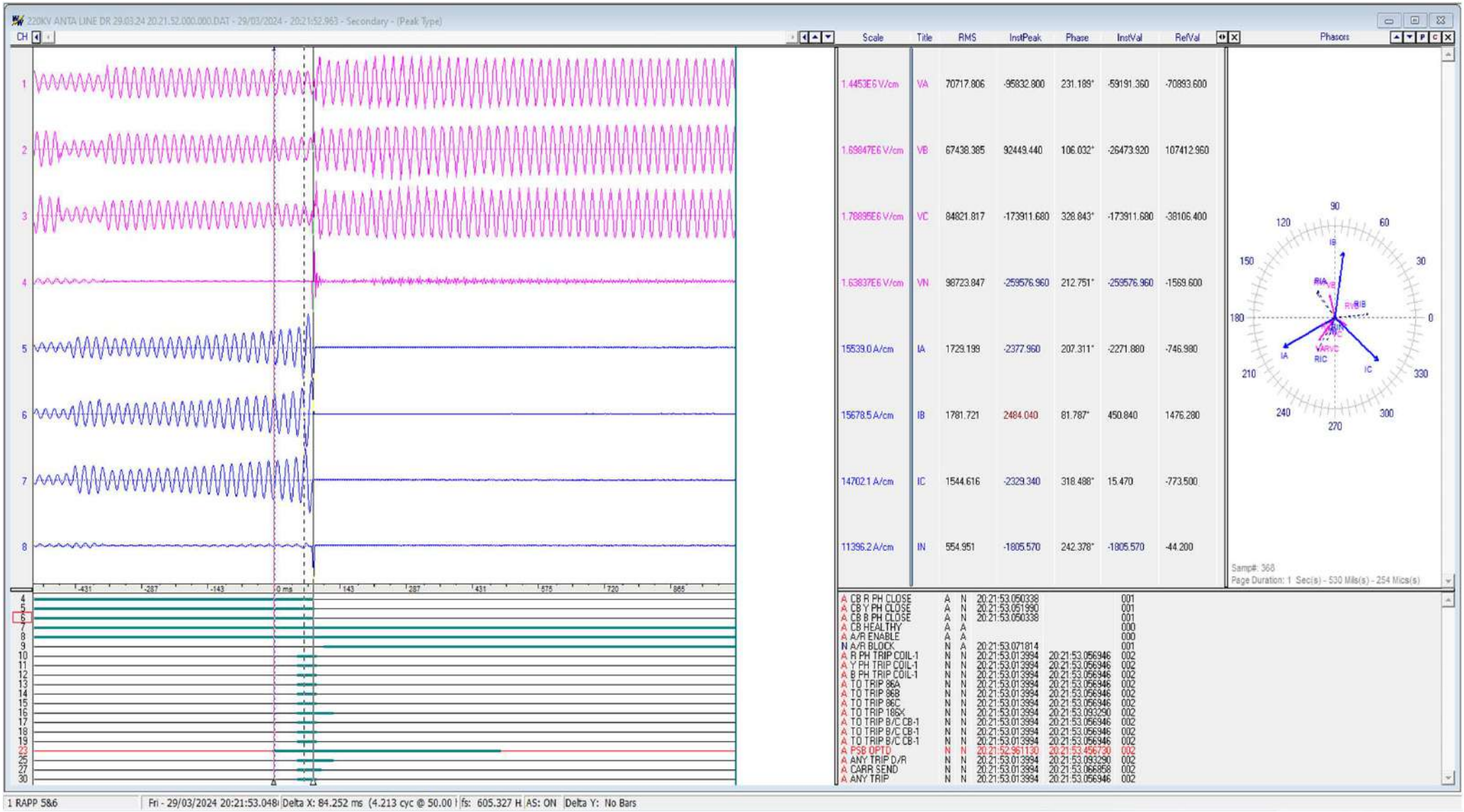
Fault sensed in Z-4, 3-ph trip after ~160msec of fault is observed.

DR of 220/132kV ICT-1 at Kota Sakatpura



Differential protection operated

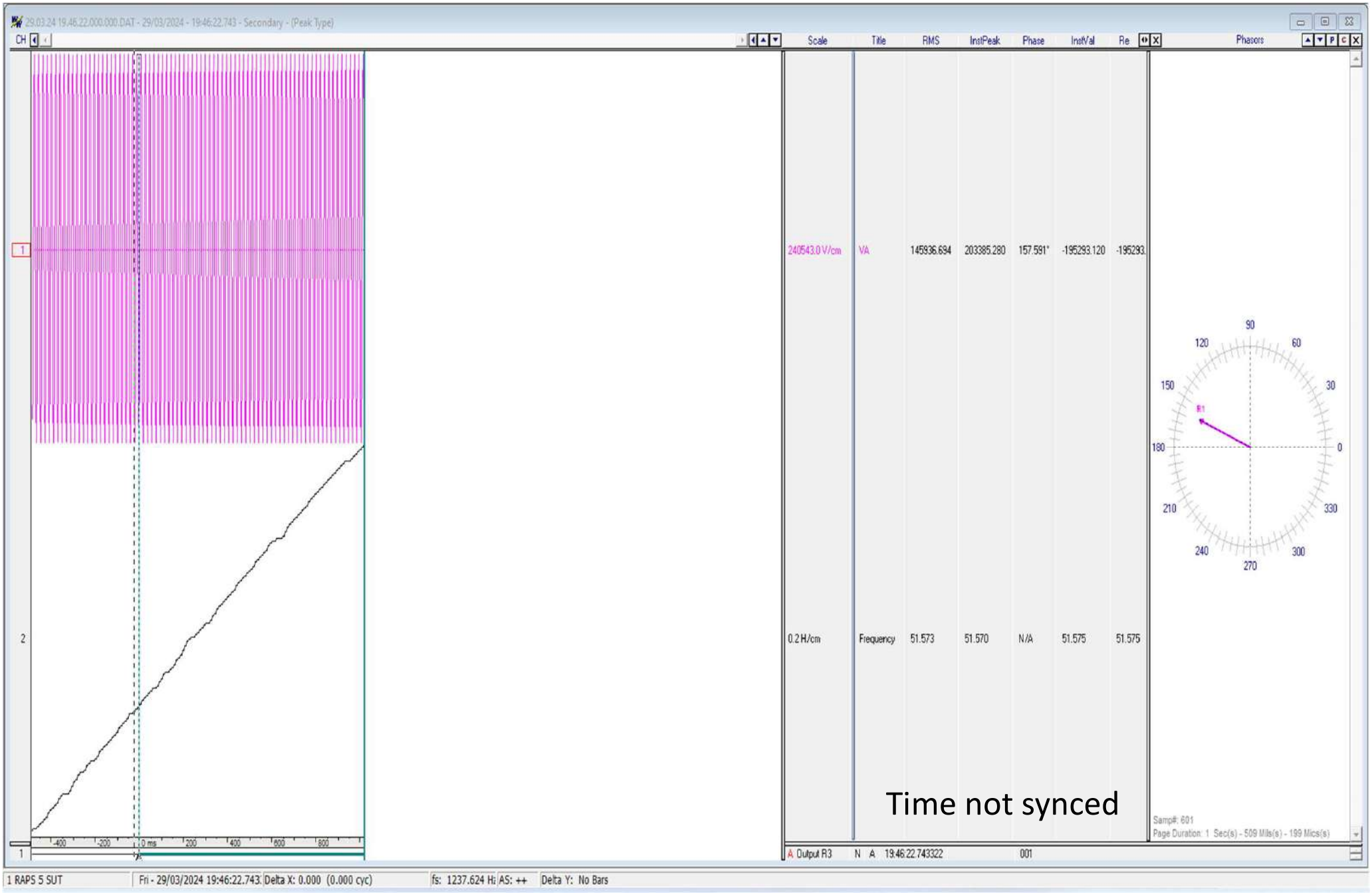
DR of 220kV RAPS_C(end)-Anta ckt



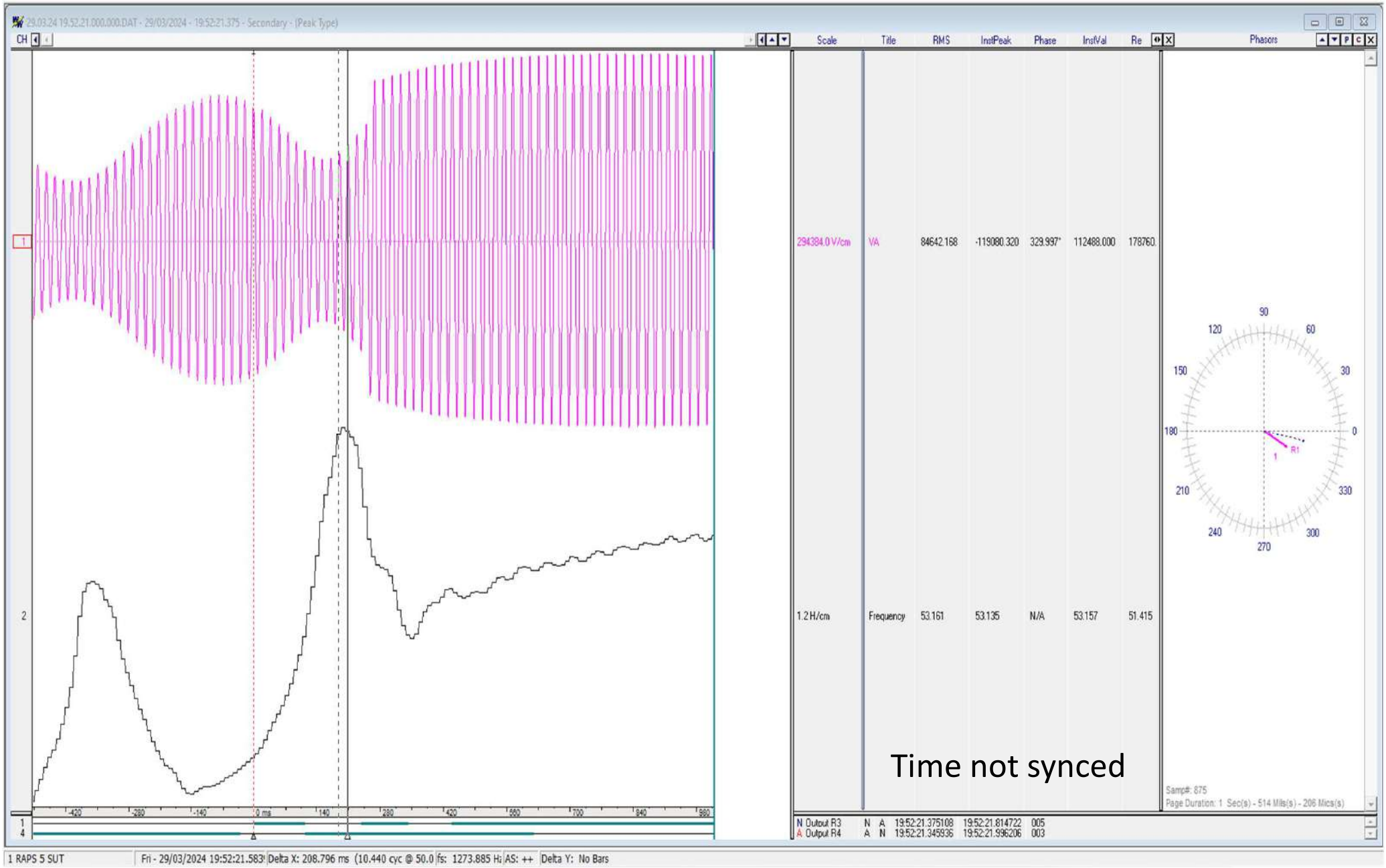
Phase currents:

- At 20:21:52:519 hrs: ~270-290A (~106MW)
- At 20:21:52:962 hrs: Power swing blocking operated: ~900-1000A (~350MW)
- At 20:21:53:048 hrs: ~1600-1800A (~650MW); breaker opened; Z-1 distance protection operated

DR of SUT-5 at RAPP-B

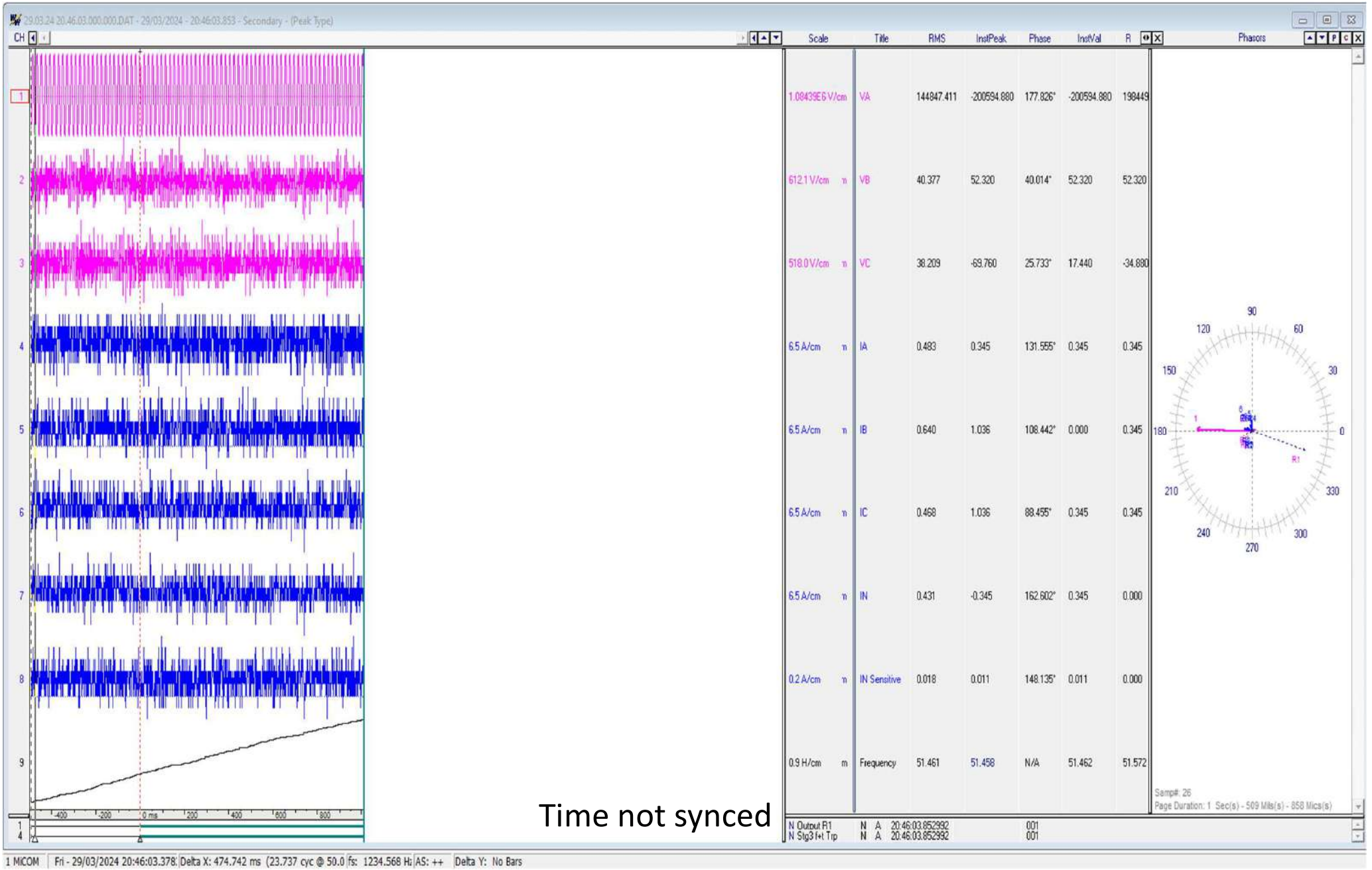


DR of SUT-5 at RAPP-B



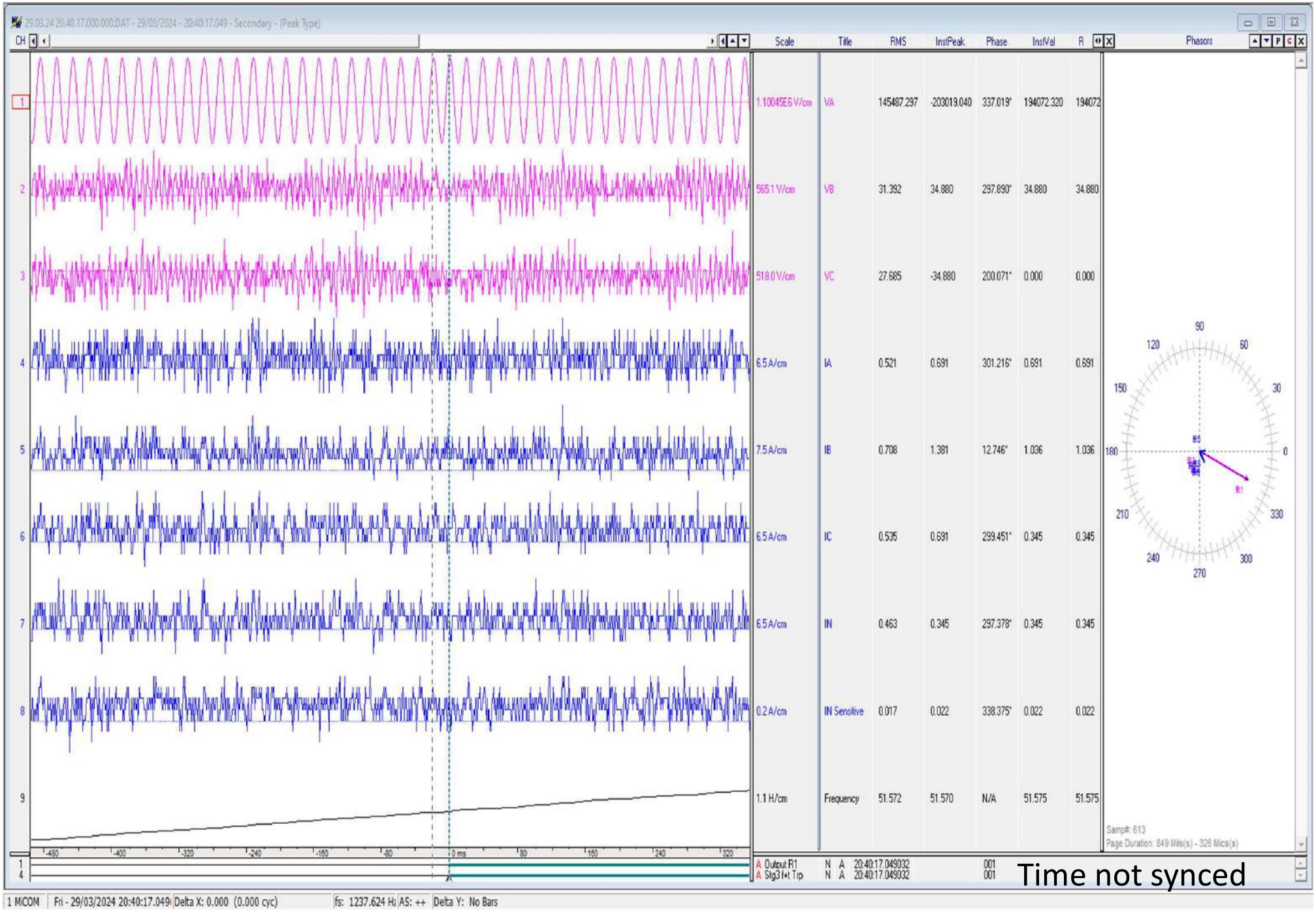
Max. frequency recorded:53.15Hz

DR of SUT-6 at RAPP-B



Time not synced

DR of SUT-6 at RAPP-B

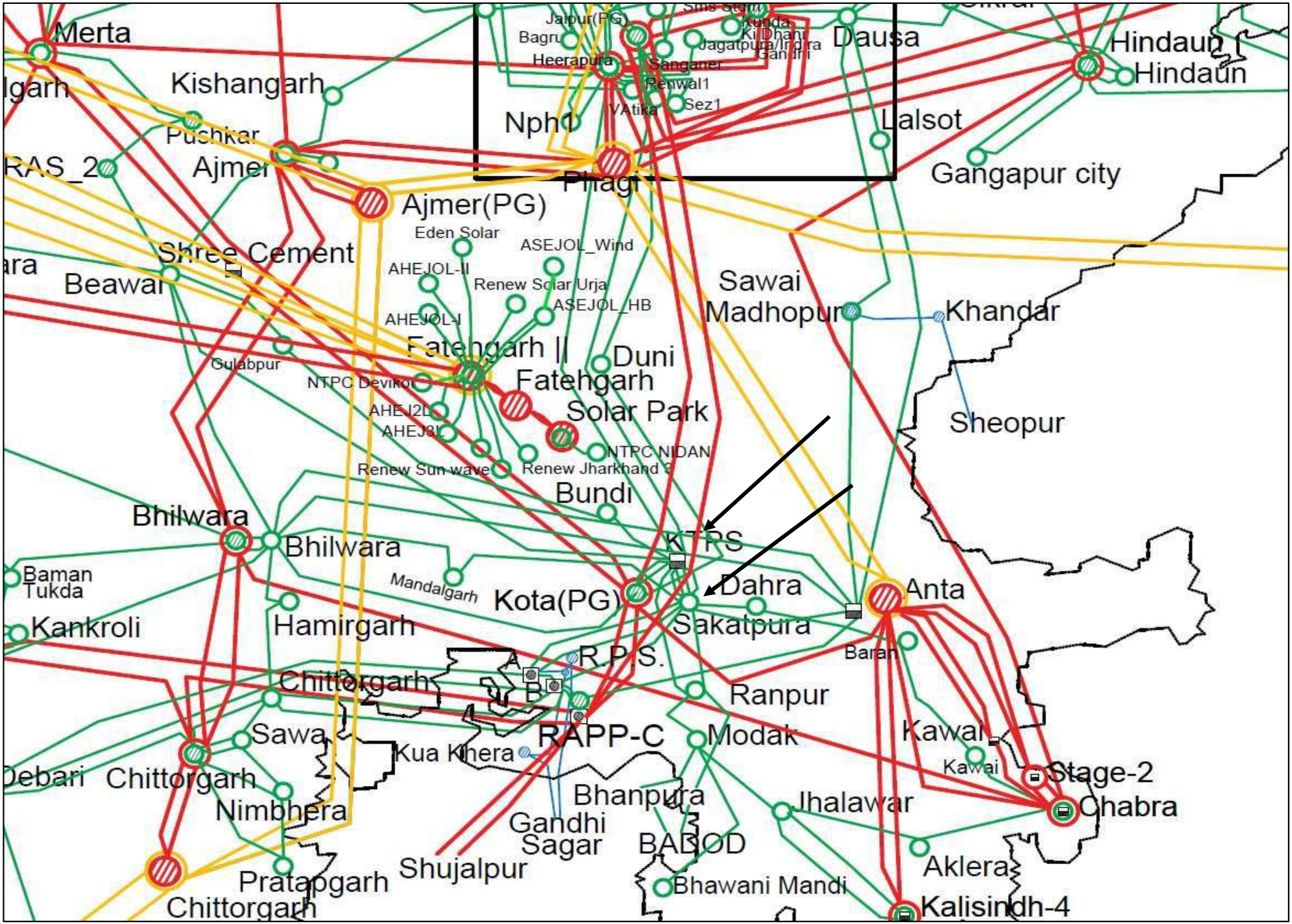


Time not synced

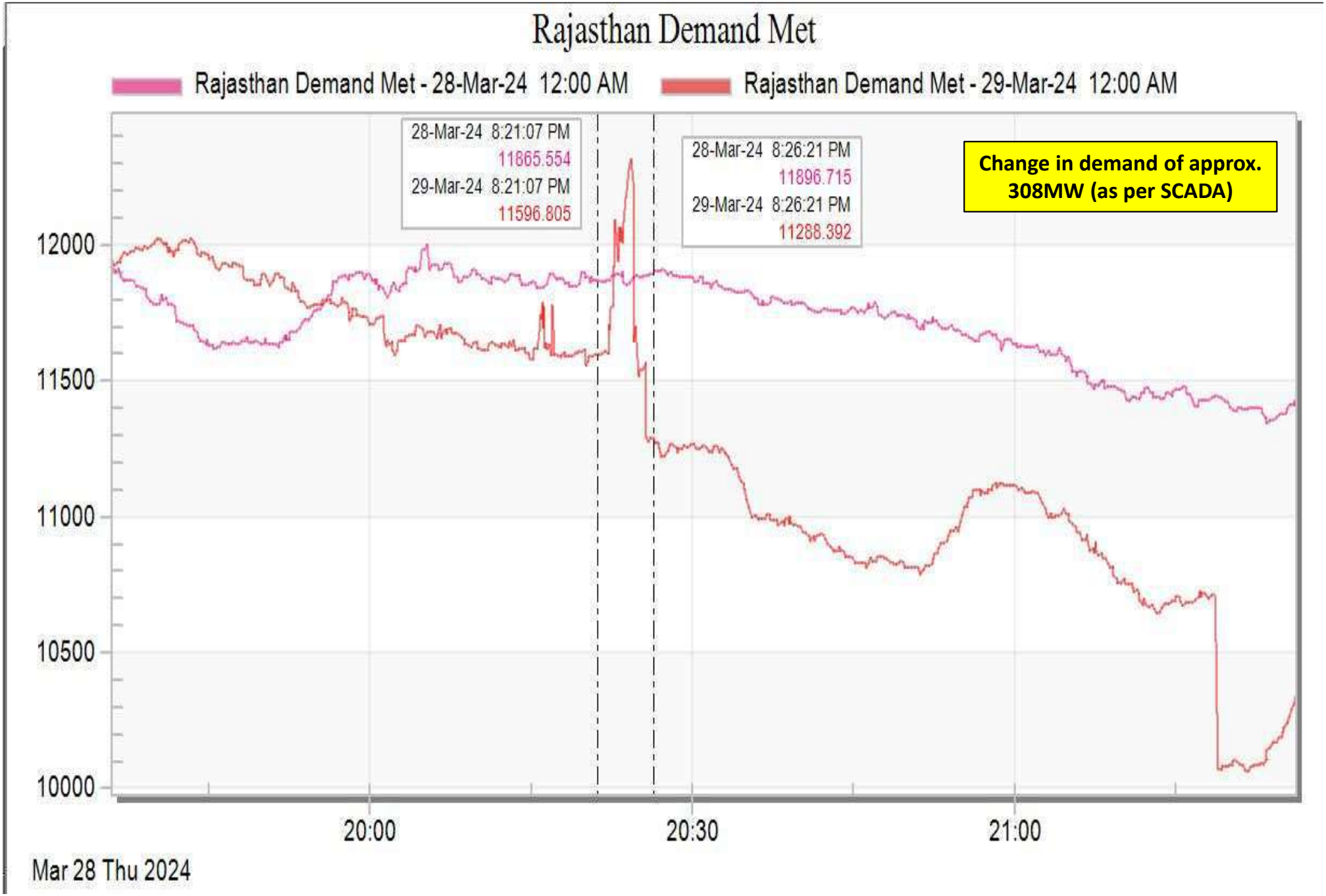
SCADA SOE

Time	Station Name	Voltage	Element	Element Type	Element Status	Remarks
20:21:51,605	KTPS	220kV	08KOTAS1	Circuit Breaker	Open	Line CB at KTPS end of 220kV KTPS-Sakatpura ckt-1
20:21:51,942	BUND2_R	220kV	04GULAB	Circuit Breaker	Open	Line CB at Bundi end of 220kV Bundi-Gulabpura ckt
20:21:51,953	BUND2_R	220kV	03KTPS	Circuit Breaker	Open	Line CB at Bundi end of 220kV Bundi-KTPS ckt opened
20:21:52,090	MANDL_R	220kV	02KOTAPG	Circuit Breaker	Open	Line CB at Manadalgarh end of 220kV Kota Sakatpura-
20:21:52,796	KTPS	220kV	10U2	Circuit Breaker	Open	KTPS Unit-2 CB opened
20:21:52,897	RANPR_R	220kV	04KOTAS	Circuit Breaker	disturbe	Line CB at Ranpur end of 220kV Kota Sakatpura-Ranpur
20:21:53,107	RAPP3 4	220kV	08KOTAS	Circuit Breaker	Open	Line CB at RAPS-B end of 220kV RAPS-B-Kota Sakatpura
20:21:58,259	KTPS	220kV	12U3	Circuit Breaker	Open	KTPS Unit-3 CB opened
20:21:58,685	KOTA	132kV	20DADAB	Circuit Breaker	Open	
20:21:58,685	KOTA	220kV	09RAPP1	Circuit Breaker	Open	Line CB at Kota Sakatpura end of 220kV RAPS-A-Kota
20:21:58,685	KOTA	220kV	18ANTA	Circuit Breaker	Open	Line CB at Kota Sakatpura end of 220kV Kota Sakatpura-
20:21:58,685	KOTA	132kV	17T1	Circuit Breaker	Open	
20:21:58,685	KOTA	220kV	16MBC	Circuit Breaker	Open	
20:21:58,685	KOTA	220kV	07T1	Circuit Breaker	Open	
20:21:58,685	KOTA	220kV	10MBC	Circuit Breaker	Open	
20:21:58,685	KOTA	220kV	13BS	Circuit Breaker	Open	
20:21:59,972	KOTA	132kV	07BS	Circuit Breaker	Open	
20:22:08,354	RPS	132kV	10U4	Circuit Breaker	Open	
20:22:09,249	RAPP3 4	220kV	07SUTR4	Circuit Breaker	Open	
20:22:09,858	RAPP3 4	220kV	06G4	Circuit Breaker	Open	

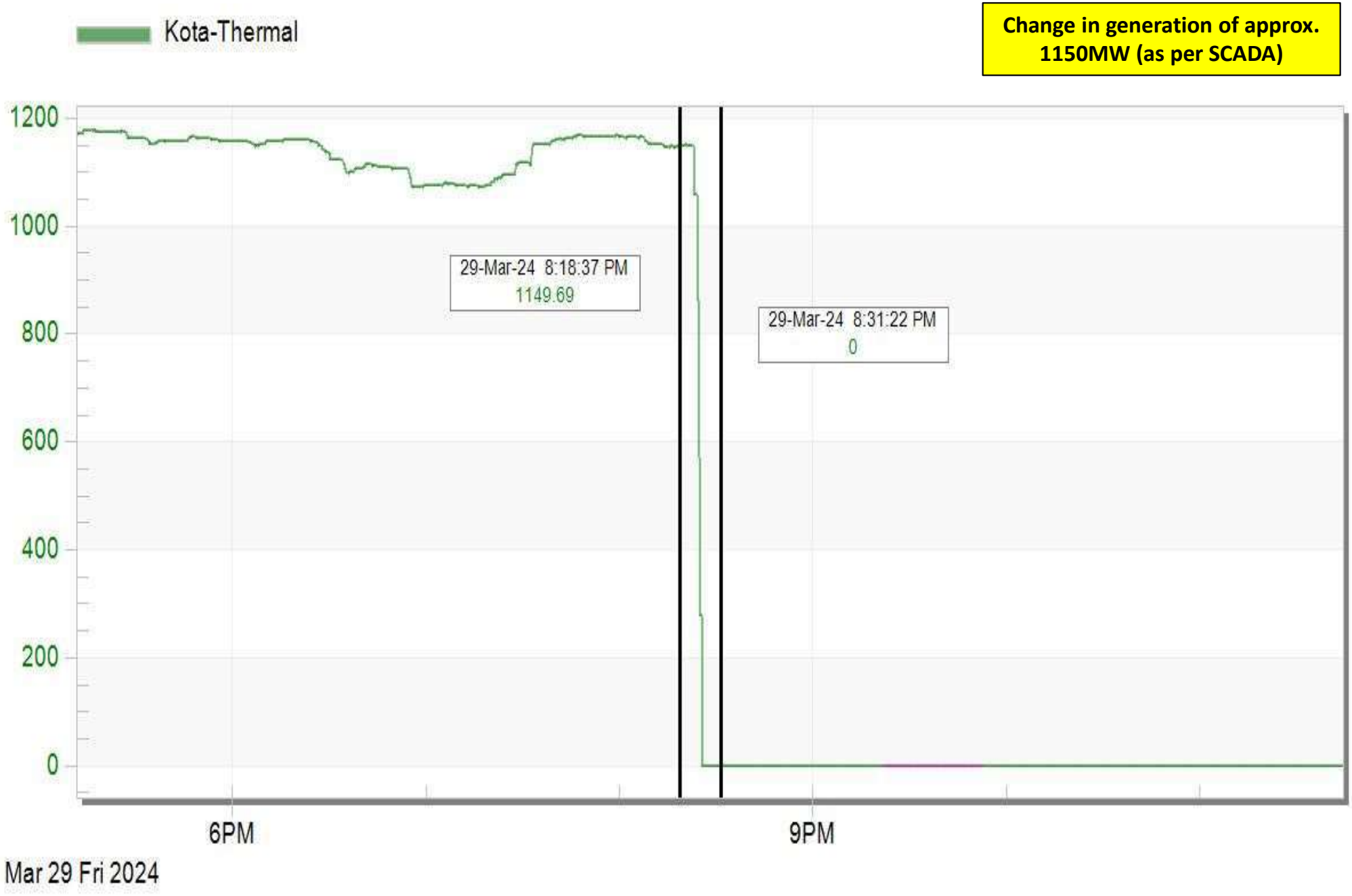
Network Diagram



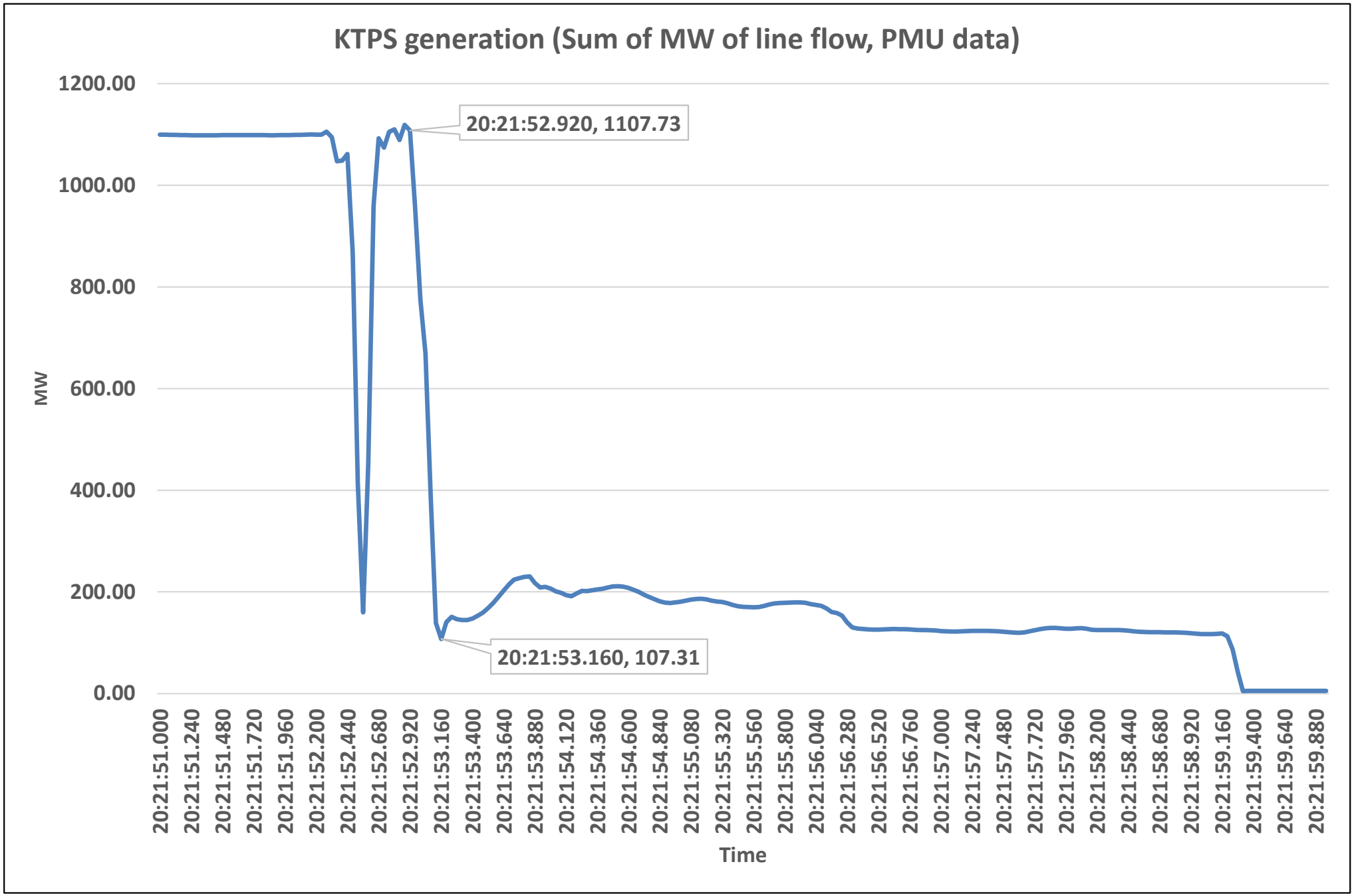
Rajasthan demand during the event



KTPS generation during the event(SCADA data)

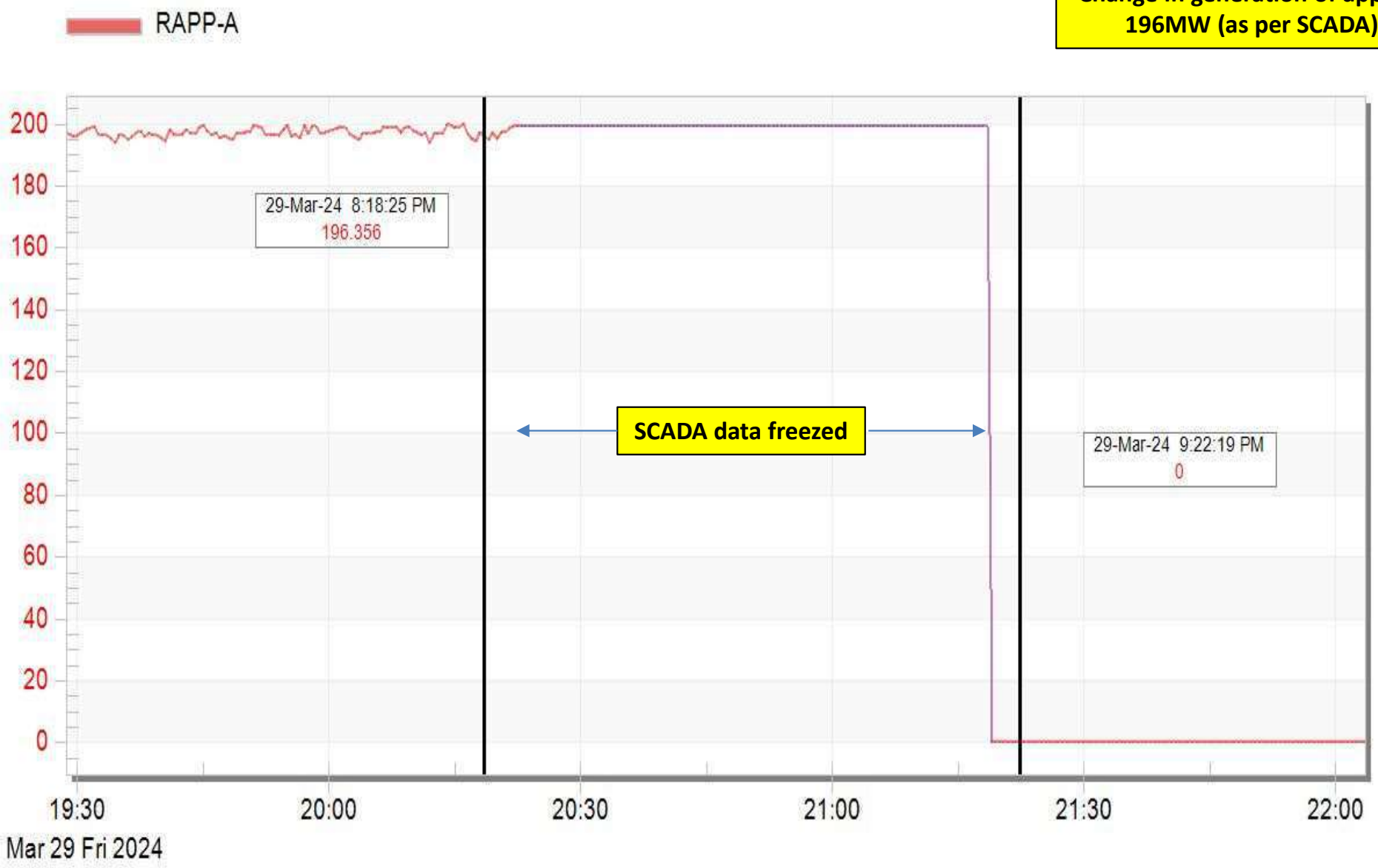


KTPS generation during the event (PMU data)

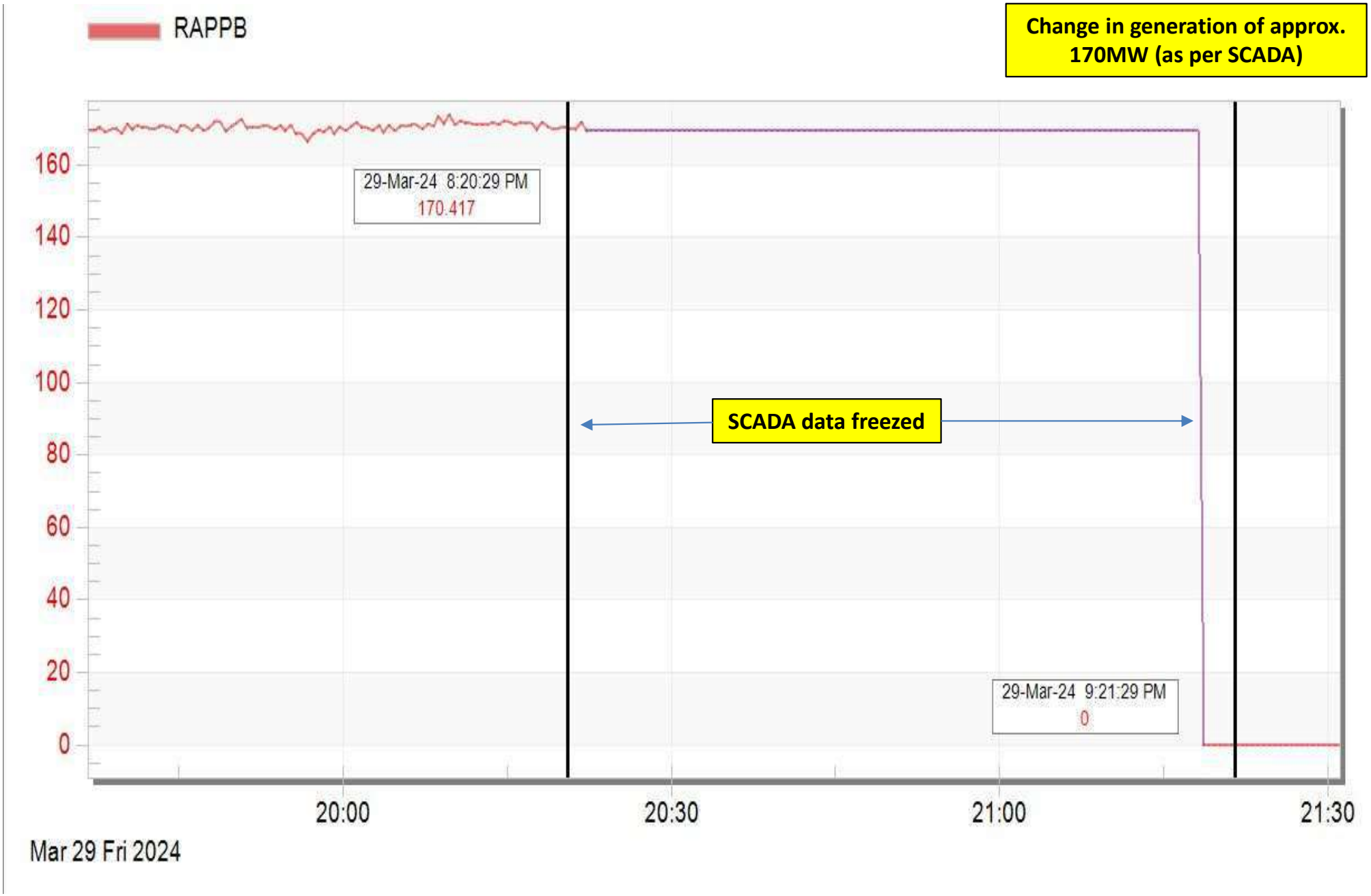


RAPP-A(NP) generation during the event

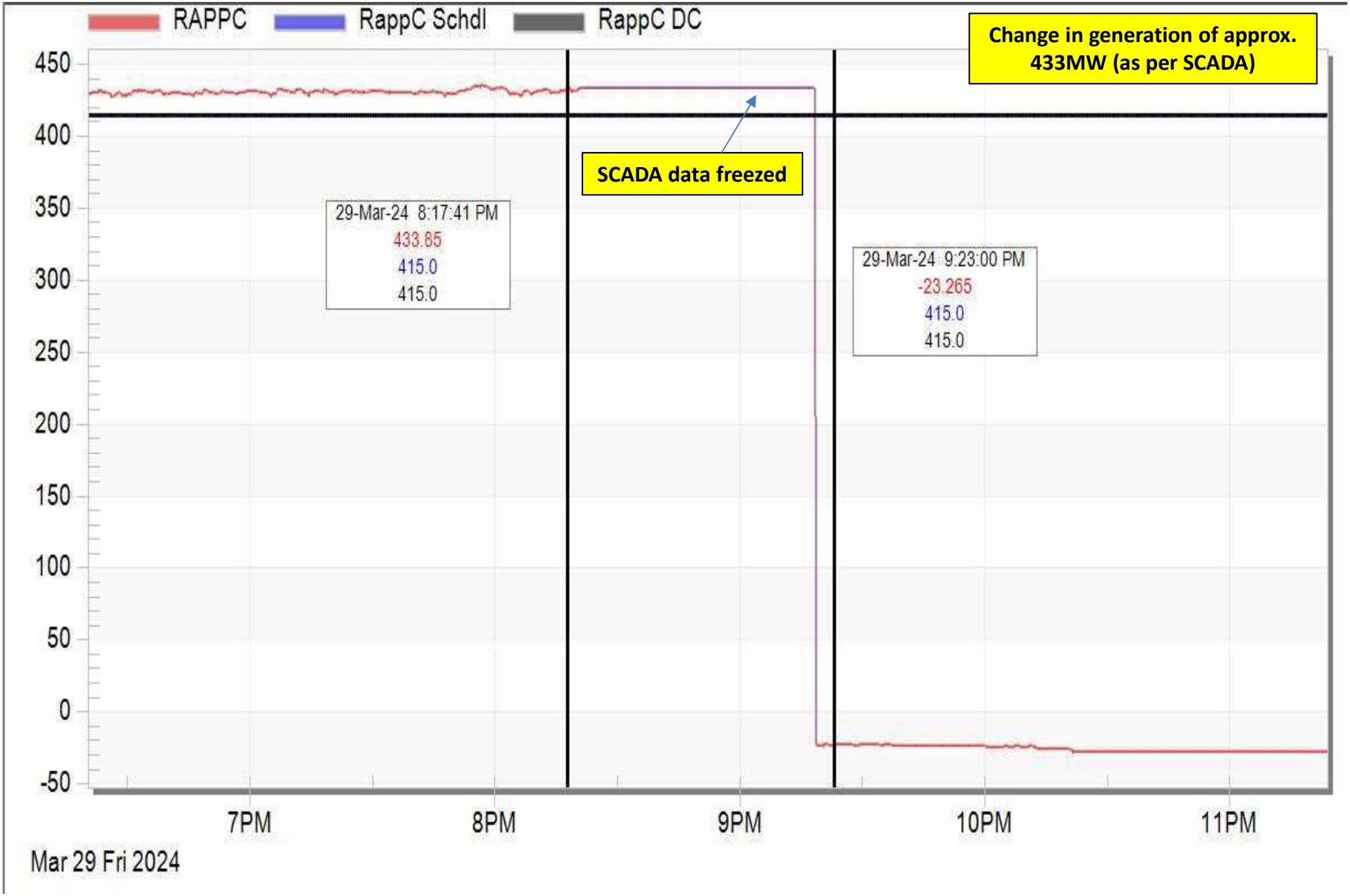
Change in generation of approx. 196MW (as per SCADA)



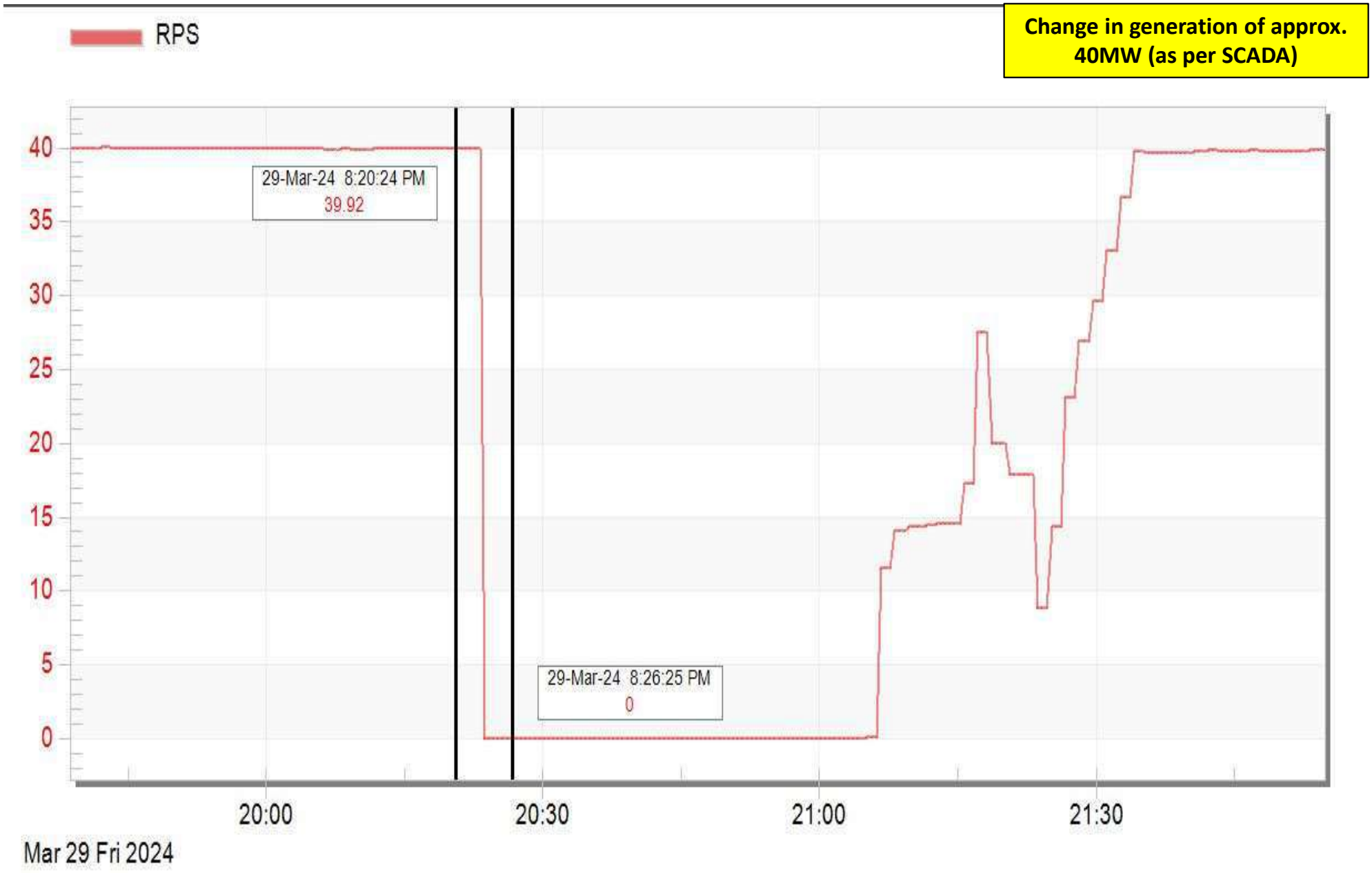
RAPP-B(NP) generation during the event



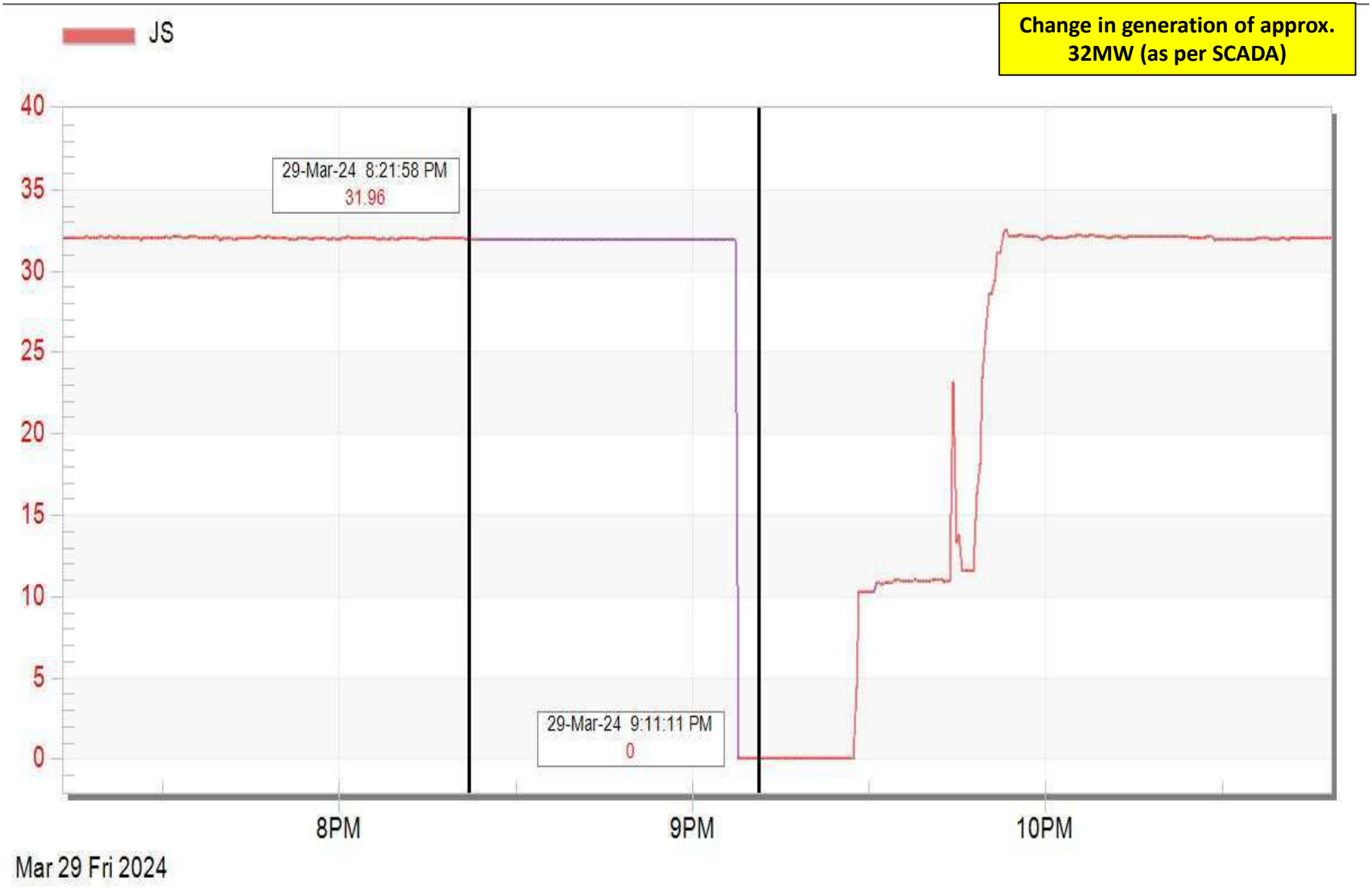
RAPP-C(NP) generation during the event



RPS HEP generation during the event



Jawahar Sagar HEP generation during the event



IMPACT OF ADDITIONAL CONNECTIVITY AND INTEGRATED OPERATION IN KTPS & RAPP GENERATION COMPLEX ON GRID STABILITY

In the 2nd meeting held on 6.8.2024 load flow study results submitted by SLDC Rajasthan (Appendix-A) was discussed & deliberated and it was observed that after cascade tripping incidents on 5.1.2024 at 5.17 hrs and later on 29.03.24 at 20.12 hrs additional connectivity has been created in RAPP & KTPS complex alongwith integrated operation which would be avoided in future such cascading tripping incidents in future .

In the meeting SLDC Rajasthan was requested to elaborate & evaluate the impact of created additional connectivity alongwith integrated operation in RAPP & KTPS generation complex on Grid stability under emergent system conditions.

1.0 Additional connectivity and integrated operation in KTPS & RAPP Generation complex

Additional connectivity and integrated operation in KTPS & RAPP Generation complex alongwith associated impact is tabulated hereunder :-

Table-1 :Impact of Additional connectivity on Grid Stability

S. No.	Particulars	Date	Remark
1	Closing of 220 kV S/C Sakatpura-Mandalgarh line alongwith integrated operation at 220 kV GSS Mandalgarh & Bhilwara	4.3.2024 at 10:20 hrs.	i. Previously 220 kV GSS Mandalgarh was radially fed from 400 kV GSS Kota(PG) through 220 kV S/C Kota(PG)-Bhilwara(split bus)-Mandalgarh line. ii. After closing of 220 kV S/C Sakatpura-Mandalgarh line system at Mandalgarh alongwith integrated operation at Mandalgarh & Bhilwara additional power flow line is available which reduce the power flow from Sakatpura to RAPP generation complex in emergent system conditions.
2	Closing of 400 kV D/C KTPS-Kota(PG) line (charged at 220 kV voltage level	1.4.2024 at 20 hrs.	iii. Thermal Capacity of 400 kV D/C KTPS-Kota(PG) line (charged at 220 KV voltage level) : 476 MVA/ckt (1250 Amp CTs are installed on the line). iv. In emergent system condition by-directional power flow has been observed on 220 kV D/C KTPS-Kota(PG) line which provide the stability in the KTPS & RAPP Generation complex in normal as well as in emergent system conditions.
3(i)	Closing of 220 kV S/C Chhittorgarh(220 kV GSS)-Chhittorgarh(400 kV GSS) line	17.4.2024 at 15:50 hrs.	i. This creates 220 kV ring system at 220 kV GSS Chhitorgarh and reduce the over loading on 220 kV S/C RAPP(C)-Anta line in normal condition as well as in emergent conditions. ii. Power flow on 220 kV D/C RAPP(B)-Chhittorgarh line increased. iii. Previously 220 kV GSS Debari (approx. Load 150-200 MW) and Chhitorgarh (approx. Load 150-200 MW) was radially connected from RAPP Complex and in emergent conditions whenever power was flow from Sakatpura to RAPP complex, 220 kV S/C RAPP©-Anta line was tripped on over load. Now additional power which inject in RAPP© complex from Sakatpura is distributed/shared in three 220 kV circuits viz. 220 kV D/C RAPP(B)-Chhitorgarh line and 220 kV S/C RAPP(C)-Anta line and reduce the possibility of outage of 220 kV S/C RAPP(C)-Anta line on over load which was observed in the incident of 5.1.2024 and 29.3.2024.
3(ii)	Closing of 220 kV S/C Chhittorgarh(220 kV GSS)- Sawa line	16.7.2024 at 13 hrs.	
3(iii)	Closing of 220 kV S/C Chhittorgarh(220 kV GSS)-Hamirgarh line	16.7.2024 at 13 hrs.	

4(i)	Creation of additional 220 kV S/C KTPS-Ranpur (Bus-2)– Sakatpura(Bus-D)-Dahra line by utilizing opened 220 kV S/C KTPS-Ranpur line & 220 kV S/C Ranpur – Sakatpura line	18.4.2024 at 13:54 hrs.	i. This creates additional evacuation line from KTPS upto extent of 220 kV GSS Dahra load (150 to 200 MW) ii. Split bus arrangement at 220 kV GSS Sakatpura reduce the no. of outage of 220 kV lines at Sakatpura under in emergent system conditions
4(ii)	Split bus arrangement at 220 kV GSS Sakatpura (Bus-D is separated from 220 kV Bus-A,B &C)		
5	Commissioning of 220 kV Bus Bar protection scheme at 220 kV GSS Sakatpura	16.7.2024 at 13 hrs.	i. Reduce the possibility of outage at 220 kV lines& generating units at RAPP and KTPS switchyard under 220 kV bus fault at Sakatpura. ii. on 14.8.2024 at 16:12 hrs. Y Phase CT of 220 KV Sakatpura-RAPP A CKT No. 1 burst and bus protection operated at 220 kV GSS Sakatpura .
6	Change of Zone-2 settings of 220 kV interconnectors between KTPS and 220 kV GSS Sakatpura	-	XEN(Protection & switchyard), KTPS intimated that Zone-2 settings of 220 kV interconnectors between KTPS and 220 kV GSS Sakatpura has been revised as under :- i. 220 kV interconnector - 1&3: 200 ms ii. 220 kV interconnector - 1&3: 240 ms Previously Zone-2 settings was 160 ms.

2.0 **LOAD FLOW STUDY**

Load flow studies have been performed for some emergent system conditions for following two scenario's :-

i. Scenario-1 : Without additional connectivity (as per table-1) at KTPS & RAPP generation complex
ii. Scenario-2 : With additional connectivity (as per table-1) at KTPS & RAPP generation complex

Load flow study results are discussed in the following paragraphs :-

2.1 Rajasthan Demand and Generation

- Rajasthan Demand : 16000 MW
- Intra State Solar Power Generation in Rajasthan : 3662.30 MW (IC : 4946.50 MW) (74.03% of IC)
- Intra State Wind Power Generation in Rajasthan : 586.57 MW (IC : 4342.94 MW) (13.5% of IC)
- Thermal power generation in Rajasthan(excluding Auxiliary consumption) : 5989.49 MW (9645.5 MW) (62.09% of IC)
- Hydro power generation in Rajasthan (excluding Auxiliary consumption) : 68 MW (411 MW) (16>54%)
- Inter State Solar Power Generation in Rajasthan : 10772.03 MW (IC : 17716.906 MW) (60.80% of IC)
- Tie line flows in Rajasthan Control area : 4598.9 MW

2.2 Generation in various Power Plants in Kota area

Table-2:Generation in Kota Area

S. No.	Name of Power PLant	Installed Capacity (MW)	Net Generation (Excluding aux. consumption) (MW)	% Generation	Remark
A	**Kota Thermal Power Station**				
1	Unit-1	110	99	90	-
2	Unit-2	110	99	90	-
3	Unit-3	210	189	90	-
4	Unit-4	210	189	90	-
5	Unit-5	210	189	90	-
6	Unit-6	195	176	90	-
7	Unit-7	195	176	90	-
	Total(A)	**1240**	**1117**	**90**	-
B	**Nuclear Power Power Stations**				
	RAPP-A				
	Unit-2	200	180	90	-
	RAPP-B				
	Unit-3	220	198	90	-
	Unit-4	220	198	90	-
	RAPP-C				
	Unit-5	220	198	90	-
	Unit-6	220	198	90	-
C	**Anta GAS THERMAL POWER STATION**				
i	Unit-1	88.71	RSD		
ii	Unit-2	88.71	RSD		
iii	Unit-3	88.71	RSD		
iv	Unit-4	153.2	RSD		
v	Anta GTPS Solar Generation	87.5	0 MW		

2.3 Load flow study in Base Case for Scenario-1 and Scenario-2

Load flow study results for Base Case in Scenario-1 and Scenario-2 are plotted at Exhibit-1A & Exhibit-1B respectively and tabulated here under :-

Table-3 : Power flow at in Base Case in Scenario-1 and Scenario-2

S. No.	Name of line	Power flow (MW) in Base Case	
		Scenario-1	Scenario-2
		Exhibit-1A	Exhibit-1B
A	**KTPS switchyard**		
1	220 kV S/C KTPS-Heerapura line	185	132
2	220 kV S/C KTPS-Beawar line	118	74
3	220 kV S/C KTPS-Bundi line	210	170
4	220 kV S/C KTPS-Ranpur line	OPEN	146
5	220 kV S/C KTPS-Vatika line	Under S/D	Under S/D
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	141	119

7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	160	135
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	141	119
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	163	137
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	OPEN	42
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	OPEN	42
B	**RAPP(A) switchyard**		
1	220 kV S/C RAPP(A)-Debari line	66	66
2	220 kV S/C RAPP(A)-RAPP(B) line	38	40
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	38	37
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	38	37
C	**RAPP(B) switchyard**		
1	220 kV S/C RAPP(B)-Debari line	63	63
2	220 kV S/C RAPP(B)-RAPP(A) line	-38	-40
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	87	62
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	87	62
5	220 kV S/C RAPP(B)-Sakatpura line	36	34
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	80	108
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	80	108
8	220 kV S/C RAPP(C)-Anta GTPS line	174	124
D	**220 kV GSS Sakatpura**		
	220 kV Bus-A		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	-38	-37
2	220 kV S/C Sakatpura-KTPS interconnector-1	-141	-119
3	220 kV S/C Sakatpura-KTPS interconnector-3	-160	-135
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	127	127
5	B/S between A& B-Closed	67	164
6	B/C between A& D-Opened	145	Open
	220 kV Bus-B		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	-38	-37
2	220 kV S/C Sakatpura-Mandalgarh line	OPEN	118
3	220 kV S/C Sakatpura-Anta GTPS line	224	153
4	B/S between B& A-Closed	-67	-164
5	B/C between B& C-Closed	-276	-228
6	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	95	95
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-B	62	62
	220 kV Bus-C		
1	220 kV S/C Sakatpura-KTPS interconnector-2	-141	-119

2	220 kV S/C Sakatpura-KTPS interconnector-4	-163	-137
3	220 kV S/C Sakatpura-RAPP(B) line	-36	-34
4	B/C between C& B-Closed	276	228
5	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	63	63
	220 kV Bus-D		
1	220 kV S/C Sakatpura-Ranpur line	OPEN	-145
2	220 kV S/C Sakatpura-Dahra line	145	145
3	B/C between A& D	-145	open

From load flow study following points are observed :-

i. In Base Case-2 loading of 220 kV S/C RAPP(C)-Anta GTPS line is reduced to 124 MW as compared to 174 MW in Base Case-1.
ii. In Base Case-2 loading of 220 kV D/C RAPP(C)-Chhitorgarh line is increased to 216 MW as compared to 160 MW in Base Case-1.
iii. In Base Case-2 loading of 220 kV S/C KTPS-Bundi line is reduced to 170 MW as compared to 210 MW in Base Case-1.
iv. In Base Case-1 transmission lines are loaded as compared to Base Case-2
v. In Base Case-1 power flow from RAPP(C) Generation complex to Sakatpura is 112 MW and In Base Case-2 power flow from RAPP(C) Generation complex to Sakatpura is 108 MW

2.4 Case-1 (Contingency-1): Outage of 220 kV S/C Sakatpura-Anta GTPS line

Load flow study results for aforesaid contingency in Scenario-1 and Scenario-2 are plotted at Exhibit-2A & Exhibit-2B respectively and tabulated here under :-

Table-4: Power flow for outage of 220 kV S/C Sakatpura-Anta GTPS line

S. No.	Name of line	Power flow (MW) in Contingency-1	
		Scenario-1	Scenario-2
		Exhibit-2A	Exhibit-2B
A	**KTPS switchyard**		
1	220 kV S/C KTPS-Heerapura line	224	134
2	220 kV S/C KTPS-Beawar line	149	79
3	220 kV S/C KTPS-Bundi line	239	175
4	220 kV S/C KTPS-Ranpur line	OPEN	146
5	220 kV S/C KTPS-Vatika line	Under S/D	Under S/D
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	118	101
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	134	115
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	118	101
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	136	117
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	OPEN	71

11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	OPEN	71
B	**RAPP(A) switchyard**		
1	220 kV S/C RAPP(A)-Debari line	67	67
2	220 kV S/C RAPP(A)-RAPP(B) line	113	80
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	00	17
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	00	17
C	**RAPP(B) switchyard**		
1	220 kV S/C RAPP(B)-Debari line	62	63
2	220 kV S/C RAPP(B)-RAPP(A) line	-113	-80
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	150	93
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	150	93
5	220 kV S/C RAPP(B)-Sakatpura line	-14	08
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	80	111
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	80	111
8	220 kV S/C RAPP(C)-Anta GTPS line	300	186
D	**220 kV GSS Sakatpura**		
	220 kV Bus-A		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	00	-17
2	220 kV S/C Sakatpura-KTPS interconnector-1	-118	-101
3	220 kV S/C Sakatpura-KTPS interconnector-3	-134	-115
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	127	127
5	B/S between A& B-Closed	-20	106
6	B/C between A& D-Opened	145	Open
	220 kV Bus-B		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	00	-17
2	220 kV S/C Sakatpura-Mandalgarh line	OPEN	128
3	220 kV S/C Sakatpura-Anta GTPS line	TRIPPED	TRIPPED
4	B/S between B& A-Closed	20	-106
5	B/C between B& C-Closed	-177	-163
6	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	95	95
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-B	62	62
	220 kV Bus-C		
1	220 kV S/C Sakatpura-KTPS interconnector-2	-118	-101
2	220 kV S/C Sakatpura-KTPS interconnector-4	-136	-117
3	220 kV S/C Sakatpura-RAPP(B) line	14	-7
4	B/C between C& B-Closed	177	163
5	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	63	63
	220 kV Bus-D		
1	220 kV S/C Sakatpura-Ranpur line	OPEN	-145
2	220 kV S/C Sakatpura-Dahra line	145	145
3	B/C between A& D	-145	open

From load flow study following points are observed :-

i. Under outage of 220 kV S/C Sakatpura-Anta GTPS line in Scenario-1, following lines are highly overloaded :-
   a. 220 kV S/C RAPP(C)-Anta GTPS line : 300 MW
   b. 220 kV S/C KTPS-Heerapura line : 224 MW
   c. 220 kV S/C KTPS-Bundi line : 239 MW
   d. There is reverse power flow of 14 MW from Sakatpura to RAPP generation complex. Power flow in Base Case-1 from RAPP to Sakatpura complex is 112 MW.

ii. Under outage of 220 kV S/C Sakatpura-Anta GTPS line in Scenario-2, line loadings are within limits:-
   a. 220 kV S/C RAPP(C)-Anta GTPS line : 186 MW
   b. 220 kV S/C KTPS-Heerapura line : 134 MW
   c. 220 kV S/C KTPS-Bundi line : 139 MW
   d. There is no reverse power flow from Sakatpura to RAPP generation complex. Power flow from RAPP to Sakatpura complex is reduced to 42 MW from 108 MW.

2.5 Case-2 (Contingency-2): Outage of 220 kV S/C KTPS-Heerapura line

Load flow study results for aforesaid contingency in Scenario-1 and Scenario-2 are plotted at Exhibit-3A & Exhibit-3B respectively and tabulated here under :-

Table-5: Power flow for outage of 220 kV S/C KTPS-Heerapura line

S. No.	Name of line	Power flow (MW) in Contingency-2	
		Scenario-1	Scenario-2
		Exhibit-3A	Exhibit-3B
A	**KTPS switchyard**		
1	220 kV S/C KTPS-Heerapura line	TRIPPED	TRIPPED
2	220 kV S/C KTPS-Beawar line	159	81
3	220 kV S/C KTPS-Bundi line	248	176
4	220 kV S/C KTPS-Ranpur line	OPEN	146
5	220 kV S/C KTPS-Vatika line	Under S/D	Under S/D
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	166	129
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	188	146
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	166	129
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	191	149
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	OPEN	80

11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	OPEN	80
B	**RAPP(A) switchyard**		
1	220 kV S/C RAPP(A)-Debari line	66	66
2	220 kV S/C RAPP(A)-RAPP(B) line	62	53
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	26	30
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	26	30
C	**RAPP(B) switchyard**		
1	220 kV S/C RAPP(B)-Debari line	63	63
2	220 kV S/C RAPP(B)-RAPP(A) line	-62	-53
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	107	64
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	107	64
5	220 kV S/C RAPP(B)-Sakatpura line	20	26
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	80	64
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	80	64
8	220 kV S/C RAPP(C)-Anta GTPS line	214	129
D	**220 kV GSS Sakatpura**		
	220 kV Bus-A		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	-26	-30
2	220 kV S/C Sakatpura-KTPS interconnector-1	-166	-129
3	220 kV S/C Sakatpura-KTPS interconnector-3	-188	-146
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	127	127
5	B/S between A& B-Closed	108	178
6	B/C between A& D-Opened	145	Open
	220 kV Bus-B		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	-26	-30
2	220 kV S/C Sakatpura-Mandalgarh line	OPEN	126
3	220 kV S/C Sakatpura-Anta GTPS line	291	166
4	B/S between B& A-Closed	-108	-240
5	B/C between B& C-Closed	-314	-178
6	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	95	95
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-B	62	62
	220 kV Bus-C		
1	220 kV S/C Sakatpura-KTPS interconnector-2	-166	-129
2	220 kV S/C Sakatpura-KTPS interconnector-4	-191	-149
3	220 kV S/C Sakatpura-RAPP(B) line	-20	-26
4	B/C between C& B-Closed	314	240
5	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	63	63
	220 kV Bus-D		
1	220 kV S/C Sakatpura-Ranpur line	OPEN	-145
2	220 kV S/C Sakatpura-Dahra line	145	145
3	B/C between A& D	-145	open

From load flow study following points are observed :-

i. Under outage of 220 kV S/C KTPS-Heerapura line in Scenario-1, following lines are highly overloaded :-
   a. 220 kV S/C RAPP(C)-Anta GTPS line : 214 MW
   b. 220 kV S/C KTPS-Bundi line : 248 MW
   c. 220 kV S/C Sakatpura-Anta GTPS Line : 291 MW
   d. There is no reverse power flow from Sakatpura to RAPP generation complex. Power flow from RAPP to Sakatpura complex is reduced to 72 MW from 112 MW.

ii. Under outage of 220 kV S/C Sakatpura-Anta GTPS line in Scenario-2, line loadings are within limits:-
   a. 220 kV S/C RAPP(C)-Anta GTPS line : 129 MW
   b. 220 kV S/C KTPS-Bundi line : 176 MW
   c. 220 kV S/C Sakatpura-Anta GTPS Line : 166 MW
   d. There is no reverse power flow from Sakatpura to RAPP generation complex. Power flow from RAPP to Sakatpura complex is reduced to 86 MW from 108 MW.

2.6 Case-3 (Contingency-3): Outage of 220 kV S/C KTPS-Beawar line

Load flow study results for aforesaid contingency in Scenario-1 and Scenario-2 are plotted at Exhibit-4A & Exhibit-4B respectively and tabulated here under :-

Table-6: Power flow for outage of 220 kV S/C KTPS-Beawar line

S. No.	Name of line	Power flow (MW) in Contingency-3	
		Scenario-1	Scenario-2
		Exhibit-4A	Exhibit-4B
\A	**KTPS switchyard**		
1	220 kV S/C KTPS-Heerapura line	211	137
2	220 kV S/C KTPS-Beawar line	TRIPPED	TRIPPED
3	220 kV S/C KTPS-Bundi line	247	183
4	220 kV S/C KTPS-Ranpur line	OPEN	146
5	220 kV S/C KTPS-Vatika line	Under S/D	Under S/D
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	154	129
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	174	124
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	154	124
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	177	141

10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	OPEN	59
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	OPEN	59
B	**RAPP(A) switchyard**		
1	220 kV S/C RAPP(A)-Debari line	66	66
2	220 kV S/C RAPP(A)-RAPP(B) line	50	47
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	32	34
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	32	34
C	**RAPP(B) switchyard**		
1	220 kV S/C RAPP(B)-Debari line	63	63
2	220 kV S/C RAPP(B)-RAPP(A) line	-50	-47
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	97	63
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	97	63
5	220 kV S/C RAPP(B)-Sakatpura line	28	30
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	80	112
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	80	112
8	220 kV S/C RAPP(C)-Anta GTPS line	195	126
D	**220 kV GSS Sakatpura**		
	220 kV Bus-A		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	-32	-33
2	220 kV S/C Sakatpura-KTPS interconnector-1	-153	-124
3	220 kV S/C Sakatpura-KTPS interconnector-3	-174	-141
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	127	127
5	B/S between A& B-Closed	88	171
6	B/C between A& D-Opened	145	Open
	220 kV Bus-B		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	-32	-33
2	220 kV S/C Sakatpura-Mandalgarh line	OPEN	123
3	220 kV S/C Sakatpura-Anta GTPS line	259	159
4	B/S between B& A-Closed	-296	-235
5	B/C between B& C-Closed	-88	-171
6	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	95	95
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-B	62	62
	220 kV Bus-C		
1	220 kV S/C Sakatpura-KTPS interconnector-2	-153	-124
2	220 kV S/C Sakatpura-KTPS interconnector-4	-177	-143
3	220 kV S/C Sakatpura-RAPP(B) line	-28	-30
4	B/C between C& B-Closed	296	235
5	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	63	63
	220 kV Bus-D		
1	220 kV S/C Sakatpura-Ranpur line	OPEN	-145

2	220 kV S/C Sakatpura-Dahra line	145	145
3	B/C between A& D	-145	open

From load flow study following points are observed :-

i. Under outage of 220 kV S/C KTPS-Bewar line in Scenario-1, following lines are highly overloaded :-
   a. 220 kV S/C KTPS-Bundi line : 247 MW
   b. 220 kV S/C Sakatpura-Anta GTPS Line : 259 MW
   c. There is no reverse power flow from Sakatpura to RAPP generation complex. Power flow from RAPP to Sakatpura complex is reduced to 92 MW from 112 MW.

ii. Under outage of 220 kV S/C Sakatpura-Anta GTPS line in Scenario-2, line loadings are within limits:-
   a. 220 kV S/C KTPS-Bundi line : 183 MW
   b. 220 kV S/C Sakatpura-Anta GTPS Line : 159 MW
   c. There is no reverse power flow from Sakatpura to RAPP generation complex. Power flow from RAPP to Sakatpura complex is reduced to 98 MW from 108 MW.

2.7 Case-4 (Contingency-4): Outage of all three circuits between Sakatpura & RAPP Generation complex

Load flow study results for aforesaid contingency in Scenario-1 and Scenario-2 are plotted at Exhibit-5A & Exhibit-5B respectively and tabulated here under :-

Table-7: Power flow for outage of all three circuits between Sakatpura and RAPP Generation complex

S. No.	Name of line	Power flow (MW) in Contingency-4	
		Scenario-1	Scenario-2
		Exhibit-5A	Exhibit-5B
\A	**KTPS switchyard**		
1	220 kV S/C KTPS-Heerapura line	171	126
2	220 kV S/C KTPS-Beawar line	106	69
3	220 kV S/C KTPS-Bundi line	200	165
4	220 kV S/C KTPS-Ranpur line	OPEN	146
5	220 kV S/C KTPS-Vatika line	Under S/D	Under S/D
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	149	134
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	169	155
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	149	134
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	172	155

10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	OPEN	17
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	OPEN	17
B	**RAPP(A) switchyard**		
1	220 kV S/C RAPP(A)-Debari line	67	67
2	220 kV S/C RAPP(A)-RAPP(B) line	113	113
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	**TRIPPED**	**TRIPPED**
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	**TRIPPED**	**TRIPPED**
C	**RAPP(B) switchyard**		
1	220 kV S/C RAPP(B)-Debari line	62	62
2	220 kV S/C RAPP(B)-RAPP(A) line	-113	-113
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	143	86
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	143	86
5	220 kV S/C RAPP(B)-Sakatpura line	**TRIPPED**	**TRIPPED**
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	80	138
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	80	138
8	220 kV S/C RAPP(C)-Anta GTPS line	286	171
D	**220 kV GSS Sakatpura**		
	220 kV Bus-A		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	**TRIPPED**	**TRIPPED**
2	220 kV S/C Sakatpura-KTPS interconnector-1	-149	-134
3	220 kV S/C Sakatpura-KTPS interconnector-3	-169	-153
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	127	127
5	B/S between A& B-Closed	46	153
6	B/C between A& D-Opened	145	Open
	220 kV Bus-B		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	**TRIPPED**	**TRIPPED**
2	220 kV S/C Sakatpura-Mandalgarh line	OPEN	123
3	220 kV S/C Sakatpura-Anta GTPS line	148	120
4	B/S between B& A-Closed	-46	-227
5	B/C between B& C-Closed	-258	-160
6	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	95	95
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-B	62	62
	220 kV Bus-C		
1	220 kV S/C Sakatpura-KTPS interconnector-2	-149	-134
2	220 kV S/C Sakatpura-KTPS interconnector-4	-172	-155
3	220 kV S/C Sakatpura-RAPP(B) line	**TRIPPED**	**TRIPPED**
4	B/C between C& B-Closed	258	227
5	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	63	63
	220 kV Bus-D		

1	220 kV S/C Sakatpura-Ranpur line	OPEN	-145
2	220 kV S/C Sakatpura-Dahra line	145	145
3	B/C between A& D	-145	open

From load flow study following points are observed :-

i. Under outage of ALL 3 nos. 220 kV circuits between Sakatpura and RAPP Generation complex in Scenario-1, following lines are highly overloaded :-
   a. 220 kV S/C RAPP(C)-Anta GTPS Line : 286 MW

ii. Under outage of ALL 3 nos. 220 kV circuits between Sakatpura and RAPP Generation complex in Scenario-3, loading on all transmission lines are within limits.
   a. 220 kV S/C RAPP(C)-Anta GTPS Line : 171 MW.

iii. In Scenario-2 upto 70 MW reverse power flow from Sakatpura to RAPP generation complex power flow on all 220 kV lines emanating from RAPP Generation complex within limits. Load flow study results for 70 MW reverse power flow from Sakatpura to RAPP(C) generation complex are placed at Exbit-5B1.

2.7 Case-5 (Contingency-5): Outage of 220 kV S/C Sakatpura-Anta GTPS and KTPS-Heerapura line

Load flow study results for aforesaid contingency in Scenario-1 and Scenario-2 are plotted at Exhibit-6A & Exhibit-6B respectively and tabulated here under :-

Table-8: Power flow for outage of 220 kV S/C Sakatpura-Anta GTPS line and 220 kV S/C KTPS-Heerapura line

S. No.	Name of line	Power flow (MW) in Contingency-5	
		Scenario-1	Scenario-2
		Exhibit-6A	Exhibit-6B
\A	**KTPS switchyard**		
1	220 kV S/C KTPS-Heerapura line	TRIPPED	TRIPPED
2	220 kV S/C KTPS-Beawar line	214	88
3	220 kV S/C KTPS-Bundi line	298	183
4	220 kV S/C KTPS-Ranpur line	OPEN	146
5	220 kV S/C KTPS-Vatika line	Under S/D	Under S/D
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	141	110
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	160	125
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	141	110
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	163	127
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	OPEN	114
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	OPEN	114
B	**RAPP(A) switchyard**		

1	220 kV S/C RAPP(A)-Debari line	68	67
2	220 kV S/C RAPP(A)-RAPP(B) line	172	98
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	-30	8
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	-30	8
C	**RAPP(B) switchyard**		
1	220 kV S/C RAPP(B)-Debari line	61	62
2	220 kV S/C RAPP(B)-RAPP(A) line	-172	-97
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	200	98
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	200	98
5	220 kV S/C RAPP(B)-Sakatpura line	-54	-4
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	80	119
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	80	119
8	220 kV S/C RAPP(C)-Anta GTPS line	399	196
D	**220 kV GSS Sakatpura**		
	220 kV Bus-A		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	30	-8
2	220 kV S/C Sakatpura-KTPS interconnector-1	-141	-110
3	220 kV S/C Sakatpura-KTPS interconnector-3	-160	-125
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	127	127
5	B/S between A& B-Closed	-1	116
6	B/C between A& D-Opened	145	Open
	220 kV Bus-B		
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	30	-8
2	220 kV S/C Sakatpura-Mandalgarh line	OPEN	137
3	220 kV S/C Sakatpura-Anta GTPS line	Tripped	Tripped
4	B/S between B& A-Closed	1	-116
5	B/C between B& C-Closed	-187	-170
6	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	95	95
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-B	62	62
	220 kV Bus-C		
1	220 kV S/C Sakatpura-KTPS interconnector-2	-141	-110
2	220 kV S/C Sakatpura-KTPS interconnector-4	-163	-127
3	220 kV S/C Sakatpura-RAPP(B) line	54	04
4	B/C between C& B-Closed	187	170
5	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	63	63
	220 kV Bus-D		
1	220 kV S/C Sakatpura-Ranpur line	OPEN	-145
2	220 kV S/C Sakatpura-Dahra line	145	145
3	B/C between A& D	-145	open

From load flow study following points are observed :-

i. Under outage of 220 kV S/C Sakatpura-Anta GTPS line and 220 kV S/C KTPS-Heerapura line in Scenario-1, following lines are highly overloaded :-
    a. 220 kV S/C RAPP(C)-Anta GTPS line : 399 MW
    b. 220 kV S/C KTPS-Bundi line : 298 MW
    c. 220 kV S/C KTPS-Beawar line : 214 MW
    d. There is reverse power flow of 114 MW from Sakatpura to RAPP generation complex. Power flow in Base Case-1 from RAPP to Sakatpura complex is 112 MW.

ii. Under outage of 220 kV S/C Sakatpura-Anta GTPS line and 220 kV S/C KTPS-Heerapura line in Scenario-2 loading on all lines are within limits:-
    a. 220 kV S/C RAPP(C)-Anta GTPS line : 196 MW
    b. 220 kV S/C KTPS-Bundi line : 183 MW
    c. 220 kV S/C KTPS-Beawar line : 88 MW
    d. There is no reverse power flow from Sakatpura to RAPP generation complex. Power flow from RAPP to Sakatpura complex is reduced to 12 MW from 108 MW.

3.0 CONCLUSION

Table-9

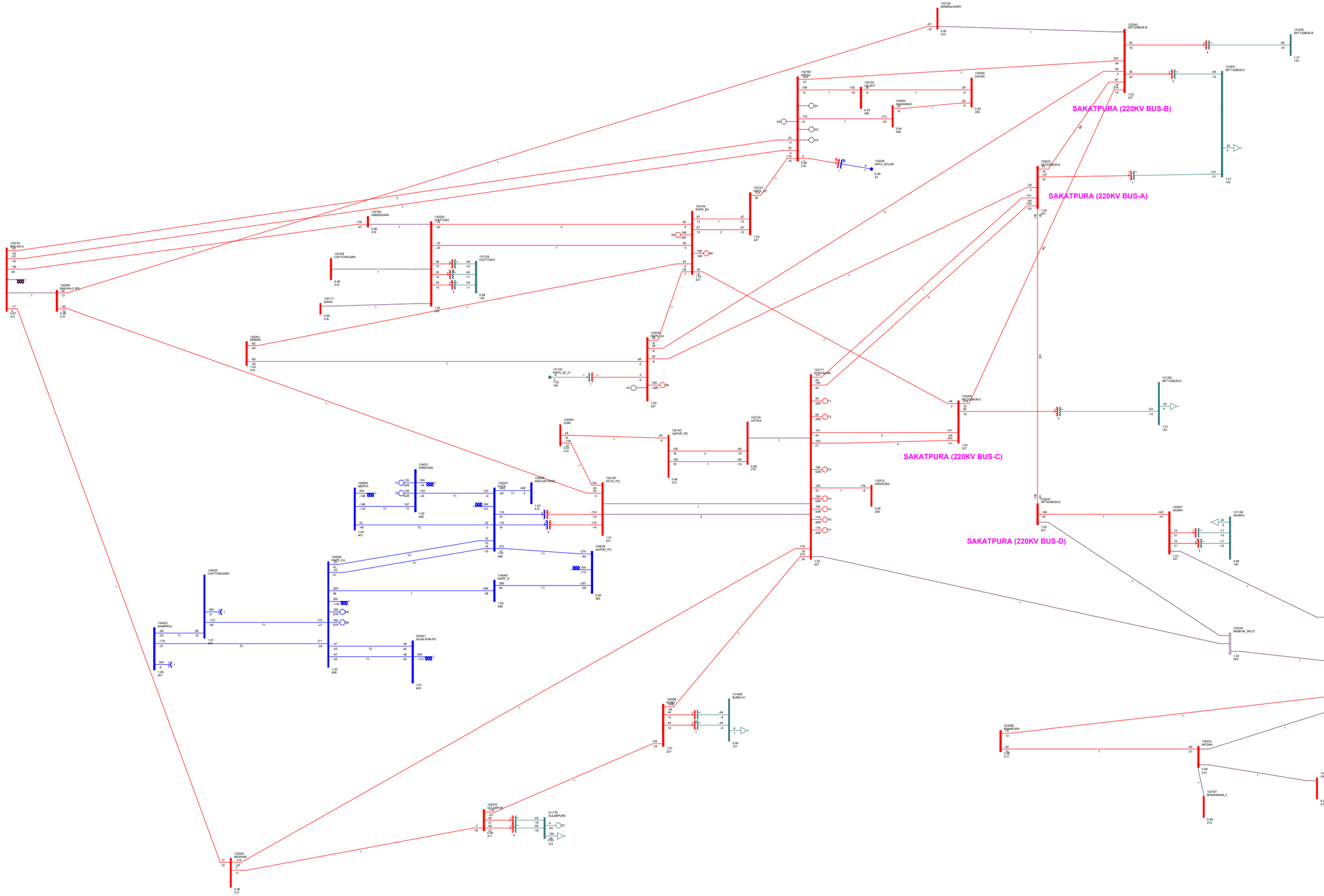
S. No.	Particulars of Case	Power flow from RAPP Complex to Sakatpura	Reverse power flow (from Sakatpura to RAPP Compex)	Ref	Remark
1A	**Base Case-1 (Scenario-1)**	**112 MW**	**-**	**Exhibit-1A**	**Power flow on all 220 KV lines are within limits.**
1B	**Base Case-2 (Scenario-2)**	**108 MW**	**-**	**Exhibit-1B**	
2A	**Outage of 220 KV S/C Sakatpura-Anta GTPS line(Scenario-1)**	**-**	**14 MW**	Exhibit-2A	Following lines are over loaded: a. 220 KV S/C RAPP(C)-Anta GTPS line : 300 MW b. 220 KV S/C KTPS-Heerapura line : 224 MW c. 220 KV S/C KTPS-Bundi line : 239 MW
2B	**Outage of 220 kV S/C Sakatpura-Anta GTPS line(Scenario-2)**	**42 MW**	**-**	Exhibit-2B	Loading on all lines are within limits:- a. 220 KV S/C RAPP(C)-Anta GTPS line : 186 MW b. 220 KV S/C KTPS-Heerapura line : 134 MW c. 220 KV S/C KTPS-Bundi line : 139 MW
3A	**Outage of 220 kV S/C KTPS-Heerapura line (Scenario-1)**	**72 MW**	**-**	Exhibit-3A	Following lines are over loaded: a. 220 KV S/C RAPP(C)-Anta GTPS line : 214 MW b. 220 KV S/C KTPS-Bundi line : 248 MW c. 220 KV S/C Sakatpura-Anta GTPS Line : 291 MW
3B	**Outage of 220 kV S/C KTPS-Heerapura line (Scenario-2)**	**86 MW**	**-**	Exhibit-3B	Loading on all lines are within limits:- a. 220 KV S/C RAPP(C)-Anta GTPS line : 129 MW b. 220 KV S/C KTPS-Bundi line : 176 MW c. 220 KV S/C Sakatpura-Anta GTPS Line : 166 MW
4A	**Outage of 220 KV S/C KTPS-Beawar line (Scenario-1)**	**92 MW**	**-**	Exhibit-4A	Following lines are over loaded: a. 220 KV S/C KTPS-Bundi line : 247 MW b. 220 KV S/C Sakatpura-Anta GTPS Line : 259 MW
4B	**Outage of 220 KV S/C KTPS-Beawar line (Scenario-1)**	**98 MW**	**-**	Exhibit-4B	Loading on all lines are within limits:- a. 220 KV S/C KTPS-Bundi line : 183 MW 220 KV S/C Sakatpura-Anta GTPS Line : 159 MW

S. No.	Particulars of Case	Power flow from RAPP Complex to Sakatpura	Reverse power flow (from Sakatpura to RAPP Compex)	Ref	Remark
5A	**Outage of ALL three circuits between Sakatpura-RAPP generation complex (Scenario-1)**	**-**	**-**	Exhibit-5A	Following lines are over loaded: a.220 kV S/C RAPP(C)-Anta GTPS line : 286 MW
5B	**Outage of ALL three circuits between Sakatpura-RAPP generation complex (Scenario-1)**	**-**	**-**	Exhibit-5B Exhibit-5B1	Loading on all lines are within limits:- a.220 kV S/C RAPP(C)-Anta GTPS line : 171 MW b.In Scenario-2 upto 70 MW reverse power flow from Sakatpura to RAPP generation complex power flow on all 220 kV lines emanating from RAPP Generation complex within limits.
6A	**Outage of 220 kV S/C Sakatpura-Anta GTPS line and 220 kV S/C KTPS-Heerapura line (Scenario-1)**	**-**	**114 MW**	Exhibit-6A	Following lines are over loaded: a. 220 kV S/C RAPP(C)-Anta GTPS line : 399 MW b. 220 kV S/C KTPS-Bundi line : 298 MW c. 220 kV S/C KTPS-Beawar line : 214 MW
6B	**Outage of 220 kV S/C Sakatpura-Anta GTPS line and 220 kV S/C KTPS-Heerapura line (Scenario-1)**	**12 MW**	**-**	Exhibit-6B	Loading on all lines are within limits:- a. 220 kV S/C RAPP(C)-Anta GTPS line : 196 MW b. 220 kV S/C KTPS-Bundi line : 183 MW c. 220 kV S/C KTPS-Beawar line : 88 MW

From load flow studies it is concluded that after cascade tripping incidents on 5.1.2024 at 5.17 hrs. and on 29.03.24 at 20.12 hrs. additional connectivity has been created in RAPP & KTPS complex alongwith integrated operation and accordingly transmission system is capable to sustain in various contingencies in the system. After integrated operation at 220 kV GSS Chhitorgarh power flow on 220 kV S/C RAPP(C)-Anta GTPS line in normal condition as well as emergent has been reduced significantly.

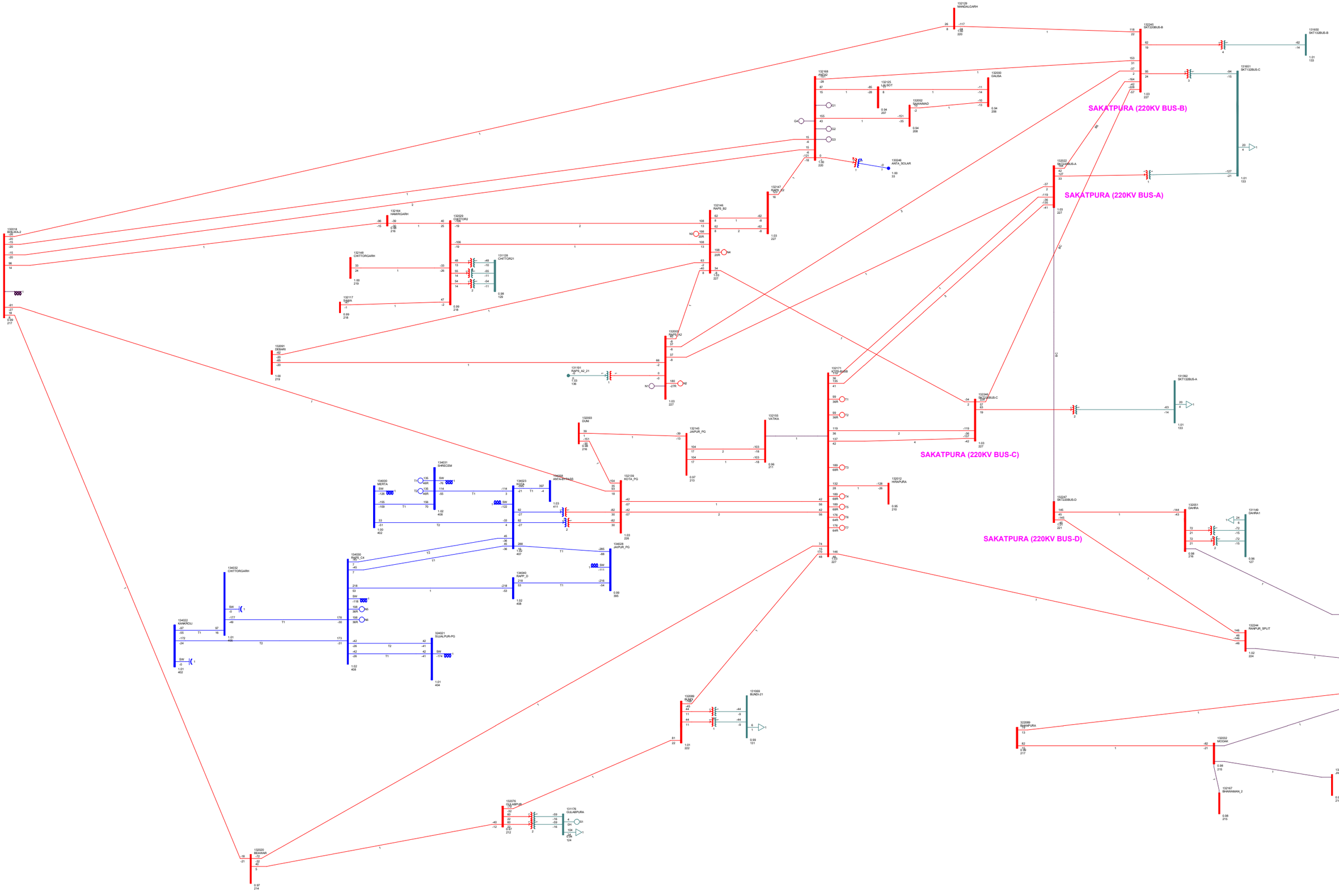
BASE CASE-1 : LOAD FLOW STUDY IN BASE CASE IN SCENARIO-1

EXHIBIT-1A



BASE CASE-2 : LOAD FLOW STUDY IN BASE CASE IN SCENARIO-2

EXHIBIT-1B



CASE-1A : LOAD FLOW STUDY IN SCENARIO-1 WITH OUTAGE OF 220 KV S/C SAKATPURA ANTA LINE EXHIBIT-2A

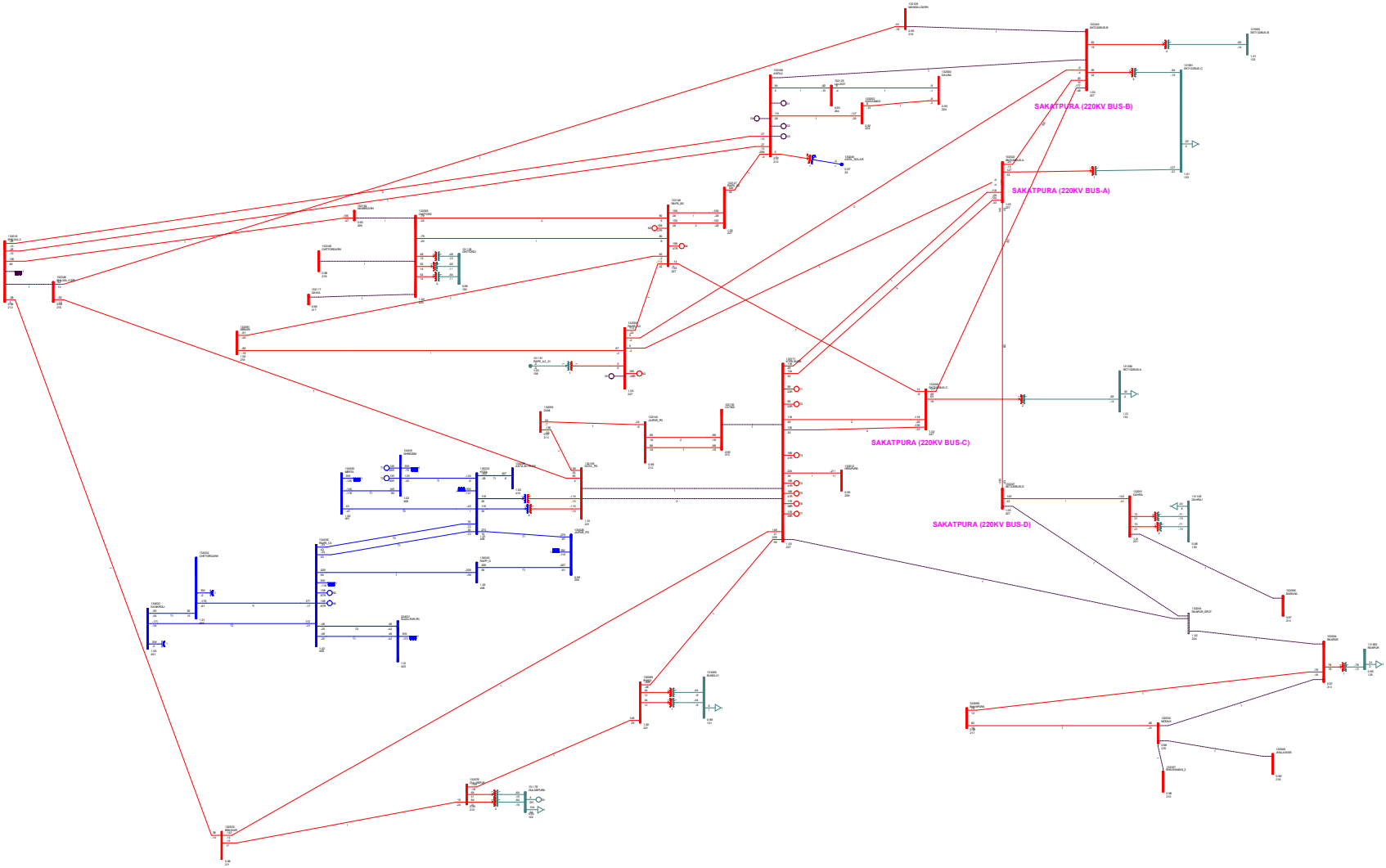
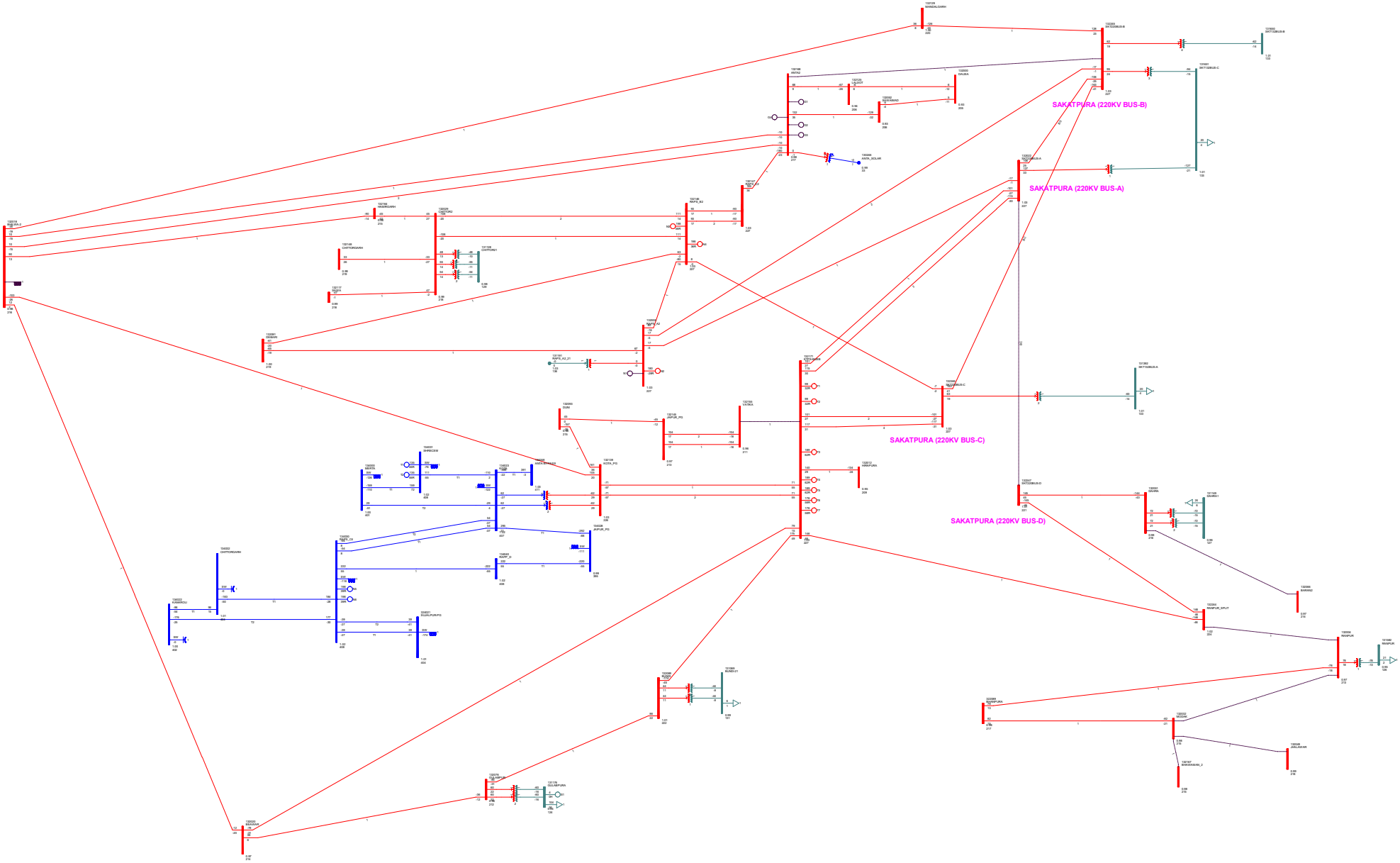


EXHIBIT-2B

CASE-1B : LOAD FLOW STUDY IN SCENARIO-2 WITH OUTAGE OF 220 KV S/C SAKATPURA ANTA LINE



CASE-2A : LOAD FLOW STUDY IN SCENARIO-1 WITH OUTAGE OF 220 KV S/C KTPS-HEERAPURA LINE EXHIBIT-3A

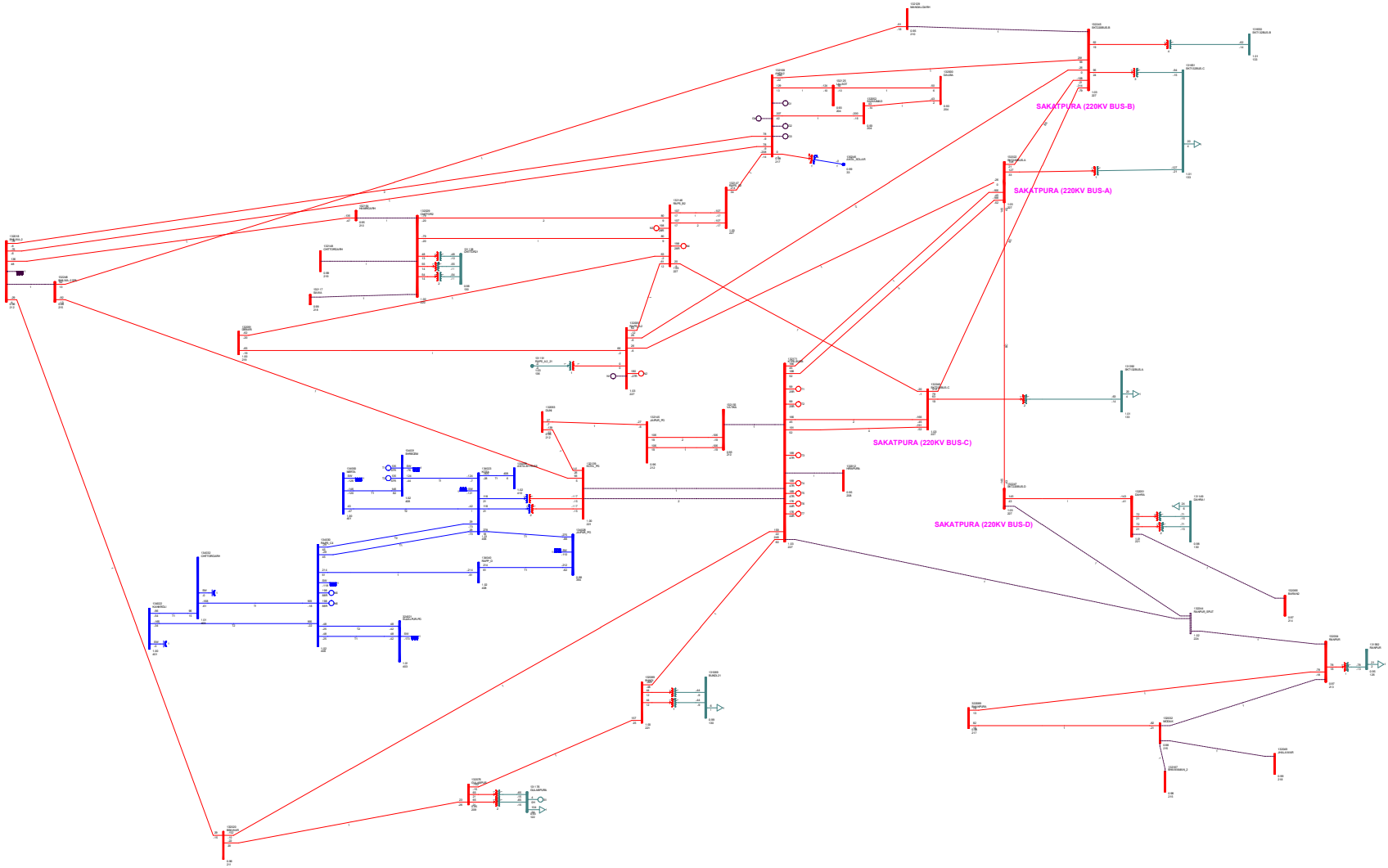
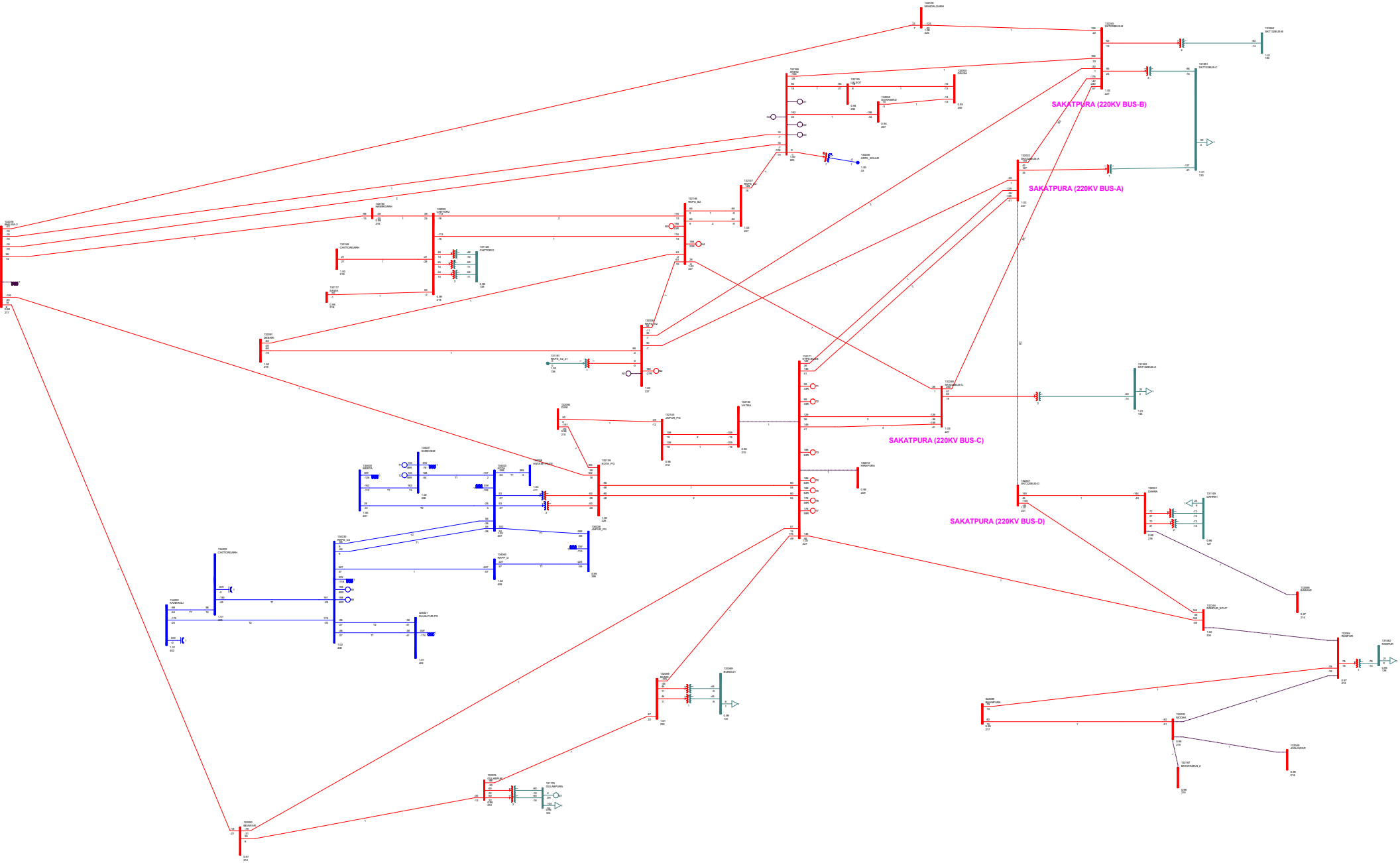


EXHIBIT-3B

CASE-3B : LOAD FLOW STUDY IN SCENARIO-2 WITH OUTAGE OF 220 KV S/C KTPS-HEERAPURA LINE



CASE-3A : LOAD FLOW STUDY IN SCENARIO-1 WITH OUTAGE OF 220 KV S/C KTPS-BEAWAR LINE EXHIBIT-4A

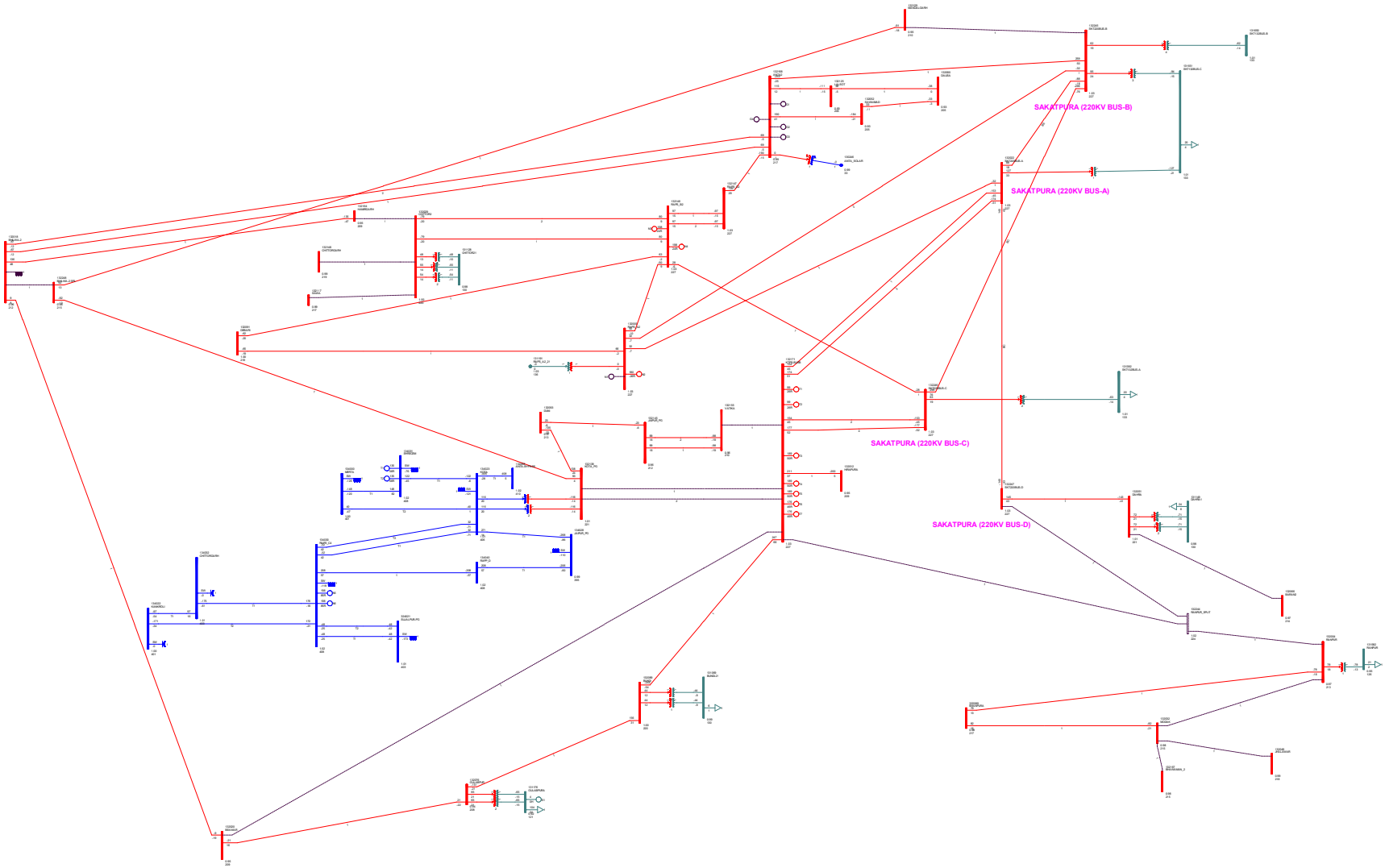


EXHIBIT-4B

CASE-3B : LOAD FLOW STUDY IN SCENARIO-2 WITH OUTAGE OF 220 KV S/C KTPS-BEAWAR LINE

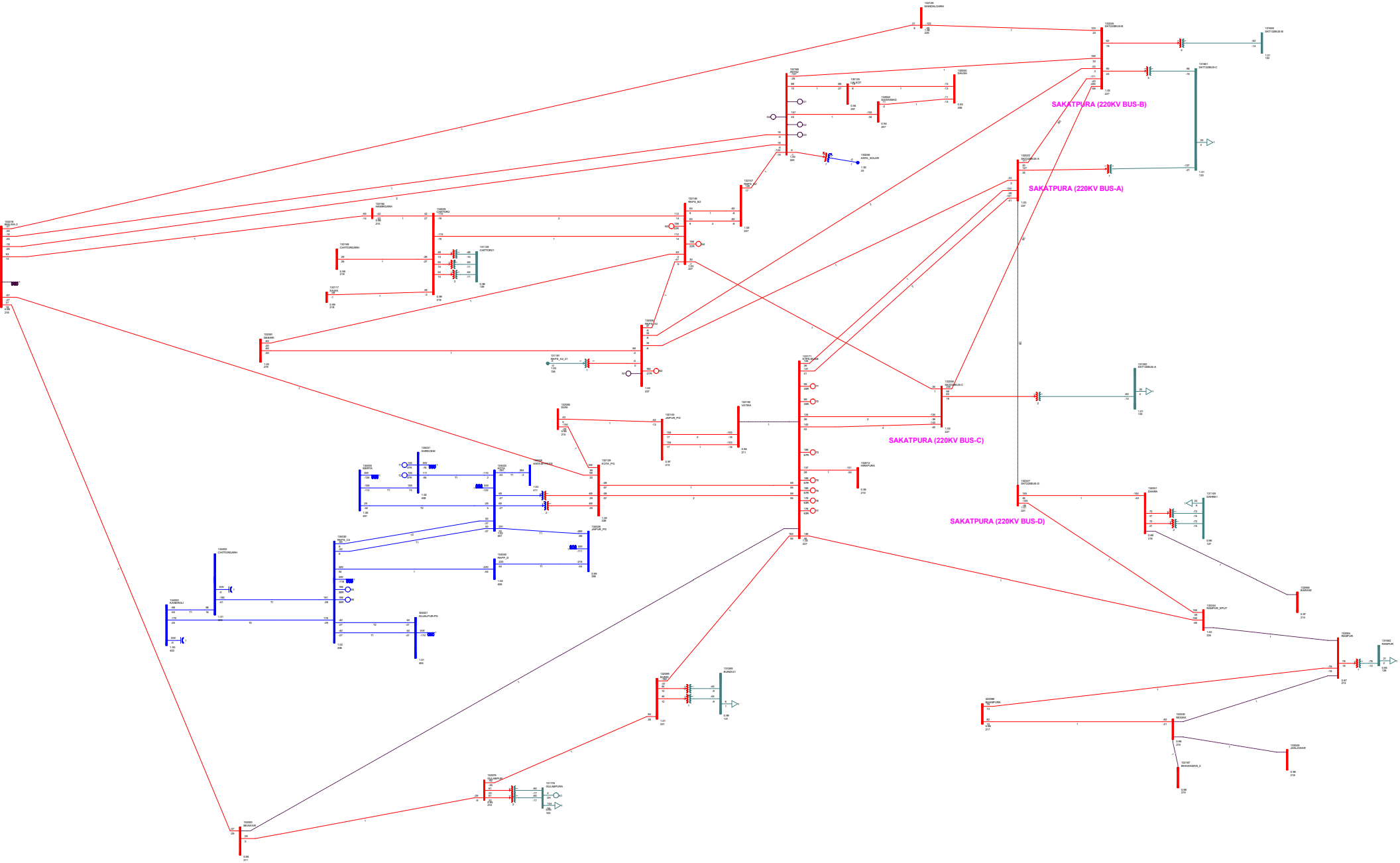


EXHIBIT-5A

CASE-4A : LOAD FLOW STUDY IN SCENARIO-1 WITH OUTAGE OF ALL THREE CIRCUITS BETWEEN SAKTPUA AND RAPP GENERATION COMPLEX

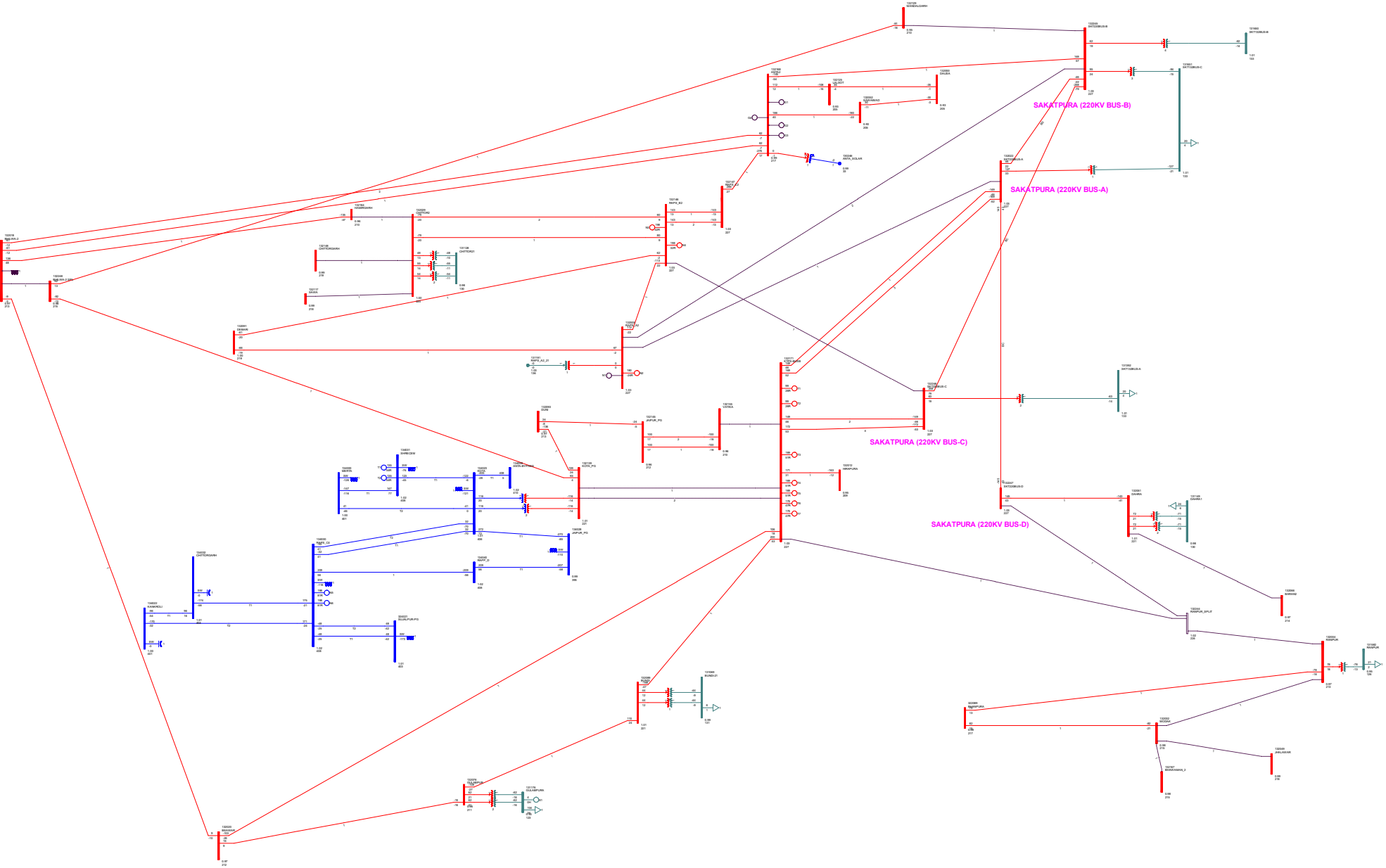


EXHIBIT-5B

CASE-4B : LOAD FLOW STUDY IN SCENARIO-2 WITH OUTAGE OF ALL THREE CIRCUITS BETWEEN SAKTPUA AND RAPP GENERATION COMPLEX

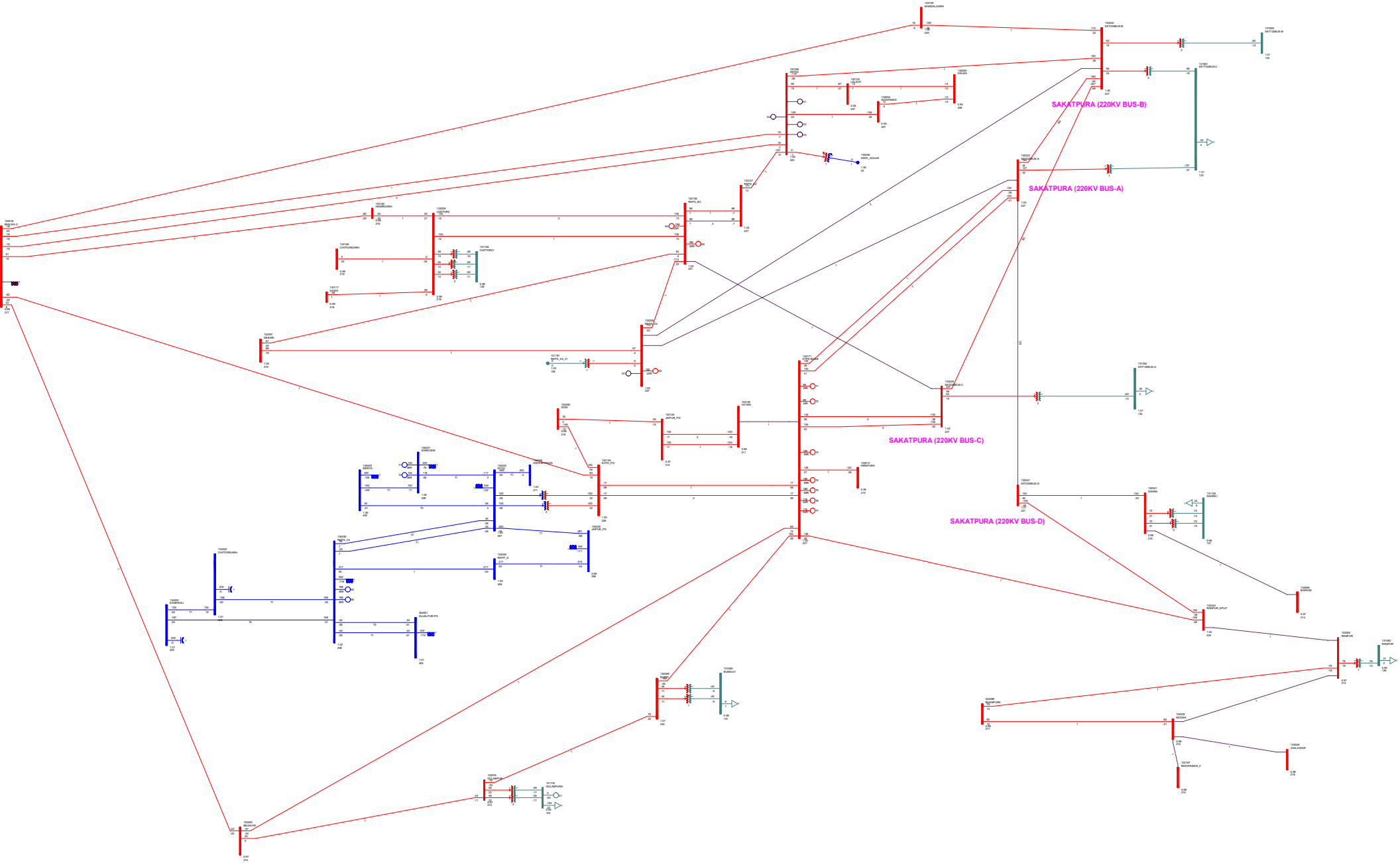


EXHIBIT-5B2

CASE-4B1 : LOAD FLOW STUDY IN SCENARIO-2 WITH OUTAGE OF ALL THREE CIRCUITS BETWEEN SAKTPUA AND RAPP GENERATION COMPLEX

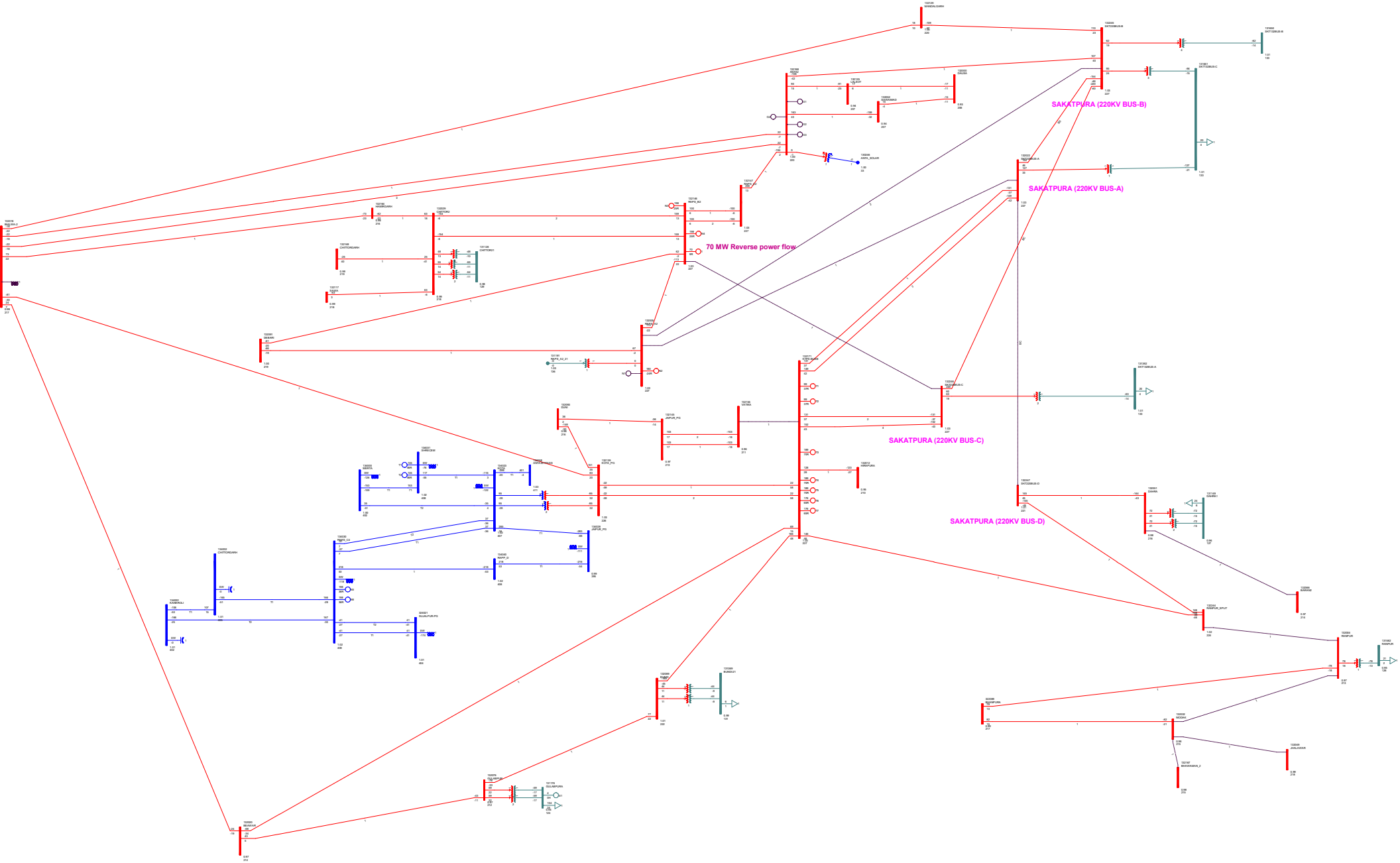


EXHIBIT-6A

CASE-6A : LOAD FLOW STUDY IN SCENARIO-1 WITH OUTAGE OF 220 KV S/C SAKATPURA-ANTA LINE AND KTPS-HEERAPURA LINE

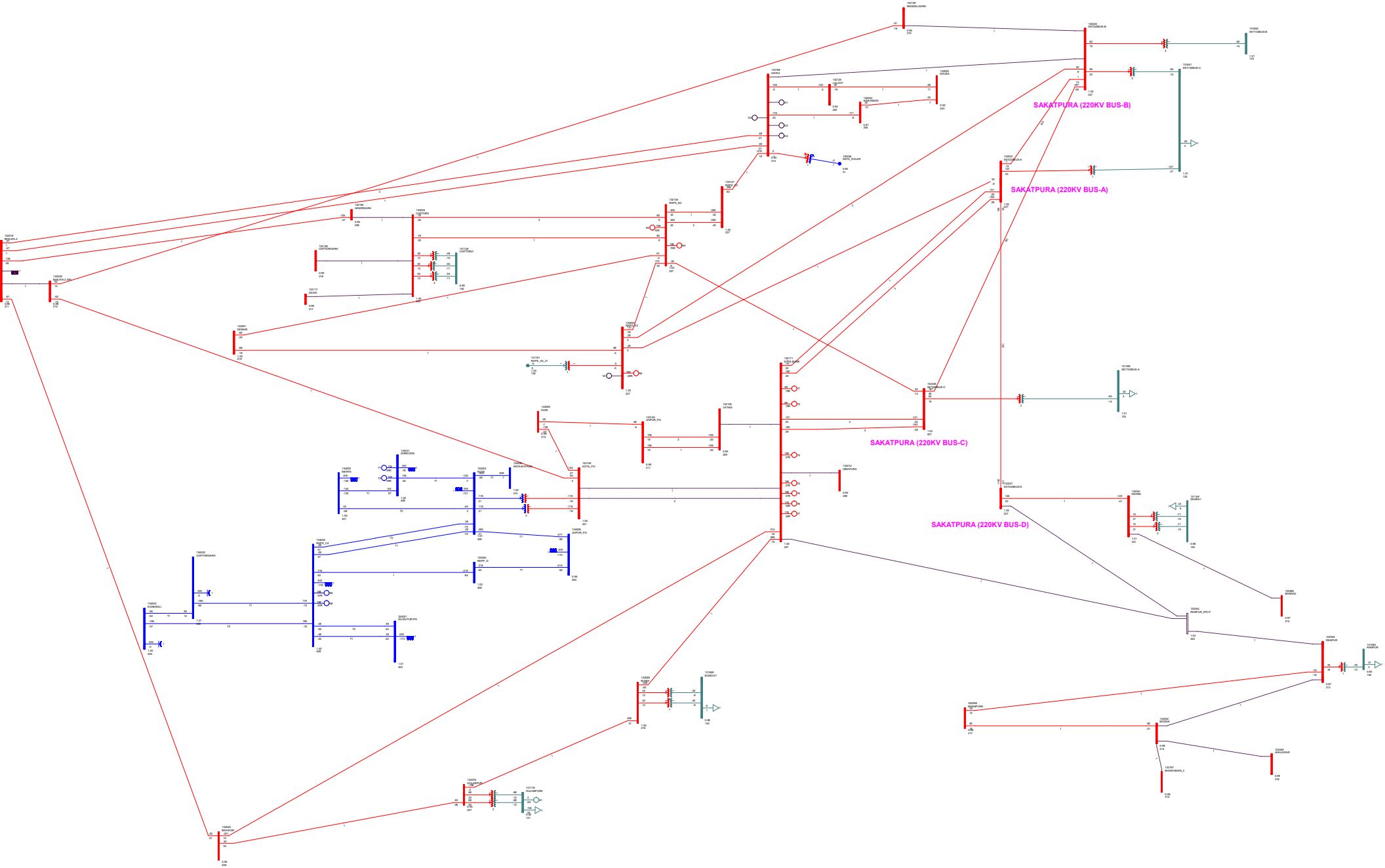
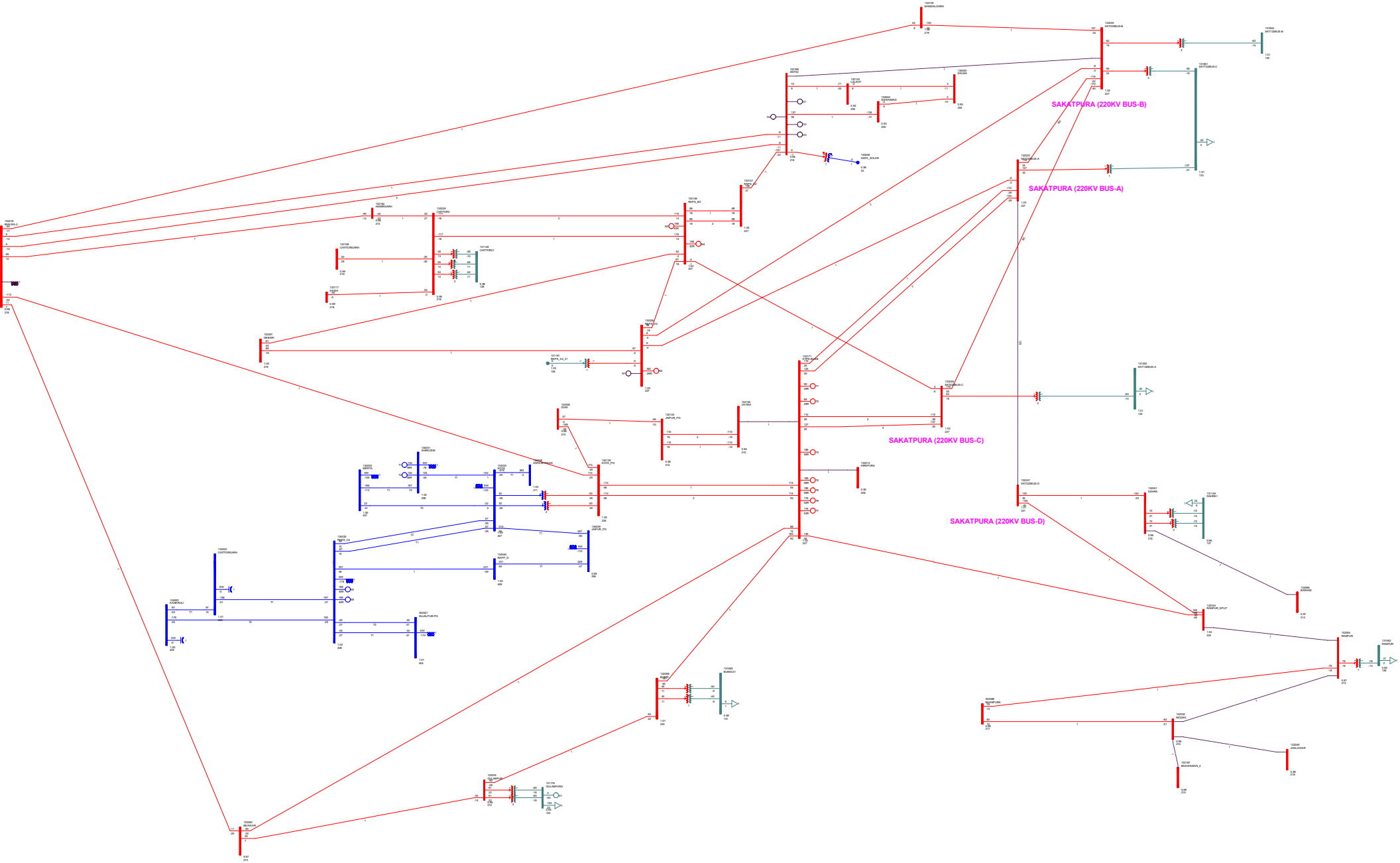


EXHIBIT-6B

CASE-6B : LOAD FLOW STUDY IN SCENARIO-2 WITH OUTAGE OF 220 KV S/C SAKATPURA-ANTA LINE AND KTPS-HEERAPURA LINE



APPENDIX-A

Load flow study in Solar and Non-solar Generation Conditions to assess power flow between 220 kV D/C Kota(PG)-KTPS line

1.0 Recorded Power Flow on 220 kV D/C Kota(PG)-KTPS line

i. Blockwise Power flow on 220 kV D/C KTPS-Kota(PG) line from 21.5.2024 to 21.6.2024 (total 3072 blocks) are placed at **Annexure-A**.

ii. Daywise Abstract of Power flow on 220 kV D/C KTPS-Kota(PG) line from 21.5.2024 to 21.6.2024 (total 3072 blocks) is placed at **Annexure-B** and tabulated hereunder :-

Table-1 : Max. / Minimum Power Exports/Imports on 220 kV D/C KTPS-Kota(PG) line from 21.5.2024 to 21.6.2024

S. No.	Date	No. of Blocks Export	No. of Blocks Import	Maximum Export (MW)	Maximum Import(MW)
1	21.5.2024	80	16	204.22	-87.76
2	22.5.2024	96	0	169.3	0
3	23.5.2024	95	1	85.15	-1.71
4	24.5.2024	91	5	75.54	-23.7
5	25.5.2024	13	83	33.92	-164.72
6	26.5.2024	24	72	94.02	-243.56
7	27.5.2024	32	64	108.22	-156.48
8	28.5.2024	44	52	166.64	-164.48
9	29.5.2024	64	32	133.86	-70.88
10	30.5.2024	67	29	122.08	-132.38
11	31.5.2024	31	65	113.84	-174.04
12	1.6.2024	57	39	179.4	-47.16
13	2.6.2024	39	57	115.44	-142.32
14	3.6.2024	85	11	163.14	-80.28
15	4.6.2024	81	15	191.94	-42.68
16	5.6.2024	87	9	159.04	-41.3
17	6.6.2024	51	45	170.24	-90.64
18	7.6.2024	89	7	272.82	-39.44
19	8.6.2024	96	0	211.54	0
20	9.6.2024	69	27	139.84	-65.36
21	10.6.2024	78	18	194.64	-64.28
22	11.6.2024	91	5	222.98	-14.3
23	12.6.2024	95	1	185.66	-7.54
24	13.6.2024	93	3	192.08	-14.84
25	14.6.2024	89	7	124.3	-28.44
26	15.6.2024	92	4	146.58	-19.8
27	16.6.2024	96	0	180.8	0
28	17.6.2024	94	2	171.68	-2.1
29	18.6.2024	87	9	174.16	-63.4
30	19.6.2024	96	0	162.06	0
31	20.6.2024	81	15	161.84	-78.14
32	21.6.2024	47	49	154.76	-241.4
	Total	2330	742		
	Maximum			272.82	-243.56
	Percentage	76	24		

It is noted out of 3072 blocks in 2330 blocks (76%) power is export at KTPS switchyard on 220 kV D/C KTPS-Kota(PG) line and in 742 blocks (24%) power is export at KTPS switchyard on 220 kV D/C KTPS-Kota(PG) line

iii. 5 nos. Conditions each for maximum Power EXPORT & IMPORT On 220 kV D/C KTPS-Kota(PG) line from 21.5.2024 to 21.6.2024 is placed at **Annexure-C** and tabulated hereunder :-

Table-2: 5 nos. Conditions of maximum Power EXPORT & IMPORT On 220 kV D/C KTPS-Kota(PG) line

S. No.	Date	Time (Hrs)	Maximum Export / Import (-) (MW)	KTPS GEN (IC : 1240 MW, Net Available : 1116 MW)			Raj Demand (MW)	Solar Gen. (MW)	Generation at KTPS
				MW	%	Generation less than from Net available			
A	**Maximum Export**								
1	7.6.2024	19:30-19:45	272.82	1064.71	86	51	12200	0	All units are in operation
2	11.6.2024	19:15-19:30	222.98	1039.33	84	77	12842	15	
3	8.6.2024	19:15-19:30	211.54	1076.5	87	40	12471	17	
4	21.5.2024	22:00-22:15	204.22	1096	88	20	13512	0	
5	10.6.2024	19:15-19:30	194.64	1049.58	85	66	12644	22	
B	**Maximum Import**								
1	26.5.2024	10:45-11:00	-243.56	712.49	57	404	16289	3376	All units are in operation and running on back down.
2	21.6.2024	11:45-12:00	-241.4	211.26	17	905	15344	3376	KTPS unit#1(110 MW) , unit #3 (210MW), unit #4 (210MW), unit #5, (210MW),unit #7 (210MW) tripped at 11:39 Hrs dt. 21.06.24 due to electrical fault.
3	31.5.2024	9:45-10:00	-174.04	849.15	68	267	16994	3059	KTPS unit #6 (195 MW) tripped at 2.23 hrs dt 31.05.24 due to suspected BTL.
4	25.5.2024	10:30-10:45	-164.72	727.56	59	388	17242	3136	KTPS unit #3 (210MW) tripped at 22.10 hrs dt 24.05.24 due to suspected BTL.
5	28.5.2024	6:30-6:45	-164.48	877.43	71	239	14731	179	All units are in operation and running on backdown.

From the blockwise power flow from 21.5.2024 to 21.6.2024 placed at Annexure-A, B& C and further tabulated at Table-1 & 2 following points are observed :-

i. Out of 3072 blocks in 2330 blocks (76%) power is export at KTPS switchyard on 220 kV D/C KTPS-Kota(PG) line and in 742 blocks (24%) power is export at KTPS switchyard on 220 kV D/C KTPS-Kota(PG) line

ii. Maximum export on 220 kV D/C KTPS-Kota(PG) line from KTPS is between 19 hrs. to 10 hrs . Maximum export recorded 272 MW on 7.6.2024 at 19:30 hrs.

iii. Maximum import on 220 kV D/C KTPS-Kota(PG) line at KTPS is between 6:30 hrs. to 11 hrs . Maximum import recorded 243 MW on 26.5.2024 at 10.45 hrs.

2.0 220 KV INTERCONNECTIONS WITH OPERATION ARRANGEMENT AT KTPS, RAPP(A), RAPP(B) & ANTA GTPS AND 220 KV GSS

I. KTPS switchyard

S. No.	Name of 220 kV interconnection	Remark
1	220 kV S/C KTPS-Heerapura line	in operation
2	220 kV S/C KTPS-Beawar line	
3	220 kV S/C KTPS-Bundi line	
4	220 kV S/C KTPS-Ranpur line	in operation Split 220 kV main bus-I&II arrangement at Ranpur. Bus-I is connected from KTPS and Sakatpura Bus-D. Further Bus-D at Sakatpura is connected from 220 kV GSS Dahra and 132 kV Bus-A through 100 MVA transformer.
5	220 kV S/C KTPS-Vatika line	Under shutdown for strengthening work of the line .
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	in operation
7	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	
8	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	

II. RAPP(A) switchyard

S. No.	Name of 220 kV interconnection	Remark
1	220 kV S/C RAPP(A)-Debari line	in operation
2	220 kV S/C RAPP(A)-RAPP(B) line	
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	

III. RAPP(B) switchyard

S. No.	Name of 220 kV interconnection	Remark
1	220 kV S/C RAPP(B)-Debari line	in operation
2	220 kV S/C RAPP(B)-RAPP(A) line	
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	
5	220 kV S/C RAPP(B)-Sakatpura line	
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	

iv. Anta GTPS switchyard

S. No.	Name of 220 kV interconnection	Remark
1	220 kV S/C Anta GTPS-Swaimadhopur line	in operation
2	220 kV S/C Anta GTPS-Lalsot line	
3	220 kV S/C Anta GTPS-RAPP(C) line	
4	220 kV D/C Anta GTPS-Bhilwara line (ckt-I)	
5	220 kV D/C Anta GTPS-Bhilwara line (ckt-II)	
6	90 MW Solar Power Plant	

IV. 220 kV GSS Sakatpura switchyard

i. Four nos. 220 kV bus viz. A,B,C,D are exists at 220 kV GSS Sakatpura

ii. 220 kV bus-A, B & C are in parallel

iii. 220 kV bus-D in isolated mode and connected from 220 kV circuits from Dahra & Ranpur/KTPS alongwith 100 MVA , 220 kV transformer-4

iv. Four nos. 132 kV bus viz. A,B,C are exists at 220 kV GSS Sakatpura. All 132 kV buses are operated in Isolated mode

v. 132 kV bus-A in in ring system through 132 kV S/C Sakatpura(bus-A)-RPS line

vi. 132 kV bus-B in in ring system through 132 kV S/C Sakatpura(bus-B)-Nanta-Talera-Bundi line

vii. 132 kV bus-C in in ring system through 132 kV Sakatpura(bus-C)-JS lines (three circuits)

viii. 220 kV Bus-A

a. 220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)
b. 220 kV S/C Sakatpura-KTPS interconnector-1
c. 220 kV S/C Sakatpura-KTPS interconnector-3
d. 220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C
e. B/S between A& B-Closed
f. B/C between A& D-Opened

ix. 220 kV Bus-B

a. 220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)
b. 220 kV S/C Sakatpura-Mandalgarh line
c. B/S between B& A-Closed
d. B/C between B& C-Closed

x. 220 kV Bus-C

a. 220 kV S/C Sakatpura-KTPS interconnector-2
b. 220 kV S/C Sakatpura-KTPS interconnector-4
c. 220 kV S/C Sakatpura-RAPP(B) line
d. 220 kV S/C Sakatpura-Anta GTPS line

e. B/C between C& B-Closed
f. 220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A
g. 220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C

xi. 220 kV Bus-D
a. 220 kV S/C Sakatpura-Ranpur line
b. 220 kV S/C Sakatpura-Dahra line
c. 220/132 kV Trf-4 (100 MVA) to 132 kV Bus-A
d. B/C between A& D-Opened

V. 220 kV GSS Chhitorgarh switchyard

i. 220 kV interconnections

S. No.	Name of 220 kV interconnection	Remark
1	220 kV D/C Chhitorgarh-RAPP(B) line (Ckt-I)	in operation
2	220 kV D/C Chhitorgarh-RAPP(B) line (Ckt-II)	
3	220 kV S/C Chhitorgarh(220 kV GSS)- Chhitorgarh(400 kV GSS) line	
4	220 kV S/C Chhitorgarh-Sawa line	Kept OFF for power flow control /regulate loading on 400 kV transformers
5	220 kV S/C Chhitorgarh-Hamirgarh line	

ii. 132 kV system at 220 kV GSS Chhitorgarh is in radial mode

VI. 220 kV GSS Debari switchyard

i. 220 kV split bus arrangement
ii. From one bus 220 kV circuits from RAPP(A) & RAPP(B) are connected alongwith 220/132 kV transformers . 132 kV system at 220 kV GSS Debari is in radial mode
iii. From another bus 220 kV circuits from Chhitorgarh (400 kV GSS) & Amberi is connected alongwith interconnections from 220 kV GSS at Madri & Aspur

3.0 LOAD FLOW STUDY

Load flow studies have been performed for various scenarios on the PSSE file shared by the NRLDC for the condition corresponding to June 2024. Load flow study has been carried out for non-solar and maximum solar conditions and discussed in the following paragraphs

3.1 Scenario-1 (Case-1) : Non-Solar Generation Condition

- Rajasthan Demand : 14000 MW
- Intra State Solar Power Generation in Rajasthan : 0 MW (IC : 4546.5 MW)
- Intra State Wind Power Generation in Rajasthan : 432.7 MW (IC : 4327.27 MW) (10% of IC)
- Thermal power generation in Rajasthan(excluding Auxiliary consumption) : 8163.45 MW (9645.5 MW)
- Hydro power generation in Rajasthan (excluding Auxiliary consumption) : 140 MW (411 MW)

-
- Generation in Power Plants in Kota area

S. No.	Name of Power PLant	Installed Capacity (MW)	Net Generation (Excluding aux. consumption) (MW)	% Generation	Remark
A	**Kota Thermal Power Station**				
1	Unit-1	110	99	90	-
2	Unit-2	110	99	90	-
3	Unit-3	210	189	90	-
4	Unit-4	210	189	90	-
5	Unit-5	210	189	90	-
6	Unit-6	195	176	90	-
7	Unit-7	195	176	90	-
	Total(A)	**1240**	**1117**	**90**	**-**
B	**Nuclear Power Power Stations**				
	RAPP-A				
	Unit-2	200	180	90	-
	RAPP-B				
	Unit-3	220	0	0	Under S/D upto 9.7.2024 for replacement of reactors components
	Unit-4	220	198	90	-
	RAPP-C				
	Unit-5	220	198	90	-
	Unit-6	220	198	90	-
C	**Anta GAS THERMAL POWER STATION**				
i	Unit-1	88.71	RSD		
ii	Unit-2	88.71	RSD		
iii	Unit-3	88.71	RSD		
iv	Unit-4	153.2	RSD		

Load flow study results for Case-1 are plotted at Exhibit-1. Power flow in case-1 are tabulated here under :-

Table-1 : Power flow at KTPS in Non Solar Power Generation Condition

S. No.	Name of line	Power flow (MW)
A	**KTPS switchyard**	
1	220 kV S/C KTPS-Heerapura line	84
2	220 kV S/C KTPS-Beawar line	85
3	220 kV S/C KTPS-Bundi line	161
4	220 kV S/C KTPS-Ranpur line	142
5	220 kV S/C KTPS-Vatika line	Under S/D

6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	124
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	141
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	147
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	170
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	30
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	30
B	**RAPP(A) switchyard**	
1	220 kV S/C RAPP(A)-Debari line	84
2	220 kV S/C RAPP(A)-RAPP(B) line	122
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	-13
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	-13
C	**RAPP(B) switchyard**	
1	220 kV S/C RAPP(B)-Debari line	78
2	220 kV S/C RAPP(B)-RAPP(A) line	-122
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	51
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	51
5	220 kV S/C RAPP(B)-Sakatpura line	-29
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	84
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	84
D	**220 kV GSS Sakatpura**	
	220 kV Bus-A	
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	13
2	220 kV S/C Sakatpura-KTPS interconnector-1	-124
3	220 kV S/C Sakatpura-KTPS interconnector-3	-141
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	84
5	B/S between A& B-Closed	169
6	B/C between A& D-Opened	open
	220 kV Bus-B	
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	13
2	220 kV S/C Sakatpura-Mandalgarh line	125
3	B/S between B& A-Closed	-169
4	B/C between B& C-Closed	31
	220 kV Bus-C	
1	220 kV S/C Sakatpura-KTPS interconnector-2	-147
2	220 kV S/C Sakatpura-KTPS interconnector-4	-170
3	220 kV S/C Sakatpura-RAPP(B) line	29
4	220 kV S/C Sakatpura-Anta GTPS line	163

5	B/C between C& B-Closed	-31
6	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	90
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	66
	220 kV Bus-D	
1	220 kV S/C Sakatpura-Ranpur line	-141
2	220 kV S/C Sakatpura-Dahra line	108
3	220/132 kV Trf-4 (100 MVA) to 132 kV Bus-A	33
4	B/C between A& D-Opened	open

From load flow studies it is observed Power flow on 220 kV D/C KTPS-Kota(PG) line in case-1 is 60 MW (Export at KTPS)

3.2 Scenario-2 (Case-2) : maximum-Solar Generation & system peak demand Condition

- Rajasthan Demand : 17000 MW
- Intra State Solar Power Generation in Rajasthan : 3864 MW (IC : 4546.5 MW)
- Intra State Wind Power Generation in Rajasthan : 432.7 MW (IC : 4327.27 MW) (10% of IC)
- Thermal power generation in Rajasthan(excluding Auxiliary consumption) : 6642 MW (20% less than non solar generation condition)
- Hydro power generation in Rajasthan (excluding Auxiliary consumption) : 112 MW MW (20% less than non solar generation condition)
- 72 MW Solar Power Generation at Anta GTPS
- Generation at KTPS Power Plants

S. No.	Name of Power PLant	Installed Capacity (MW)	Net Generation (Excluding aux. consumption) (MW)	% Generation	Remark
A	**Kota Thermal Power Station**				
1	Unit-1	110	81	73	-
2	Unit-2	110	81	73	-
3	Unit-3	210	154	73	-
4	Unit-4	210	154	73	-
5	Unit-5	210	154	73	-
6	Unit-6	195	143	73	-
7	Unit-7	195	143	73	-
	Total(A)	**1240**	**910**	**73**	**-**

Load flow study results for Case-2 are plotted at Exhibit-2 and tabulated here under :-

Table-2 : Power flow at KTPS in Peak Solar Power Generation & Peak load in Raj System Condition

S. No.	Name of line	Power flow (MW)
A	**KTPS switchyard**	
1	220 kV S/C KTPS-Heerapura line	63
2	220 kV S/C KTPS-Beawar line	70
3	220 kV S/C KTPS-Bundi line	166
4	220 kV S/C KTPS-Ranpur line	170
5	220 kV S/C KTPS-Vatika line	Under S/D
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	132
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	150
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	153
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	177
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	-87
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	-87
B	**RAPP(A) switchyard**	
1	220 kV S/C RAPP(A)-Debari line	102
2	220 kV S/C RAPP(A)-RAPP(B) line	98
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	-10
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	-10
C	**RAPP(B) switchyard**	
1	220 kV S/C RAPP(B)-Debari line	96
2	220 kV S/C RAPP(B)-RAPP(A) line	-98
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	43
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	43
5	220 kV S/C RAPP(B)-Sakatpura line	-22
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	68
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	68
D	**220 kV GSS Sakatpura**	
	220 kV Bus-A	
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	10
2	220 kV S/C Sakatpura-KTPS interconnector-1	-132
3	220 kV S/C Sakatpura-KTPS interconnector-3	-150
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	108
5	B/S between A& B-Closed	163

6	B/C between A& D-Opened	open
	220 kV Bus-B	
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	10
2	220 kV S/C Sakatpura-Mandalgarh line	127
3	B/S between B& A-Closed	-163
4	B/C between B& C-Closed	26
	220 kV Bus-C	
1	220 kV S/C Sakatpura-KTPS interconnector-2	-153
2	220 kV S/C Sakatpura-KTPS interconnector-4	-177
3	220 kV S/C Sakatpura-RAPP(B) line	22
4	220 kV S/C Sakatpura-Anta GTPS line	136
5	B/C between C& B-Closed	-26
6	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	113
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	85
	220 kV Bus-D	
1	220 kV S/C Sakatpura-Ranpur line	-168
2	220 kV S/C Sakatpura-Dahra line	132
3	220/132 kV Trf-4 (100 MVA) to 132 kV Bus-A	37
4	B/C between A& D-Opened	open

From load flow studies it is observed Power flow on 220 kV D/C KTPS-Kota(PG) line in case-2 is 174 MW (Import at KTPS)

3.3 Contingency Studies

Following contingency studies are performed in Case-1 :-

Contingency at KTPS

i. Contingency-1 (Case-1A, Exhibit-1A) : Outage of Unit-3 at KTPS.
ii. Contingency-2 (Case-1B, Exhibit-1B) : Outage of Unit-3 & 4 at KTPS.
iii. Contingency-3 (Case-1C, Exhibit-1C): Outage of 220 kV Interconnector-1 between KTPS &Sakatpura (bus-A)
iv. Contingency-4(Case-1D, Exhibit-1D): Outage of 220 kV Interconnector-2 between KTPS &Sakatpura (bus-C)
v. Contingency-5(Case-1E, Exhibit-1E): Outage of one circuit of 220 kV D/C KTPS-Kota(PG) line
vi. Contingency-6(Case-1F, Exhibit-1F): Outage of 220 kV S/C KTPS-Beawar line
vii. Contingency-7(Case-1G, Exhibit-1G): Outage of 220 kV S/C KTPS-Heerapura line
viii. Contingency-8(Case-1H, Exhibit-1H): Outage of 220 kV S/C KTPS-Ranpur line with 108 MW load throw off of 220 kV GSS Dahra

Contingency at RAPP(A)

i. Contingency-9(Case-1I, Exhibit-1I): Outage of 220 kV S/C RAPP(A)-Debari line
ii. Contingency-10(Case-1J, Exhibit-1J): Outage of 220 kV S/C RAPP(A)-RAPP(B) line
iii. Contingency-11(Case-1K, Exhibit-1K) : Outage of 220 kV D/C RAPP(A)-Sakatpura line

Contingency at RAPP(B)

i. Contingency-12(Case-1L, Exhibit-1L): Outage of 220 kV S/C RAPP(B)-Debari line
ii. Contingency-13(Case-1M, Exhibit-1M): Outage of 220 kV S/C RAPP(B)-Sakatpura line
iii. Contingency-14(Case-1N, Exhibit-1N) : Outage of 220 kV D/C RAPP(B)-Chhitorgarh line
iv. Contingency-15(Case-1O, Exhibit-1O): Outage of 220 kV D/C RAPP(B)-RAPP(C) line

Contingency at 400 kV GSS Kota(PG)

i. Contingency-16 (Case-1P, Exhibit-1P): Outage of one 315 MVA, 400/220 kV transformer at Kota(PG)
ii. Contingency-17 (Case-1Q, Exhibit-1Q) : Outage of 220 kV S/C Kota(PG)-Bhilwara line
iii. Contingency-18 (Case-1R, Exhibit-1R): Outage of 220 kV S/C Kota(PG)-Duni line
iv. Contingency-19 (Case-1S, Exhibit-1S): Outage of 400 kV S/C Kota(PG)-Anta –Chhabra TPS line
v. Contingency-20 (Case-1T, Exhibit-1T): Outage of 400 kV S/C Kota(PG)-Jaipur(PG) line
vi. Contingency-21 (Case-1U, Exhibit-1U): Outage of 400 kV S/C Kota(PG)-Merta line

Power flow in various contingency cases are plotted at Exhibit-1A to Exhibit-U and also tabulated at Annexure-1 to 4 as per following details :-

- Power flow in Base Case and various contingency at KTPS switchyard are tabulated at Annexure-1.
- Power flow in Base Case and various contingency at RAPP(A) switchyard are tabulated at Annexure-2.
- Power flow in Base Case and various contingency at RAPP(B) switchyard are tabulated at Annexure-3.
- Power flow in Base Case and various contingency at 400 kV GSS Kota(PG) are tabulated at Annexure-4.

From load flow studies following points are observed :-

- Contingency-1 : under outage of one unit at KTPS power import at KTPS is 42 MW.
- Contingency-2: under outage of two units at KTPS power import at KTPS is 146 MW.
- Under outage of any 220 kV line at KTPS, power export from KTPS switchyard is increased and extended upto the 122 MW under outage of 220 kV S/C KTPS-Ranpur line alongwith 108 MW load throw up of 220 kV GSS Ranpur.

ANNEXURE-A

BLOCKWISE Power flow on 220 kV D/C KTPS-Kota(PG) line from 21.5.2024 to 21.6.2024

S. No.	Time	KTPS KOTA PG-1 220KV	KTPS KOTA PG-2 220KV
	HRS	MW	MW
1	21-05-24 00:00	5.86	5.99
2	21-05-24 00:15	7.1	7.21
3	21-05-24 00:30	22.37	22.8
4	21-05-24 00:45	49.33	49.33
5	21-05-24 01:00	9.83	9.85
6	21-05-24 01:15	6.62	6.96
7	21-05-24 01:30	8.26	7.81
8	21-05-24 01:45	7.95	7.59
9	21-05-24 02:00	7.63	7.75
10	21-05-24 02:15	11.73	11.36
11	21-05-24 02:30	13.26	12.28
12	21-05-24 02:45	14.4	14.82
13	21-05-24 03:00	16.35	16.46
14	21-05-24 03:15	16.14	16.53
15	21-05-24 03:30	19.51	19.61
16	21-05-24 03:45	23.51	24.25
17	21-05-24 04:00	26.9	27.22
18	21-05-24 04:15	21.88	22.46
19	21-05-24 04:30	19.87	20.03
20	21-05-24 04:45	23.79	24.58
21	21-05-24 05:00	19.75	20.24
22	21-05-24 05:15	13.05	13.44
23	21-05-24 05:30	11.06	11.18
24	21-05-24 05:45	13.8	14.02
25	21-05-24 06:00	11.95	11.95
26	21-05-24 06:15	-6.29	-5.69
27	21-05-24 06:30	-4.84	-4.24
28	21-05-24 06:45	16.46	17.79
29	21-05-24 07:00	15.34	17.1
30	21-05-24 07:15	17.65	17.51
31	21-05-24 07:30	19.16	19.76
32	21-05-24 07:45	16.52	17.13
33	21-05-24 08:00	21.98	22.77
34	21-05-24 08:15	23.03	22.98
35	21-05-24 08:30	28.77	29.41
36	21-05-24 08:45	28.65	28.92
37	21-05-24 09:00	33.83	32.94
38	21-05-24 09:15	31.81	32.35
39	21-05-24 09:30	32.36	32.88
40	21-05-24 09:45	2.89	3.27
41	21-05-24 10:00	-13	-13.9
42	21-05-24 10:15	-14.71	-15.61
43	21-05-24 10:30	-12.9	-13.54
44	21-05-24 10:45	-11.85	-11.8
45	21-05-24 11:00	-3.19	-3.11
46	21-05-24 11:15	0.14	0.05
47	21-05-24 11:30	-0.87	-2.59
48	21-05-24 11:45	1.8	1.3
49	21-05-24 12:00	11.21	11.44
50	21-05-24 12:15	11.36	10.96
51	21-05-24 12:30	15.62	15.76

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
52	21-05-24 12:45	58.42	58.21
53	21-05-24 13:00	27.46	27.97
54	21-05-24 13:15	-12.21	-11.46
55	21-05-24 13:30	-7.04	-6.06
56	21-05-24 13:45	-20.58	-20.01
57	21-05-24 14:00	-3.97	-3.32
58	21-05-24 14:15	14.81	15.12
59	21-05-24 14:30	16.09	16.33
60	21-05-24 14:45	19.9	20.45
61	21-05-24 15:00	11.11	12.1
62	21-05-24 15:15	-12.77	-10.72
63	21-05-24 15:30	-38.49	-33.63
64	21-05-24 15:45	-43.88	-42.9
65	21-05-24 16:00	-24.43	-23.16
66	21-05-24 16:15	15.06	15.69
67	21-05-24 16:30	32.72	32.55
68	21-05-24 16:45	31.62	31.86
69	21-05-24 17:00	35.9	36.53
70	21-05-24 17:15	39.41	39.01
71	21-05-24 17:30	39.4	39.7
72	21-05-24 17:45	51.24	51.1
73	21-05-24 18:00	35.86	35.87
74	21-05-24 18:15	14.63	15
75	21-05-24 18:30	31.58	32.05
76	21-05-24 18:45	57.72	58.1
77	21-05-24 19:00	61.62	62.34
78	21-05-24 19:15	64.11	63.88
79	21-05-24 19:30	81.11	80.72
80	21-05-24 19:45	87.43	87.57
81	21-05-24 20:00	99.17	98.95
82	21-05-24 20:15	99.58	100.07
83	21-05-24 20:30	99.37	99.11
84	21-05-24 20:45	92.64	92.67
85	21-05-24 21:00	85.99	86.06
86	21-05-24 21:15	88.37	88.69
87	21-05-24 21:30	91.74	91.41
88	21-05-24 21:45	92.83	92.47
89	21-05-24 22:00	102.11	102.29
90	21-05-24 22:15	100.37	100.09
91	21-05-24 22:30	98.63	98.75
92	21-05-24 22:45	93.06	93.31
93	21-05-24 23:00	88.56	89.04
94	21-05-24 23:15	84.09	83.9
95	21-05-24 23:30	79.63	79.39
96	21-05-24 23:45	62.86	62.75
21.5.2024	**No. of Blocks export**	**80**	**80**
	No. of Blocks Import	**16**	**16**
	Maximum export	**102.11**	**102.29**
	Maximum Import	**-43.88**	**-42.9**
1	22-05-24 00:00	59.37	59.81
2	22-05-24 00:15	56.81	56.7
3	22-05-24 00:30	58	58.16
4	22-05-24 00:45	50.56	50.54
5	22-05-24 01:00	53	52.77
6	22-05-24 01:15	54.28	54.29

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
7	22-05-24 01:30	50.33	50.05
8	22-05-24 01:45	45.06	44.89
9	22-05-24 02:00	43.91	44.28
10	22-05-24 02:15	45.48	45.48
11	22-05-24 02:30	45.13	44.57
12	22-05-24 02:45	42.35	42.99
13	22-05-24 03:00	46.06	45.89
14	22-05-24 03:15	44.12	44.2
15	22-05-24 03:30	44.61	45.01
16	22-05-24 03:45	48.25	48.6
17	22-05-24 04:00	51.81	51.69
18	22-05-24 04:15	51.57	51.82
19	22-05-24 04:30	51.4	51.83
20	22-05-24 04:45	54.37	54.44
21	22-05-24 05:00	51.13	51.89
22	22-05-24 05:15	46.92	47.62
23	22-05-24 05:30	43.37	42.69
24	22-05-24 05:45	41.28	42.18
25	22-05-24 06:00	42.67	42.79
26	22-05-24 06:15	29.58	30.7
27	22-05-24 06:30	24.8	25.86
28	22-05-24 06:45	24.59	24.55
29	22-05-24 07:00	26.07	26.37
30	22-05-24 07:15	23.39	23.5
31	22-05-24 07:30	20.94	21.08
32	22-05-24 07:45	20.48	20.41
33	22-05-24 08:00	22.39	22.85
34	22-05-24 08:15	25.43	24.97
35	22-05-24 08:30	27.9	28.08
36	22-05-24 08:45	31.23	31.48
37	22-05-24 09:00	32.65	32.55
38	22-05-24 09:15	25.34	25.22
39	22-05-24 09:30	23.39	23.19
40	22-05-24 09:45	25.57	25.67
41	22-05-24 10:00	35.26	35.83
42	22-05-24 10:15	33.76	33.46
43	22-05-24 10:30	36.95	37.43
44	22-05-24 10:45	38.65	38.42
45	22-05-24 11:00	45.14	44.74
46	22-05-24 11:15	38.77	38.19
47	22-05-24 11:30	41.54	41.06
48	22-05-24 11:45	50.87	50.54
49	22-05-24 12:00	58.97	58.47
50	22-05-24 12:15	60.86	60.37
51	22-05-24 12:30	64.11	63.59
52	22-05-24 12:45	63.13	62.82
53	22-05-24 13:00	72.1	71.85
54	22-05-24 13:15	79.75	79.6
55	22-05-24 13:30	84.65	83.77
56	22-05-24 13:45	72.78	72.24
57	22-05-24 14:00	65.24	64.95
58	22-05-24 14:15	62.09	62.12
59	22-05-24 14:30	60.8	60.6
60	22-05-24 14:45	55.43	57.15
61	22-05-24 15:00	56.1	56.08

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
62	22-05-24 15:15	55.3	55.09
63	22-05-24 15:30	56.71	56.67
64	22-05-24 15:45	61.85	61.54
65	22-05-24 16:00	54.19	54.03
66	22-05-24 16:15	52.37	52.77
67	22-05-24 16:30	52.17	52.11
68	22-05-24 16:45	49.79	49.92
69	22-05-24 17:00	52.09	52.94
70	22-05-24 17:15	50.04	50.5
71	22-05-24 17:30	58.55	58.79
72	22-05-24 17:45	59.01	59.24
73	22-05-24 18:00	69.93	70.43
74	22-05-24 18:15	75.33	75.46
75	22-05-24 18:30	78.77	78.77
76	22-05-24 18:45	77.95	78.61
77	22-05-24 19:00	82.96	83.77
78	22-05-24 19:15	80.14	79.88
79	22-05-24 19:30	77.38	77.54
80	22-05-24 19:45	74.75	75.74
81	22-05-24 20:00	75.72	75.26
82	22-05-24 20:15	75.42	75.71
83	22-05-24 20:30	75.5	75.63
84	22-05-24 20:45	80.47	80.9
85	22-05-24 21:00	79.73	79.45
86	22-05-24 21:15	79.1	78.7
87	22-05-24 21:30	79.64	79.19
88	22-05-24 21:45	67.03	67
89	22-05-24 22:00	79.23	79.63
90	22-05-24 22:15	80.81	80.75
91	22-05-24 22:30	82.53	80.76
92	22-05-24 22:45	83.95	83.83
93	22-05-24 23:00	79.62	79.99
94	22-05-24 23:15	75.16	75.67
95	22-05-24 23:30	74.92	75.1
96	22-05-24 23:45	68.91	68.8
22.5.2024	**No. of Blocks export**	**96**	**96**
	No. of Blocks Import	**0**	**0**
	Maximum export	**84.65**	**83.83**
	Maximum Import	**0**	**0**
1	23-05-24 00:00	62.18	61.3
2	23-05-24 00:15	57.04	56.94
3	23-05-24 00:30	51.07	50.93
4	23-05-24 00:45	48.85	48.53
5	23-05-24 01:00	47.75	47.62
6	23-05-24 01:15	45.97	46.34
7	23-05-24 01:30	45.44	45.27
8	23-05-24 01:45	45.62	45.52
9	23-05-24 02:00	14.11	14.09
10	23-05-24 02:15	-1.71	-1.49
11	23-05-24 02:30	16.5	16.69
12	23-05-24 02:45	47.21	47.64
13	23-05-24 03:00	54.43	53.59
14	23-05-24 03:15	56.9	56.87
15	23-05-24 03:30	58.02	58.22
16	23-05-24 03:45	59.17	59.29

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
17	23-05-24 04:00	58.67	58.43
18	23-05-24 04:15	56.68	56.97
19	23-05-24 04:30	59.27	59.08
20	23-05-24 04:45	56.5	56.3
21	23-05-24 05:00	54.84	55.09
22	23-05-24 05:15	45.59	45.74
23	23-05-24 05:30	40.91	41.25
24	23-05-24 05:45	40.73	40.53
25	23-05-24 06:00	42.96	43.23
26	23-05-24 06:15	33.95	34.07
27	23-05-24 06:30	27.86	28.19
28	23-05-24 06:45	24.71	25.83
29	23-05-24 07:00	21.6	21.9
30	23-05-24 07:15	18.05	18.17
31	23-05-24 07:30	16.31	16.48
32	23-05-24 07:45	22.76	22.98
33	23-05-24 08:00	27.5	27.3
34	23-05-24 08:15	28.89	29.21
35	23-05-24 08:30	32.92	32.26
36	23-05-24 08:45	32.52	30.73
37	23-05-24 09:00	31.35	30.62
38	23-05-24 09:15	32.14	31.61
39	23-05-24 09:30	32.2	32.01
40	23-05-24 09:45	35.59	35.6
41	23-05-24 10:00	41.48	42.19
42	23-05-24 10:15	40.57	39.82
43	23-05-24 10:30	39.42	38.96
44	23-05-24 10:45	50.1	49.37
45	23-05-24 11:00	51.54	50.41
46	23-05-24 11:15	55.44	55.84
47	23-05-24 11:30	59.96	59.57
48	23-05-24 11:45	60.53	59.48
49	23-05-24 12:00	66.81	66.37
50	23-05-24 12:15	72.52	73.02
51	23-05-24 12:30	80.67	80.16
52	23-05-24 12:45	74.85	73.65
53	23-05-24 13:00	74.28	74.04
54	23-05-24 13:15	69.43	69.16
55	23-05-24 13:30	59.94	60.03
56	23-05-24 13:45	55.98	55.4
57	23-05-24 14:00	52.38	51.75
58	23-05-24 14:15	45.64	45.19
59	23-05-24 14:30	51.37	50.98
60	23-05-24 14:45	47.1	47.61
61	23-05-24 15:00	48.54	47.92
62	23-05-24 15:15	48.23	48.02
63	23-05-24 15:30	42.26	42.29
64	23-05-24 15:45	36.43	37.57
65	23-05-24 16:00	31.85	31.84
66	23-05-24 16:15	24.19	24.96
67	23-05-24 16:30	24.22	24.86
68	23-05-24 16:45	22.99	24.03
69	23-05-24 17:00	30.72	31.08
70	23-05-24 17:15	34.49	35.18
71	23-05-24 17:30	42.83	43.14

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
72	23-05-24 17:45	48.46	49.01
73	23-05-24 18:00	58.27	58.42
74	23-05-24 18:15	72.43	72.98
75	23-05-24 18:30	74	74.15
76	23-05-24 18:45	75	75.22
77	23-05-24 19:00	80.83	79.94
78	23-05-24 19:15	82.2	83.26
79	23-05-24 19:30	78.61	79.25
80	23-05-24 19:45	80.53	80.7
81	23-05-24 20:00	84.07	84.08
82	23-05-24 20:15	81.47	81.56
83	23-05-24 20:30	76.89	76.26
84	23-05-24 20:45	74.23	74.4
85	23-05-24 21:00	78.06	78.72
86	23-05-24 21:15	74.9	75.12
87	23-05-24 21:30	81.14	81.47
88	23-05-24 21:45	85.15	85.11
89	23-05-24 22:00	83.14	84.1
90	23-05-24 22:15	77.31	77.3
91	23-05-24 22:30	82.78	83.03
92	23-05-24 22:45	84.82	85.2
93	23-05-24 23:00	82.78	82.03
94	23-05-24 23:15	81.97	81.87
95	23-05-24 23:30	77.08	77.23
96	23-05-24 23:45	75.26	75.25
23.5.2024	**No. of Blocks export**	**95**	**95**
	No. of Blocks Import	**1**	**1**
	Maximum export	**85.15**	**85.2**
	Maximum Import	**-1.71**	**-1.49**
1	24-05-24 00:00	70.55	71.88
2	24-05-24 00:15	64.47	64.92
3	24-05-24 00:30	53.01	52.82
4	24-05-24 00:45	43.03	43.11
5	24-05-24 01:00	40.69	40.81
6	24-05-24 01:15	39.41	39.63
7	24-05-24 01:30	37.52	37.57
8	24-05-24 01:45	37.17	37.8
9	24-05-24 02:00	37.46	37.55
10	24-05-24 02:15	36	35.96
11	24-05-24 02:30	35.78	36
12	24-05-24 02:45	40.92	41.21
13	24-05-24 03:00	37.1	37.15
14	24-05-24 03:15	38.91	39.15
15	24-05-24 03:30	41.16	41.71
16	24-05-24 03:45	45.66	46.05
17	24-05-24 04:00	48.06	48.31
18	24-05-24 04:15	46.44	47.33
19	24-05-24 04:30	39.2	39.78
20	24-05-24 04:45	37.67	38.36
21	24-05-24 05:00	32.98	33.68
22	24-05-24 05:15	29.82	30.13
23	24-05-24 05:30	28.99	29.38
24	24-05-24 05:45	34.92	34.54
25	24-05-24 06:00	33.87	34.46
26	24-05-24 06:15	22.05	22.23

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
27	24-05-24 06:30	14.68	14.86
28	24-05-24 06:45	12.78	12.94
29	24-05-24 07:00	12.45	13
30	24-05-24 07:15	14.11	14.46
31	24-05-24 07:30	9.1	10.22
32	24-05-24 07:45	-4.54	-3.85
33	24-05-24 08:00	-0.09	0.23
34	24-05-24 08:15	-3.17	-2.78
35	24-05-24 08:30	5.26	5.38
36	24-05-24 08:45	8.4	8.51
37	24-05-24 09:00	8.79	8.42
38	24-05-24 09:15	11.38	11.14
39	24-05-24 09:30	19.03	19.43
40	24-05-24 09:45	17.45	17.92
41	24-05-24 10:00	21.34	21.57
42	24-05-24 10:15	20.61	20.46
43	24-05-24 10:30	24.54	24.3
44	24-05-24 10:45	27.79	27.66
45	24-05-24 11:00	37.95	37.12
46	24-05-24 11:15	39.07	38.98
47	24-05-24 11:30	46.61	46.55
48	24-05-24 11:45	44.17	44.38
49	24-05-24 12:00	51.51	51.48
50	24-05-24 12:15	49.14	49.46
51	24-05-24 12:30	49.12	48.8
52	24-05-24 12:45	44.7	44.41
53	24-05-24 13:00	48.3	48.06
54	24-05-24 13:15	44.14	44.54
55	24-05-24 13:30	41.34	41.92
56	24-05-24 13:45	41.23	41.13
57	24-05-24 14:00	38.21	38.48
58	24-05-24 14:15	30.92	30.73
59	24-05-24 14:30	29.9	29.74
60	24-05-24 14:45	30.55	30.68
61	24-05-24 15:00	28.25	28.56
62	24-05-24 15:15	25.18	25.4
63	24-05-24 15:30	26.32	26.37
64	24-05-24 15:45	24.47	24.66
65	24-05-24 16:00	22.7	22.42
66	24-05-24 16:15	13.14	13.41
67	24-05-24 16:30	3.01	3.93
68	24-05-24 16:45	-23.7	-23.21
69	24-05-24 17:00	-0.11	-0.21
70	24-05-24 17:15	15.6	15.16
71	24-05-24 17:30	23.15	23.47
72	24-05-24 17:45	31.12	31.72
73	24-05-24 18:00	41.28	41.8
74	24-05-24 18:15	55.98	55.89
75	24-05-24 18:30	60.94	62.45
76	24-05-24 18:45	59.53	60.5
77	24-05-24 19:00	60.09	60.21
78	24-05-24 19:15	56.08	57.16
79	24-05-24 19:30	61.23	62.13
80	24-05-24 19:45	70.96	71.17
81	24-05-24 20:00	72.99	72.68

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
82	24-05-24 20:15	73.23	73.51
83	24-05-24 20:30	75.54	75.53
84	24-05-24 20:45	72.65	72.63
85	24-05-24 21:00	67	67.48
86	24-05-24 21:15	64.2	64.97
87	24-05-24 21:30	59.05	59.42
88	24-05-24 21:45	35.71	36.75
89	24-05-24 22:00	18.6	19.45
90	24-05-24 22:15	8.48	9.74
91	24-05-24 22:30	6.96	8.22
92	24-05-24 22:45	5.1	6.3
93	24-05-24 23:00	1.31	1.56
94	24-05-24 23:15	3.06	4.07
95	24-05-24 23:30	0.15	1.28
96	24-05-24 23:45	1.61	2.43
24.5.2024	**No. of Blocks export**	**91**	**92**
	No. of Blocks Import	**5**	**4**
	Maximum export	**75.54**	**75.53**
	Maximum Import	**-23.7**	**-23.21**
1	25-05-24 00:00	3.83	4.06
2	25-05-24 00:15	16.96	17.22
3	25-05-24 00:30	11.56	11.61
4	25-05-24 00:45	-10.42	-9.93
5	25-05-24 01:00	-20.24	-19.87
6	25-05-24 01:15	-18.32	-17.61
7	25-05-24 01:30	-15.94	-15.53
8	25-05-24 01:45	-16.38	-16
9	25-05-24 02:00	-11.74	-11.39
10	25-05-24 02:15	-9.48	-8.76
11	25-05-24 02:30	-7.44	-7.29
12	25-05-24 02:45	-7.15	-7.17
13	25-05-24 03:00	-8.2	-6.42
14	25-05-24 03:15	-8.44	-7.81
15	25-05-24 03:30	-9.34	-9.22
16	25-05-24 03:45	-4.57	-4.25
17	25-05-24 04:00	-4.08	-2.65
18	25-05-24 04:15	-4.76	-4.04
19	25-05-24 04:30	-6.2	-5.65
20	25-05-24 04:45	-6.68	-6.19
21	25-05-24 05:00	-11.12	-10.14
22	25-05-24 05:15	-17.37	-17.06
23	25-05-24 05:30	-20.22	-19.52
24	25-05-24 05:45	-18.1	-17.32
25	25-05-24 06:00	-19.91	-19.94
26	25-05-24 06:15	-26.6	-25.88
27	25-05-24 06:30	-23.76	-22.91
28	25-05-24 06:45	-25.82	-25.69
29	25-05-24 07:00	-31.39	-31.19
30	25-05-24 07:15	-39.24	-38.35
31	25-05-24 07:30	-39.41	-39.19
32	25-05-24 07:45	-38.67	-37.9
33	25-05-24 08:00	-33.94	-33.13
34	25-05-24 08:15	-38.72	-38.33
35	25-05-24 08:30	-53.28	-54.18
36	25-05-24 08:45	-53.47	-54

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
37	25-05-24 09:00	-50.99	-51.86
38	25-05-24 09:15	-52.14	-52.75
39	25-05-24 09:30	-50.78	-51.96
40	25-05-24 09:45	-50.01	-51.08
41	25-05-24 10:00	-69.68	-69.67
42	25-05-24 10:15	-79.57	-80.17
43	25-05-24 10:30	-82.36	-83.13
44	25-05-24 10:45	-76.89	-77.72
45	25-05-24 11:00	-66.82	-67.44
46	25-05-24 11:15	-67.19	-67.64
47	25-05-24 11:30	-63.88	-64.42
48	25-05-24 11:45	-66.57	-66.59
49	25-05-24 12:00	-58.45	-59.1
50	25-05-24 12:15	-49.77	-50.24
51	25-05-24 12:30	-45.95	-46.5
52	25-05-24 12:45	-52.62	-52.36
53	25-05-24 13:00	-46.6	-46.86
54	25-05-24 13:15	-49.28	-49.92
55	25-05-24 13:30	-43.66	-44.25
56	25-05-24 13:45	-47.87	-48.83
57	25-05-24 14:00	-22.16	-23.06
58	25-05-24 14:15	-13.05	-13.48
59	25-05-24 14:30	-10.75	-10.65
60	25-05-24 14:45	-9.23	-8.58
61	25-05-24 15:00	-10.71	-10.54
62	25-05-24 15:15	-12.75	-13.75
63	25-05-24 15:30	-22.85	-23.15
64	25-05-24 15:45	-22.28	-22.89
65	25-05-24 16:00	-23.19	-23.47
66	25-05-24 16:15	-27.77	-28.58
67	25-05-24 16:30	-29.31	-28.84
68	25-05-24 16:45	-53.2	-52.7
69	25-05-24 17:00	-70.7	-71.38
70	25-05-24 17:15	-72.49	-72.52
71	25-05-24 17:30	-65.55	-65.64
72	25-05-24 17:45	-58.01	-57.2
73	25-05-24 18:00	-50.75	-51.46
74	25-05-24 18:15	-52.51	-52.7
75	25-05-24 18:30	-49.29	-49.31
76	25-05-24 18:45	-47.25	-47.44
77	25-05-24 19:00	-20.45	-20.55
78	25-05-24 19:15	1.4	1.16
79	25-05-24 19:30	12.34	4.64
80	25-05-24 19:45	4.41	4.58
81	25-05-24 20:00	3.15	2.89
82	25-05-24 20:15	-3.14	-2.84
83	25-05-24 20:30	-4.16	-4.23
84	25-05-24 20:45	-6.97	-7
85	25-05-24 21:00	-14.51	-14.16
86	25-05-24 21:15	-10.23	-10.51
87	25-05-24 21:30	-11.25	-10.92
88	25-05-24 21:45	-10.69	-10.07
89	25-05-24 22:00	-7.76	-7.38
90	25-05-24 22:15	-5.34	-4.68
91	25-05-24 22:30	8	8.11

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
92	25-05-24 22:45	6.64	6.89
93	25-05-24 23:00	4.51	4.8
94	25-05-24 23:15	12	12.52
95	25-05-24 23:30	12.54	12.65
96	25-05-24 23:45	16.13	16.06
25.5.2024	**No. of Blocks export**	**13**	**13**
	No. of Blocks Import	**83**	**83**
	Maximum export	**16.96**	**17.22**
	Maximum Import	**-82.36**	**-83.13**
1	26-05-24 00:00	14.71	14.4
2	26-05-24 00:15	18.93	18.78
3	26-05-24 00:30	6.42	6.48
4	26-05-24 00:45	3.31	3.94
5	26-05-24 01:00	-11.24	-11.1
6	26-05-24 01:15	-23.51	-22.5
7	26-05-24 01:30	-37.96	-37.86
8	26-05-24 01:45	-43.03	-43.07
9	26-05-24 02:00	-44.74	-43.68
10	26-05-24 02:15	-43.64	-43.09
11	26-05-24 02:30	-42.72	-42.1
12	26-05-24 02:45	-37.86	-37.39
13	26-05-24 03:00	-41.66	-41.98
14	26-05-24 03:15	-44.16	-43.71
15	26-05-24 03:30	-46.26	-46.19
16	26-05-24 03:45	-44.34	-44.45
17	26-05-24 04:00	-41.31	-41.42
18	26-05-24 04:15	-42.18	-41.82
19	26-05-24 04:30	-43.95	-44.03
20	26-05-24 04:45	-43.16	-43.31
21	26-05-24 05:00	-48.84	-49.39
22	26-05-24 05:15	-56.74	-56.84
23	26-05-24 05:30	-56.04	-55.84
24	26-05-24 05:45	-54.22	-53.87
25	26-05-24 06:00	-52.7	-52.51
26	26-05-24 06:15	-59.32	-59.06
27	26-05-24 06:30	-68.47	-67.79
28	26-05-24 06:45	-66.65	-65.26
29	26-05-24 07:00	-72.38	-71.58
30	26-05-24 07:15	-71.72	-71.44
31	26-05-24 07:30	-71.94	-71.91
32	26-05-24 07:45	-76.85	-76.49
33	26-05-24 08:00	-68.52	-68.22
34	26-05-24 08:15	-63.93	-63.43
35	26-05-24 08:30	-62.68	-61.94
36	26-05-24 08:45	-62.04	-61.45
37	26-05-24 09:00	-61.18	-60.5
38	26-05-24 09:15	-66.19	-65.5
39	26-05-24 09:30	-61.48	-61.44
40	26-05-24 09:45	-63.33	-63.46
41	26-05-24 10:00	-57.52	-57.82
42	26-05-24 10:15	-95.81	-96.13
43	26-05-24 10:30	-106.52	-108.3
44	26-05-24 10:45	-121.78	-122.18
45	26-05-24 11:00	-116.88	-117.22
46	26-05-24 11:15	-105.17	-105.88

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
47	26-05-24 11:30	-91.16	-91.45
48	26-05-24 11:45	-86.86	-86.97
49	26-05-24 12:00	-80.91	-81.12
50	26-05-24 12:15	-81.84	-81.97
51	26-05-24 12:30	-74.31	-75.96
52	26-05-24 12:45	-75.41	-75.99
53	26-05-24 13:00	-67.14	-67.16
54	26-05-24 13:15	-42.57	-42.36
55	26-05-24 13:30	-8.72	-10.64
56	26-05-24 13:45	-11.31	-11.56
57	26-05-24 14:00	-6.5	-6.32
58	26-05-24 14:15	3.43	3.09
59	26-05-24 14:30	-0.75	-0.96
60	26-05-24 14:45	5.88	4.81
61	26-05-24 15:00	1.04	0.98
62	26-05-24 15:15	3.11	3.01
63	26-05-24 15:30	-0.22	-0.36
64	26-05-24 15:45	-3.68	-3.96
65	26-05-24 16:00	-4.59	-4.56
66	26-05-24 16:15	-7.42	-7.44
67	26-05-24 16:30	10.35	10.33
68	26-05-24 16:45	16.92	17.38
69	26-05-24 17:00	26.38	26.98
70	26-05-24 17:15	-12.18	-11.02
71	26-05-24 17:30	-31.33	-30.83
72	26-05-24 17:45	-26.12	-26.27
73	26-05-24 18:00	-11.95	-12.18
74	26-05-24 18:15	-5.53	-5.31
75	26-05-24 18:30	-3.21	-3.07
76	26-05-24 18:45	12.41	12.66
77	26-05-24 19:00	17.06	17.5
78	26-05-24 19:15	47.01	47.17
79	26-05-24 19:30	43.83	44.01
80	26-05-24 19:45	39.63	39.61
81	26-05-24 20:00	40.5	39.55
82	26-05-24 20:15	40.93	40.5
83	26-05-24 20:30	12.85	12.73
84	26-05-24 20:45	-20.04	-19.38
85	26-05-24 21:00	2.81	2.16
86	26-05-24 21:15	11.24	11.06
87	26-05-24 21:30	14.74	14.19
88	26-05-24 21:45	17.22	16.75
89	26-05-24 22:00	18.1	18.22
90	26-05-24 22:15	-40.3	-40.35
91	26-05-24 22:30	-42.38	-42.37
92	26-05-24 22:45	-44.81	-44.5
93	26-05-24 23:00	-43.68	-44.14
94	26-05-24 23:15	-37.31	-36.88
95	26-05-24 23:30	-48.39	-48.32
96	26-05-24 23:45	-47.2	-47.62
26.5.2024	**No. of Blocks export**	**24**	**24**
	No. of Blocks Import	**72**	**72**
	Maximum export	**47.01**	**47.17**
	Maximum Import	**-121.78**	**-122.18**
1	27-05-24 00:00	-46.98	-46.71

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
2	27-05-24 00:15	-48.16	-48.31
3	27-05-24 00:30	-45.09	-45.24
4	27-05-24 00:45	-44.38	-44.63
5	27-05-24 01:00	-41.56	-41.62
6	27-05-24 01:15	-37.06	-37.01
7	27-05-24 01:30	-58.95	-60.07
8	27-05-24 01:45	-59.57	-60.25
9	27-05-24 02:00	-68.25	-72.98
10	27-05-24 02:15	-60.02	-61.02
11	27-05-24 02:30	-76.89	-77.14
12	27-05-24 02:45	-78.24	-78.28
13	27-05-24 03:00	-75.27	-75.33
14	27-05-24 03:15	-71.56	-71.94
15	27-05-24 03:30	-67.85	-67.87
16	27-05-24 03:45	-63.23	-63.26
17	27-05-24 04:00	-64.41	-64.87
18	27-05-24 04:15	-66.82	-66.98
19	27-05-24 04:30	-66	-66.37
20	27-05-24 04:45	-68.91	-68.42
21	27-05-24 05:00	-56.78	-57.07
22	27-05-24 05:15	-32.68	-32.98
23	27-05-24 05:30	-33.11	-33.59
24	27-05-24 05:45	-37.05	-36.41
25	27-05-24 06:00	-35.58	-35.28
26	27-05-24 06:15	-15.55	-15
27	27-05-24 06:30	-1.72	-1.47
28	27-05-24 06:45	1.22	1.74
29	27-05-24 07:00	-32.38	-31.99
30	27-05-24 07:15	-54.81	-55.08
31	27-05-24 07:30	-55.01	-55.38
32	27-05-24 07:45	-19.35	-19.19
33	27-05-24 08:00	2.78	3.65
34	27-05-24 08:15	7.12	7.39
35	27-05-24 08:30	6.82	6.68
36	27-05-24 08:45	10.82	10.75
37	27-05-24 09:00	20.72	21.46
38	27-05-24 09:15	32.15	31.81
39	27-05-24 09:30	25.68	25.5
40	27-05-24 09:45	-17.74	-16.71
41	27-05-24 10:00	-24.57	-24.56
42	27-05-24 10:15	-26.05	-26.16
43	27-05-24 10:30	-32	-31.58
44	27-05-24 10:45	-32.25	-32.62
45	27-05-24 11:00	-27.57	-27.75
46	27-05-24 11:15	-31.87	-31.97
47	27-05-24 11:30	-36.11	-36.96
48	27-05-24 11:45	-37.26	-37.45
49	27-05-24 12:00	-31.22	-31.48
50	27-05-24 12:15	-27.71	-28.2
51	27-05-24 12:30	-26.96	-27.54
52	27-05-24 12:45	-22.82	-23.58
53	27-05-24 13:00	-20.24	-21.16
54	27-05-24 13:15	-6.51	-7.13
55	27-05-24 13:30	54.11	53.12
56	27-05-24 13:45	41.68	40.33

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
57	27-05-24 14:00	48.11	48.13
58	27-05-24 14:15	40.69	40.04
59	27-05-24 14:30	22.7	22.49
60	27-05-24 14:45	30.73	30.05
61	27-05-24 15:00	16.83	16.82
62	27-05-24 15:15	21.04	20.51
63	27-05-24 15:30	15.88	15.34
64	27-05-24 15:45	-13.38	-13.79
65	27-05-24 16:00	-7.51	-7.97
66	27-05-24 16:15	-2.14	-2.77
67	27-05-24 16:30	14.52	14.76
68	27-05-24 16:45	17.84	17.66
69	27-05-24 17:00	20.64	20.15
70	27-05-24 17:15	4.73	4.2
71	27-05-24 17:30	-21.79	-21.85
72	27-05-24 17:45	-31.33	-30.4
73	27-05-24 18:00	-28.78	-28.23
74	27-05-24 18:15	-10.13	-10.53
75	27-05-24 18:30	17.25	17.35
76	27-05-24 18:45	23.66	23.84
77	27-05-24 19:00	37.67	37.99
78	27-05-24 19:15	37.65	37.12
79	27-05-24 19:30	34.73	34.59
80	27-05-24 19:45	24.59	23.98
81	27-05-24 20:00	27.11	27.18
82	27-05-24 20:15	23.82	23.77
83	27-05-24 20:30	16.38	16.96
84	27-05-24 20:45	18.86	18.83
85	27-05-24 21:00	29.59	28.41
86	27-05-24 21:15	-6.17	-7.68
87	27-05-24 21:30	-8.02	-8.05
88	27-05-24 21:45	-25.65	-25.7
89	27-05-24 22:00	-28.62	-28.5
90	27-05-24 22:15	-27.76	-27.75
91	27-05-24 22:30	-29.58	-28.87
92	27-05-24 22:45	-25.37	-24.57
93	27-05-24 23:00	-17.56	-17.57
94	27-05-24 23:15	-18.32	-18.41
95	27-05-24 23:30	-21.08	-21.1
96	27-05-24 23:45	-19.31	-19.53
27.5.2024	**No. of Blocks export**	**32**	**32**
	No. of Blocks Import	**64**	**64**
	Maximum export	**54.11**	**53.12**
	Maximum Import	**-78.24**	**-78.28**
1	28-05-24 00:00	-14.68	-15.41
2	28-05-24 00:15	7.47	6.53
3	28-05-24 00:30	0.96	0.61
4	28-05-24 00:45	-14.78	-14.55
5	28-05-24 01:00	-14.77	-14.91
6	28-05-24 01:15	-13.96	-13.55
7	28-05-24 01:30	-15.57	-15.59
8	28-05-24 01:45	-39.2	-39.74
9	28-05-24 02:00	-55.2	-54.92
10	28-05-24 02:15	-48.85	-49.36
11	28-05-24 02:30	-22.22	-22.54

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
12	28-05-24 02:45	-10.37	-9.33
13	28-05-24 03:00	-8.48	-8.32
14	28-05-24 03:15	-4.38	-4.76
15	28-05-24 03:30	-4.68	-4.79
16	28-05-24 03:45	3.31	2.78
17	28-05-24 04:00	2.48	2.69
18	28-05-24 04:15	-0.98	-0.67
19	28-05-24 04:30	3.07	2.78
20	28-05-24 04:45	-3.44	-3.61
21	28-05-24 05:00	-14.23	-14.25
22	28-05-24 05:15	-17.93	-18.39
23	28-05-24 05:30	-20.06	-20.48
24	28-05-24 05:45	-25.66	-25.54
25	28-05-24 06:00	-24.47	-24.32
26	28-05-24 06:15	-67.94	-67.3
27	28-05-24 06:30	-82.24	-82.54
28	28-05-24 06:45	-78.13	-78.27
29	28-05-24 07:00	-73.04	-72.39
30	28-05-24 07:15	-33	-32.86
31	28-05-24 07:30	-20.03	-20.04
32	28-05-24 07:45	-9.63	-10.15
33	28-05-24 08:00	-35.5	-35.82
34	28-05-24 08:15	-40.25	-40.68
35	28-05-24 08:30	-36.62	-36.44
36	28-05-24 08:45	-29.5	-29.12
37	28-05-24 09:00	-26.56	-27.47
38	28-05-24 09:15	-35.2	-34.75
39	28-05-24 09:30	-35.32	-35.19
40	28-05-24 09:45	-29.65	-29.97
41	28-05-24 10:00	-13.64	-13.79
42	28-05-24 10:15	-7.31	-7.49
43	28-05-24 10:30	-11.01	-11.44
44	28-05-24 10:45	-2.83	-3.06
45	28-05-24 11:00	-9.32	-10.09
46	28-05-24 11:15	-30.35	-31.08
47	28-05-24 11:30	-33.89	-35.1
48	28-05-24 11:45	-38.55	-38.79
49	28-05-24 12:00	-33.21	-34.25
50	28-05-24 12:15	-31.91	-32.54
51	28-05-24 12:30	-30.31	-30.52
52	28-05-24 12:45	-27.83	-28.06
53	28-05-24 13:00	-21.77	-21.81
54	28-05-24 13:15	-19.92	-20.99
55	28-05-24 13:30	-11.93	-12.13
56	28-05-24 13:45	8.06	7.76
57	28-05-24 14:00	33.42	32.05
58	28-05-24 14:15	17.16	16.26
59	28-05-24 14:30	-5.68	-5.83
60	28-05-24 14:45	-6.31	-6.32
61	28-05-24 15:00	3.47	3.32
62	28-05-24 15:15	3.24	2.8
63	28-05-24 15:30	44.33	44.37
64	28-05-24 15:45	52.18	52.05
65	28-05-24 16:00	41.13	41.31
66	28-05-24 16:15	31.68	32.01

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
67	28-05-24 16:30	32.01	30.9
68	28-05-24 16:45	37.82	37.39
69	28-05-24 17:00	48.16	48.52
70	28-05-24 17:15	43.23	43.57
71	28-05-24 17:30	47.48	47.71
72	28-05-24 17:45	66.88	66.87
73	28-05-24 18:00	65.87	66.35
74	28-05-24 18:15	73.9	73.97
75	28-05-24 18:30	73.27	73.28
76	28-05-24 18:45	63.37	63.07
77	28-05-24 19:00	75.39	75.34
78	28-05-24 19:15	83.32	83.44
79	28-05-24 19:30	66.35	65.93
80	28-05-24 19:45	61.08	61.14
81	28-05-24 20:00	59.22	59.23
82	28-05-24 20:15	55.91	56.22
83	28-05-24 20:30	56.18	54.35
84	28-05-24 20:45	46.34	46.28
85	28-05-24 21:00	44.52	44.48
86	28-05-24 21:15	37.48	37.29
87	28-05-24 21:30	43.34	43.9
88	28-05-24 21:45	42.64	42.37
89	28-05-24 22:00	39.15	39.67
90	28-05-24 22:15	33.85	33.7
91	28-05-24 22:30	31.07	30.48
92	28-05-24 22:45	27.62	26.61
93	28-05-24 23:00	23.57	23.73
94	28-05-24 23:15	20.6	21.29
95	28-05-24 23:30	21.05	20.95
96	28-05-24 23:45	24.39	23.82
28.5.2024	**No. of Blocks export**	**44**	**44**
	No. of Blocks Import	**52**	**52**
	Maximum export	**83.32**	**83.44**
	Maximum Import	**-82.24**	**-82.54**
1	29-05-24 00:00	28.67	28.41
2	29-05-24 00:15	29.5	29.38
3	29-05-24 00:30	28.2	27.49
4	29-05-24 00:45	28.94	28.52
5	29-05-24 01:00	29.18	28.92
6	29-05-24 01:15	30.13	29.61
7	29-05-24 01:30	6.7	6.96
8	29-05-24 01:45	-16	-15.53
9	29-05-24 02:00	-17.37	-16.95
10	29-05-24 02:15	-14.9	-15.09
11	29-05-24 02:30	-4.27	-5.09
12	29-05-24 02:45	25.95	25.67
13	29-05-24 03:00	37.14	36.93
14	29-05-24 03:15	34.07	34.25
15	29-05-24 03:30	7.38	6.77
16	29-05-24 03:45	-5.24	-6.05
17	29-05-24 04:00	-3.49	-3.23
18	29-05-24 04:15	-7.28	-6.24
19	29-05-24 04:30	-1.92	-2.31
20	29-05-24 04:45	-2.99	-3.4
21	29-05-24 05:00	-10.85	-10.93

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
22	29-05-24 05:15	-19.63	-20.12
23	29-05-24 05:30	-22.75	-22.85
24	29-05-24 05:45	-20.11	-20.25
25	29-05-24 06:00	-21.54	-21.97
26	29-05-24 06:15	-28.91	-29.33
27	29-05-24 06:30	-34.14	-34.26
28	29-05-24 06:45	-34.67	-34.15
29	29-05-24 07:00	-34.34	-34.44
30	29-05-24 07:15	-34.12	-34
31	29-05-24 07:30	-35.44	-35.22
32	29-05-24 07:45	-30.84	-30.54
33	29-05-24 08:00	-13.45	-14.15
34	29-05-24 08:15	-14.05	-14.36
35	29-05-24 08:30	-11.87	-11.69
36	29-05-24 08:45	-12.49	-11.99
37	29-05-24 09:00	-11.7	-11.63
38	29-05-24 09:15	-8.68	-9
39	29-05-24 09:30	-10.03	-9.96
40	29-05-24 09:45	-6.67	-7.31
41	29-05-24 10:00	0.94	-0.29
42	29-05-24 10:15	-3.39	-3.91
43	29-05-24 10:30	-0.5	-0.96
44	29-05-24 10:45	-1.33	-1.26
45	29-05-24 11:00	1.58	1.06
46	29-05-24 11:15	4.64	3.93
47	29-05-24 11:30	8.87	8.55
48	29-05-24 11:45	19.25	18.67
49	29-05-24 12:00	50.55	50.04
50	29-05-24 12:15	62.49	61.24
51	29-05-24 12:30	66.93	65.06
52	29-05-24 12:45	56.81	56.37
53	29-05-24 13:00	53.29	52.15
54	29-05-24 13:15	48.78	48.46
55	29-05-24 13:30	47.27	46.6
56	29-05-24 13:45	46.64	46.08
57	29-05-24 14:00	42.02	41.37
58	29-05-24 14:15	34.82	34.25
59	29-05-24 14:30	33.52	32.96
60	29-05-24 14:45	28.5	28.16
61	29-05-24 15:00	20.92	20.92
62	29-05-24 15:15	22.66	22.44
63	29-05-24 15:30	16.06	16.46
64	29-05-24 15:45	19.39	18.49
65	29-05-24 16:00	11.34	11.08
66	29-05-24 16:15	10.29	10.29
67	29-05-24 16:30	5	5.22
68	29-05-24 16:45	7.94	7.45
69	29-05-24 17:00	5.54	5.62
70	29-05-24 17:15	14.25	14.74
71	29-05-24 17:30	51.53	51.37
72	29-05-24 17:45	62.52	62.54
73	29-05-24 18:00	54.25	54.85
74	29-05-24 18:15	44.57	44.78
75	29-05-24 18:30	56.17	56
76	29-05-24 18:45	57.74	57.86

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
77	29-05-24 19:00	65.67	66.75
78	29-05-24 19:15	61.71	62.05
79	29-05-24 19:30	60.64	60.35
80	29-05-24 19:45	55.6	55.37
81	29-05-24 20:00	51.47	51.18
82	29-05-24 20:15	45.99	45.71
83	29-05-24 20:30	45.71	45.44
84	29-05-24 20:45	41.37	41.41
85	29-05-24 21:00	42.65	42.99
86	29-05-24 21:15	42.04	42.29
87	29-05-24 21:30	35.22	34.57
88	29-05-24 21:45	35.81	35.18
89	29-05-24 22:00	31.15	31.16
90	29-05-24 22:15	32.95	32.88
91	29-05-24 22:30	31.33	31.21
92	29-05-24 22:45	26.03	26.18
93	29-05-24 23:00	28.34	28.34
94	29-05-24 23:15	26.58	25.67
95	29-05-24 23:30	25.47	25.15
96	29-05-24 23:45	23.96	23.89
29.5.2024	**No. of Blocks export**	**64**	**63**
	No. of Blocks Import	**32**	**33**
	Maximum export	**66.93**	**66.75**
	Maximum Import	**-35.44**	**-35.22**
1	30-05-24 00:00	22.56	22.18
2	30-05-24 00:15	16.26	16.23
3	30-05-24 00:30	-13.59	-14.65
4	30-05-24 00:45	-27.49	-28.01
5	30-05-24 01:00	-28.22	-28.03
6	30-05-24 01:15	-20.02	-21.09
7	30-05-24 01:30	-9.01	-10.02
8	30-05-24 01:45	19.19	18.76
9	30-05-24 02:00	26.88	26.31
10	30-05-24 02:15	29.72	29.66
11	30-05-24 02:30	30.95	30.56
12	30-05-24 02:45	32.51	32.14
13	30-05-24 03:00	31.11	30.59
14	30-05-24 03:15	32.59	32.46
15	30-05-24 03:30	31.7	32.15
16	30-05-24 03:45	32.62	33.17
17	30-05-24 04:00	36.83	36.98
18	30-05-24 04:15	35.39	35.14
19	30-05-24 04:30	34.62	34.67
20	30-05-24 04:45	34.27	34.46
21	30-05-24 05:00	24.43	24.27
22	30-05-24 05:15	20.36	20.36
23	30-05-24 05:30	19.61	18.71
24	30-05-24 05:45	18.74	18.85
25	30-05-24 06:00	15.67	14.29
26	30-05-24 06:15	9.71	9.21
27	30-05-24 06:30	2.2	1.82
28	30-05-24 06:45	7.66	7.9
29	30-05-24 07:00	-12.15	-10
30	30-05-24 07:15	-52.67	-52.37
31	30-05-24 07:30	-59.63	-59.27

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
32	30-05-24 07:45	-49.87	-50.03
33	30-05-24 08:00	-40.84	-41.49
34	30-05-24 08:15	-38.8	-38.82
35	30-05-24 08:30	-23.62	-23.59
36	30-05-24 08:45	-0.63	-0.33
37	30-05-24 09:00	-0.02	-0.08
38	30-05-24 09:15	1.68	1.42
39	30-05-24 09:30	5.85	5.35
40	30-05-24 09:45	3.82	3.27
41	30-05-24 10:00	8.02	7.86
42	30-05-24 10:15	7.9	7.33
43	30-05-24 10:30	12.29	12.04
44	30-05-24 10:45	15.87	15.64
45	30-05-24 11:00	20.73	20.64
46	30-05-24 11:15	14.22	13.92
47	30-05-24 11:30	15.84	15.4
48	30-05-24 11:45	13.28	13.18
49	30-05-24 12:00	25.93	25.26
50	30-05-24 12:15	23.43	23.19
51	30-05-24 12:30	19.4	18.69
52	30-05-24 12:45	16.68	16.2
53	30-05-24 13:00	19.92	19.58
54	30-05-24 13:15	23.47	23.58
55	30-05-24 13:30	22.2	21.54
56	30-05-24 13:45	3.46	2.98
57	30-05-24 14:00	-25.2	-24.31
58	30-05-24 14:15	-34.53	-33.72
59	30-05-24 14:30	-33.08	-32.33
60	30-05-24 14:45	-30.12	-29.37
61	30-05-24 15:00	-30.46	-29.93
62	30-05-24 15:15	-27.11	-26.72
63	30-05-24 15:30	-29.26	-28.34
64	30-05-24 15:45	-29.1	-27.88
65	30-05-24 16:00	-30.16	-29.1
66	30-05-24 16:15	-47.19	-46.79
67	30-05-24 16:30	-66.19	-65.23
68	30-05-24 16:45	-57.55	-57.42
69	30-05-24 17:00	-29.59	-28.4
70	30-05-24 17:15	-13.34	-12.39
71	30-05-24 17:30	-7.53	-7.06
72	30-05-24 17:45	3.58	4.41
73	30-05-24 18:00	42.69	43.17
74	30-05-24 18:15	50.07	50.04
75	30-05-24 18:30	55.19	55.66
76	30-05-24 18:45	61.04	61.02
77	30-05-24 19:00	50.14	50.36
78	30-05-24 19:15	26.4	26.02
79	30-05-24 19:30	14.38	13.1
80	30-05-24 19:45	13.43	12.33
81	30-05-24 20:00	27.35	26.46
82	30-05-24 20:15	58.74	59.18
83	30-05-24 20:30	59.33	59.32
84	30-05-24 20:45	50.47	50.49
85	30-05-24 21:00	50.42	50.19
86	30-05-24 21:15	52.86	53.67

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
87	30-05-24 21:30	41.87	41.94
88	30-05-24 21:45	37.48	36.9
89	30-05-24 22:00	47.36	46.6
90	30-05-24 22:15	51.64	51.43
91	30-05-24 22:30	47.13	47.54
92	30-05-24 22:45	46.53	46.24
93	30-05-24 23:00	52.14	51.98
94	30-05-24 23:15	54.28	53.61
95	30-05-24 23:30	40.16	39.48
96	30-05-24 23:45	31.75	31
30.5.2024	**No. of Blocks export**	**67**	**67**
	No. of Blocks Import	**29**	**29**
	Maximum export	**61.04**	**61.02**
	Maximum Import	**-66.19**	**-65.23**
1	31-05-24 00:00	38.01	37.58
2	31-05-24 00:15	37.08	37.37
3	31-05-24 00:30	34.09	33.37
4	31-05-24 00:45	39.31	37.61
5	31-05-24 01:00	35.9	35.18
6	31-05-24 01:15	30.19	30.18
7	31-05-24 01:30	30	29.62
8	31-05-24 01:45	24.1	22.81
9	31-05-24 02:00	23.48	22.52
10	31-05-24 02:15	13.63	11.7
11	31-05-24 02:30	-13.84	-17.08
12	31-05-24 02:45	-14.19	-16.91
13	31-05-24 03:00	-12.25	-15.02
14	31-05-24 03:15	-8.8	-12.35
15	31-05-24 03:30	-7.78	-10.98
16	31-05-24 03:45	-6.76	-9.71
17	31-05-24 04:00	-6.33	-9.15
18	31-05-24 04:15	-9.02	-12.39
19	31-05-24 04:30	-8.89	-11.84
20	31-05-24 04:45	-8.55	-12.18
21	31-05-24 05:00	-22.14	-25.82
22	31-05-24 05:15	-58.6	-61.24
23	31-05-24 05:30	-58.03	-60.27
24	31-05-24 05:45	-58.39	-60.7
25	31-05-24 06:00	-55.92	-58.15
26	31-05-24 06:15	-61.89	-64.65
27	31-05-24 06:30	-64.08	-66.25
28	31-05-24 06:45	-65.44	-67.57
29	31-05-24 07:00	-69.01	-71.62
30	31-05-24 07:15	-72.36	-75.73
31	31-05-24 07:30	-70.16	-72.63
32	31-05-24 07:45	-69.59	-72.32
33	31-05-24 08:00	-68.82	-71.2
34	31-05-24 08:15	-62.58	-64.64
35	31-05-24 08:30	-60.27	-62.53
36	31-05-24 08:45	-56.69	-58.5
37	31-05-24 09:00	-56.92	-59.61
38	31-05-24 09:15	-62.65	-65.47
39	31-05-24 09:30	-76.97	-79.81
40	31-05-24 09:45	-87.02	-89.75
41	31-05-24 10:00	-84.72	-87.11

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
42	31-05-24 10:15	-79.98	-82.75
43	31-05-24 10:30	-68.51	-71.81
44	31-05-24 10:45	-74.58	-77.68
45	31-05-24 11:00	-41.88	-45.25
46	31-05-24 11:15	-51.45	-55.29
47	31-05-24 11:30	-51.92	-54.41
48	31-05-24 11:45	-50.51	-53.1
49	31-05-24 12:00	-39.37	-42.37
50	31-05-24 12:15	-33.65	-37.93
51	31-05-24 12:30	-31.56	-34.7
52	31-05-24 12:45	-29.16	-33.36
53	31-05-24 13:00	-25.03	-28.29
54	31-05-24 13:15	-20.27	-23.76
55	31-05-24 13:30	-24.83	-27.95
56	31-05-24 13:45	-25.1	-30.03
57	31-05-24 14:00	-27.87	-32.14
58	31-05-24 14:15	-27.58	-31.44
59	31-05-24 14:30	-11.8	-14.91
60	31-05-24 14:45	-13.88	-16.45
61	31-05-24 15:00	-13.92	-17.4
62	31-05-24 15:15	-13.12	-16.34
63	31-05-24 15:30	-14.97	-17.9
64	31-05-24 15:45	-16.32	-19.12
65	31-05-24 16:00	-2.66	-5.94
66	31-05-24 16:15	-12.3	-15.34
67	31-05-24 16:30	-10.58	-12.93
68	31-05-24 16:45	-10.66	-14.18
69	31-05-24 17:00	-5.72	-8.54
70	31-05-24 17:15	-4.5	-7.41
71	31-05-24 17:30	-6.44	-10.22
72	31-05-24 17:45	-4.13	-7.51
73	31-05-24 18:00	2.37	-0.51
74	31-05-24 18:15	8.25	5.44
75	31-05-24 18:30	11.49	8.38
76	31-05-24 18:45	10.99	7.78
77	31-05-24 19:00	14.88	11.74
78	31-05-24 19:15	12.06	8.55
79	31-05-24 19:30	4.5	0.89
80	31-05-24 19:45	0.91	-1.29
81	31-05-24 20:00	3.81	1.1
82	31-05-24 20:15	-2.49	-4.89
83	31-05-24 20:30	-6.16	-9.13
84	31-05-24 20:45	-5.02	-8.45
85	31-05-24 21:00	3.24	0.53
86	31-05-24 21:15	4.93	1.69
87	31-05-24 21:30	1.48	-0.98
88	31-05-24 21:45	21.43	19.11
89	31-05-24 22:00	40.65	38.43
90	31-05-24 22:15	51.96	48.86
91	31-05-24 22:30	56.92	53.92
92	31-05-24 22:45	56.77	53.77
93	31-05-24 23:00	49.99	46.74
94	31-05-24 23:15	46.91	43.91
95	31-05-24 23:30	36.78	34.11
96	31-05-24 23:45	21.9	18.72

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
31.5.2024	No. of Blocks export	31	28
	No. of Blocks Import	65	68
	Maximum export	56.92	53.92
	Maximum Import	-87.02	-89.75
1	01-06-24 00:00	7.36	4.71
2	01-06-24 00:15	6.04	2.69
3	01-06-24 00:30	-1.33	-4.07
4	01-06-24 00:45	-1.79	-5.73
5	01-06-24 01:00	-6.72	-9.85
6	01-06-24 01:15	-14.75	-18.21
7	01-06-24 01:30	-12.47	-15.15
8	01-06-24 01:45	-10.59	-13.56
9	01-06-24 02:00	-7.89	-10.63
10	01-06-24 02:15	-4.28	-6.67
11	01-06-24 02:30	4.92	3.11
12	01-06-24 02:45	12.86	11.1
13	01-06-24 03:00	9.98	7.86
14	01-06-24 03:15	20.3	18.83
15	01-06-24 03:30	27.31	26.45
16	01-06-24 03:45	31.2	30.03
17	01-06-24 04:00	36.49	35.89
18	01-06-24 04:15	37.12	36.71
19	01-06-24 04:30	35.14	34.91
20	01-06-24 04:45	33.29	34.54
21	01-06-24 05:00	26.03	26.12
22	01-06-24 05:15	11.14	11.01
23	01-06-24 05:30	-23.32	-22.48
24	01-06-24 05:45	-23.58	-23.44
25	01-06-24 06:00	-9.31	-8.99
26	01-06-24 06:15	-21.26	-20.68
27	01-06-24 06:30	-19.74	-18.73
28	01-06-24 06:45	-18.46	-18.14
29	01-06-24 07:00	-23.53	-22.64
30	01-06-24 07:15	-23.34	-22.98
31	01-06-24 07:30	-16.98	-16.91
32	01-06-24 07:45	-13.25	-13.14
33	01-06-24 08:00	-9.99	-9.48
34	01-06-24 08:15	-8.84	-8.65
35	01-06-24 08:30	-8.94	-8.77
36	01-06-24 08:45	-1.59	-1.48
37	01-06-24 09:00	1.37	2.86
38	01-06-24 09:15	-3.54	-3.18
39	01-06-24 09:30	-0.45	0.17
40	01-06-24 09:45	0.63	1.35
41	01-06-24 10:00	6.91	7.28
42	01-06-24 10:15	-6.94	-6.69
43	01-06-24 10:30	-5.93	-5.35
44	01-06-24 10:45	-6.95	-6.24
45	01-06-24 11:00	-1.5	-1.92
46	01-06-24 11:15	-2.78	-2.09
47	01-06-24 11:30	-5.78	-4.94
48	01-06-24 11:45	-5.98	-5.38
49	01-06-24 12:00	7	6.91
50	01-06-24 12:15	7.79	7.47
51	01-06-24 12:30	10.59	10.97

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
52	01-06-24 12:45	10.37	10.8
53	01-06-24 13:00	13.85	14.06
54	01-06-24 13:15	15.58	17.12
55	01-06-24 13:30	11.94	14.13
56	01-06-24 13:45	3.66	4.19
57	01-06-24 14:00	0.35	0.81
58	01-06-24 14:15	-12.03	-11.46
59	01-06-24 14:30	-6.06	-5.1
60	01-06-24 14:45	-3.76	-2.93
61	01-06-24 15:00	4.01	4.9
62	01-06-24 15:15	33.49	33.4
63	01-06-24 15:30	18.39	18.52
64	01-06-24 15:45	-9.15	-9.27
65	01-06-24 16:00	-3.57	-4.34
66	01-06-24 16:15	-16.7	-16.92
67	01-06-24 16:30	-22.22	-21.94
68	01-06-24 16:45	-21.71	-22.02
69	01-06-24 17:00	11.3	11.48
70	01-06-24 17:15	26.61	26.79
71	01-06-24 17:30	33.16	33.38
72	01-06-24 17:45	42.62	42.28
73	01-06-24 18:00	55.39	55.44
74	01-06-24 18:15	67.56	67.64
75	01-06-24 18:30	84.26	84.38
76	01-06-24 18:45	87.19	86.41
77	01-06-24 19:00	89.7	89.57
78	01-06-24 19:15	83.15	83.47
79	01-06-24 19:30	79.86	79.73
80	01-06-24 19:45	71.48	71.27
81	01-06-24 20:00	35.11	33.97
82	01-06-24 20:15	22.54	22.25
83	01-06-24 20:30	15.13	15
84	01-06-24 20:45	21.55	20.82
85	01-06-24 21:00	37.74	35.66
86	01-06-24 21:15	47.17	47.49
87	01-06-24 21:30	46.73	48.3
88	01-06-24 21:45	37.08	37.65
89	01-06-24 22:00	34.84	34.6
90	01-06-24 22:15	34.89	34.88
91	01-06-24 22:30	32.18	32.06
92	01-06-24 22:45	28.6	29.19
93	01-06-24 23:00	25.87	25.78
94	01-06-24 23:15	18.96	17.6
95	01-06-24 23:30	6.95	7.67
96	01-06-24 23:45	4.07	4.23
1.6.2024	**No. of Blocks export**	**57**	**58**
	No. of Blocks Import	**39**	**38**
	Maximum export	**89.7**	**89.57**
	Maximum Import	**-23.58**	**-23.44**
1	02-06-24 00:00	4.15	4.44
2	02-06-24 00:15	5.38	5.77
3	02-06-24 00:30	6.18	6.77
4	02-06-24 00:45	10.19	10.61
5	02-06-24 01:00	12.74	12.08
6	02-06-24 01:15	-4.53	-4.62

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
7	02-06-24 01:30	-38.85	-38.74
8	02-06-24 01:45	-39.43	-39.28
9	02-06-24 02:00	-41.36	-41.57
10	02-06-24 02:15	-41.35	-41.02
11	02-06-24 02:30	-41.95	-41.49
12	02-06-24 02:45	-43.06	-42.88
13	02-06-24 03:00	-37.52	-37.59
14	02-06-24 03:15	-34.57	-34
15	02-06-24 03:30	-30.91	-30.56
16	02-06-24 03:45	-32.49	-31.98
17	02-06-24 04:00	-28.99	-29.77
18	02-06-24 04:15	-28.37	-28.53
19	02-06-24 04:30	-28.67	-28.36
20	02-06-24 04:45	-30.61	-30.64
21	02-06-24 05:00	2.68	3.1
22	02-06-24 05:15	6.7	7.08
23	02-06-24 05:30	5.3	5.55
24	02-06-24 05:45	7.65	8.72
25	02-06-24 06:00	6.22	6.25
26	02-06-24 06:15	-3.67	-3.3
27	02-06-24 06:30	-1.22	-0.83
28	02-06-24 06:45	-16.48	-16.22
29	02-06-24 07:00	-57.47	-56.5
30	02-06-24 07:15	-66.08	-65.57
31	02-06-24 07:30	-71.16	-71.21
32	02-06-24 07:45	-67.18	-66.38
33	02-06-24 08:00	-63.74	-64.04
34	02-06-24 08:15	-62.55	-62.66
35	02-06-24 08:30	-57.44	-57.78
36	02-06-24 08:45	-57.32	-57.69
37	02-06-24 09:00	-52.28	-51.79
38	02-06-24 09:15	-50.31	-50.23
39	02-06-24 09:30	-47.23	-47.49
40	02-06-24 09:45	-48.61	-48.48
41	02-06-24 10:00	-42.56	-42.4
42	02-06-24 10:15	-39.27	-39.47
43	02-06-24 10:30	-38.73	-38.89
44	02-06-24 10:45	-33.93	-33.81
45	02-06-24 11:00	-30.45	-31.47
46	02-06-24 11:15	-29.21	-29.41
47	02-06-24 11:30	-27	-26.64
48	02-06-24 11:45	-26.49	-26.83
49	02-06-24 12:00	-19.55	-19.4
50	02-06-24 12:15	-18.27	-18.68
51	02-06-24 12:30	-18.55	-19.11
52	02-06-24 12:45	-18.63	-18.69
53	02-06-24 13:00	-19.99	-19.64
54	02-06-24 13:15	-22.55	-23.15
55	02-06-24 13:30	-23.41	-23.76
56	02-06-24 13:45	-24	-24.27
57	02-06-24 14:00	-2.4	-2.21
58	02-06-24 14:15	12.19	11.89
59	02-06-24 14:30	13.74	13.81
60	02-06-24 14:45	17.02	16.99
61	02-06-24 15:00	15.55	16.42

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
62	02-06-24 15:15	19.45	19.41
63	02-06-24 15:30	0.43	0.64
64	02-06-24 15:45	-35.24	-34.93
65	02-06-24 16:00	-33.72	-34.12
66	02-06-24 16:15	-32.38	-31.86
67	02-06-24 16:30	-29.29	-29.68
68	02-06-24 16:45	-28.08	-27.68
69	02-06-24 17:00	-24.95	-24.36
70	02-06-24 17:15	-21.88	-21.44
71	02-06-24 17:30	-15.37	-15.52
72	02-06-24 17:45	-13.41	-13.38
73	02-06-24 18:00	-5.36	-4.49
74	02-06-24 18:15	13.54	13.14
75	02-06-24 18:30	19.88	20.25
76	02-06-24 18:45	24.04	24.33
77	02-06-24 19:00	29.07	29.47
78	02-06-24 19:15	34.79	35.35
79	02-06-24 19:30	45.58	45.44
80	02-06-24 19:45	44.93	44.9
81	02-06-24 20:00	35.03	35.17
82	02-06-24 20:15	28.34	28.4
83	02-06-24 20:30	19.18	19.12
84	02-06-24 20:45	15.03	15.07
85	02-06-24 21:00	44.3	44.02
86	02-06-24 21:15	57.72	57.94
87	02-06-24 21:30	54.86	55.25
88	02-06-24 21:45	53.01	53.05
89	02-06-24 22:00	50.89	50.85
90	02-06-24 22:15	46.82	46.31
91	02-06-24 22:30	44.07	44.2
92	02-06-24 22:45	41.95	41.98
93	02-06-24 23:00	39.38	39.56
94	02-06-24 23:15	34.29	33.5
95	02-06-24 23:30	36.41	36.47
96	02-06-24 23:45	47.15	47.74
2.6.2024	**No. of Blocks export**	**39**	**39**
	No. of Blocks Import	**57**	**57**
	Maximum export	**57.72**	**57.94**
	Maximum Import	**-71.16**	**-71.21**
1	03-06-24 00:00	51.55	51.9
2	03-06-24 00:15	52.93	53.58
3	03-06-24 00:30	61.04	61.12
4	03-06-24 00:45	51.76	52.06
5	03-06-24 01:00	53.78	53.43
6	03-06-24 01:15	47.4	47.02
7	03-06-24 01:30	41.55	42.08
8	03-06-24 01:45	26.23	26.53
9	03-06-24 02:00	23.92	24.49
10	03-06-24 02:15	22.92	22.82
11	03-06-24 02:30	23.61	23.81
12	03-06-24 02:45	25.59	26.42
13	03-06-24 03:00	28.65	28.81
14	03-06-24 03:15	30.97	30.79
15	03-06-24 03:30	36.07	36.11
16	03-06-24 03:45	36.47	36.27

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
17	03-06-24 04:00	38.07	39.12
18	03-06-24 04:15	38.34	39.05
19	03-06-24 04:30	37.45	37.44
20	03-06-24 04:45	31.08	30.77
21	03-06-24 05:00	28.64	28.75
22	03-06-24 05:15	24.74	24.61
23	03-06-24 05:30	22.05	21.96
24	03-06-24 05:45	23.08	22.74
25	03-06-24 06:00	15.54	15.49
26	03-06-24 06:15	9.62	9.36
27	03-06-24 06:30	6.55	7.36
28	03-06-24 06:45	1.96	2.48
29	03-06-24 07:00	3.76	4.32
30	03-06-24 07:15	2.03	2.49
31	03-06-24 07:30	-0.64	-0.41
32	03-06-24 07:45	-3.14	-1.78
33	03-06-24 08:00	-3.28	-2.61
34	03-06-24 08:15	-2.31	-2.3
35	03-06-24 08:30	0.41	0.31
36	03-06-24 08:45	3.13	3.63
37	03-06-24 09:00	0.2	0.96
38	03-06-24 09:15	-1.6	-1.63
39	03-06-24 09:30	-0.63	-0.32
40	03-06-24 09:45	4.27	4.13
41	03-06-24 10:00	8.91	8.98
42	03-06-24 10:15	7.13	6.48
43	03-06-24 10:30	-8.82	-8.67
44	03-06-24 10:45	-40.14	-40.14
45	03-06-24 11:00	-31.24	-31.49
46	03-06-24 11:15	-27.12	-26.97
47	03-06-24 11:30	-11.74	-11.82
48	03-06-24 11:45	20.42	20.03
49	03-06-24 12:00	40.71	40.67
50	03-06-24 12:15	41.64	41.13
51	03-06-24 12:30	46.85	47
52	03-06-24 12:45	45.36	45.61
53	03-06-24 13:00	52.55	52.13
54	03-06-24 13:15	50.27	50.1
55	03-06-24 13:30	48.15	46.66
56	03-06-24 13:45	45.82	45
57	03-06-24 14:00	42.49	42.44
58	03-06-24 14:15	42.16	41.71
59	03-06-24 14:30	42.87	42.6
60	03-06-24 14:45	30.12	29.39
61	03-06-24 15:00	23.57	23.4
62	03-06-24 15:15	25.81	25.68
63	03-06-24 15:30	24.28	23.97
64	03-06-24 15:45	20.83	20.77
65	03-06-24 16:00	19.96	20.45
66	03-06-24 16:15	19.46	19.79
67	03-06-24 16:30	27.39	28.02
68	03-06-24 16:45	28.16	28.13
69	03-06-24 17:00	28.51	28.31
70	03-06-24 17:15	24.15	23.97
71	03-06-24 17:30	32.21	32.17

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
72	03-06-24 17:45	39.17	37.83
73	03-06-24 18:00	52.2	51.78
74	03-06-24 18:15	62.74	62.53
75	03-06-24 18:30	75.13	75.07
76	03-06-24 18:45	75.44	75.5
77	03-06-24 19:00	79.56	79.03
78	03-06-24 19:15	75.54	75.01
79	03-06-24 19:30	69.61	69.59
80	03-06-24 19:45	69.35	69.04
81	03-06-24 20:00	67.05	66.44
82	03-06-24 20:15	72.1	71.91
83	03-06-24 20:30	73.89	73.38
84	03-06-24 20:45	75.74	76.38
85	03-06-24 21:00	81.57	81.65
86	03-06-24 21:15	78.96	79.03
87	03-06-24 21:30	69.49	70.01
88	03-06-24 21:45	62.52	62.5
89	03-06-24 22:00	77.69	78.62
90	03-06-24 22:15	75.37	75.48
91	03-06-24 22:30	73.67	74.01
92	03-06-24 22:45	72.44	72.74
93	03-06-24 23:00	75.06	75.51
94	03-06-24 23:15	68.25	68.74
95	03-06-24 23:30	55.71	55.92
96	03-06-24 23:45	47.52	47.99
3.6.2024	**No. of Blocks export**	**85**	**85**
	No. of Blocks Import	**11**	**11**
	Maximum export	**81.57**	**81.65**
	Maximum Import	**-40.14**	**-40.14**
1	04-06-24 00:00	54.07	54.64
2	04-06-24 00:15	52.7	53.04
3	04-06-24 00:30	38.04	38.57
4	04-06-24 00:45	24.1	24.68
5	04-06-24 01:00	31.51	31.48
6	04-06-24 01:15	33.2	33.54
7	04-06-24 01:30	34.55	34.62
8	04-06-24 01:45	34.4	35.32
9	04-06-24 02:00	40.63	41.11
10	04-06-24 02:15	37.49	37.74
11	04-06-24 02:30	37.97	38.52
12	04-06-24 02:45	44.47	44.84
13	04-06-24 03:00	43.73	44.14
14	04-06-24 03:15	43.54	44.03
15	04-06-24 03:30	44.86	45.05
16	04-06-24 03:45	45.14	45.3
17	04-06-24 04:00	43.36	43.43
18	04-06-24 04:15	43.99	44.28
19	04-06-24 04:30	22.41	22.4
20	04-06-24 04:45	-2.82	-2.6
21	04-06-24 05:00	-10.97	-10.69
22	04-06-24 05:15	-17.8	-17.87
23	04-06-24 05:30	-15.18	-13.77
24	04-06-24 05:45	-9.63	-9.55
25	04-06-24 06:00	-8.57	-8.82
26	04-06-24 06:15	-17.53	-17.34

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
27	04-06-24 06:30	-21.34	-21.96
28	04-06-24 06:45	-19.46	-19.29
29	04-06-24 07:00	0.66	-0.37
30	04-06-24 07:15	17.5	17.93
31	04-06-24 07:30	12.74	13.11
32	04-06-24 07:45	12.82	13.04
33	04-06-24 08:00	18.13	18.29
34	04-06-24 08:15	21.18	21.09
35	04-06-24 08:30	24.14	24.53
36	04-06-24 08:45	22.18	22.13
37	04-06-24 09:00	26.56	26.95
38	04-06-24 09:15	26.98	26.68
39	04-06-24 09:30	26.36	26.44
40	04-06-24 09:45	23.5	23.58
41	04-06-24 10:00	27.91	27.69
42	04-06-24 10:15	25.9	25.98
43	04-06-24 10:30	-4.73	-5.34
44	04-06-24 10:45	-21.07	-20.83
45	04-06-24 11:00	-10.58	-11.09
46	04-06-24 11:15	-9.19	-9.97
47	04-06-24 11:30	-6.79	-6.52
48	04-06-24 11:45	-2.35	-2.61
49	04-06-24 12:00	3.09	2.84
50	04-06-24 12:15	3.1	2.53
51	04-06-24 12:30	6.89	7.22
52	04-06-24 12:45	36.63	36.57
53	04-06-24 13:00	50.2	50.15
54	04-06-24 13:15	55.8	56.08
55	04-06-24 13:30	56.18	55.52
56	04-06-24 13:45	51.89	51.05
57	04-06-24 14:00	50.67	49.17
58	04-06-24 14:15	43.09	42.46
59	04-06-24 14:30	68.81	67.89
60	04-06-24 14:45	47.45	47.35
61	04-06-24 15:00	39.18	38.85
62	04-06-24 15:15	36.34	36.18
63	04-06-24 15:30	33.28	33.78
64	04-06-24 15:45	29.49	29.39
65	04-06-24 16:00	9.59	8.67
66	04-06-24 16:15	0.35	-1.04
67	04-06-24 16:30	14.19	14.89
68	04-06-24 16:45	26.27	26.41
69	04-06-24 17:00	23.91	23.71
70	04-06-24 17:15	24.16	23.59
71	04-06-24 17:30	43.6	43.36
72	04-06-24 17:45	48.89	48.95
73	04-06-24 18:00	34.64	34.52
74	04-06-24 18:15	31.59	31.74
75	04-06-24 18:30	47.86	47.41
76	04-06-24 18:45	50.63	50.96
77	04-06-24 19:00	84.26	83.98
78	04-06-24 19:15	95.97	95.71
79	04-06-24 19:30	62.73	63.67
80	04-06-24 19:45	34.07	34.26
81	04-06-24 20:00	75.83	75.31

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
82	04-06-24 20:15	86.1	86.34
83	04-06-24 20:30	87.19	86.91
84	04-06-24 20:45	85.48	85.2
85	04-06-24 21:00	78.52	78.87
86	04-06-24 21:15	66.73	66.4
87	04-06-24 21:30	71.76	71.58
88	04-06-24 21:45	80.65	80.2
89	04-06-24 22:00	79.39	79.67
90	04-06-24 22:15	79.61	78.97
91	04-06-24 22:30	77.94	78.81
92	04-06-24 22:45	70.3	71.64
93	04-06-24 23:00	75.82	75.84
94	04-06-24 23:15	76.15	76.14
95	04-06-24 23:30	81.11	80.61
96	04-06-24 23:45	80.38	79.82
4.6.2024	**No. of Blocks export**	**81**	**79**
	No. of Blocks Import	**15**	**17**
	Maximum export	**95.97**	**95.71**
	Maximum Import	**-21.34**	**-21.96**
1	05-06-24 00:00	75.99	75.55
2	05-06-24 00:15	54.77	54.35
3	05-06-24 00:30	51.15	51.02
4	05-06-24 00:45	53.13	53.43
5	05-06-24 01:00	53.84	54.48
6	05-06-24 01:15	48.5	47.46
7	05-06-24 01:30	42.99	42.9
8	05-06-24 01:45	44.46	43.7
9	05-06-24 02:00	47.54	47.79
10	05-06-24 02:15	45.98	46.14
11	05-06-24 02:30	51.55	52.05
12	05-06-24 02:45	52.08	52.29
13	05-06-24 03:00	54.66	54.62
14	05-06-24 03:15	55.32	54.95
15	05-06-24 03:30	56.61	56.78
16	05-06-24 03:45	55.34	55.19
17	05-06-24 04:00	58.41	58.54
18	05-06-24 04:15	62.08	63.19
19	05-06-24 04:30	59.43	59.63
20	05-06-24 04:45	59.69	59.84
21	05-06-24 05:00	52.45	52.39
22	05-06-24 05:15	22.28	22.23
23	05-06-24 05:30	-5.5	-5.05
24	05-06-24 05:45	-8.66	-8.67
25	05-06-24 06:00	-9.33	-9.45
26	05-06-24 06:15	-20.65	-20.9
27	05-06-24 06:30	-5.86	-5.51
28	05-06-24 06:45	20.1	19.95
29	05-06-24 07:00	21.64	21.32
30	05-06-24 07:15	21.96	22.01
31	05-06-24 07:30	22.17	22.21
32	05-06-24 07:45	21.22	21.4
33	05-06-24 08:00	29.1	28.9
34	05-06-24 08:15	34.41	34.15
35	05-06-24 08:30	33.34	33.21
36	05-06-24 08:45	21.17	20.54

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
37	05-06-24 09:00	-10.5	-10.7
38	05-06-24 09:15	-5.46	-5.53
39	05-06-24 09:30	-10.7	-11.18
40	05-06-24 09:45	-5.6	-5.33
41	05-06-24 10:00	7.33	6.81
42	05-06-24 10:15	14.42	13.86
43	05-06-24 10:30	49.35	48.71
44	05-06-24 10:45	58.04	57.18
45	05-06-24 11:00	63.63	62.5
46	05-06-24 11:15	64.63	63.82
47	05-06-24 11:30	64.01	63.49
48	05-06-24 11:45	69.04	68.46
49	05-06-24 12:00	73.11	72.67
50	05-06-24 12:15	76.49	77.19
51	05-06-24 12:30	64.55	63.81
52	05-06-24 12:45	60.86	60.59
53	05-06-24 13:00	58.11	57.29
54	05-06-24 13:15	63.87	63.38
55	05-06-24 13:30	63.03	62.01
56	05-06-24 13:45	56.41	56.14
57	05-06-24 14:00	49.76	49.39
58	05-06-24 14:15	47.47	47.11
59	05-06-24 14:30	42.41	41.92
60	05-06-24 14:45	37.35	37.75
61	05-06-24 15:00	40.1	40.44
62	05-06-24 15:15	42.08	42.98
63	05-06-24 15:30	39.94	40.8
64	05-06-24 15:45	31.33	31.14
65	05-06-24 16:00	32.41	32.12
66	05-06-24 16:15	28.24	28.38
67	05-06-24 16:30	29.68	29.87
68	05-06-24 16:45	34.1	34.01
69	05-06-24 17:00	31.39	31.48
70	05-06-24 17:15	32.85	32.82
71	05-06-24 17:30	40.6	40.6
72	05-06-24 17:45	46.73	46.57
73	05-06-24 18:00	59.68	59.04
74	05-06-24 18:15	67.69	68.47
75	05-06-24 18:30	70.06	70.65
76	05-06-24 18:45	49.4	49.24
77	05-06-24 19:00	46.52	46.66
78	05-06-24 19:15	39.89	40.1
79	05-06-24 19:30	30.55	30.25
80	05-06-24 19:45	53.07	52.77
81	05-06-24 20:00	79.52	79.84
82	05-06-24 20:15	73.04	73.09
83	05-06-24 20:30	71.4	71.7
84	05-06-24 20:45	76.21	76.37
85	05-06-24 21:00	66.79	66.2
86	05-06-24 21:15	57.11	57.57
87	05-06-24 21:30	55.57	56.04
88	05-06-24 21:45	57.17	57.01
89	05-06-24 22:00	51.98	51.8
90	05-06-24 22:15	39.15	39.43
91	05-06-24 22:30	34.81	34.6

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
92	05-06-24 22:45	36.75	37.29
93	05-06-24 23:00	35.33	35.22
94	05-06-24 23:15	36.75	36.78
95	05-06-24 23:30	33.49	33.87
96	05-06-24 23:45	38.43	38.54
5.6.2024	**No. of Blocks export**	**87**	**87**
	No. of Blocks Import	**9**	**9**
	Maximum export	**79.52**	**79.84**
	Maximum Import	**-20.65**	**-20.9**
1	06-06-24 00:00	32.39	32.57
2	06-06-24 00:15	17.01	17.61
3	06-06-24 00:30	-13.8	-13.12
4	06-06-24 00:45	-29.69	-29.71
5	06-06-24 01:00	-28.33	-28.23
6	06-06-24 01:15	6.8	7.37
7	06-06-24 01:30	8.9	8.45
8	06-06-24 01:45	9.43	9.79
9	06-06-24 02:00	13.79	14.68
10	06-06-24 02:15	-16.76	-16.58
11	06-06-24 02:30	-31.52	-32.23
12	06-06-24 02:45	-27.77	-27.91
13	06-06-24 03:00	-21.85	-21.46
14	06-06-24 03:15	-19.28	-19.06
15	06-06-24 03:30	-17.86	-17.64
16	06-06-24 03:45	-20.4	-19.95
17	06-06-24 04:00	-18.4	-18.73
18	06-06-24 04:15	-20.12	-19.89
19	06-06-24 04:30	-22.5	-22.62
20	06-06-24 04:45	-20.01	-20.19
21	06-06-24 05:00	-23.69	-23.89
22	06-06-24 05:15	-7.48	-7.33
23	06-06-24 05:30	11.37	11.34
24	06-06-24 05:45	16.76	16.9
25	06-06-24 06:00	19.42	19.37
26	06-06-24 06:15	9.54	9.75
27	06-06-24 06:30	5.32	4.98
28	06-06-24 06:45	3.36	2.73
29	06-06-24 07:00	-5.31	-4.9
30	06-06-24 07:15	-8.01	-7.58
31	06-06-24 07:30	-9.86	-9.44
32	06-06-24 07:45	-8.19	-8.15
33	06-06-24 08:00	-5.6	-5.17
34	06-06-24 08:15	-3.91	-4.4
35	06-06-24 08:30	-1.72	-2.45
36	06-06-24 08:45	-3.83	-3.75
37	06-06-24 09:00	-6.59	-7.32
38	06-06-24 09:15	-33.08	-32.79
39	06-06-24 09:30	-45.32	-44.85
40	06-06-24 09:45	-40.3	-40.59
41	06-06-24 10:00	-37.13	-36.73
42	06-06-24 10:15	-34.76	-34.86
43	06-06-24 10:30	-28.55	-28.65
44	06-06-24 10:45	-6.36	-5.93
45	06-06-24 11:00	2.28	2.05
46	06-06-24 11:15	-10.08	-10.33

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
47	06-06-24 11:30	-17.53	-17.13
48	06-06-24 11:45	-21.49	-21.95
49	06-06-24 12:00	-9.24	-9.71
50	06-06-24 12:15	-5.71	-6.31
51	06-06-24 12:30	-12.77	-13.38
52	06-06-24 12:45	-12.06	-12.19
53	06-06-24 13:00	-10.02	-10.12
54	06-06-24 13:15	-9.19	-9.46
55	06-06-24 13:30	20.95	18.8
56	06-06-24 13:45	48.12	47.94
57	06-06-24 14:00	35.33	34.55
58	06-06-24 14:15	27.84	27.43
59	06-06-24 14:30	26.15	26.01
60	06-06-24 14:45	17.08	17.28
61	06-06-24 15:00	14.73	14.61
62	06-06-24 15:15	22.21	22.28
63	06-06-24 15:30	22.2	22.12
64	06-06-24 15:45	20.7	20.86
65	06-06-24 16:00	22.78	22.55
66	06-06-24 16:15	26.23	26.06
67	06-06-24 16:30	30.12	30.56
68	06-06-24 16:45	26.83	27.7
69	06-06-24 17:00	1.1	0.9
70	06-06-24 17:15	-10.09	-10.23
71	06-06-24 17:30	16.63	16.48
72	06-06-24 17:45	38.29	38.15
73	06-06-24 18:00	62.41	62.72
74	06-06-24 18:15	68.42	68.57
75	06-06-24 18:30	72.02	71.75
76	06-06-24 18:45	74.92	74.88
77	06-06-24 19:00	82.82	83.21
78	06-06-24 19:15	85.12	85.13
79	06-06-24 19:30	76.91	76.6
80	06-06-24 19:45	71.52	71.39
81	06-06-24 20:00	63.35	64.17
82	06-06-24 20:15	48.2	47.82
83	06-06-24 20:30	12.96	12.6
84	06-06-24 20:45	5.24	5.97
85	06-06-24 21:00	4.66	4.42
86	06-06-24 21:15	5.28	5.38
87	06-06-24 21:30	10.82	10.29
88	06-06-24 21:45	29.81	29.31
89	06-06-24 22:00	21.92	21.35
90	06-06-24 22:15	41.73	42.35
91	06-06-24 22:30	42.86	42.23
92	06-06-24 22:45	-1.62	-2.16
93	06-06-24 23:00	-1.06	-1.59
94	06-06-24 23:15	2.72	2.86
95	06-06-24 23:30	-0.55	-0.73
96	06-06-24 23:45	6.5	7.19
6.6.2024	**No. of Blocks export**	**51**	**51**
	No. of Blocks Import	**45**	**45**
	Maximum export	**85.12**	**85.13**
	Maximum Import	**-45.32**	**-44.85**
1	07-06-24 00:00	6.67	6.53

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
2	07-06-24 00:15	0.59	0.68
3	07-06-24 00:30	9.1	9.13
4	07-06-24 00:45	35.66	35.6
5	07-06-24 01:00	38.12	38.37
6	07-06-24 01:15	40.5	40.84
7	07-06-24 01:30	43.54	43.38
8	07-06-24 01:45	43.53	43.32
9	07-06-24 02:00	44.47	44.26
10	07-06-24 02:15	44.3	44.28
11	07-06-24 02:30	37.49	37.78
12	07-06-24 02:45	8	7.8
13	07-06-24 03:00	4.33	4.52
14	07-06-24 03:15	5.54	2.86
15	07-06-24 03:30	19.09	19.3
16	07-06-24 03:45	47.99	47.82
17	07-06-24 04:00	58.97	57.61
18	07-06-24 04:15	56.84	56.73
19	07-06-24 04:30	58.59	59.07
20	07-06-24 04:45	31.8	31.5
21	07-06-24 05:00	5.3	6.9
22	07-06-24 05:15	-7.25	-7.23
23	07-06-24 05:30	-16.82	-17.32
24	07-06-24 05:45	-18.81	-19.25
25	07-06-24 06:00	-19.72	-19.32
26	07-06-24 06:15	2.69	3.39
27	07-06-24 06:30	14.28	14.96
28	07-06-24 06:45	12.57	12.86
29	07-06-24 07:00	11.71	12.02
30	07-06-24 07:15	12.62	12.75
31	07-06-24 07:30	16.56	16.33
32	07-06-24 07:45	24.42	24.67
33	07-06-24 08:00	24.51	24.47
34	07-06-24 08:15	17.43	17.74
35	07-06-24 08:30	25.22	25.84
36	07-06-24 08:45	34.52	34.74
37	07-06-24 09:00	41.14	42.06
38	07-06-24 09:15	31.57	31.62
39	07-06-24 09:30	31.71	32.08
40	07-06-24 09:45	33.33	33.73
41	07-06-24 10:00	38.48	38.84
42	07-06-24 10:15	46.03	45.08
43	07-06-24 10:30	46.86	46.86
44	07-06-24 10:45	49.8	49.53
45	07-06-24 11:00	50.19	50.36
46	07-06-24 11:15	60.85	61.12
47	07-06-24 11:30	57.57	57.45
48	07-06-24 11:45	53.25	52.75
49	07-06-24 12:00	53.75	53.7
50	07-06-24 12:15	50.3	49.75
51	07-06-24 12:30	46.42	45.98
52	07-06-24 12:45	40.43	39.89
53	07-06-24 13:00	40.78	40.32
54	07-06-24 13:15	45.08	45.06
55	07-06-24 13:30	47.27	46.68
56	07-06-24 13:45	49.36	49.28

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
57	07-06-24 14:00	48.83	48.27
58	07-06-24 14:15	46.69	45.79
59	07-06-24 14:30	41.7	41.36
60	07-06-24 14:45	31.65	31.25
61	07-06-24 15:00	31.63	31.65
62	07-06-24 15:15	39.1	39
63	07-06-24 15:30	20.95	20.68
64	07-06-24 15:45	2.54	2.98
65	07-06-24 16:00	3.91	3.79
66	07-06-24 16:15	-12.3	-11.85
67	07-06-24 16:30	-14.82	-14.45
68	07-06-24 16:45	-5.21	-6.41
69	07-06-24 17:00	34.88	34.81
70	07-06-24 17:15	62.83	63.24
71	07-06-24 17:30	55.78	55.17
72	07-06-24 17:45	60.65	60.25
73	07-06-24 18:00	68.82	68.97
74	07-06-24 18:15	78.87	79.26
75	07-06-24 18:30	86.17	86.26
76	07-06-24 18:45	88.5	88.26
77	07-06-24 19:00	130.53	131.57
78	07-06-24 19:15	135.75	135.66
79	07-06-24 19:30	136.41	136.8
80	07-06-24 19:45	132.44	132.49
81	07-06-24 20:00	124.61	124.12
82	07-06-24 20:15	111.96	111.65
83	07-06-24 20:30	102.75	103.25
84	07-06-24 20:45	103.27	102.97
85	07-06-24 21:00	97.61	97.28
86	07-06-24 21:15	95.04	95.47
87	07-06-24 21:30	90.6	92.96
88	07-06-24 21:45	81.45	81.54
89	07-06-24 22:00	84.85	85.45
90	07-06-24 22:15	86.74	86.67
91	07-06-24 22:30	73.42	73.65
92	07-06-24 22:45	73.68	73.66
93	07-06-24 23:00	67.37	68
94	07-06-24 23:15	57.31	57.27
95	07-06-24 23:30	57.04	56.11
96	07-06-24 23:45	53.35	53.61
7.6.2024	**No. of Blocks export**	**89**	**89**
	No. of Blocks Import	**7**	**7**
	Maximum export	**136.41**	**136.8**
	Maximum Import	**-19.72**	**-19.32**
1	08-06-24 00:00	57.06	56.46
2	08-06-24 00:15	40.08	39.95
3	08-06-24 00:30	9.45	10.48
4	08-06-24 00:45	5.29	4.86
5	08-06-24 01:00	29.02	27.91
6	08-06-24 01:15	48.56	49
7	08-06-24 01:30	48.39	47.96
8	08-06-24 01:45	51.85	52.45
9	08-06-24 02:00	56.57	56.84
10	08-06-24 02:15	58.14	59.77
11	08-06-24 02:30	57.79	58.09

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
12	08-06-24 02:45	57.4	57.12
13	08-06-24 03:00	26.68	26.66
14	08-06-24 03:15	12.85	12.59
15	08-06-24 03:30	16.71	16.67
16	08-06-24 03:45	20.54	20.53
17	08-06-24 04:00	19.41	19.61
18	08-06-24 04:15	19.87	19.82
19	08-06-24 04:30	18.9	19.42
20	08-06-24 04:45	20.97	22.13
21	08-06-24 05:00	25.79	26.17
22	08-06-24 05:15	27.3	27.61
23	08-06-24 05:30	26.35	26.36
24	08-06-24 05:45	30.49	30.16
25	08-06-24 06:00	29.83	29.68
26	08-06-24 06:15	23.48	23.57
27	08-06-24 06:30	17.95	18.25
28	08-06-24 06:45	17.66	18.45
29	08-06-24 07:00	15.32	15.14
30	08-06-24 07:15	13.77	14.71
31	08-06-24 07:30	16.9	17.51
32	08-06-24 07:45	39.42	39.88
33	08-06-24 08:00	64.52	69.28
34	08-06-24 08:15	71.57	71.7
35	08-06-24 08:30	73.78	74.38
36	08-06-24 08:45	69.27	69.39
37	08-06-24 09:00	71.81	71.95
38	08-06-24 09:15	30	29.96
39	08-06-24 09:30	34.14	34.01
40	08-06-24 09:45	30.69	30.74
41	08-06-24 10:00	32.38	31.96
42	08-06-24 10:15	33.44	33.48
43	08-06-24 10:30	27.81	27.75
44	08-06-24 10:45	23.1	22.91
45	08-06-24 11:00	24.64	24.75
46	08-06-24 11:15	21.99	21.75
47	08-06-24 11:30	15.3	17.12
48	08-06-24 11:45	20.26	20.46
49	08-06-24 12:00	26.28	26.87
50	08-06-24 12:15	26.03	25.55
51	08-06-24 12:30	23.92	23.36
52	08-06-24 12:45	21.42	21.33
53	08-06-24 13:00	27.64	27.55
54	08-06-24 13:15	19.52	18.91
55	08-06-24 13:30	17.46	17.96
56	08-06-24 13:45	11.41	11.16
57	08-06-24 14:00	9.4	8.79
58	08-06-24 14:15	12.85	12.33
59	08-06-24 14:30	2.08	1.84
60	08-06-24 14:45	29.85	29.98
61	08-06-24 15:00	47.91	47.28
62	08-06-24 15:15	48.95	48.8
63	08-06-24 15:30	48.29	48.76
64	08-06-24 15:45	50.22	49.71
65	08-06-24 16:00	55.69	55.84
66	08-06-24 16:15	56.11	55.6

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
67	08-06-24 16:30	62.73	62.33
68	08-06-24 16:45	62.34	62.72
69	08-06-24 17:00	62	62.47
70	08-06-24 17:15	58.28	58.01
71	08-06-24 17:30	65.15	63.88
72	08-06-24 17:45	64.46	65.11
73	08-06-24 18:00	77.44	78.49
74	08-06-24 18:15	87.17	87.56
75	08-06-24 18:30	92.35	92.48
76	08-06-24 18:45	98.7	98.94
77	08-06-24 19:00	102.64	102.81
78	08-06-24 19:15	105.77	105.78
79	08-06-24 19:30	103.38	103.54
80	08-06-24 19:45	100.66	100.74
81	08-06-24 20:00	100.16	100.21
82	08-06-24 20:15	102.4	102.79
83	08-06-24 20:30	96.98	97.43
84	08-06-24 20:45	92.54	92.1
85	08-06-24 21:00	91.21	90.81
86	08-06-24 21:15	85.17	84.83
87	08-06-24 21:30	81.04	80.51
88	08-06-24 21:45	75.72	75.72
89	08-06-24 22:00	66.24	66.55
90	08-06-24 22:15	70.26	70.8
91	08-06-24 22:30	74.79	74.75
92	08-06-24 22:45	56.57	56.82
93	08-06-24 23:00	46.57	46.69
94	08-06-24 23:15	36.14	35.87
95	08-06-24 23:30	29.34	29.52
96	08-06-24 23:45	19.39	19.97
8.6.2024	**No. of Blocks export**	**96**	**96**
	No. of Blocks Import	**0**	**0**
	Maximum export	**105.77**	**105.78**
	Maximum Import	**0**	**0**
1	09-06-24 00:00	11.76	12.63
2	09-06-24 00:15	17.16	17.12
3	09-06-24 00:30	17.27	16.82
4	09-06-24 00:45	16.82	16.7
5	09-06-24 01:00	17.44	17.5
6	09-06-24 01:15	14.89	14.66
7	09-06-24 01:30	19.17	19.5
8	09-06-24 01:45	19.63	19.42
9	09-06-24 02:00	22.37	22.21
10	09-06-24 02:15	23.79	23.91
11	09-06-24 02:30	24.93	24.83
12	09-06-24 02:45	28.53	29.39
13	09-06-24 03:00	34.33	34.76
14	09-06-24 03:15	34.86	35.37
15	09-06-24 03:30	33.67	34.5
16	09-06-24 03:45	36.63	36.78
17	09-06-24 04:00	37.15	36.42
18	09-06-24 04:15	34.17	34.67
19	09-06-24 04:30	36.25	36.22
20	09-06-24 04:45	33.01	34.1
21	09-06-24 05:00	28.93	28.98

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
22	09-06-24 05:15	25.67	25.49
23	09-06-24 05:30	22.74	23.36
24	09-06-24 05:45	18.47	18.48
25	09-06-24 06:00	19.36	19.1
26	09-06-24 06:15	15.47	15.98
27	09-06-24 06:30	14	14.59
28	09-06-24 06:45	14.66	15.72
29	09-06-24 07:00	5.93	6.57
30	09-06-24 07:15	-29.6	-28.94
31	09-06-24 07:30	-31.89	-31.07
32	09-06-24 07:45	-32.68	-31.52
33	09-06-24 08:00	-32.14	-31.19
34	09-06-24 08:15	-28.62	-28.38
35	09-06-24 08:30	-27.83	-27.9
36	09-06-24 08:45	-26.76	-26.56
37	09-06-24 09:00	-25.17	-24.67
38	09-06-24 09:15	-23.4	-23.35
39	09-06-24 09:30	-22.98	-22.14
40	09-06-24 09:45	-22.15	-21.87
41	09-06-24 10:00	-14.76	-14.04
42	09-06-24 10:15	-17.13	-16.7
43	09-06-24 10:30	-17.12	-17
44	09-06-24 10:45	-11.01	-11.04
45	09-06-24 11:00	-2.04	-2.11
46	09-06-24 11:15	3.97	4.05
47	09-06-24 11:30	6.23	5.89
48	09-06-24 11:45	12.53	11.2
49	09-06-24 12:00	11.37	11.4
50	09-06-24 12:15	11.71	11.75
51	09-06-24 12:30	12.64	12.37
52	09-06-24 12:45	10.77	10.63
53	09-06-24 13:00	11.93	11.98
54	09-06-24 13:15	15.54	15.68
55	09-06-24 13:30	5.75	5.3
56	09-06-24 13:45	9.51	8.9
57	09-06-24 14:00	5.59	5.38
58	09-06-24 14:15	2.32	1.96
59	09-06-24 14:30	-3.2	-3.52
60	09-06-24 14:45	-7.06	-6.69
61	09-06-24 15:00	-6.46	-6.75
62	09-06-24 15:15	-13.22	-13.54
63	09-06-24 15:30	-11.84	-11.95
64	09-06-24 15:45	-11.05	-11.38
65	09-06-24 16:00	-10.82	-10.83
66	09-06-24 16:15	13.68	13.47
67	09-06-24 16:30	26.23	26.34
68	09-06-24 16:45	31.67	32.28
69	09-06-24 17:00	24.82	24.92
70	09-06-24 17:15	-5.65	-5.64
71	09-06-24 17:30	-22.84	-22.18
72	09-06-24 17:45	-11.65	-11.81
73	09-06-24 18:00	-1.43	-1.38
74	09-06-24 18:15	7.71	7.41
75	09-06-24 18:30	15.47	15.24
76	09-06-24 18:45	7.52	8.02

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
77	09-06-24 19:00	8.55	8.69
78	09-06-24 19:15	48.12	48.05
79	09-06-24 19:30	67.84	68.36
80	09-06-24 19:45	69.92	68.81
81	09-06-24 20:00	61.15	61.21
82	09-06-24 20:15	58.87	58.78
83	09-06-24 20:30	52.56	52.45
84	09-06-24 20:45	49.26	49.81
85	09-06-24 21:00	47.4	47.63
86	09-06-24 21:15	36.13	35.93
87	09-06-24 21:30	39.83	39.97
88	09-06-24 21:45	46.02	45.45
89	09-06-24 22:00	41.9	41.87
90	09-06-24 22:15	40.28	40.48
91	09-06-24 22:30	44.8	44.28
92	09-06-24 22:45	45.9	46.6
93	09-06-24 23:00	55.73	55.26
94	09-06-24 23:15	54.56	55.04
95	09-06-24 23:30	47.92	47.62
96	09-06-24 23:45	34.8	34.94
9.6.2024	**No. of Blocks export**	**69**	**69**
	No. of Blocks Import	**27**	**27**
	Maximum export	**69.92**	**68.81**
	Maximum Import	**-32.68**	**-31.52**
1	10-06-24 00:00	6.89	6.94
2	10-06-24 00:15	5.41	5.91
3	10-06-24 00:30	10.2	10.03
4	10-06-24 00:45	5.51	6.24
5	10-06-24 01:00	-15.87	-15.66
6	10-06-24 01:15	-31.99	-31.95
7	10-06-24 01:30	-31.46	-31.43
8	10-06-24 01:45	-32.14	-32.04
9	10-06-24 02:00	-29.11	-28.76
10	10-06-24 02:15	-26.22	-26
11	10-06-24 02:30	-22.38	-22.31
12	10-06-24 02:45	-26.79	-26.66
13	10-06-24 03:00	-24.1	-24.03
14	10-06-24 03:15	-22.74	-22.69
15	10-06-24 03:30	-22.37	-22.87
16	10-06-24 03:45	-22.08	-22.14
17	10-06-24 04:00	-19.31	-19.38
18	10-06-24 04:15	8.39	8.42
19	10-06-24 04:30	22.05	21.54
20	10-06-24 04:45	27.41	27.17
21	10-06-24 05:00	26.92	26.7
22	10-06-24 05:15	20.54	20.68
23	10-06-24 05:30	16.5	16.25
24	10-06-24 05:45	13.54	13.41
25	10-06-24 06:00	13.21	12.89
26	10-06-24 06:15	5.91	5.87
27	10-06-24 06:30	2.92	2.91
28	10-06-24 06:45	-0.62	-0.57
29	10-06-24 07:00	-0.07	0.26
30	10-06-24 07:15	-5.95	-5.54
31	10-06-24 07:30	2.05	2.32

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
32	10-06-24 07:45	5.94	5.67
33	10-06-24 08:00	8.8	8.7
34	10-06-24 08:15	5.24	4.95
35	10-06-24 08:30	4.7	4.75
36	10-06-24 08:45	6.38	6.96
37	10-06-24 09:00	8.47	7.82
38	10-06-24 09:15	5.52	5.6
39	10-06-24 09:30	4.53	5.49
40	10-06-24 09:45	5.24	5.71
41	10-06-24 10:00	12.15	12.08
42	10-06-24 10:15	10.76	10.74
43	10-06-24 10:30	-15.34	-15.56
44	10-06-24 10:45	-28.56	-28.6
45	10-06-24 11:00	1.26	1.92
46	10-06-24 11:15	19.33	19.98
47	10-06-24 11:30	25.41	26.07
48	10-06-24 11:45	44.18	44.19
49	10-06-24 12:00	57.45	57.57
50	10-06-24 12:15	53.63	53.83
51	10-06-24 12:30	51.33	51.5
52	10-06-24 12:45	47.02	47.15
53	10-06-24 13:00	19.59	19.2
54	10-06-24 13:15	9.37	8.54
55	10-06-24 13:30	3.18	3.4
56	10-06-24 13:45	1.06	1.22
57	10-06-24 14:00	21.24	20.67
58	10-06-24 14:15	30.9	30.81
59	10-06-24 14:30	40.51	40.44
60	10-06-24 14:45	39.67	39.52
61	10-06-24 15:00	38.75	39.09
62	10-06-24 15:15	33.35	32.85
63	10-06-24 15:30	37.78	37.74
64	10-06-24 15:45	47.33	47.03
65	10-06-24 16:00	46.34	46.63
66	10-06-24 16:15	39.59	39.49
67	10-06-24 16:30	42.68	42.72
68	10-06-24 16:45	43.23	43.57
69	10-06-24 17:00	39.88	39.77
70	10-06-24 17:15	45.56	44.9
71	10-06-24 17:30	54.66	54.59
72	10-06-24 17:45	66.55	66.77
73	10-06-24 18:00	80.29	80.63
74	10-06-24 18:15	84.54	84.73
75	10-06-24 18:30	94.88	94.96
76	10-06-24 18:45	93.56	93.33
77	10-06-24 19:00	91.08	90.88
78	10-06-24 19:15	97.32	97.08
79	10-06-24 19:30	93.7	92.21
80	10-06-24 19:45	87.89	88.95
81	10-06-24 20:00	85.32	86.35
82	10-06-24 20:15	84.34	83.9
83	10-06-24 20:30	86.78	86.67
84	10-06-24 20:45	88.72	88.11
85	10-06-24 21:00	82.61	81.65
86	10-06-24 21:15	80.52	81.08

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
87	10-06-24 21:30	78.27	78.46
88	10-06-24 21:45	78.37	78.37
89	10-06-24 22:00	78.12	77.78
90	10-06-24 22:15	71.19	70.84
91	10-06-24 22:30	68.28	68.08
92	10-06-24 22:45	66.5	66.37
93	10-06-24 23:00	59.73	59.31
94	10-06-24 23:15	61.29	61.17
95	10-06-24 23:30	64.1	64.34
96	10-06-24 23:45	61.72	61.25
10.6.2024	**No. of Blocks export**	**78**	**79**
	No. of Blocks Import	**18**	**17**
	Maximum export	**97.32**	**97.08**
	Maximum Import	**-32.14**	**-32.04**
1	11-06-24 00:00	58.34	58.22
2	11-06-24 00:15	65.69	66.33
3	11-06-24 00:30	66.79	66.42
4	11-06-24 00:45	68.31	67.65
5	11-06-24 01:00	61.8	61.45
6	11-06-24 01:15	56.01	55.91
7	11-06-24 01:30	55.94	55.23
8	11-06-24 01:45	50.62	49.82
9	11-06-24 02:00	54.27	53.97
10	11-06-24 02:15	55.56	55.14
11	11-06-24 02:30	54.5	54.45
12	11-06-24 02:45	59.19	59.31
13	11-06-24 03:00	61.66	62.15
14	11-06-24 03:15	63.28	62.72
15	11-06-24 03:30	49.43	49.28
16	11-06-24 03:45	46.94	45.77
17	11-06-24 04:00	58.12	58.03
18	11-06-24 04:15	61.4	61.61
19	11-06-24 04:30	60.33	61.66
20	11-06-24 04:45	61.46	61.74
21	11-06-24 05:00	58.47	58.98
22	11-06-24 05:15	51.45	51.75
23	11-06-24 05:30	45.52	44.93
24	11-06-24 05:45	43.99	43.67
25	11-06-24 06:00	44.9	44.59
26	11-06-24 06:15	39.21	40.47
27	11-06-24 06:30	30.27	30.85
28	11-06-24 06:45	29.62	30.23
29	11-06-24 07:00	29.93	30.91
30	11-06-24 07:15	29.59	29.74
31	11-06-24 07:30	28.32	29.14
32	11-06-24 07:45	29.55	30.34
33	11-06-24 08:00	25.22	25.83
34	11-06-24 08:15	-7.15	-7
35	11-06-24 08:30	-6.64	-7.24
36	11-06-24 08:45	-1.33	-1.61
37	11-06-24 09:00	-4.34	-4.1
38	11-06-24 09:15	-5.23	-5.44
39	11-06-24 09:30	3.32	2.79
40	11-06-24 09:45	5.97	5.7
41	11-06-24 10:00	41.3	40.73

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
42	11-06-24 10:15	54.49	54.46
43	11-06-24 10:30	60.28	60.02
44	11-06-24 10:45	53.61	53.39
45	11-06-24 11:00	51.32	50.89
46	11-06-24 11:15	47.11	48.81
47	11-06-24 11:30	47.73	47.91
48	11-06-24 11:45	56.97	56.56
49	11-06-24 12:00	62.7	62.28
50	11-06-24 12:15	68.13	67.64
51	11-06-24 12:30	64.95	64.68
52	11-06-24 12:45	62.71	62.92
53	11-06-24 13:00	68.82	68.38
54	11-06-24 13:15	71.57	71
55	11-06-24 13:30	62	62.31
56	11-06-24 13:45	53.74	53.59
57	11-06-24 14:00	54.88	54.81
58	11-06-24 14:15	54.28	54.15
59	11-06-24 14:30	55.51	55.72
60	11-06-24 14:45	56.5	56.35
61	11-06-24 15:00	62.24	62
62	11-06-24 15:15	31.37	31.38
63	11-06-24 15:30	26.79	26.74
64	11-06-24 15:45	44.83	45.21
65	11-06-24 16:00	51.33	50.02
66	11-06-24 16:15	53.16	53.19
67	11-06-24 16:30	60.45	60.53
68	11-06-24 16:45	64.27	63.97
69	11-06-24 17:00	65.49	65.32
70	11-06-24 17:15	72.47	72
71	11-06-24 17:30	73.71	73.58
72	11-06-24 17:45	82.12	82.58
73	11-06-24 18:00	93.93	93.63
74	11-06-24 18:15	101.94	101.53
75	11-06-24 18:30	95.38	95.47
76	11-06-24 18:45	93.48	94.13
77	11-06-24 19:00	105.54	105.8
78	11-06-24 19:15	111.49	111.14
79	11-06-24 19:30	101.53	101.6
80	11-06-24 19:45	93.14	93.17
81	11-06-24 20:00	89.23	88.66
82	11-06-24 20:15	83.84	84.13
83	11-06-24 20:30	90.93	90.88
84	11-06-24 20:45	96.14	96.04
85	11-06-24 21:00	89.8	89.62
86	11-06-24 21:15	87.63	86.78
87	11-06-24 21:30	87.43	86.86
88	11-06-24 21:45	86.27	85.93
89	11-06-24 22:00	92.48	92.38
90	11-06-24 22:15	91.05	91.01
91	11-06-24 22:30	86.6	86.51
92	11-06-24 22:45	86.94	87.12
93	11-06-24 23:00	90.94	90.99
94	11-06-24 23:15	89.27	89.89
95	11-06-24 23:30	86.98	86.15
96	11-06-24 23:45	84.51	83.81

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
11.6.2024	No. of Blocks export	91	91
	No. of Blocks Import	5	5
	Maximum export	111.49	111.14
	Maximum Import	-7.15	-7.24
1	12-06-24 00:00	89.48	89.79
2	12-06-24 00:15	89.08	88.42
3	12-06-24 00:30	91.37	90.85
4	12-06-24 00:45	92.83	92.14
5	12-06-24 01:00	90.55	89.64
6	12-06-24 01:15	90.8	91.44
7	12-06-24 01:30	75.86	75.62
8	12-06-24 01:45	30.36	29.9
9	12-06-24 02:00	10.08	9.47
10	12-06-24 02:15	13.95	13.44
11	12-06-24 02:30	26.53	26.26
12	12-06-24 02:45	28.03	28.11
13	12-06-24 03:00	67.58	67.2
14	12-06-24 03:15	81.38	81.18
15	12-06-24 03:30	86.77	86.39
16	12-06-24 03:45	85.67	85.46
17	12-06-24 04:00	86.93	86.96
18	12-06-24 04:15	82.84	82.84
19	12-06-24 04:30	61.38	60.67
20	12-06-24 04:45	34.05	33.59
21	12-06-24 05:00	30.22	30.33
22	12-06-24 05:15	24.38	24.46
23	12-06-24 05:30	58.07	58.09
24	12-06-24 05:45	68.79	68.34
25	12-06-24 06:00	71.46	71.73
26	12-06-24 06:15	62.85	64.43
27	12-06-24 06:30	57.92	58.65
28	12-06-24 06:45	52.78	53.02
29	12-06-24 07:00	39.88	40.17
30	12-06-24 07:15	0.85	1.37
31	12-06-24 07:30	-3.77	-4.2
32	12-06-24 07:45	5.24	4.89
33	12-06-24 08:00	10.71	10.53
34	12-06-24 08:15	9.82	9.8
35	12-06-24 08:30	29.27	29.22
36	12-06-24 08:45	51.27	50.85
37	12-06-24 09:00	58.57	58.84
38	12-06-24 09:15	63.53	63.34
39	12-06-24 09:30	63.14	62.82
40	12-06-24 09:45	62.69	63.24
41	12-06-24 10:00	63.05	63.1
42	12-06-24 10:15	63.17	62.55
43	12-06-24 10:30	68.32	68.47
44	12-06-24 10:45	78.62	78.79
45	12-06-24 11:00	83.48	83.02
46	12-06-24 11:15	81.72	81.78
47	12-06-24 11:30	85.35	85.47
48	12-06-24 11:45	82.23	81.69
49	12-06-24 12:00	79.13	79.19
50	12-06-24 12:15	76.52	76.67
51	12-06-24 12:30	73.42	73.81

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
52	12-06-24 12:45	74.94	75.34
53	12-06-24 13:00	72.85	73.19
54	12-06-24 13:15	75.46	75.34
55	12-06-24 13:30	70.95	70.49
56	12-06-24 13:45	62.31	62.14
57	12-06-24 14:00	59.38	58.38
58	12-06-24 14:15	56.3	55.64
59	12-06-24 14:30	58.96	58.33
60	12-06-24 14:45	55.68	55.37
61	12-06-24 15:00	56.12	56.03
62	12-06-24 15:15	50.27	50.15
63	12-06-24 15:30	45.5	45.41
64	12-06-24 15:45	43.77	43.72
65	12-06-24 16:00	44.27	43.9
66	12-06-24 16:15	44.01	43.59
67	12-06-24 16:30	43.02	42.76
68	12-06-24 16:45	41.61	41.37
69	12-06-24 17:00	44.12	43.28
70	12-06-24 17:15	39.36	38.88
71	12-06-24 17:30	41.6	41.6
72	12-06-24 17:45	49.05	48.93
73	12-06-24 18:00	56.02	56.33
74	12-06-24 18:15	56.48	55.84
75	12-06-24 18:30	53.52	54.31
76	12-06-24 18:45	63.66	63.89
77	12-06-24 19:00	70.43	70.48
78	12-06-24 19:15	76.43	76.58
79	12-06-24 19:30	73.02	73.49
80	12-06-24 19:45	69.77	69.91
81	12-06-24 20:00	65.93	64.24
82	12-06-24 20:15	75.61	75.12
83	12-06-24 20:30	79.8	79.5
84	12-06-24 20:45	72.28	71.76
85	12-06-24 21:00	73.63	73.38
86	12-06-24 21:15	78.89	78.76
87	12-06-24 21:30	75.97	75.51
88	12-06-24 21:45	73.84	72.43
89	12-06-24 22:00	70.44	69.87
90	12-06-24 22:15	67.13	67.78
91	12-06-24 22:30	58.89	59.07
92	12-06-24 22:45	58.47	58.43
93	12-06-24 23:00	59.75	60.71
94	12-06-24 23:15	62.93	62.47
95	12-06-24 23:30	61.44	61.03
96	12-06-24 23:45	59.15	58.9
12.6.2024	**No. of Blocks export**	**95**	**95**
	No. of Blocks Import	**1**	**1**
	Maximum export	**92.83**	**92.14**
	Maximum Import	**-3.77**	**-4.2**
1	13-06-24 00:00	60.2	60.56
2	13-06-24 00:15	70.23	69.89
3	13-06-24 00:30	62.8	62.69
4	13-06-24 00:45	40.57	40.72
5	13-06-24 01:00	41.07	40.46
6	13-06-24 01:15	42.48	42.18

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
7	13-06-24 01:30	43.85	43.41
8	13-06-24 01:45	43.65	43.7
9	13-06-24 02:00	45.21	44.71
10	13-06-24 02:15	48.35	48.41
11	13-06-24 02:30	50.99	51.07
12	13-06-24 02:45	49.18	49.33
13	13-06-24 03:00	54.46	54.13
14	13-06-24 03:15	57.18	57.45
15	13-06-24 03:30	57.6	57.35
16	13-06-24 03:45	59.01	59.3
17	13-06-24 04:00	58.92	59.33
18	13-06-24 04:15	54.76	54.38
19	13-06-24 04:30	55.51	55.23
20	13-06-24 04:45	56.48	56.15
21	13-06-24 05:00	52.48	52.62
22	13-06-24 05:15	42.69	42.14
23	13-06-24 05:30	35.36	35.4
24	13-06-24 05:45	36.24	34.94
25	13-06-24 06:00	38.99	38.71
26	13-06-24 06:15	31.28	31.61
27	13-06-24 06:30	19.5	19.27
28	13-06-24 06:45	18.48	18.73
29	13-06-24 07:00	20.39	19.73
30	13-06-24 07:15	14.27	14.34
31	13-06-24 07:30	18.52	18.72
32	13-06-24 07:45	24.04	24.89
33	13-06-24 08:00	18.9	20.66
34	13-06-24 08:15	0.56	1.37
35	13-06-24 08:30	-2.77	-2.88
36	13-06-24 08:45	-7.42	-7.23
37	13-06-24 09:00	-4.25	-4.69
38	13-06-24 09:15	14.8	14.73
39	13-06-24 09:30	26.48	26.09
40	13-06-24 09:45	24.92	24.19
41	13-06-24 10:00	30.94	30.01
42	13-06-24 10:15	35.26	34.79
43	13-06-24 10:30	35.51	34.11
44	13-06-24 10:45	35.02	34.46
45	13-06-24 11:00	37.19	36.31
46	13-06-24 11:15	34.61	33.5
47	13-06-24 11:30	37.96	36.46
48	13-06-24 11:45	33.58	33.18
49	13-06-24 12:00	18.03	16.95
50	13-06-24 12:15	14.07	12.92
51	13-06-24 12:30	32.52	31.6
52	13-06-24 12:45	57.33	56.32
53	13-06-24 13:00	64.92	64.5
54	13-06-24 13:15	64.12	63.61
55	13-06-24 13:30	64.6	64.53
56	13-06-24 13:45	72.37	66.96
57	13-06-24 14:00	55.84	55.85
58	13-06-24 14:15	59.16	58.82
59	13-06-24 14:30	60.97	60.9
60	13-06-24 14:45	61.09	60.57
61	13-06-24 15:00	82.52	82.03

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
62	13-06-24 15:15	87.93	87.02
63	13-06-24 15:30	90.46	89.79
64	13-06-24 15:45	86.25	85.59
65	13-06-24 16:00	74.46	73.67
66	13-06-24 16:15	64.55	64.34
67	13-06-24 16:30	35.51	35.6
68	13-06-24 16:45	35.02	34.72
69	13-06-24 17:00	30.19	30.93
70	13-06-24 17:15	24.27	24.33
71	13-06-24 17:30	25.72	25.73
72	13-06-24 17:45	26.46	37.65
73	13-06-24 18:00	57.82	57.6
74	13-06-24 18:15	69.38	69.08
75	13-06-24 18:30	80.59	81.7
76	13-06-24 18:45	85.27	85.28
77	13-06-24 19:00	96.04	96.02
78	13-06-24 19:15	91.27	91.47
79	13-06-24 19:30	79.84	80.31
80	13-06-24 19:45	70.82	70.33
81	13-06-24 20:00	70.49	70.82
82	13-06-24 20:15	66.57	66.62
83	13-06-24 20:30	68.91	69.35
84	13-06-24 20:45	64.86	64.65
85	13-06-24 21:00	65.33	64.87
86	13-06-24 21:15	58.06	57.71
87	13-06-24 21:30	54.79	54.27
88	13-06-24 21:45	55.47	55.57
89	13-06-24 22:00	51.64	51.53
90	13-06-24 22:15	50.03	50.28
91	13-06-24 22:30	46.94	46.29
92	13-06-24 22:45	46.62	45.98
93	13-06-24 23:00	54.63	53.99
94	13-06-24 23:15	53.23	53.12
95	13-06-24 23:30	43.47	43.34
96	13-06-24 23:45	33.2	33.23
13.6.2024	**No. of Blocks export**	**93**	**93**
	No. of Blocks Import	**3**	**3**
	Maximum export	**96.04**	**96.02**
	Maximum Import	**-7.42**	**-7.23**
1	14-06-24 00:00	30.67	30.34
2	14-06-24 00:15	31.45	32.3
3	14-06-24 00:30	36.01	36.22
4	14-06-24 00:45	40.45	41.14
5	14-06-24 01:00	45.53	45.89
6	14-06-24 01:15	47.12	46.69
7	14-06-24 01:30	46.57	45.97
8	14-06-24 01:45	49.6	49.18
9	14-06-24 02:00	49.39	49.78
10	14-06-24 02:15	48.9	48.83
11	14-06-24 02:30	51.61	51.87
12	14-06-24 02:45	52.97	53.13
13	14-06-24 03:00	49.18	49.19
14	14-06-24 03:15	51.03	51.97
15	14-06-24 03:30	49.57	49.91
16	14-06-24 03:45	51.59	51.17

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
17	14-06-24 04:00	53.66	52.98
18	14-06-24 04:15	52.84	53.03
19	14-06-24 04:30	50.33	50.22
20	14-06-24 04:45	51.78	51.77
21	14-06-24 05:00	46.78	46.78
22	14-06-24 05:15	40.61	39.75
23	14-06-24 05:30	38.86	38.66
24	14-06-24 05:45	40.63	40.94
25	14-06-24 06:00	39.84	40.27
26	14-06-24 06:15	33.94	33.78
27	14-06-24 06:30	24.19	23.9
28	14-06-24 06:45	25.76	25.74
29	14-06-24 07:00	22.24	22.14
30	14-06-24 07:15	23.62	23.74
31	14-06-24 07:30	25.64	25.83
32	14-06-24 07:45	1.34	1.32
33	14-06-24 08:00	-7.86	-8.01
34	14-06-24 08:15	-5.2	-5.36
35	14-06-24 08:30	-4.91	-5.07
36	14-06-24 08:45	3.96	3.92
37	14-06-24 09:00	8.17	7.86
38	14-06-24 09:15	17.04	16.8
39	14-06-24 09:30	-11.16	-11.8
40	14-06-24 09:45	-14.22	-15.03
41	14-06-24 10:00	-0.69	-1.28
42	14-06-24 10:15	-0.05	-0.82
43	14-06-24 10:30	8.75	7.85
44	14-06-24 10:45	12.03	11.15
45	14-06-24 11:00	18.06	17.72
46	14-06-24 11:15	15.9	14.67
47	14-06-24 11:30	21.26	20.36
48	14-06-24 11:45	24.34	23.57
49	14-06-24 12:00	27.66	26.93
50	14-06-24 12:15	27.14	26.22
51	14-06-24 12:30	19.39	19.02
52	14-06-24 12:45	17.24	16.43
53	14-06-24 13:00	15.05	14.38
54	14-06-24 13:15	10.39	9.33
55	14-06-24 13:30	32.47	32.56
56	14-06-24 13:45	57.33	56.49
57	14-06-24 14:00	55.72	55
58	14-06-24 14:15	50.44	50.19
59	14-06-24 14:30	43.72	42.57
60	14-06-24 14:45	42.27	41.55
61	14-06-24 15:00	36.66	36.55
62	14-06-24 15:15	32.91	32.44
63	14-06-24 15:30	36.89	36.76
64	14-06-24 15:45	37.33	36.86
65	14-06-24 16:00	38.73	38.72
66	14-06-24 16:15	37.6	36.93
67	14-06-24 16:30	33.35	33.8
68	14-06-24 16:45	31.52	31.33
69	14-06-24 17:00	30.57	29.38
70	14-06-24 17:15	22.61	21.75
71	14-06-24 17:30	22.61	22.92

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
72	14-06-24 17:45	30.7	30.65
73	14-06-24 18:00	33.17	33.08
74	14-06-24 18:15	44.14	43.93
75	14-06-24 18:30	43.9	43.93
76	14-06-24 18:45	55.58	55.88
77	14-06-24 19:00	60.07	60.22
78	14-06-24 19:15	61.28	60.98
79	14-06-24 19:30	62.15	61.87
80	14-06-24 19:45	54.52	53.94
81	14-06-24 20:00	53.98	53.79
82	14-06-24 20:15	53.59	53.71
83	14-06-24 20:30	55.9	55.82
84	14-06-24 20:45	50.51	50.49
85	14-06-24 21:00	52.13	52.25
86	14-06-24 21:15	49.22	48.29
87	14-06-24 21:30	39.11	39.45
88	14-06-24 21:45	29.58	29.1
89	14-06-24 22:00	35.63	35.65
90	14-06-24 22:15	40	40.21
91	14-06-24 22:30	33.48	33.12
92	14-06-24 22:45	31.71	31.68
93	14-06-24 23:00	54.43	53.98
94	14-06-24 23:15	58.15	58.18
95	14-06-24 23:30	51.69	51.42
96	14-06-24 23:45	55.29	55.04
14.6.2024	**No. of Blocks export**	**89**	**89**
	No. of Blocks Import	**7**	**7**
	Maximum export	**62.15**	**61.87**
	Maximum Import	**-14.22**	**-15.03**
1	15-06-24 00:00	51.92	52.12
2	15-06-24 00:15	46.13	46.46
3	15-06-24 00:30	54.25	54.21
4	15-06-24 00:45	65.34	64.69
5	15-06-24 01:00	66.97	67.2
6	15-06-24 01:15	68.17	68.27
7	15-06-24 01:30	65.86	65.38
8	15-06-24 01:45	55.75	54.4
9	15-06-24 02:00	51.92	51.4
10	15-06-24 02:15	56.01	55.62
11	15-06-24 02:30	52.41	52.67
12	15-06-24 02:45	51.34	51.59
13	15-06-24 03:00	52.41	52.38
14	15-06-24 03:15	52.69	51.43
15	15-06-24 03:30	55.98	55.32
16	15-06-24 03:45	59.71	59.61
17	15-06-24 04:00	60.32	60.85
18	15-06-24 04:15	61.05	60.44
19	15-06-24 04:30	57.17	58.05
20	15-06-24 04:45	69.25	69.66
21	15-06-24 05:00	65.15	65.19
22	15-06-24 05:15	60.42	60.76
23	15-06-24 05:30	59.68	60.41
24	15-06-24 05:45	57.5	57.58
25	15-06-24 06:00	58.33	59.09
26	15-06-24 06:15	48.4	48.66

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
27	15-06-24 06:30	35.67	36.38
28	15-06-24 06:45	31.95	32.93
29	15-06-24 07:00	30.65	31.24
30	15-06-24 07:15	30.61	30.07
31	15-06-24 07:30	34.17	34.86
32	15-06-24 07:45	7.96	8.64
33	15-06-24 08:00	-2.28	-3.26
34	15-06-24 08:15	-9.76	-7.98
35	15-06-24 08:30	-2.83	-2.33
36	15-06-24 08:45	2.91	3.25
37	15-06-24 09:00	34.72	33.88
38	15-06-24 09:15	53.82	53.87
39	15-06-24 09:30	58.38	58.77
40	15-06-24 09:45	62.65	63.25
41	15-06-24 10:00	71.25	70.66
42	15-06-24 10:15	40.33	41.01
43	15-06-24 10:30	4.74	4.2
44	15-06-24 10:45	-9.9	-10.66
45	15-06-24 11:00	24.39	24.02
46	15-06-24 11:15	41	40.99
47	15-06-24 11:30	41.03	40.25
48	15-06-24 11:45	51.09	51.02
49	15-06-24 12:00	63.08	63.72
50	15-06-24 12:15	72.18	71.98
51	15-06-24 12:30	73.29	72.75
52	15-06-24 12:45	67.97	68.39
53	15-06-24 13:00	70.45	70.51
54	15-06-24 13:15	71	71.15
55	15-06-24 13:30	66.67	67.01
56	15-06-24 13:45	61.79	62.13
57	15-06-24 14:00	58.43	59.21
58	15-06-24 14:15	53.36	53.69
59	15-06-24 14:30	58.83	58.89
60	15-06-24 14:45	57.32	58.27
61	15-06-24 15:00	54.39	54.85
62	15-06-24 15:15	54.04	54.42
63	15-06-24 15:30	49.79	50.73
64	15-06-24 15:45	48.76	49.18
65	15-06-24 16:00	50.73	50.53
66	15-06-24 16:15	42.36	42.47
67	15-06-24 16:30	33.51	34.3
68	15-06-24 16:45	34.54	35.28
69	15-06-24 17:00	25.1	25.71
70	15-06-24 17:15	2.92	2.41
71	15-06-24 17:30	11.04	10.8
72	15-06-24 17:45	13.86	13.96
73	15-06-24 18:00	28.29	28.16
74	15-06-24 18:15	29.93	29.72
75	15-06-24 18:30	34.81	34.47
76	15-06-24 18:45	35.95	36.01
77	15-06-24 19:00	45.37	45.33
78	15-06-24 19:15	38.28	39.45
79	15-06-24 19:30	29.09	28.58
80	15-06-24 19:45	42.53	42.84
81	15-06-24 20:00	42.22	42.13

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
82	15-06-24 20:15	48.41	47.79
83	15-06-24 20:30	49.13	49.24
84	15-06-24 20:45	44.58	44.78
85	15-06-24 21:00	42.6	42.96
86	15-06-24 21:15	40.6	40.59
87	15-06-24 21:30	39.64	39.26
88	15-06-24 21:45	34.35	34.2
89	15-06-24 22:00	38.52	38.86
90	15-06-24 22:15	42.08	42
91	15-06-24 22:30	54.27	54.21
92	15-06-24 22:45	66.39	66.32
93	15-06-24 23:00	65.65	64.51
94	15-06-24 23:15	55.13	55.08
95	15-06-24 23:30	52.47	52.3
96	15-06-24 23:45	49.66	49.34
15.6.2024	**No. of Blocks export**	**92**	**92**
	No. of Blocks Import	**4**	**4**
	Maximum export	**73.29**	**72.75**
	Maximum Import	**-9.9**	**-10.66**
1	16-06-24 00:00	53.37	53.46
2	16-06-24 00:15	52.13	52.06
3	16-06-24 00:30	60.91	60.85
4	16-06-24 00:45	64.32	64.29
5	16-06-24 01:00	63.53	63.87
6	16-06-24 01:15	65.53	63.94
7	16-06-24 01:30	71.28	71.08
8	16-06-24 01:45	64.76	64.91
9	16-06-24 02:00	48.63	47.84
10	16-06-24 02:15	48.04	48.21
11	16-06-24 02:30	46.89	46.04
12	16-06-24 02:45	50.26	50.25
13	16-06-24 03:00	53.45	53.51
14	16-06-24 03:15	55.95	55.84
15	16-06-24 03:30	56.94	57.1
16	16-06-24 03:45	39.23	38.64
17	16-06-24 04:00	41.08	41.11
18	16-06-24 04:15	39.54	39.36
19	16-06-24 04:30	45.53	46
20	16-06-24 04:45	48.73	48.55
21	16-06-24 05:00	40.29	40.37
22	16-06-24 05:15	31.31	30.8
23	16-06-24 05:30	28.48	28.38
24	16-06-24 05:45	29.97	29.76
25	16-06-24 06:00	32.83	32.88
26	16-06-24 06:15	25.64	25.6
27	16-06-24 06:30	15.98	16.44
28	16-06-24 06:45	10.41	10.52
29	16-06-24 07:00	5.68	5.84
30	16-06-24 07:15	4.21	4.53
31	16-06-24 07:30	4.51	4.29
32	16-06-24 07:45	6.79	7.43
33	16-06-24 08:00	11.73	11.88
34	16-06-24 08:15	14.25	13.96
35	16-06-24 08:30	15.77	14.78
36	16-06-24 08:45	20.04	20.19

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
37	16-06-24 09:00	18.75	18.57
38	16-06-24 09:15	19.58	19.94
39	16-06-24 09:30	23.3	23.26
40	16-06-24 09:45	22.37	23.06
41	16-06-24 10:00	24.83	25.04
42	16-06-24 10:15	25.55	25.53
43	16-06-24 10:30	24.6	23.72
44	16-06-24 10:45	33.83	33.61
45	16-06-24 11:00	40.28	38.82
46	16-06-24 11:15	40.86	40.95
47	16-06-24 11:30	40.48	40.47
48	16-06-24 11:45	43.6	43.13
49	16-06-24 12:00	54.44	54.44
50	16-06-24 12:15	54.39	53.9
51	16-06-24 12:30	54.5	54.11
52	16-06-24 12:45	47.36	46.16
53	16-06-24 13:00	50.59	50.61
54	16-06-24 13:15	50.33	50.12
55	16-06-24 13:30	45.37	45.18
56	16-06-24 13:45	37.74	36.95
57	16-06-24 14:00	43.02	42.75
58	16-06-24 14:15	37.46	37.11
59	16-06-24 14:30	42.96	41.53
60	16-06-24 14:45	47.85	47.6
61	16-06-24 15:00	50.92	50.9
62	16-06-24 15:15	56.2	55.71
63	16-06-24 15:30	47.51	46.39
64	16-06-24 15:45	41.32	41.19
65	16-06-24 16:00	42.83	43.53
66	16-06-24 16:15	41.76	41.34
67	16-06-24 16:30	29.87	30.39
68	16-06-24 16:45	31.73	32.87
69	16-06-24 17:00	47.21	47.65
70	16-06-24 17:15	28.93	29.89
71	16-06-24 17:30	30.85	31.37
72	16-06-24 17:45	44.04	44.09
73	16-06-24 18:00	47.01	47.78
74	16-06-24 18:15	50.53	50.59
75	16-06-24 18:30	57.25	56.85
76	16-06-24 18:45	68.66	68.27
77	16-06-24 19:00	67.49	67.46
78	16-06-24 19:15	62.55	62.42
79	16-06-24 19:30	54.6	54.71
80	16-06-24 19:45	44.99	45.49
81	16-06-24 20:00	47.76	47.69
82	16-06-24 20:15	38.59	38.4
83	16-06-24 20:30	40.52	39.95
84	16-06-24 20:45	43.25	43.12
85	16-06-24 21:00	51.68	51.47
86	16-06-24 21:15	55.4	54.86
87	16-06-24 21:30	62	61.78
88	16-06-24 21:45	81.29	81.53
89	16-06-24 22:00	83.26	82.92
90	16-06-24 22:15	90.4	89.73
91	16-06-24 22:30	87.73	87.85

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
92	16-06-24 22:45	85.12	85.26
93	16-06-24 23:00	71.87	71.94
94	16-06-24 23:15	78.63	78.91
95	16-06-24 23:30	77.44	77.37
96	16-06-24 23:45	74.35	73.96
16.6.2024	**No. of Blocks export**	**96**	**96**
	No. of Blocks Import	**0**	**0**
	Maximum export	**90.4**	**89.73**
	Maximum Import	**0**	**0**
1	17-06-24 00:00	77.56	78.05
2	17-06-24 00:15	76.72	76.65
3	17-06-24 00:30	80.6	80.65
4	17-06-24 00:45	80.54	81.4
5	17-06-24 01:00	81.43	81.35
6	17-06-24 01:15	84.22	83.86
7	17-06-24 01:30	80.65	80.82
8	17-06-24 01:45	74.68	74.52
9	17-06-24 02:00	56.95	57.16
10	17-06-24 02:15	49.42	49.68
11	17-06-24 02:30	46.21	45.42
12	17-06-24 02:45	41.62	41.76
13	17-06-24 03:00	43.86	43.82
14	17-06-24 03:15	41.32	41.11
15	17-06-24 03:30	46.61	46.32
16	17-06-24 03:45	60.24	60.39
17	17-06-24 04:00	70.83	71.92
18	17-06-24 04:15	84.5	84.33
19	17-06-24 04:30	84.35	84.82
20	17-06-24 04:45	85.84	86.01
21	17-06-24 05:00	83.06	82.7
22	17-06-24 05:15	68.03	67.77
23	17-06-24 05:30	72.15	72.29
24	17-06-24 05:45	73.82	73.71
25	17-06-24 06:00	69.42	69.11
26	17-06-24 06:15	51.17	51.07
27	17-06-24 06:30	31.55	31.64
28	17-06-24 06:45	16.09	16.18
29	17-06-24 07:00	10.4	9.92
30	17-06-24 07:15	6.93	7.3
31	17-06-24 07:30	4.36	4.02
32	17-06-24 07:45	12.5	12.2
33	17-06-24 08:00	13.18	13.17
34	17-06-24 08:15	11.13	10.9
35	17-06-24 08:30	13.39	13.36
36	17-06-24 08:45	14.53	15.26
37	17-06-24 09:00	15.87	16.13
38	17-06-24 09:15	14.11	14.02
39	17-06-24 09:30	5.62	5.57
40	17-06-24 09:45	2.62	2.53
41	17-06-24 10:00	5.95	5.2
42	17-06-24 10:15	9.09	8.5
43	17-06-24 10:30	15.78	15.22
44	17-06-24 10:45	19.49	19.06
45	17-06-24 11:00	22.33	22.56
46	17-06-24 11:15	14.11	13.88

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
47	17-06-24 11:30	13.24	12.82
48	17-06-24 11:45	10.95	11.06
49	17-06-24 12:00	21.38	21.59
50	17-06-24 12:15	24.54	24.31
51	17-06-24 12:30	40.18	40.09
52	17-06-24 12:45	30.54	31.06
53	17-06-24 13:00	28.69	28.11
54	17-06-24 13:15	23.19	23.36
55	17-06-24 13:30	17.79	17.29
56	17-06-24 13:45	24.81	24.58
57	17-06-24 14:00	25.73	25.39
58	17-06-24 14:15	22.46	22
59	17-06-24 14:30	20.67	20.91
60	17-06-24 14:45	19.6	19.81
61	17-06-24 15:00	22.77	21.95
62	17-06-24 15:15	25.14	24.9
63	17-06-24 15:30	34.56	34.38
64	17-06-24 15:45	28.61	28.34
65	17-06-24 16:00	32.37	32.02
66	17-06-24 16:15	34.6	34.93
67	17-06-24 16:30	35.82	35.69
68	17-06-24 16:45	33.96	34.28
69	17-06-24 17:00	12.4	12.75
70	17-06-24 17:15	9.62	10.1
71	17-06-24 17:30	-0.63	-0.42
72	17-06-24 17:45	-1.05	-0.76
73	17-06-24 18:00	8.52	8.23
74	17-06-24 18:15	19.03	19.67
75	17-06-24 18:30	24.81	24.92
76	17-06-24 18:45	23.46	23.63
77	17-06-24 19:00	37.29	37.13
78	17-06-24 19:15	42.26	42.19
79	17-06-24 19:30	40.67	40.8
80	17-06-24 19:45	32.73	32.65
81	17-06-24 20:00	53.8	54.42
82	17-06-24 20:15	62.18	62.41
83	17-06-24 20:30	66.95	67.29
84	17-06-24 20:45	80.23	79.51
85	17-06-24 21:00	82	81.39
86	17-06-24 21:15	73.59	73.44
87	17-06-24 21:30	64.35	64.39
88	17-06-24 21:45	62.48	62.09
89	17-06-24 22:00	60.72	60.81
90	17-06-24 22:15	61.18	60.84
91	17-06-24 22:30	57.53	57.55
92	17-06-24 22:45	58.42	59
93	17-06-24 23:00	67.05	67.24
94	17-06-24 23:15	69.58	69.5
95	17-06-24 23:30	69.27	69.47
96	17-06-24 23:45	69.37	69.19
17.6.2024	**No. of Blocks export**	**94**	**94**
	No. of Blocks Import	**2**	**2**
	Maximum export	**85.84**	**86.01**
	Maximum Import	**-1.05**	**-0.76**
1	18-06-24 00:00	72.46	72.46

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
2	18-06-24 00:15	73.84	74.06
3	18-06-24 00:30	80.38	80.02
4	18-06-24 00:45	79.55	78.46
5	18-06-24 01:00	75.89	76.51
6	18-06-24 01:15	73.11	73
7	18-06-24 01:30	76.75	76.88
8	18-06-24 01:45	77.06	76.97
9	18-06-24 02:00	74.8	74.21
10	18-06-24 02:15	75.74	75.28
11	18-06-24 02:30	60.12	59.89
12	18-06-24 02:45	50.85	50.79
13	18-06-24 03:00	54.44	54.71
14	18-06-24 03:15	53.19	52.93
15	18-06-24 03:30	55	55.27
16	18-06-24 03:45	55.43	55.8
17	18-06-24 04:00	50.19	50.47
18	18-06-24 04:15	46.91	46.77
19	18-06-24 04:30	46.57	46.76
20	18-06-24 04:45	52.91	53.07
21	18-06-24 05:00	63.05	62.91
22	18-06-24 05:15	60.09	60.42
23	18-06-24 05:30	52.13	53.06
24	18-06-24 05:45	52.54	52.64
25	18-06-24 06:00	54.45	54.42
26	18-06-24 06:15	32.26	32.48
27	18-06-24 06:30	9.76	9.74
28	18-06-24 06:45	-3.38	-3.25
29	18-06-24 07:00	-6.81	-6.38
30	18-06-24 07:15	-7.35	-6.65
31	18-06-24 07:30	1.99	2.64
32	18-06-24 07:45	4.06	4.93
33	18-06-24 08:00	3.06	3.62
34	18-06-24 08:15	-24.28	-24.21
35	18-06-24 08:30	-31.7	-31.97
36	18-06-24 08:45	-26.72	-26.33
37	18-06-24 09:00	-22.56	-22.58
38	18-06-24 09:15	-13.47	-13.06
39	18-06-24 09:30	-13.9	-14.49
40	18-06-24 09:45	14.68	14.01
41	18-06-24 10:00	20.66	20.16
42	18-06-24 10:15	25.88	25.73
43	18-06-24 10:30	25.83	25.84
44	18-06-24 10:45	34.99	34.76
45	18-06-24 11:00	31.35	30.58
46	18-06-24 11:15	26.51	25.14
47	18-06-24 11:30	25.4	25.23
48	18-06-24 11:45	25.87	25.18
49	18-06-24 12:00	31.43	31.98
50	18-06-24 12:15	33.48	32.89
51	18-06-24 12:30	30.82	30.69
52	18-06-24 12:45	20.41	20.3
53	18-06-24 13:00	0.11	-0.2
54	18-06-24 13:15	1.1	1.15
55	18-06-24 13:30	3.13	3.38
56	18-06-24 13:45	1.68	0.89

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
57	18-06-24 14:00	22.19	21.65
58	18-06-24 14:15	27.63	27.39
59	18-06-24 14:30	30.4	30.46
60	18-06-24 14:45	38.84	38.08
61	18-06-24 15:00	33.58	33.22
62	18-06-24 15:15	36.53	36.39
63	18-06-24 15:30	29.75	29.81
64	18-06-24 15:45	36.36	36.14
65	18-06-24 16:00	17.3	16.87
66	18-06-24 16:15	17.79	17.61
67	18-06-24 16:30	17.77	17.46
68	18-06-24 16:45	18.39	18.21
69	18-06-24 17:00	17.95	17.77
70	18-06-24 17:15	20.57	21.44
71	18-06-24 17:30	24.29	25.24
72	18-06-24 17:45	25.1	25.43
73	18-06-24 18:00	24.57	24.53
74	18-06-24 18:15	34.7	34.8
75	18-06-24 18:30	45.15	45.34
76	18-06-24 18:45	41.56	41.47
77	18-06-24 19:00	61.8	61.82
78	18-06-24 19:15	87.08	87.29
79	18-06-24 19:30	82.36	81.87
80	18-06-24 19:45	75.93	75.44
81	18-06-24 20:00	69.09	69.03
82	18-06-24 20:15	64.84	64.79
83	18-06-24 20:30	67.03	67.13
84	18-06-24 20:45	68.06	68.18
85	18-06-24 21:00	69.53	70.21
86	18-06-24 21:15	73.86	73.51
87	18-06-24 21:30	77.32	77.96
88	18-06-24 21:45	76.27	76.48
89	18-06-24 22:00	68.24	67.73
90	18-06-24 22:15	60.24	59.73
91	18-06-24 22:30	56.72	56.78
92	18-06-24 22:45	59.58	59.61
93	18-06-24 23:00	65.19	64.66
94	18-06-24 23:15	75.29	75.74
95	18-06-24 23:30	80.83	80.81
96	18-06-24 23:45	79.96	79.6
18.6.2024	**No. of Blocks export**	**87**	**86**
	No. of Blocks Import	**9**	**10**
	Maximum export	**87.08**	**87.29**
	Maximum Import	**-31.7**	**-31.97**
1	19-06-24 00:00	81.03	80.94
2	19-06-24 00:15	76.61	76.23
3	19-06-24 00:30	60.2	60.18
4	19-06-24 00:45	59.65	59.58
5	19-06-24 01:00	51.07	50.61
6	19-06-24 01:15	45.98	45.85
7	19-06-24 01:30	40.04	39.54
8	19-06-24 01:45	41.23	41.96
9	19-06-24 02:00	51.33	52.2
10	19-06-24 02:15	50.87	51.92
11	19-06-24 02:30	41.99	42.73

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
12	19-06-24 02:45	40.83	41.48
13	19-06-24 03:00	42.2	41.26
14	19-06-24 03:15	45.31	45.74
15	19-06-24 03:30	49.16	49.29
16	19-06-24 03:45	52.23	52.25
17	19-06-24 04:00	56.87	56.89
18	19-06-24 04:15	61.26	60.55
19	19-06-24 04:30	55.7	54.85
20	19-06-24 04:45	46.23	46.09
21	19-06-24 05:00	44.49	44.65
22	19-06-24 05:15	40.92	41.06
23	19-06-24 05:30	37.57	37.73
24	19-06-24 05:45	38.81	38.77
25	19-06-24 06:00	37.8	38.21
26	19-06-24 06:15	27.23	26.78
27	19-06-24 06:30	21	20.87
28	19-06-24 06:45	20.69	20.64
29	19-06-24 07:00	15.34	15.26
30	19-06-24 07:15	14.49	14.92
31	19-06-24 07:30	10.63	10.91
32	19-06-24 07:45	16.2	16.44
33	19-06-24 08:00	18.26	18.02
34	19-06-24 08:15	16.73	17.21
35	19-06-24 08:30	22.16	22.57
36	19-06-24 08:45	24.08	23.85
37	19-06-24 09:00	24.55	24.25
38	19-06-24 09:15	28.66	28.79
39	19-06-24 09:30	30.66	30.54
40	19-06-24 09:45	31.38	31.41
41	19-06-24 10:00	39.76	38.58
42	19-06-24 10:15	37.37	36.87
43	19-06-24 10:30	33.29	33.16
44	19-06-24 10:45	31.75	31.37
45	19-06-24 11:00	36.5	36.13
46	19-06-24 11:15	39.93	39.45
47	19-06-24 11:30	40.45	40.21
48	19-06-24 11:45	36.31	36.4
49	19-06-24 12:00	44.98	44.99
50	19-06-24 12:15	48.48	48.1
51	19-06-24 12:30	53.61	53.06
52	19-06-24 12:45	50.33	49.75
53	19-06-24 13:00	55.1	54.64
54	19-06-24 13:15	46.97	46.25
55	19-06-24 13:30	45.54	44.14
56	19-06-24 13:45	49.35	48.65
57	19-06-24 14:00	49.87	49.97
58	19-06-24 14:15	41.79	41.31
59	19-06-24 14:30	38.06	37.75
60	19-06-24 14:45	36.2	35.99
61	19-06-24 15:00	39.29	38.86
62	19-06-24 15:15	30.62	29.15
63	19-06-24 15:30	27	27.53
64	19-06-24 15:45	25.6	26.15
65	19-06-24 16:00	25.38	26.54
66	19-06-24 16:15	16.29	15.97

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
67	19-06-24 16:30	14.75	14.14
68	19-06-24 16:45	25.38	25.13
69	19-06-24 17:00	24.58	23.32
70	19-06-24 17:15	33.77	33.55
71	19-06-24 17:30	27.27	27.04
72	19-06-24 17:45	26.95	25.34
73	19-06-24 18:00	41.6	41.86
74	19-06-24 18:15	53.38	52.93
75	19-06-24 18:30	60.62	60.82
76	19-06-24 18:45	58.04	57.74
77	19-06-24 19:00	65.77	64.45
78	19-06-24 19:15	56.84	56.71
79	19-06-24 19:30	58.61	59.14
80	19-06-24 19:45	52.57	51.82
81	19-06-24 20:00	51	50.35
82	19-06-24 20:15	50.28	50.55
83	19-06-24 20:30	50.35	51.49
84	19-06-24 20:45	46.82	46.44
85	19-06-24 21:00	42.24	42.62
86	19-06-24 21:15	33.36	33.73
87	19-06-24 21:30	32.09	32.01
88	19-06-24 21:45	26.13	25.48
89	19-06-24 22:00	23.82	24.01
90	19-06-24 22:15	23.89	24.32
91	19-06-24 22:30	34.76	33.88
92	19-06-24 22:45	33.58	33.49
93	19-06-24 23:00	37.09	36.9
94	19-06-24 23:15	39.14	38.9
95	19-06-24 23:30	25.42	25.62
96	19-06-24 23:45	22.75	22.63
19.6.2024	**No. of Blocks export**	**96**	**96**
	No. of Blocks Import	**0**	**0**
	Maximum export	**81.03**	**80.94**
	Maximum Import	**0**	**0**
1	20-06-24 00:00	26.81	26.92
2	20-06-24 00:15	33.74	33.43
3	20-06-24 00:30	28.49	27.99
4	20-06-24 00:45	28.49	28.14
5	20-06-24 01:00	30.05	30.14
6	20-06-24 01:15	30.55	30.61
7	20-06-24 01:30	33.94	34.03
8	20-06-24 01:45	34.09	34.43
9	20-06-24 02:00	35.5	34.69
10	20-06-24 02:15	33.6	33.43
11	20-06-24 02:30	35.39	35.19
12	20-06-24 02:45	35.03	34.82
13	20-06-24 03:00	37.05	36.87
14	20-06-24 03:15	36.99	36.77
15	20-06-24 03:30	38.05	37.8
16	20-06-24 03:45	37.74	37.58
17	20-06-24 04:00	37.26	36.89
18	20-06-24 04:15	36.47	36.28
19	20-06-24 04:30	34.21	34.54
20	20-06-24 04:45	35.74	35.84
21	20-06-24 05:00	30.37	29.98

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
22	20-06-24 05:15	21.89	21.84
23	20-06-24 05:30	21.35	21.81
24	20-06-24 05:45	21.1	20.72
25	20-06-24 06:00	21.93	21.43
26	20-06-24 06:15	11.13	12.7
27	20-06-24 06:30	6.93	6.14
28	20-06-24 06:45	4.56	4.35
29	20-06-24 07:00	3.01	1.11
30	20-06-24 07:15	-25.24	-25.25
31	20-06-24 07:30	-35.4	-35.2
32	20-06-24 07:45	-39.07	-38.51
33	20-06-24 08:00	-38.88	-38.78
34	20-06-24 08:15	-30.26	-30.19
35	20-06-24 08:30	-23.88	-22.96
36	20-06-24 08:45	-17.57	-17.71
37	20-06-24 09:00	-13.73	-14.41
38	20-06-24 09:15	-13.02	-13.12
39	20-06-24 09:30	-11.32	-11.31
40	20-06-24 09:45	-7.36	-7.42
41	20-06-24 10:00	-4.54	-4.46
42	20-06-24 10:15	-5.99	-6.4
43	20-06-24 10:30	-6.49	-7.47
44	20-06-24 10:45	-6.91	-6.92
45	20-06-24 11:00	5.99	5.51
46	20-06-24 11:15	2.95	2.52
47	20-06-24 11:30	0.54	0.11
48	20-06-24 11:45	7.04	6.5
49	20-06-24 12:00	12.58	11.84
50	20-06-24 12:15	8.6	7.37
51	20-06-24 12:30	13.15	12.38
52	20-06-24 12:45	15.53	14.99
53	20-06-24 13:00	18.7	18.17
54	20-06-24 13:15	25.07	24.9
55	20-06-24 13:30	26.04	25.18
56	20-06-24 13:45	34.19	33.38
57	20-06-24 14:00	25.25	24.86
58	20-06-24 14:15	23.69	23.51
59	20-06-24 14:30	18.53	18.19
60	20-06-24 14:45	19.23	19.11
61	20-06-24 15:00	16.95	16.28
62	20-06-24 15:15	52.21	52.1
63	20-06-24 15:30	51.15	51.01
64	20-06-24 15:45	50.79	50.42
65	20-06-24 16:00	54.53	54.81
66	20-06-24 16:15	20.39	20.81
67	20-06-24 16:30	10.55	11.22
68	20-06-24 16:45	13.15	12.79
69	20-06-24 17:00	10.34	10.8
70	20-06-24 17:15	8.88	9.58
71	20-06-24 17:30	8.9	8.08
72	20-06-24 17:45	15.22	15.16
73	20-06-24 18:00	18.68	18.77
74	20-06-24 18:15	32.15	31.93
75	20-06-24 18:30	37.49	37.3
76	20-06-24 18:45	35.07	35.16

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
77	20-06-24 19:00	71.85	72.28
78	20-06-24 19:15	80.92	80.81
79	20-06-24 19:30	71.82	71.93
80	20-06-24 19:45	62.73	62.91
81	20-06-24 20:00	50.51	50.28
82	20-06-24 20:15	54.4	54.31
83	20-06-24 20:30	57.82	58.29
84	20-06-24 20:45	61.81	61.36
85	20-06-24 21:00	67.01	66.86
86	20-06-24 21:15	61.15	60.68
87	20-06-24 21:30	45.37	45.04
88	20-06-24 21:45	41.04	41.24
89	20-06-24 22:00	40.1	39.64
90	20-06-24 22:15	47.67	47.35
91	20-06-24 22:30	57.72	56.83
92	20-06-24 22:45	57.61	57.53
93	20-06-24 23:00	58.44	58.05
94	20-06-24 23:15	56.03	55.86
95	20-06-24 23:30	53.39	53.48
96	20-06-24 23:45	55.58	55.86
20..6.2024	**No. of Blocks export**	**81**	**81**
	No. of Blocks Import	**15**	**15**
	Maximum export	**80.92**	**80.81**
	Maximum Import	**-39.07**	**-38.78**
1	21-06-24 00:00	57.06	57.46
2	21-06-24 00:15	54.7	54.57
3	21-06-24 00:30	51.75	51.98
4	21-06-24 00:45	52.84	52.5
5	21-06-24 01:00	57.14	57.34
6	21-06-24 01:15	61.43	61.83
7	21-06-24 01:30	61.97	62.14
8	21-06-24 01:45	65.44	65.67
9	21-06-24 02:00	71.44	71.74
10	21-06-24 02:15	75.54	75.96
11	21-06-24 02:30	77.39	77.09
12	21-06-24 02:45	77.12	77.38
13	21-06-24 03:00	75.5	75.57
14	21-06-24 03:15	73.62	73.27
15	21-06-24 03:30	64.97	65.19
16	21-06-24 03:45	27.42	28.83
17	21-06-24 04:00	36.49	35.46
18	21-06-24 04:15	31.55	32.42
19	21-06-24 04:30	17.86	18.08
20	21-06-24 04:45	46.33	45.18
21	21-06-24 05:00	59.82	59.57
22	21-06-24 05:15	57.74	57.93
23	21-06-24 05:30	57.97	58.65
24	21-06-24 05:45	54.27	54.22
25	21-06-24 06:00	58.55	56.76
26	21-06-24 06:15	53.86	54.02
27	21-06-24 06:30	51.25	51.32
28	21-06-24 06:45	51.66	52.37
29	21-06-24 07:00	37	37.17
30	21-06-24 07:15	28.24	28.42
31	21-06-24 07:30	27.04	26.62

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
32	21-06-24 07:45	33.58	34.05
33	21-06-24 08:00	35.43	36.64
34	21-06-24 08:15	36.39	36.65
35	21-06-24 08:30	36.61	36.45
36	21-06-24 08:45	32.52	32.7
37	21-06-24 09:00	36.95	36.98
38	21-06-24 09:15	55.25	55.26
39	21-06-24 09:30	38.22	38.45
40	21-06-24 09:45	41.55	41.75
41	21-06-24 10:00	52.85	53.67
42	21-06-24 10:15	55.34	55.55
43	21-06-24 10:30	53.4	53.71
44	21-06-24 10:45	52.68	52.53
45	21-06-24 11:00	59.05	58.69
46	21-06-24 11:15	60.14	59.62
47	21-06-24 11:30	34.95	-21.73
48	21-06-24 11:45	0	-241.4
49	21-06-24 12:00	0	-196.15
50	21-06-24 12:15	0	-170.07
51	21-06-24 12:30	0	-162.27
52	21-06-24 12:45	0	-167.76
53	21-06-24 13:00	0	-175.41
54	21-06-24 13:15	0	-169.75
55	21-06-24 13:30	0	-200.01
56	21-06-24 13:45	0	-193.44
57	21-06-24 14:00	0	-202.07
58	21-06-24 14:15	0	-218.61
59	21-06-24 14:30	0	-217.95
60	21-06-24 14:45	0	-200.8
61	21-06-24 15:00	0	-193.04
62	21-06-24 15:15	0	-216.05
63	21-06-24 15:30	0	-212.92
64	21-06-24 15:45	0	-196.51
65	21-06-24 16:00	0	-185.08
66	21-06-24 16:15	0	-164.06
67	21-06-24 16:30	0	-157.7
68	21-06-24 16:45	0	-141.5
69	21-06-24 17:00	0	-130.04
70	21-06-24 17:15	0	-129.69
71	21-06-24 17:30	0	-128.67
72	21-06-24 17:45	0	-130.67
73	21-06-24 18:00	0	-118.07
74	21-06-24 18:15	0	-116.61
75	21-06-24 18:30	0	-113.88
76	21-06-24 18:45	0	-111.12
77	21-06-24 19:00	0	-102.24
78	21-06-24 19:15	0	-91.69
79	21-06-24 19:30	0	-59.31
80	21-06-24 19:45	0	-47.75
81	21-06-24 20:00	0	-43.08
82	21-06-24 20:15	0	-95.91
83	21-06-24 20:30	0	-105.32
84	21-06-24 20:45	0	-105.27
85	21-06-24 21:00	0	-107.11
86	21-06-24 21:15	0	-106.69

S. No.	Time	KTPS	KTPS
		KOTA PG-1	KOTA PG-2
		220KV	220KV
	HRS	MW	MW
87	21-06-24 21:30	0	-104.13
88	21-06-24 21:45	0	-105.1
89	21-06-24 22:00	0	-104.05
90	21-06-24 22:15	0	-91.45
91	21-06-24 22:30	0	-93.63
92	21-06-24 22:45	0	-110.82
93	21-06-24 23:00	0	-112.66
94	21-06-24 23:15	0	-87.9
95	21-06-24 23:30	0	-33.09
96	21-06-24 23:45	0	11.47
21..6.2024	**No. of Blocks export**	**47**	**47**
	No. of Blocks Import	**0**	**49**
	Maximum export	**77.39**	**77.38**
	Maximum Import	**0**	**-241.4**

Annexure-B

Max. / Minimum Power Exports/Imports on 220 kV D/C KTPS-Kota(PG) line from 21.5.2024 to 21.6.2024

S. No.	Date	No. of Blocks Export	No. of Blocks Import	Maximum Export (MW)	Maximum Import(MW)
1	21.5.2024	80	16	204.22	-87.76
2	22.5.2024	96	0	169.3	0
3	23.5.2024	95	1	85.15	-1.71
4	24.5.2024	91	5	75.54	-23.7
5	25.5.2024	13	83	33.92	-164.72
6	26.5.2024	24	72	94.02	-243.56
7	27.5.2024	32	64	108.22	-156.48
8	28.5.2024	44	52	166.64	-164.48
9	29.5.2024	64	32	133.86	-70.88
10	30.5.2024	67	29	122.08	-132.38
11	31.5.2024	31	65	113.84	-174.04
12	1.6.2024	57	39	179.4	-47.16
13	2.6.2024	39	57	115.44	-142.32
14	3.6.2024	85	11	163.14	-80.28
15	4.6.2024	81	15	191.94	-42.68
16	5.6.2024	87	9	159.04	-41.3
17	6.6.2024	51	45	170.24	-90.64
18	7.6.2024	89	7	272.82	-39.44
19	8.6.2024	96	0	211.54	0
20	9.6.2024	69	27	139.84	-65.36
21	10.6.2024	78	18	194.64	-64.28
22	11.6.2024	91	5	222.98	-14.3
23	12.6.2024	95	1	185.66	-7.54
24	13.6.2024	93	3	192.08	-14.84
25	14.6.2024	89	7	124.3	-28.44
26	15.6.2024	92	4	146.58	-19.8
27	16.6.2024	96	0	180.8	0
28	17.6.2024	94	2	171.68	-2.1
29	18.6.2024	87	9	174.16	-63.4
30	19.6.2024	96	0	162.06	0
31	20.6.2024	81	15	161.84	-78.14
32	21.6.2024	47	49	154.76	-241.4
	Total	2330	742		
	Maximum			272.82	-243.56

Annexure-C

5 nos. Conditions of maximum Power EXPORT & IMPORT On 220 kV D/C KTPS-Kota(PG) line from 21.5.2024 to 21.6.2024

S. No.	Date	Time (Hrs)	Maximum Export / Import (-) (MW)	KTPS GEN (IC : 1240 MW, Net Available : 1116 MW)			Raj Demand (MW)	Solar (MW)	Generation at KTPS
				MW	%	Generation less than from Net available			
A	Maximum Export								
1	7.6.2024	19:30-19:45	272.82	1064.71	86	51	12200	0	All units are in operation
2	11.6.2024	19:15-19:30	222.98	1039.33	84	77	12842	15	
3	8.6.2024	19:15-19:30	211.54	1076.5	87	40	12471	17	
4	21.5.2024	22:00-22:15	204.22	1096	88	20	13512	0	
5	10.6.2024	19:15-19:30	194.64	1049.58	85	66	12644	22	
B	Maximum Import								
1	26.5.2024	10:45-11:00	-243.56	712.49	57	404	16289	3376	All units are in operation and running on backdown.
2	21.6.2024	11:45-12:00	-241.4	211.26	17	905	15344	3376	KTPS unit#1(110 MW) , unit #3 (210MW), unit #4 (210MW), unit #5, (210MW),unit #7 (210MW) tripped at 11:39 Hrs dt. 21.06.24 due to electrical fault. In the event Following lines tripped at KTPS :- 1. one circuit of 220 kV D/C KTPS-Kota(PG) line (ckt-1) 2. KTPS-Bundi line 3. KTPS-Ranpur line 4. KTPS-Sakatpura Interconnector-3
3	31.5.2024	9:45-10:00	-174.04	849.15	68	267	16994	3059	KTPS unit #6 (195 MW) tripped at 2.23 hrs dt 31.05.24 due to suspected BTL.
4	25.5.2024	10:30-10:45	-164.72	727.56	59	388	17242	3136	KTPS unit #3 (210MW) tripped at 22.10 hrs dt 24.05.24 due to suspected BTL.
5	28.5.2024	6:30-6:45	-164.48	877.43	71	239	14731	179	All units are in operation and running on backdown.

Annexure-1

Power flow (MW) in various contingencies at KTPS switchyard

S. No.	Name of line	Base Case	Contingency at KTPS							
			Cont-1	Cont-2	Cont-3	Cont-4	Cont-5	Cont-6	Cont-7	Cont-7
		Case-1	Case-1A	Case-1B	Case-1C	Case-1D	Case-1E	Case-1F	Case-1G	Case-1G
			Outage of unit-3 (210 MW) at KTPS	Outage of unit-3&4 (2X210 MW) at KTPS	Outage of Interconnector-1 between KTPS and Sakatpura(Bus-A)					
A	**KTPS switchyard**									
1	220 kV S/C KTPS-Heerapura line	84	71	57	84					
2	220 kV S/C KTPS-Beawar line	85	76	67	86					
3	220 kV S/C KTPS-Bundi line	161	154	146	161					
4	220 kV S/C KTPS-Ranpur line	142	141	140	142					
5	220 kV S/C KTPS-Vatika line	Under S/D	Under S/D	Under S/D	Under S/D	Under S/D	Under S/D	Under S/D	Under S/D	Under S/D
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	124	112	101	OUT					
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	141	128	114	196					
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	147	133	120	179					
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	170	154	139	207					
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	30	-21	-73	31					
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	30	-21	-73	31					
B	**RAPP(A) switchyard**									
1	220 kV S/C RAPP(A)-Debari line	84	83	83	84					
2	220 kV S/C RAPP(A)-RAPP(B) line	122	105	88	121					
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	-13	-4	5	-12					
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	-13	-4	4	-13					
C	**RAPP(B) switchyard**									
1	220 kV S/C RAPP(B)-Debari line	78	78	79	78					
2	220 kV S/C RAPP(B)-RAPP(A) line	-122	-105	-88	-121					
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	51	49	46	51					
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	51	49	46	51					
5	220 kV S/C RAPP(B)-Sakatpura line	-29	-17	-6	-29					
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	84	72	60	84					
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	84	72	60	84					
D	**220 kV GSS Sakatpura**									
	220 kV Bus-A									
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	13	4	-4	13					
2	220 kV S/C Sakatpura-KTPS interconnector-1	-124	-112	-101	OUT					
3	220 kV S/C Sakatpura-KTPS interconnector-3	-141	-128	-114	-196					
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	84	83	82	83					
5	B/S between A& B-Closed	169	153	137	99					
6	B/C between A& D-Opened	open	open	open	open	open	open	open	open	open
	220 kV Bus-B									
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	13	4	-5	12					
2	220 kV S/C Sakatpura-Mandalgarh line	125	116	107	125					
3	B/S between B& A-Closed	-169	-153	-137	-99					
4	B/C between B& C-Closed	31	33	35	-38					
	220 kV Bus-C									
1	220 kV S/C Sakatpura-KTPS interconnector-2	-147	-133	-120	-179					
2	220 kV S/C Sakatpura-KTPS interconnector-4	-170	-154	-139	-207					
3	220 kV S/C Sakatpura-RAPP(B) line	29	17	6	29					
4	220 kV S/C Sakatpura-Anta GTPS line	163	149	136	163					
5	B/C between C& B-Closed	-31	-33	-35	38					
6	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	90	89	88	90					
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	66	65	64	66					
	220 kV Bus-D									
1	220 kV S/C Sakatpura-Ranpur line	-141	-140	-139	-141					
2	220 kV S/C Sakatpura-Dahra line	108	108	108	108					
3	220/132 kV Trf-4 (100 MVA) to 132 kV Bus-A	33	32	31	33					
4	B/C between A& D-Opened	open	open	open	open	open	open	open	open	open

Annexure-2

Power flow (MW) in various contingencies at RAPP(A) switchyard

S. No.	Name of line	Base Case	Contingency at KTPS		
			Cont-1	Cont-2	Cont-3
		Case-1	Case-1I	Case-1J	Case-1K
			Outage of 220 kV S/C RAPP(A)-Debari line	Outage of 220 kV S/C RAPP(A)-RAPP(B) line	Outage of 220 kV D/C RAPP(A)-Sakatpura line
A	**KTPS switchyard**				
1	220 kV S/C KTPS-Heerapura line	84	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow
2	220 kV S/C KTPS-Beawar line	85			
3	220 kV S/C KTPS-Bundi line	161			
4	220 kV S/C KTPS-Ranpur line	142			
5	220 kV S/C KTPS-Vatika line	Under S/D			
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	124			
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	141			
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	147			
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	170			
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	30	30	40	33
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	30	30	40	33
B	**RAPP(A) switchyard**				
1	220 kV S/C RAPP(A)-Debari line	84	OUT	96	83
2	220 kV S/C RAPP(A)-RAPP(B) line	122	199	OUT	97
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	-13	-9	42	OUT
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	-13	-10	42	OUT
C	**RAPP(B) switchyard**				
1	220 kV S/C RAPP(B)-Debari line	78	167	66	78
2	220 kV S/C RAPP(B)-RAPP(A) line	-122	-199	-	-97
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	51	50	41	49
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	51	50	41	49
5	220 kV S/C RAPP(B)-Sakatpura line	-29	-35	-95	-44
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	84	82	72	49
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	84	82	72	49
D	**220 kV GSS Sakatpura**				
	220 kV Bus-A				
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	13	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow
2	220 kV S/C Sakatpura-KTPS interconnector-1	-124			
3	220 kV S/C Sakatpura-KTPS interconnector-3	-141			
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	84			
5	B/S between A& B-Closed	169			
6	B/C between A& D-Opened	open			
	220 kV Bus-B				
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	13			
2	220 kV S/C Sakatpura-Mandalgarh line	125			
3	B/S between B& A-Closed	-169			
4	B/C between B& C-Closed	31			
	220 kV Bus-C				
1	220 kV S/C Sakatpura-KTPS interconnector-2	-147			
2	220 kV S/C Sakatpura-KTPS interconnector-4	-170			
3	220 kV S/C Sakatpura-RAPP(B) line	29			
4	220 kV S/C Sakatpura-Anta GTPS line	163			
5	B/C between C& B-Closed	-31			
6	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	90			
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	66			
	220 kV Bus-D				
1	220 kV S/C Sakatpura-Ranpur line	-141			
2	220 kV S/C Sakatpura-Dahra line	108			
3	220/132 kV Trf-4 (100 MVA) to 132 kV Bus-A	33			
4	B/C between A& D-Opened	open			

Annexure3

Power flow (MW) in various contingencies at RAPP(B) switchyard

S. No.	Name of line	Base Case	Contingency at RAPP(B)			
			Cont-12	Cont-13	Cont-14	Cont-15
		Case-1	Case-1L	Case-1M	Case-1N	Case-10
			Outage of 220 kV S/C RAPP(B)-Debari line	Outage of 220 kV S/C RAPP(B)-Sakatpura line	Outage of 220 kV D/C RAPP(B)-Chhitorgarh line	Outage of 220 kV D/C RAPP(B)-RAPP(C) line
A	**KTPS switchyard**					
1	220 kV S/C KTPS-Heerapura line	84	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow
2	220 kV S/C KTPS-Beawar line	85				
3	220 kV S/C KTPS-Bundi line	161				
4	220 kV S/C KTPS-Ranpur line	142				
5	220 kV S/C KTPS-Vatika line	Under S/D				
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	124				
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	141				
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	147				
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	170				
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	30	29	32	72	39
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	30	29	32	72	39
B	**RAPP(A) switchyard**					
1	220 kV S/C RAPP(A)-Debari line	84	166	84	83	83
2	220 kV S/C RAPP(A)-RAPP(B) line	122	49	142	38	72
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	-13	-18	-23	30	13
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	-13	-18	-23	30	12
C	**RAPP(B) switchyard**					
1	220 kV S/C RAPP(B)-Debari line	78	OUT	78	78	79
2	220 kV S/C RAPP(B)-RAPP(A) line	-122	-49	-141	-38	-72
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	51	52	49	65	OUT
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	51	52	49	65	OUT
5	220 kV S/C RAPP(B)-Sakatpura line	-29	-25	OUT	27	5
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	84	84	82	OUT	93
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	84	84	82	OUT	93
D	**220 kV GSS Sakatpura**					
	220 kV Bus-A					
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	13	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow
2	220 kV S/C Sakatpura-KTPS interconnector-1	-124				
3	220 kV S/C Sakatpura-KTPS interconnector-3	-141				
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	84				
5	B/S between A& B-Closed	169				
6	B/C between A& D-Opened	open				
	220 kV Bus-B					
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	13				
2	220 kV S/C Sakatpura-Mandalgarh line	125				
3	B/S between B& A-Closed	-169				
4	B/C between B& C-Closed	31				
	220 kV Bus-C					
1	220 kV S/C Sakatpura-KTPS interconnector-2	-147				
2	220 kV S/C Sakatpura-KTPS interconnector-4	-170				
3	220 kV S/C Sakatpura-RAPP(B) line	29				
4	220 kV S/C Sakatpura-Anta GTPS line	163				221
5	B/C between C& B-Closed	-31				Minimal change in power flow
6	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	90				
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	66				
	220 kV Bus-D					
1	220 kV S/C Sakatpura-Ranpur line	-141				
2	220 kV S/C Sakatpura-Dahra line	108				
3	220/132 kV Trf-4 (100 MVA) to 132 kV Bus-A	33				
4	B/C between A& D-Opened	open				

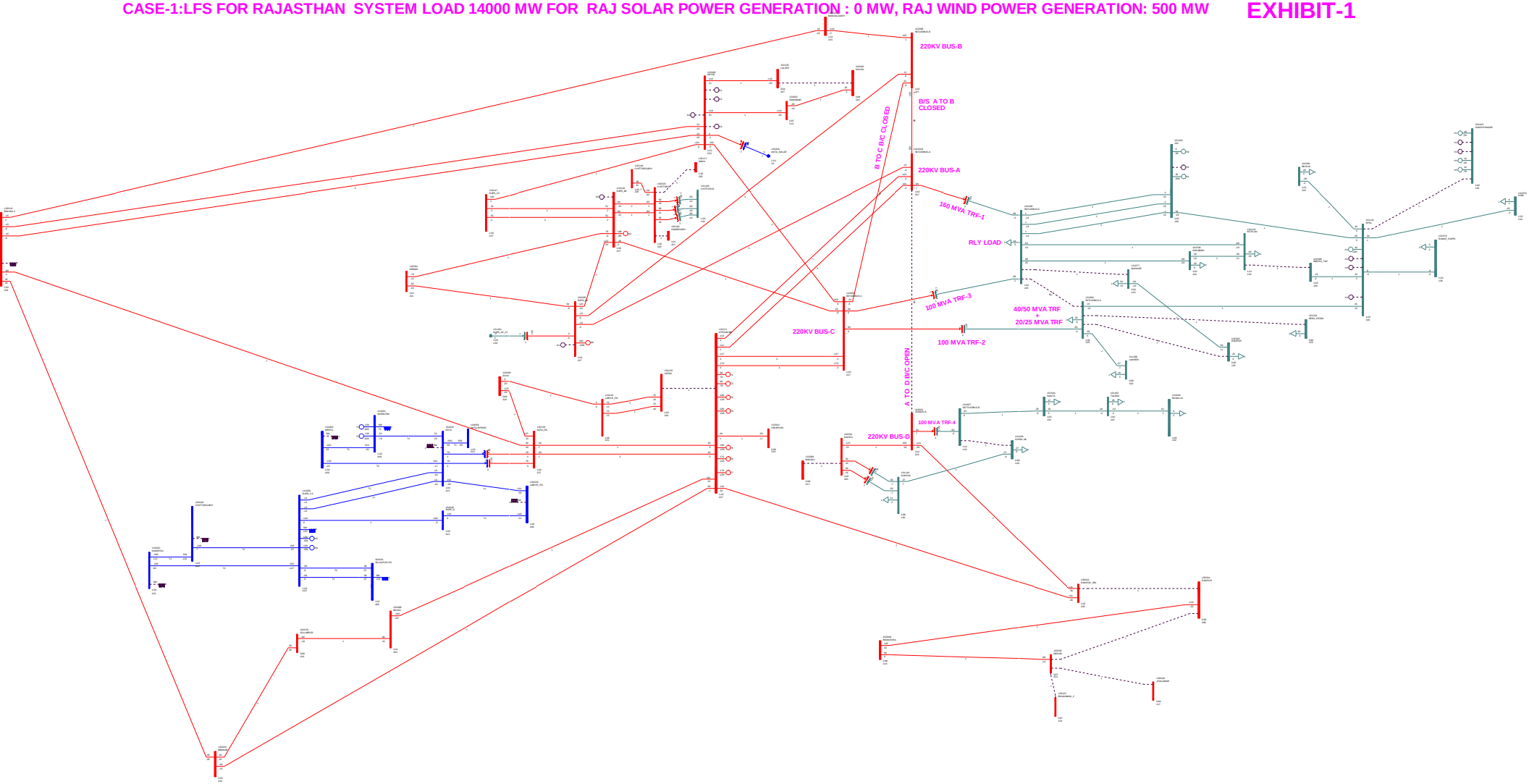
Annexure-4

Power flow (MW) in various contingencies at Kota(PG)) switchyard

S. No.	Name of line	Base Case	Contingency at Kota(PG)					
			Cont-16	Cont-17	Cont-18	Cont-19	Cont-20	Cont-21
		Case-1	Case-16	Case-17	Case-18	Case-19	Case-20	Case-21
			Outage of one 315 MVA, 400/220 kV transformer at Kota(PG)	Outage of 220 kV S/C Kota(PG)-Bhilwara line	Outage of 220 kV S/C Kota(PG)-Duni line	Outage of 400 kV S/C Kota(PG)-Anta –Chhabra TPS line	Outage of 400 kV S/C Kota(PG)-Jaipur(PG) line	Outage of 400 kV S/C Kota(PG)-Merta line
A	**KTPS switchyard**							
1	220 kV S/C KTPS-Heerapura line	84	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow
2	220 kV S/C KTPS-Beawar line	85						
3	220 kV S/C KTPS-Bundi line	161						
4	220 kV S/C KTPS-Ranpur line	142						
5	220 kV S/C KTPS-Vatika line	Under S/D						
6	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-1	124						
7	220 kV S/C KTPS-Sakatpura(bus-A) interconnector-3	141						
8	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-2	147						
9	220 kV S/C KTPS-Sakatpura (bus-C) interconnector-4	170						
10	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-1)	30	48	4	2	66	26	23
11	220 kV D/C KTPS-Kota(PG) line (400 kV line charged at 220 kV) (Ckt-2)	30	48	4	2	66	26	23
B	**RAPP(A) switchyard**							
1	220 kV S/C RAPP(A)-Debari line	84	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow
2	220 kV S/C RAPP(A)-RAPP(B) line	122						
3	220 kV D/C RAPP(A)-Sakatpura line (ckt-I)	-13						
4	220 kV D/C RAPP(A)-Sakatpura line (ckt-II)	-13						
C	**RAPP(B) switchyard**							
1	220 kV S/C RAPP(B)-Debari line	78	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow
2	220 kV S/C RAPP(B)-RAPP(A) line	-122						
3	220 kV D/C RAPP(B)-RAPP(C) line (ckt-I)	51						
4	220 kV D/C RAPP(B)-RAPP(C) line (ckt-II)	51						
5	220 kV S/C RAPP(B)-Sakatpura line	-29						
6	220 kV D/C RAPP(B)-Chittorgarh line (ckt-I)	84						
7	220 kV D/C RAPP(B)-Chittorgarh line (ckt-II)	84						
D	**220 kV GSS Sakatpura**							
	220 kV Bus-A		Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow	Minimal change in power flow
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-I)	13						
2	220 kV S/C Sakatpura-KTPS interconnector-1	-124						
3	220 kV S/C Sakatpura-KTPS interconnector-3	-141						
4	220/132 kV Trf-1 (160 MVA) to 132 kV Bus-C	84						
5	B/S between A& B-Closed	169						
6	B/C between A& D-Opened	open						
	220 kV Bus-B							
1	220 kV D/C Sakatpura-RAPP(A) line(Ckt-II)	13						
2	220 kV S/C Sakatpura-Mandalgarh line	125						
3	B/S between B& A-Closed	-169						
4	B/C between B& C-Closed	31						
	220 kV Bus-C							
1	220 kV S/C Sakatpura-KTPS interconnector-2	-147						
2	220 kV S/C Sakatpura-KTPS interconnector-4	-170						
3	220 kV S/C Sakatpura-RAPP(B) line	29						
4	220 kV S/C Sakatpura-Anta GTPS line	163						
5	B/C between C& B-Closed	-31						
6	220/132 kV Trf-2 (100 MVA) to 132 kV Bus-A	90						
7	220/132 kV Trf-3 (100 MVA) to 132 kV Bus-C	66						
	220 kV Bus-D							
1	220 kV S/C Sakatpura-Ranpur line	-141						
2	220 kV S/C Sakatpura-Dahra line	108						
3	220/132 kV Trf-4 (100 MVA) to 132 kV Bus-A	33						
4	B/C between A& D-Opened	open						

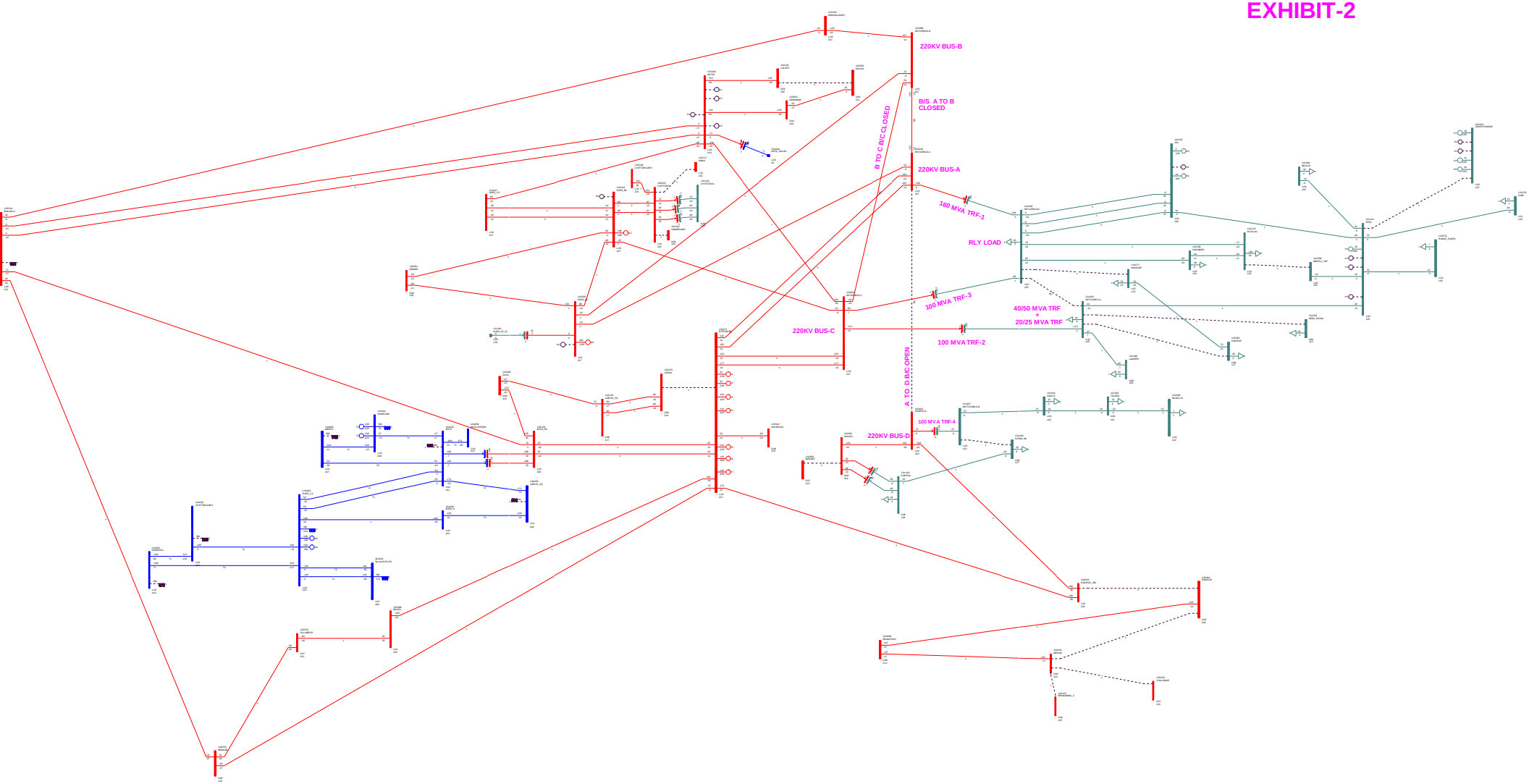
CASE-1:LFS FOR RAJASTHAN SYSTEM LOAD 14000 MW FOR RAJ SOLAR POWER GENERATION : 0 MW, RAJ WIND POWER GENERATION: 500 MW

EXHIBIT-1



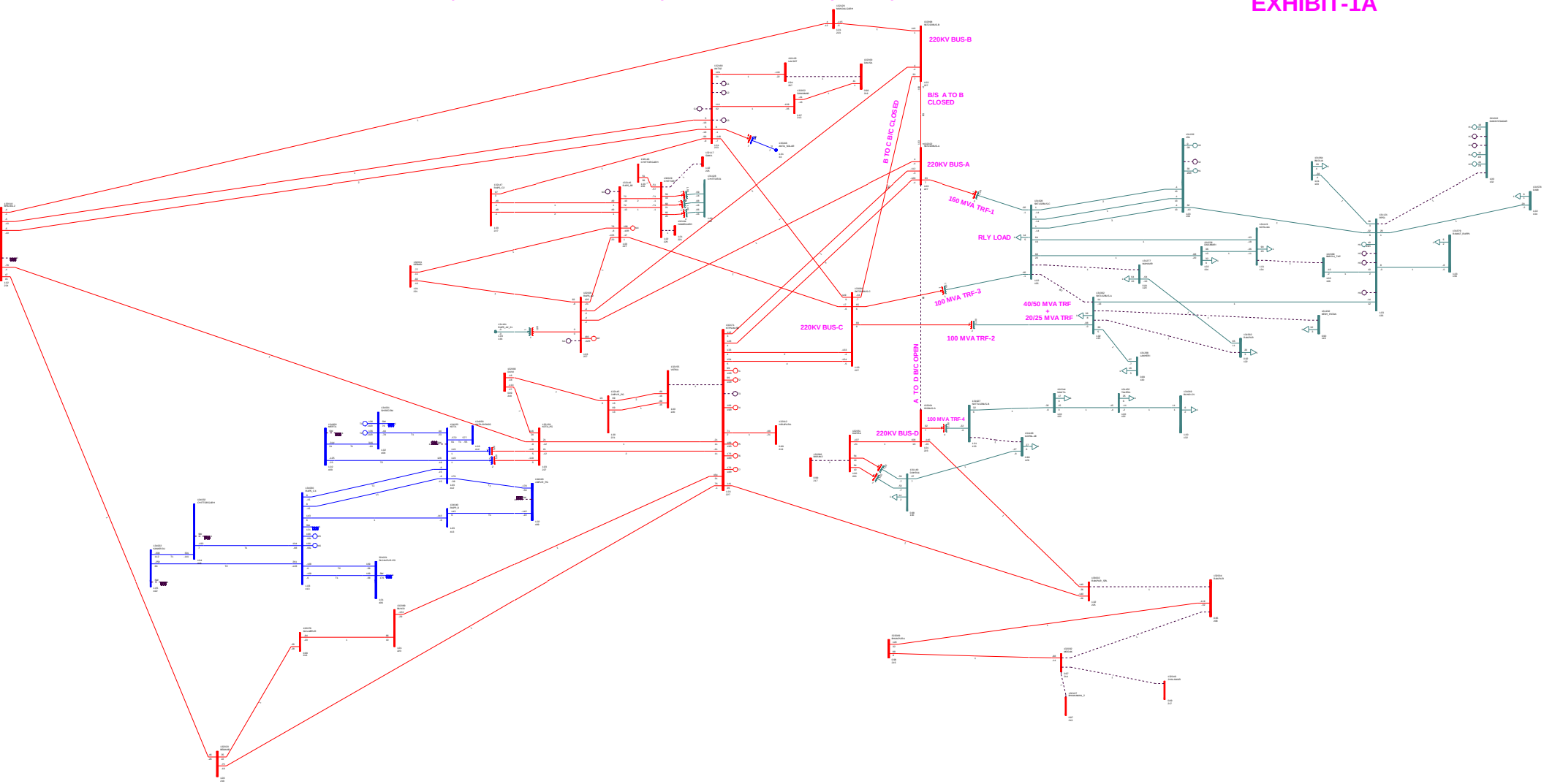
CASE-2:LFS FOR RAJASTHAN SYSTEM LOAD 17000 MW FOR RAJ SOLAR POWER GENERATION : 3864 MW, RAJ WIND POWER GENERATION: 500 MW

EXHIBIT-2



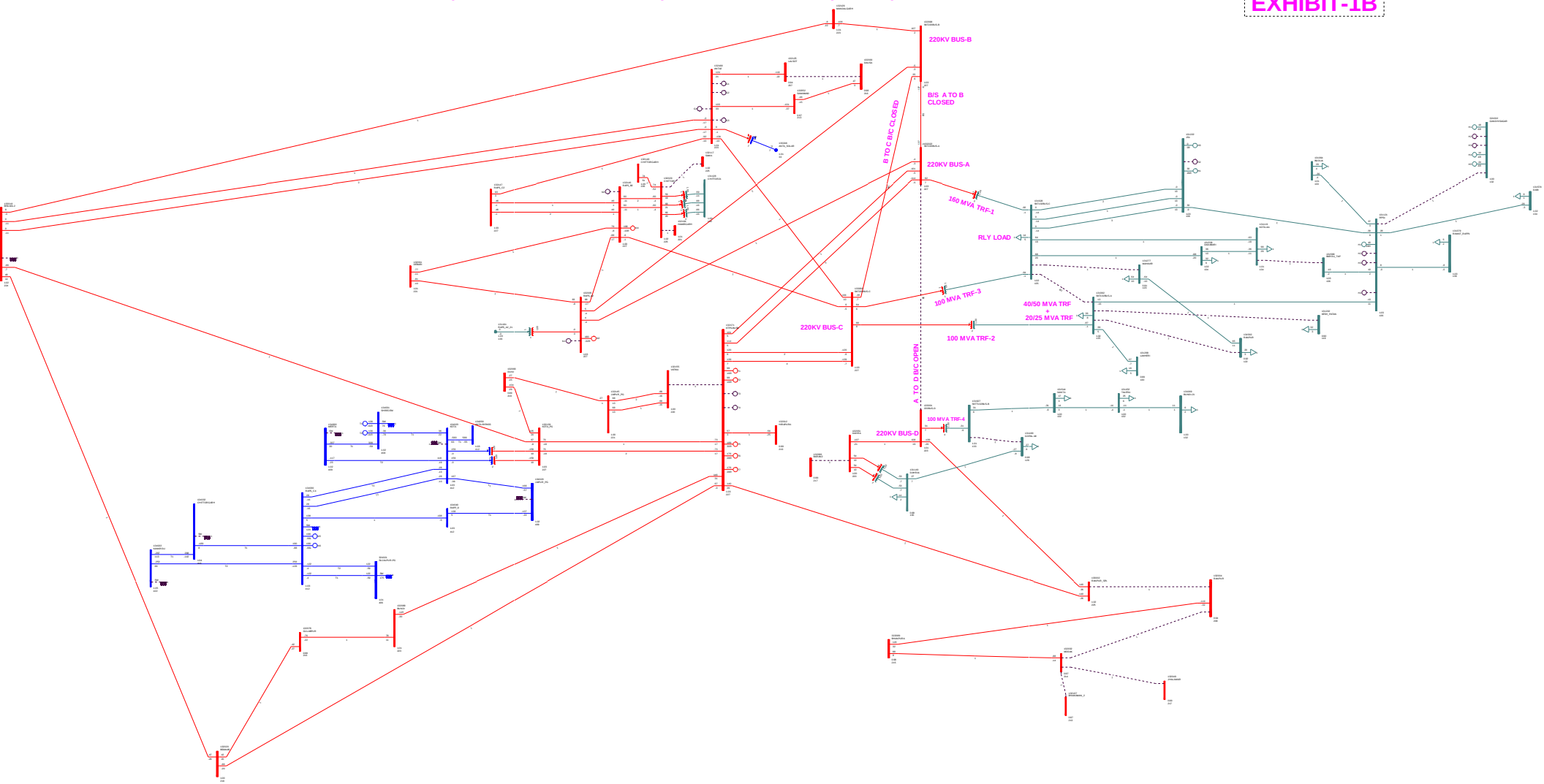
CASE-1A (CONTINGENCY-1 IN CASE-1) : OUTAGE OF UNIT-3 (210 MW) AT KTPS

EXHIBIT-1A



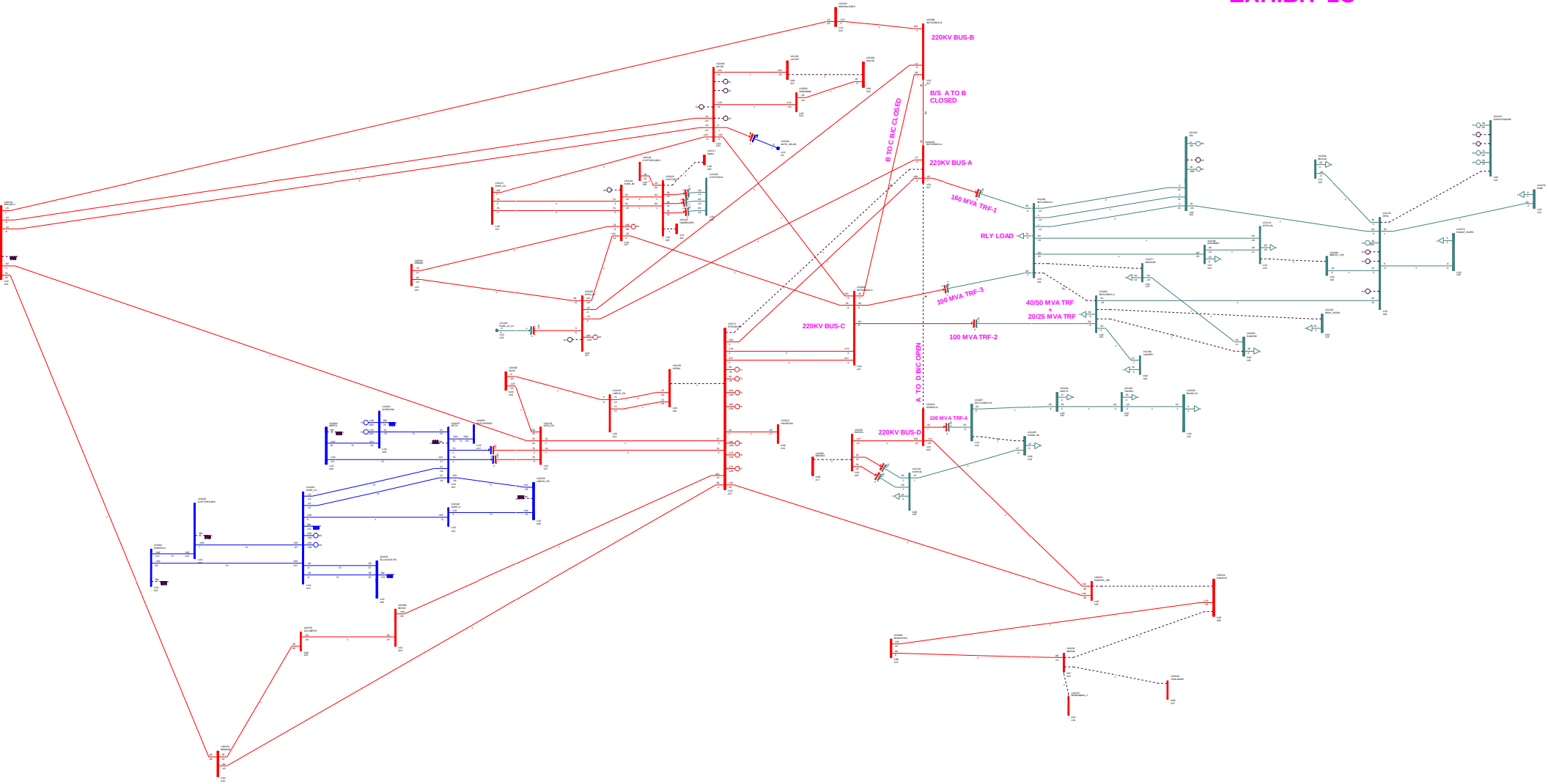
CASE-1B (CONTINGENCY-2 IN CASE-1) : OUTAGE OF UNIT-3 (210 MW) AT KTPS

EXHIBIT-1B



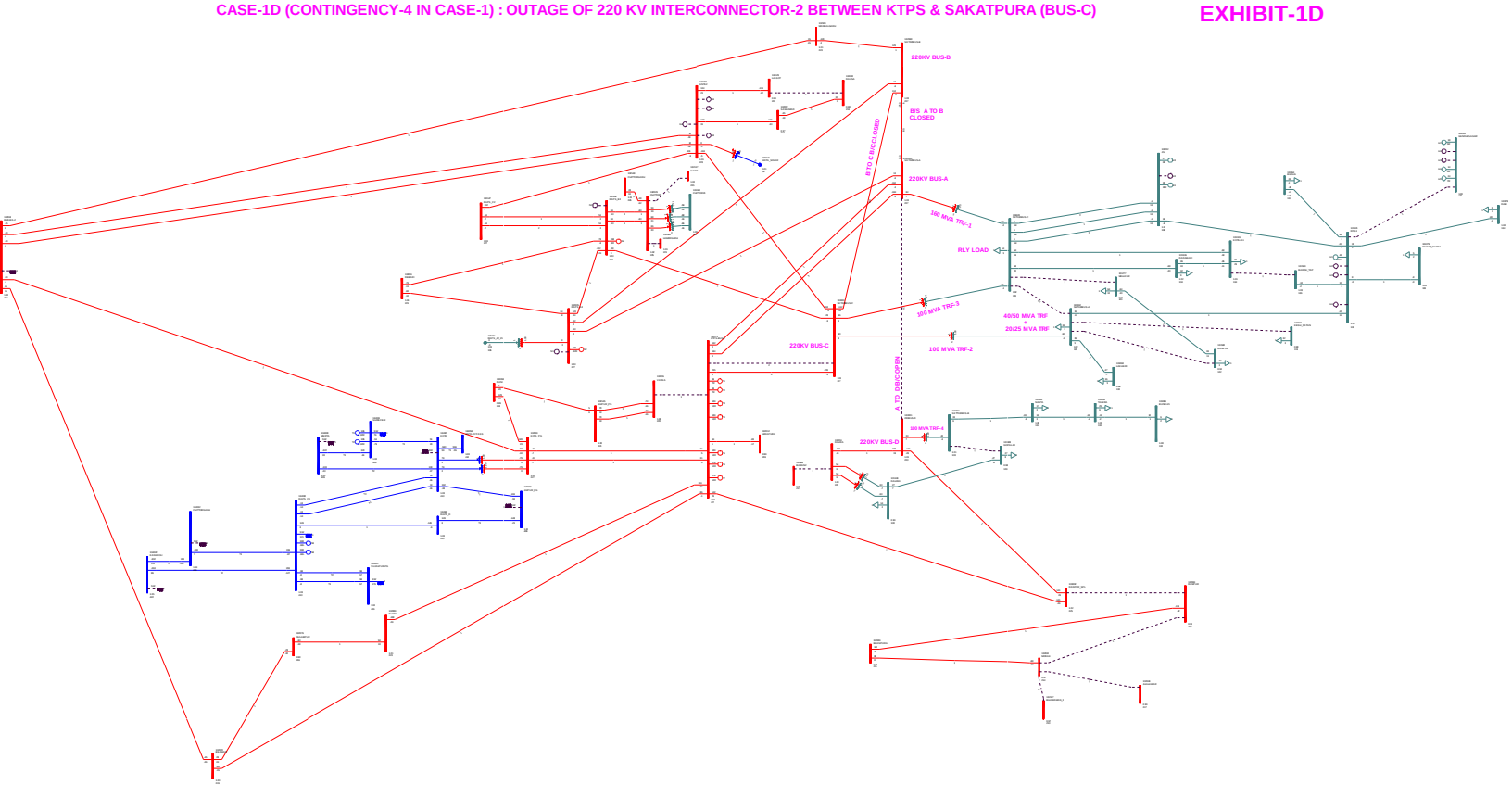
CASE-1C (CONTINGENCY-3 IN CASE-1) : OUTAGE OF 220 KV INTERCONNECTOR-1 BETWEEN KTPS & SAKATPURA (BUS-A)

EXHIBIT-1C



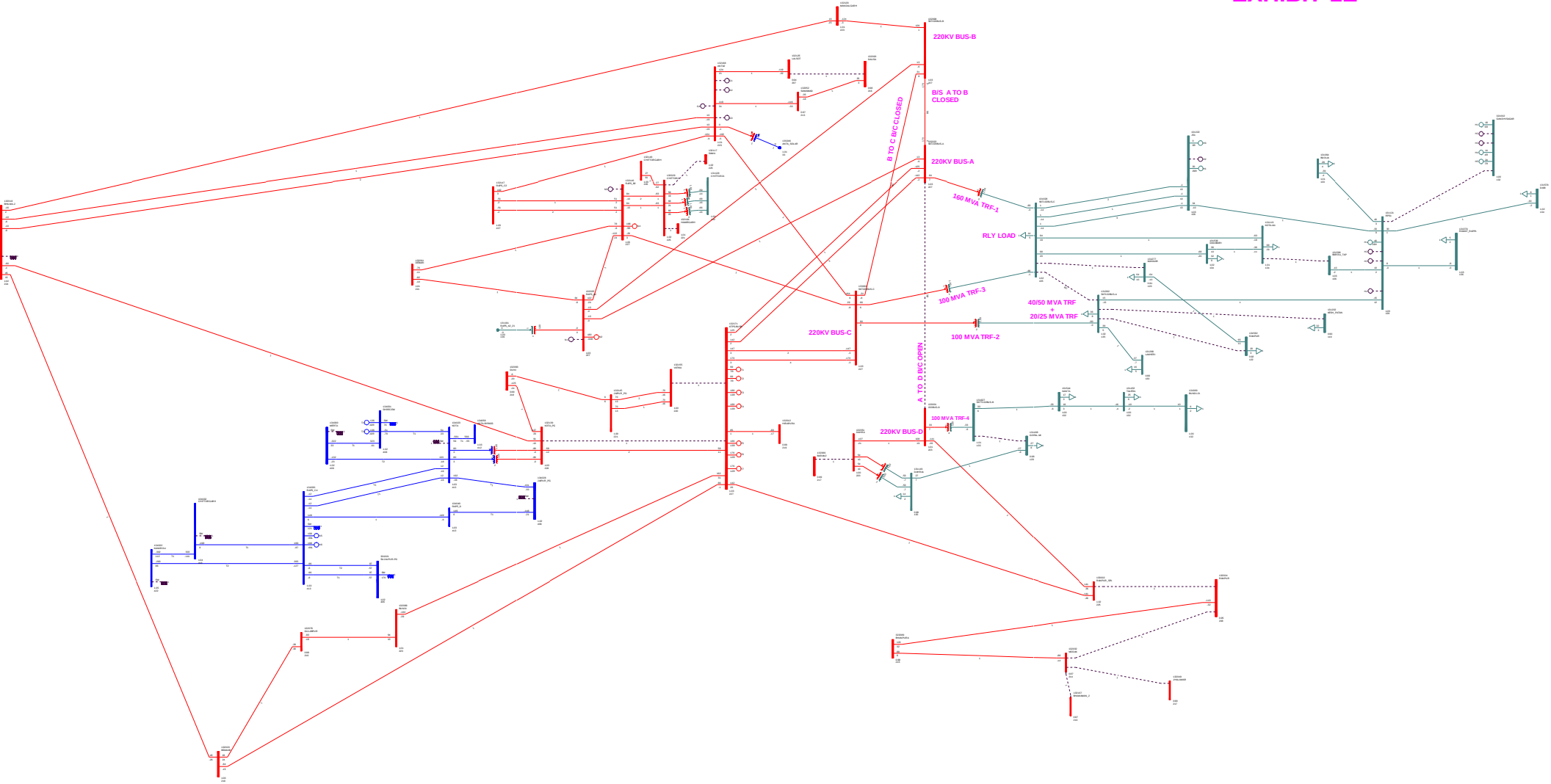
CASE-1D (CONTINGENCY-4 IN CASE-1) : OUTAGE OF 220 KV INTERCONNECTOR-2 BETWEEN KTPS & SAKATPURA (BUS-C)

EXHIBIT-1D



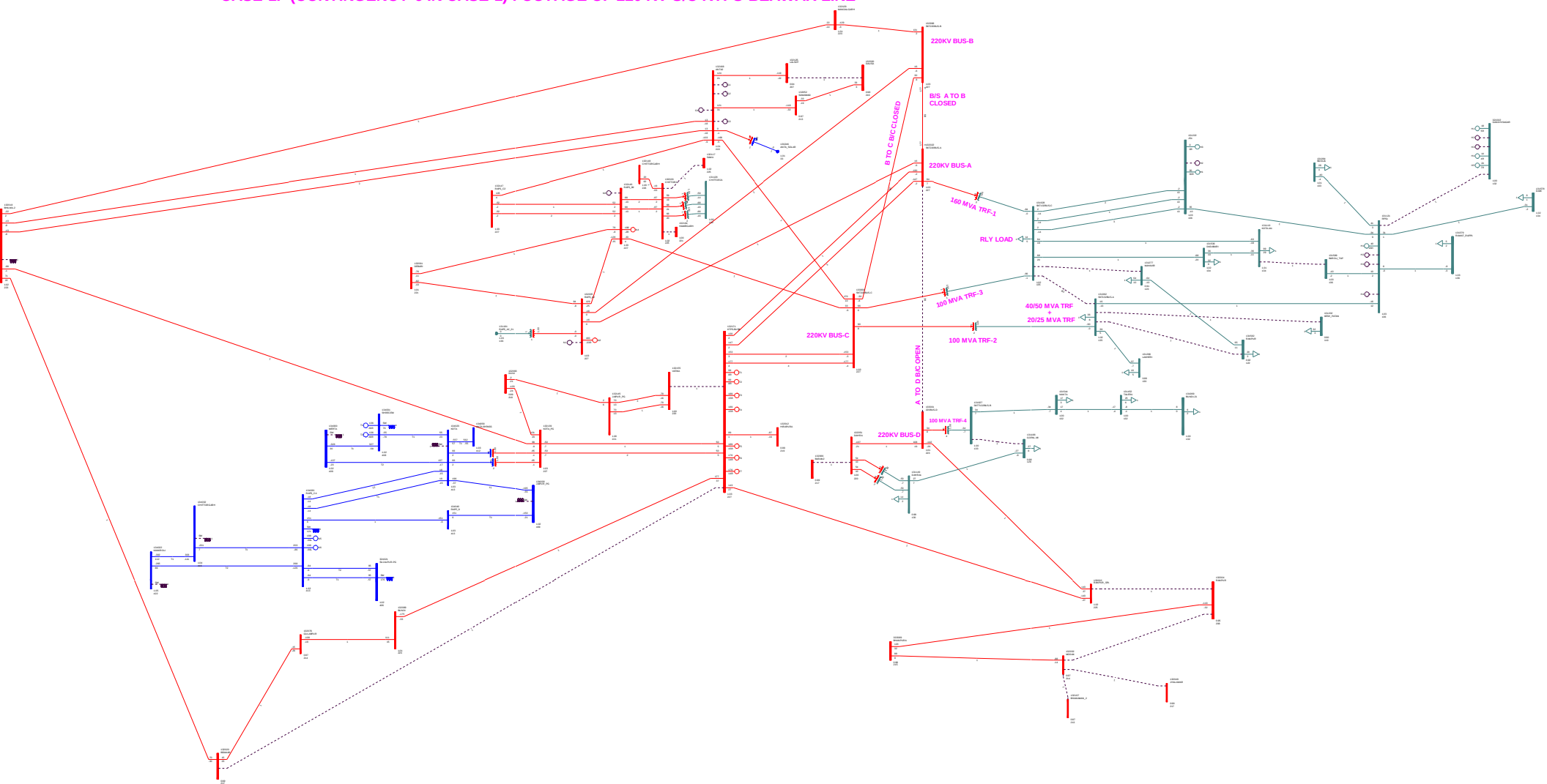
CASE-1E (CONTINGENCY-5 IN CASE-1) : OUTAGE OF ONE CIRCUIT OF 220 KV D/C KTPS-KOTA(PG) LINE

EXHIBIT-1E



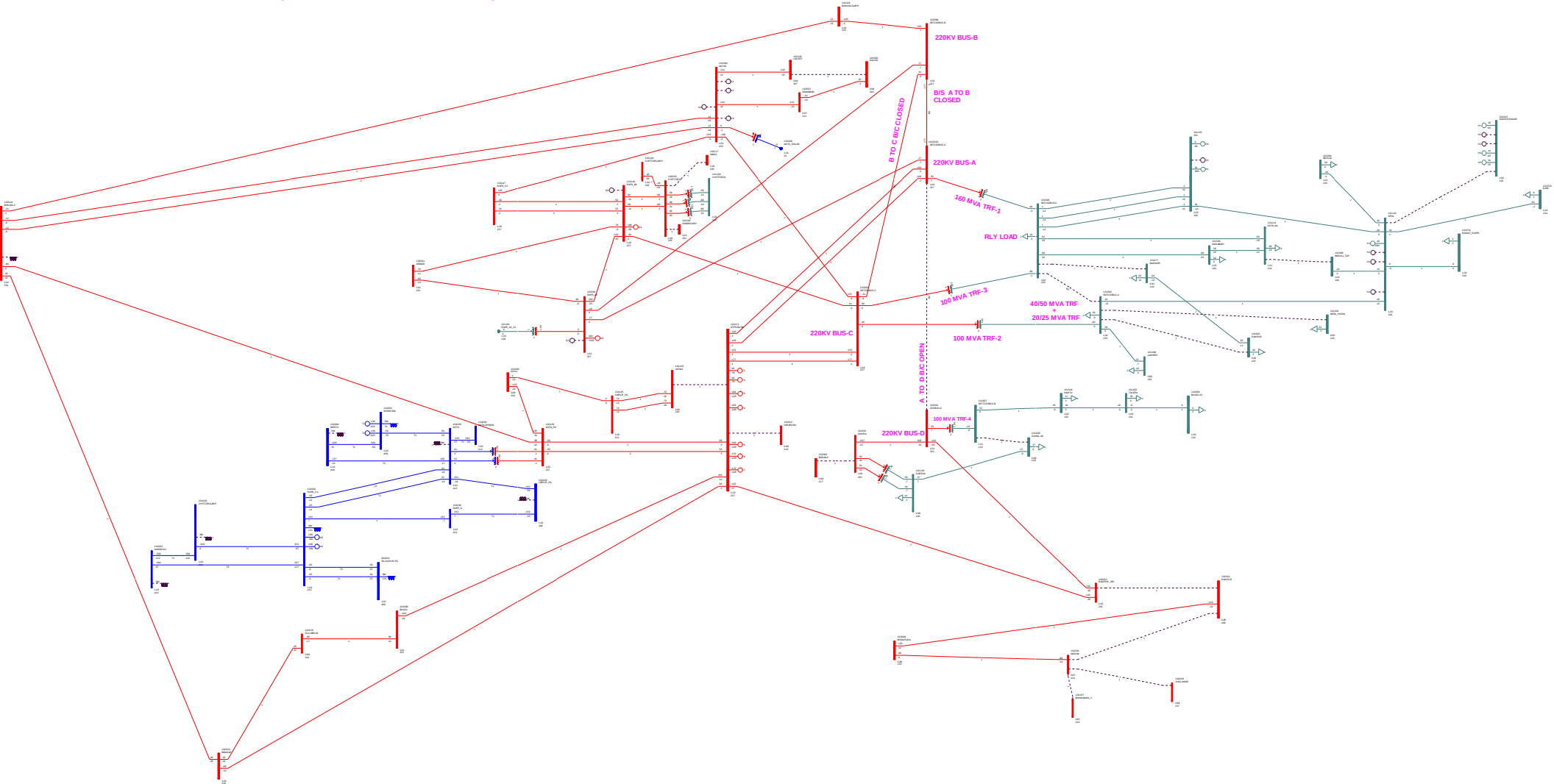
CASE-1F (CONTINGENCY-6 IN CASE-1) : OUTAGE OF 220 KV S/C KTPS-BEAWAR LINE

EXHIBIT-1F



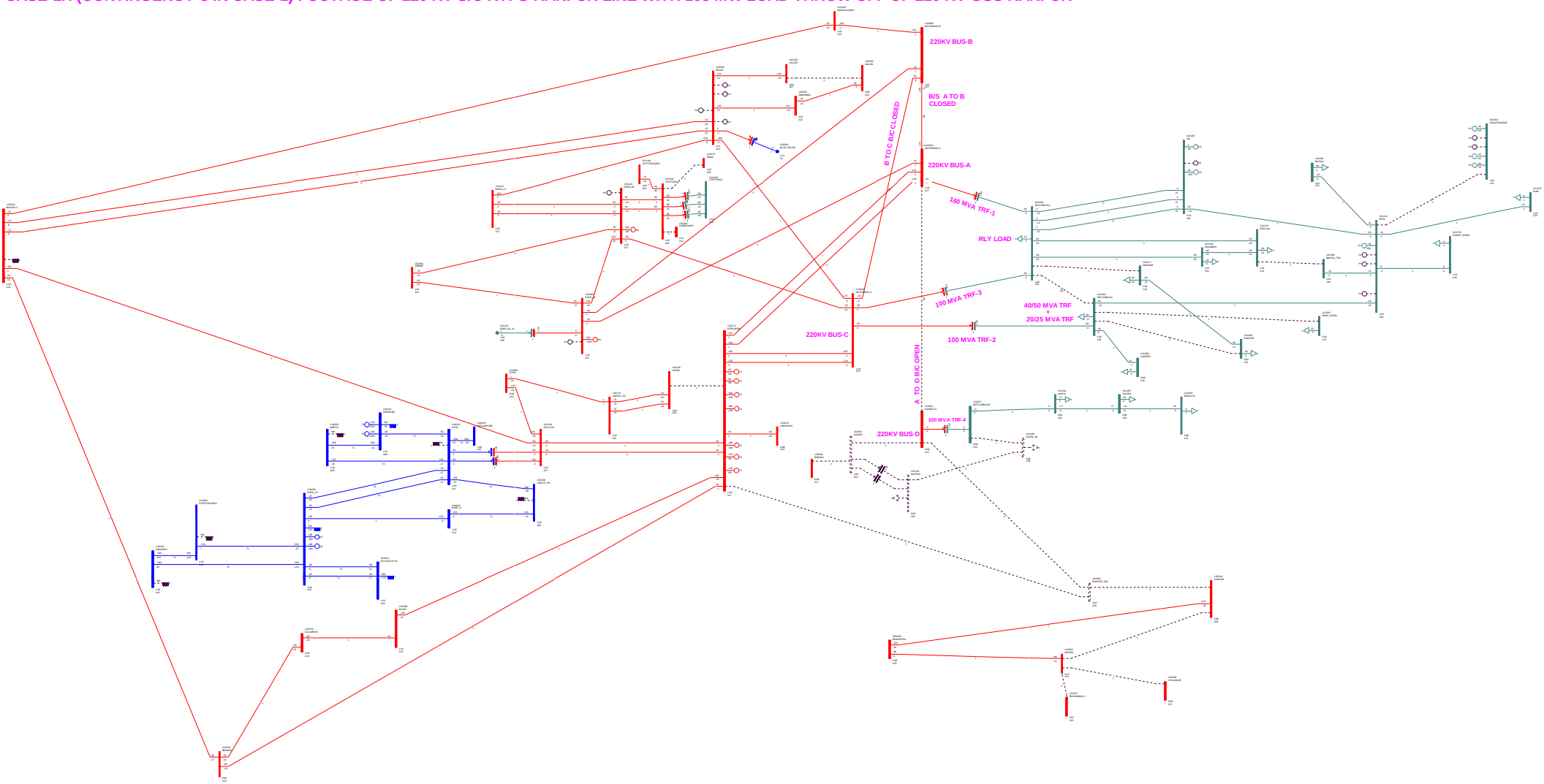
CASE-1G (CONTINGENCY-7 IN CASE-1) : OUTAGE OF 220 KV S/C KTPS-HEERAPURA LINE

EXHIBIT-1G



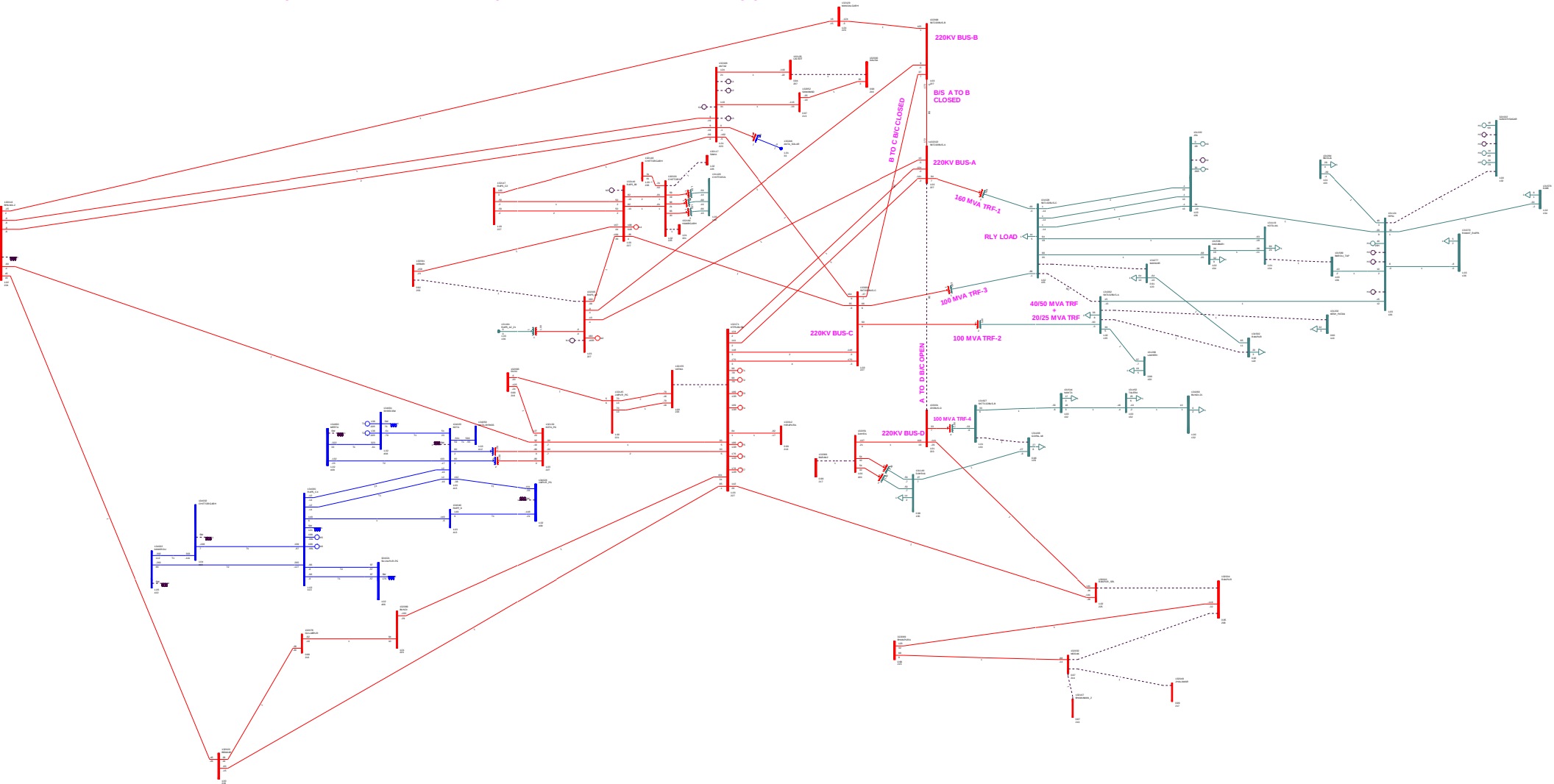
CASE-1H (CONTINGENCY-8 IN CASE-1) : OUTAGE OF 220 KV S/C KTPS-RANPUR LINE WITH 108 MW LOAD THROW OFF OF 220 KV GSS RANPUR

EXHIBIT-1H



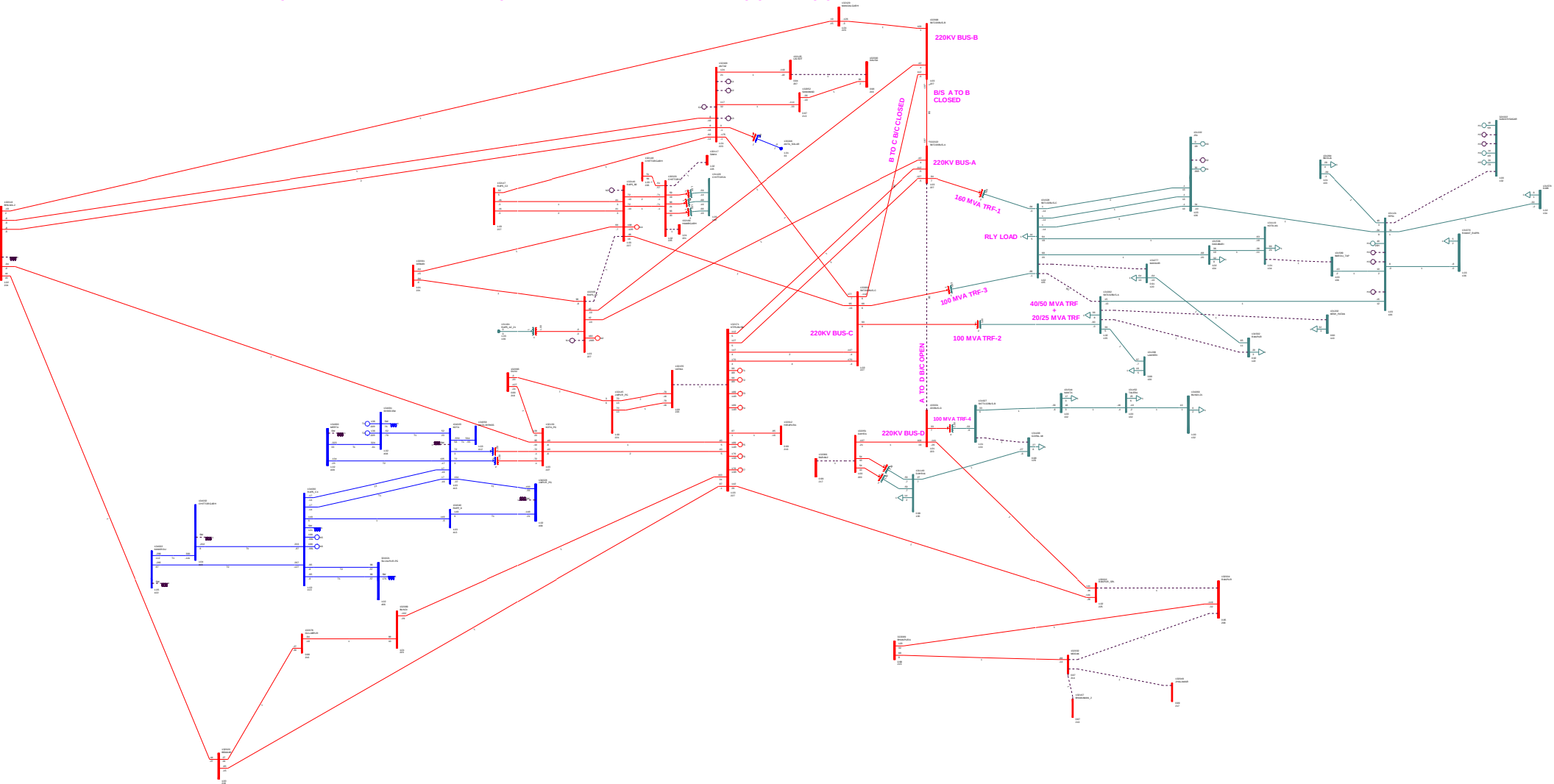
CASE-1I (CONTINGENCY-9 IN CASE-1) : OUTAGE OF 220 KV S/C RAPP(A)-DEBARI LINE

EXHIBIT-1I



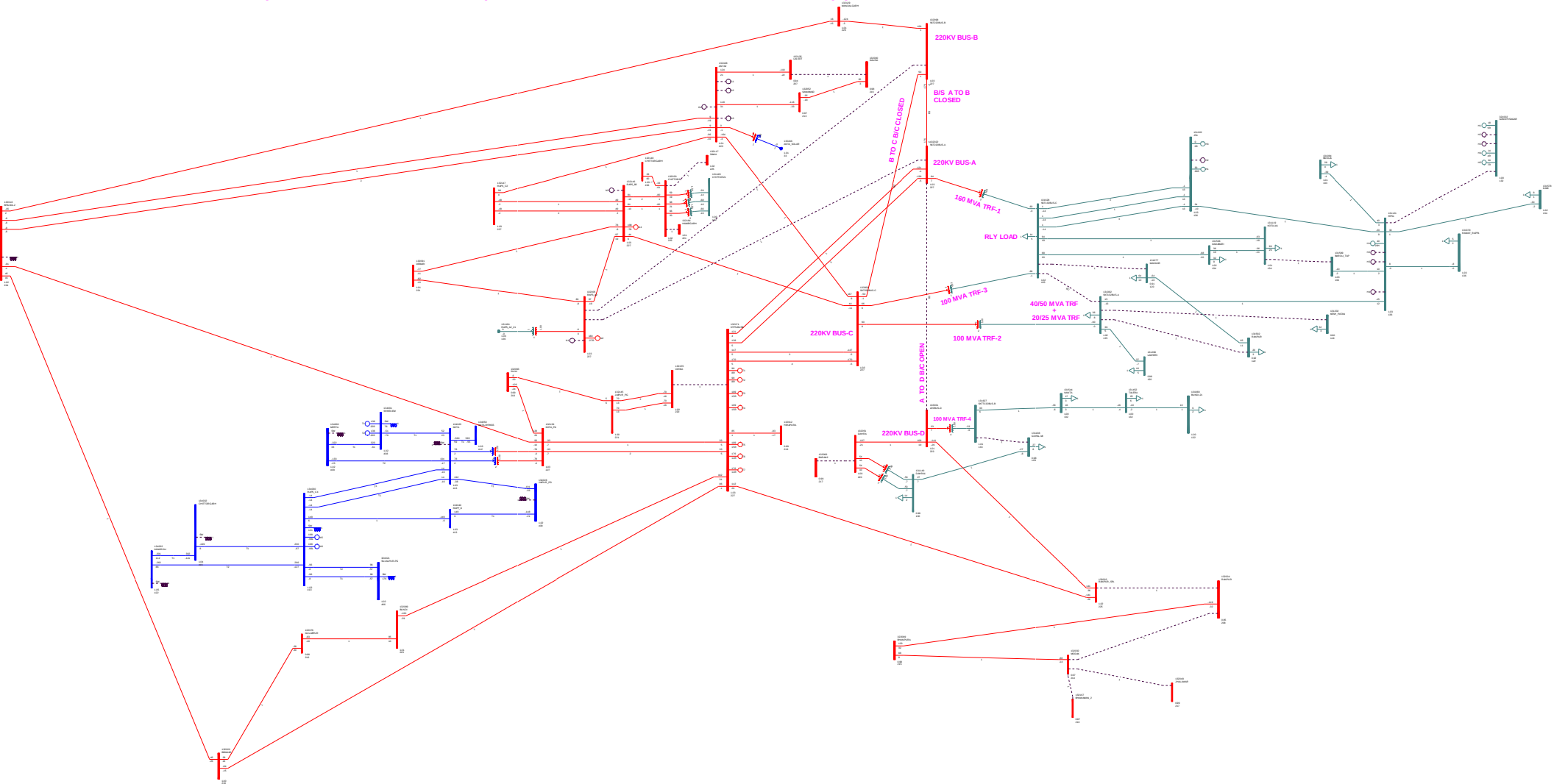
CASE-1J (CONTINGENCY-10 IN CASE-1) : OUTAGE OF 220 KV S/C RAPP(A)-RAPP(B) LINE

EXHIBIT-1J



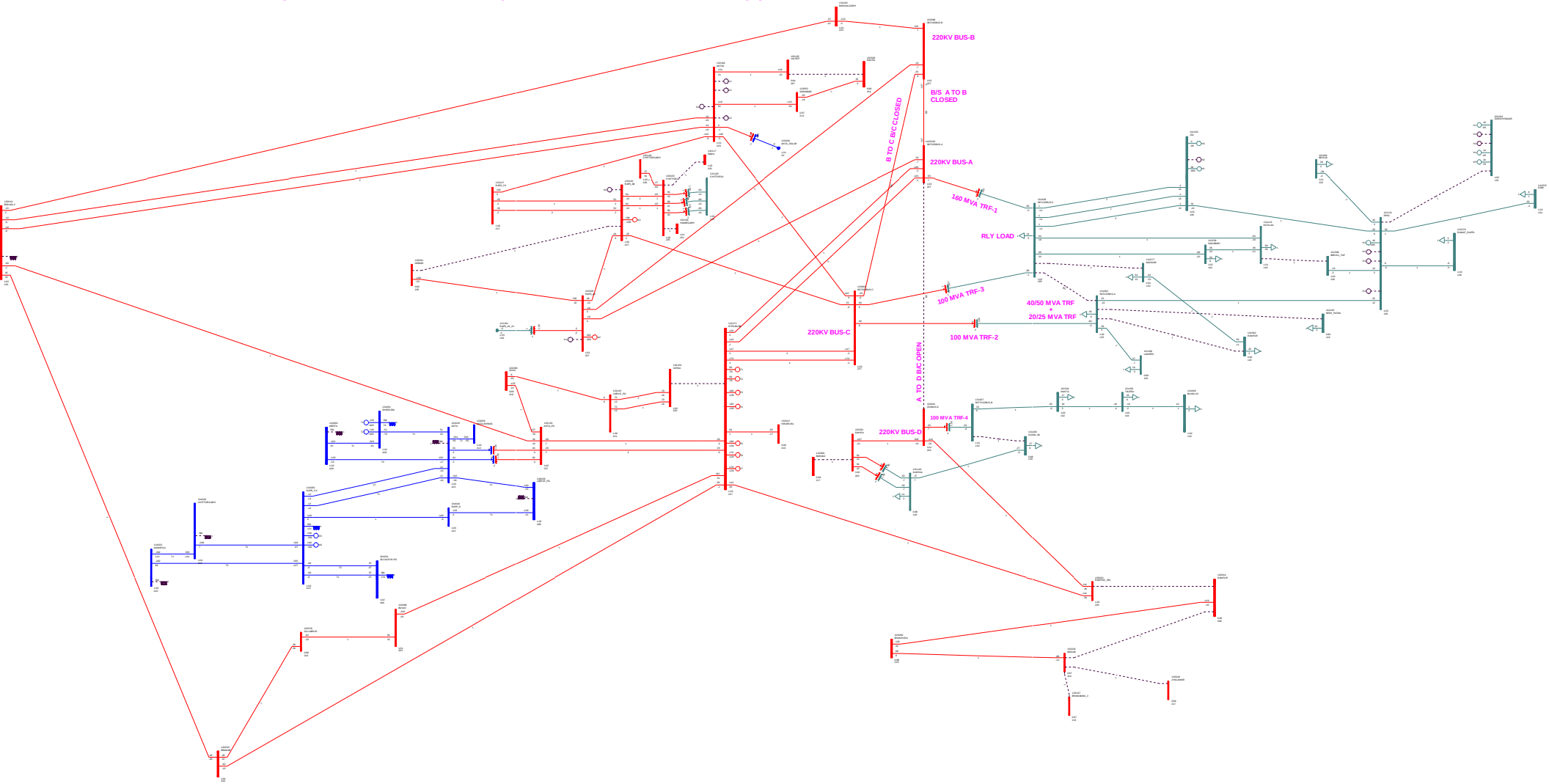
CASE-1K (CONTINGENCY-11 IN CASE-1) : OUTAGE OF 220 KV D/C SAKATPURA-RAPP(A) LINE

EXHIBIT-1K



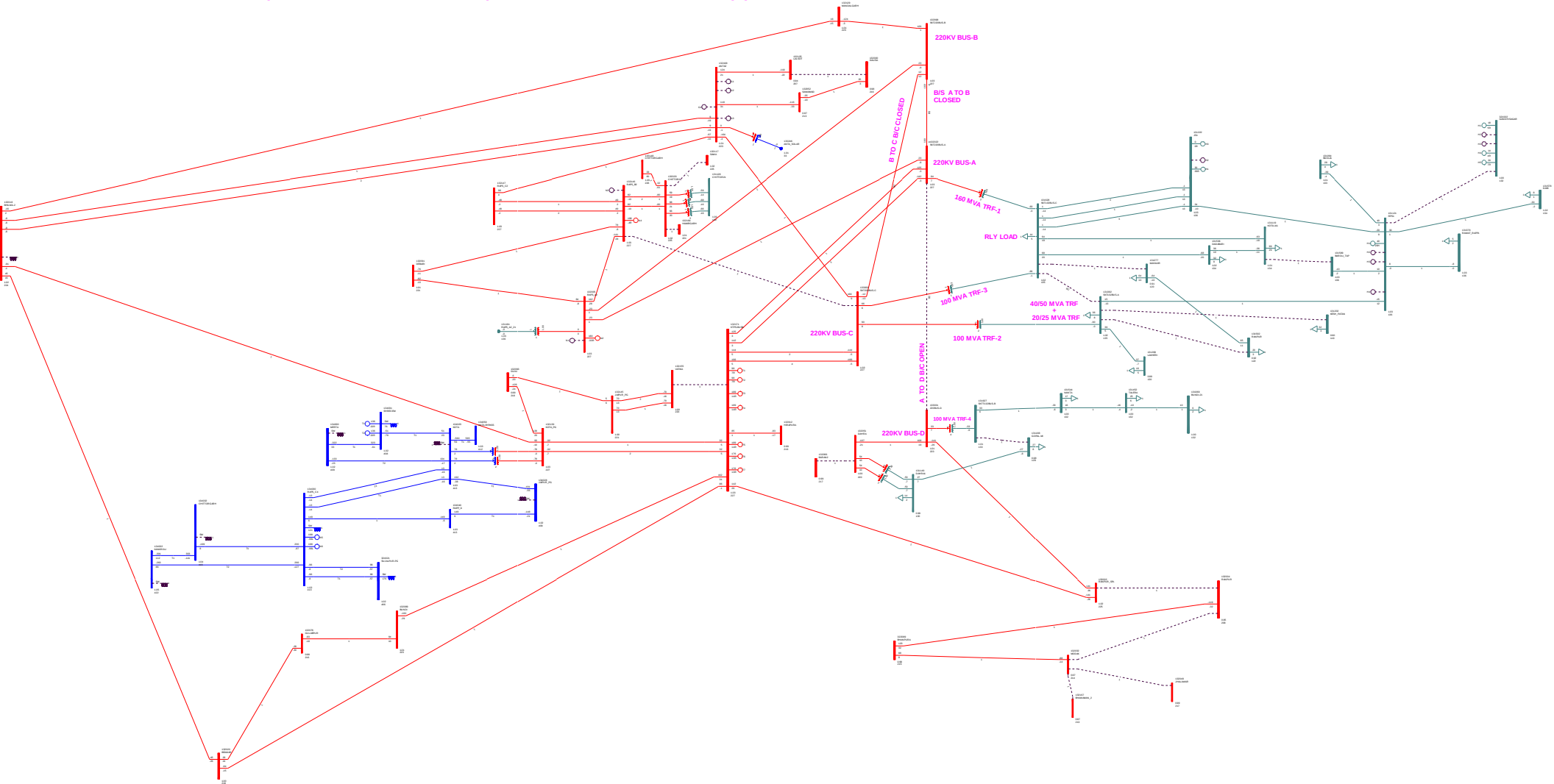
CASE-1L (CONTINGENCY-12 IN CASE-1) : OUTAGE OF 220 KV S/C RAPP(B)-DEBARI LINE

EXHIBIT-1L



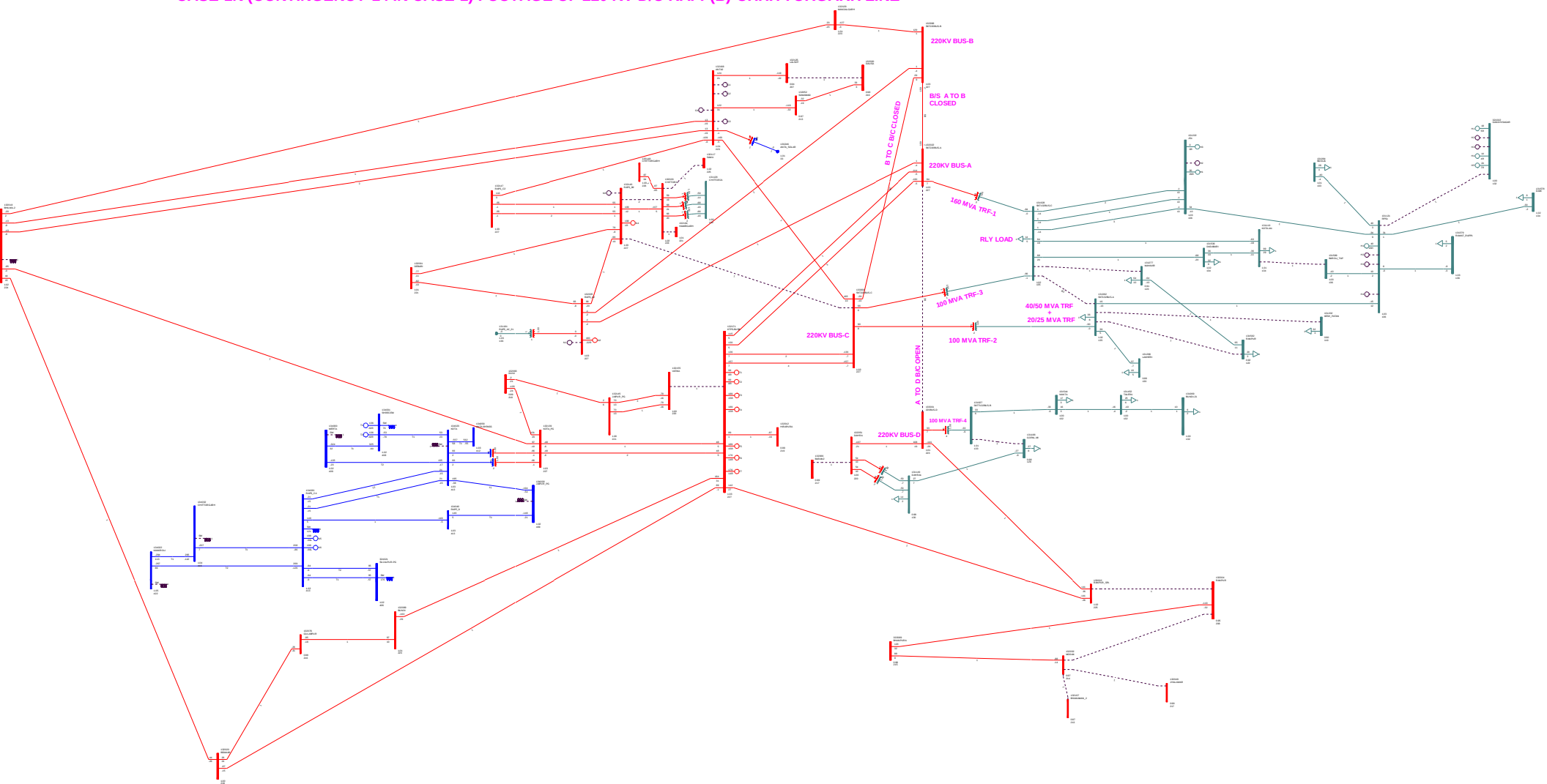
CASE-1M (CONTINGENCY-13 IN CASE-1) : OUTAGE OF 220 KV S/C RAPP(B)-SAKATPURA LINE

EXHIBIT-1M



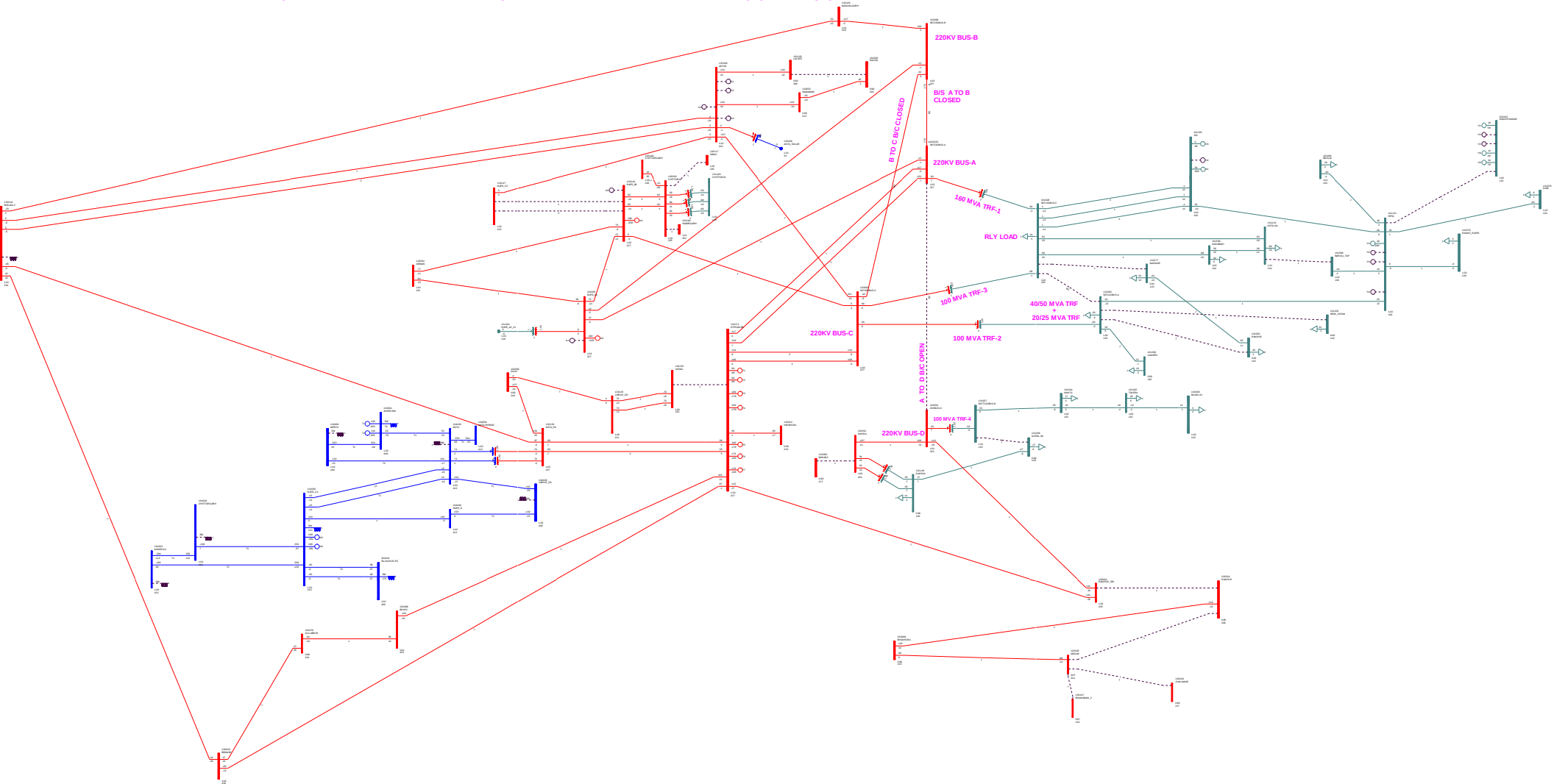
CASE-1N (CONTINGENCY-14 IN CASE-1) : OUTAGE OF 220 KV D/C RAPP(B)-CHHITTORGARH LINE

EXHIBIT-1N

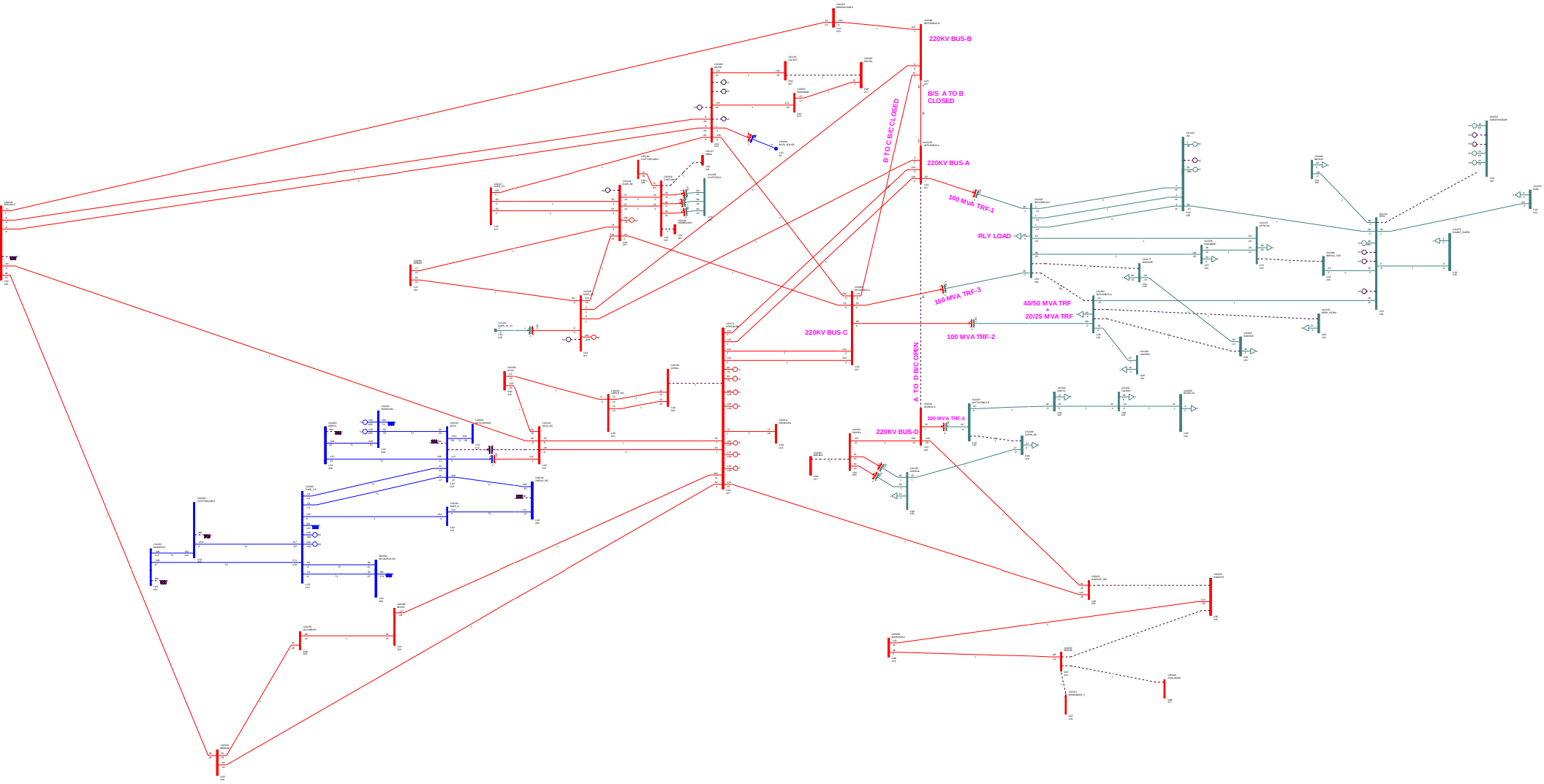


CASE-1O (CONTINGENCY-15 IN CASE-1) : OUTAGE OF 220 KV D/C RAPP(B)-RAPP(C) LINE

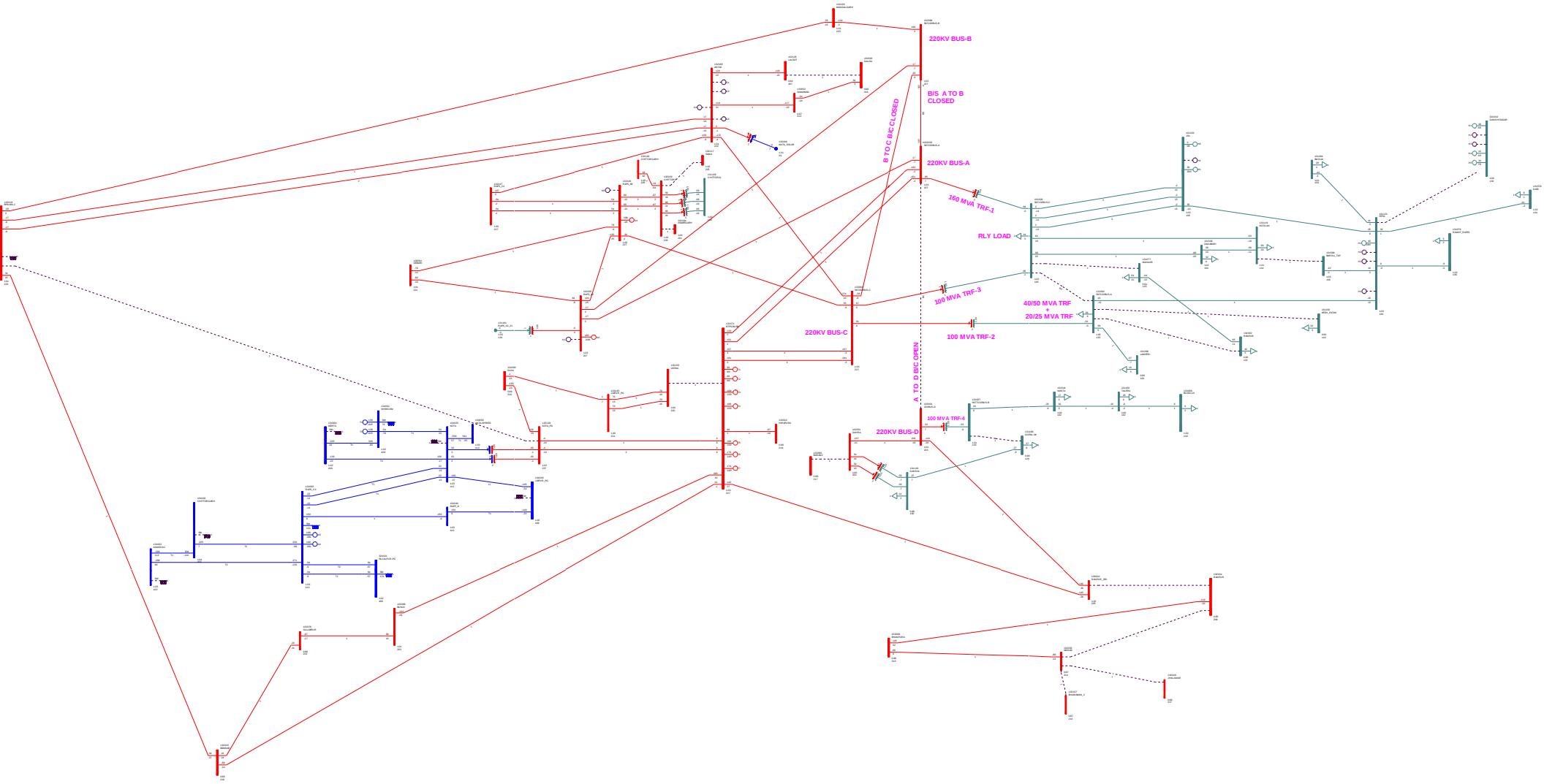
EXHIBIT-1O



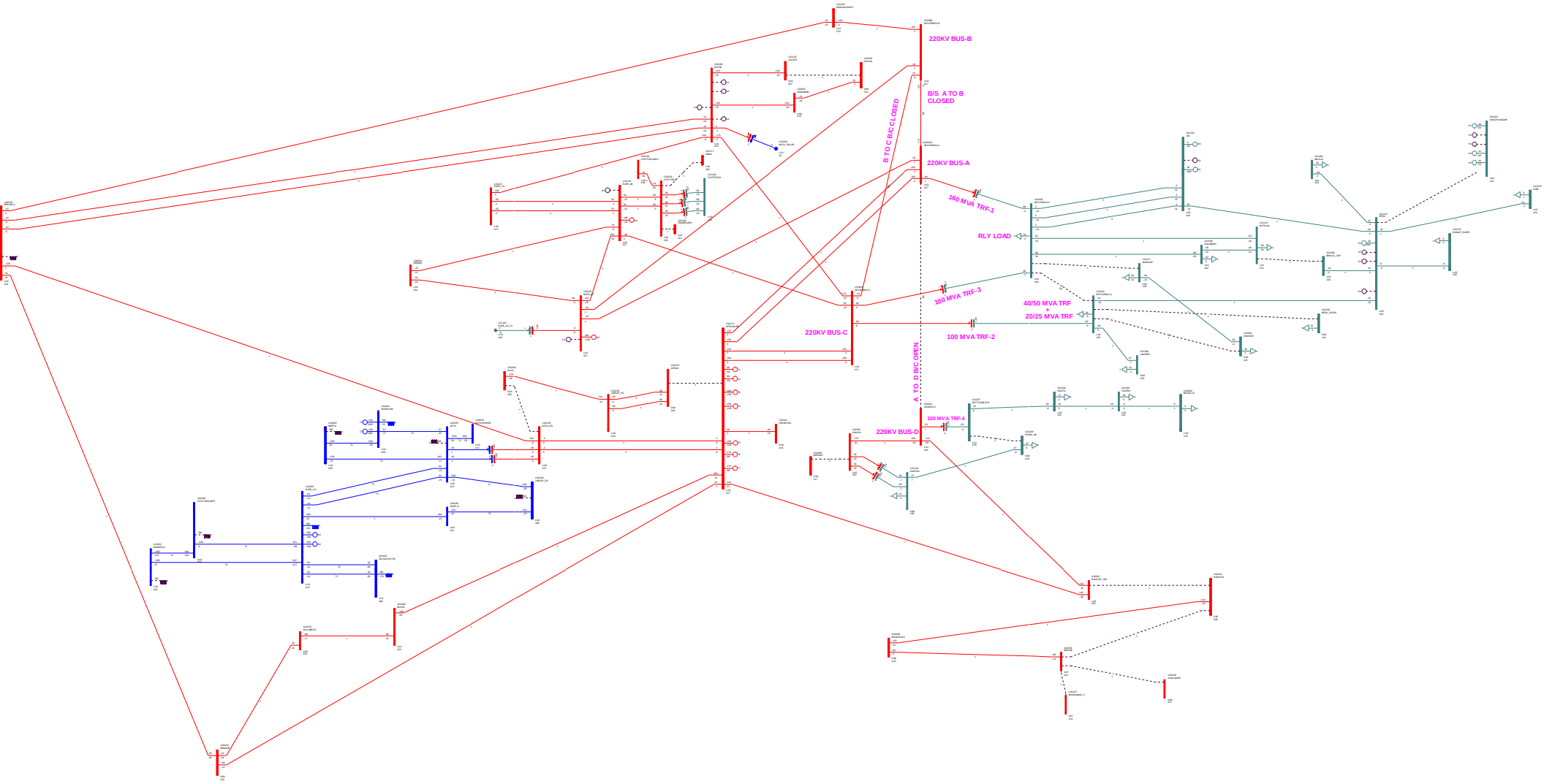
Contingency-16 (Case-1P, Exhibit-1P): Outage of one 315 MVA, 400/220 kV transformer at Kota(PG)



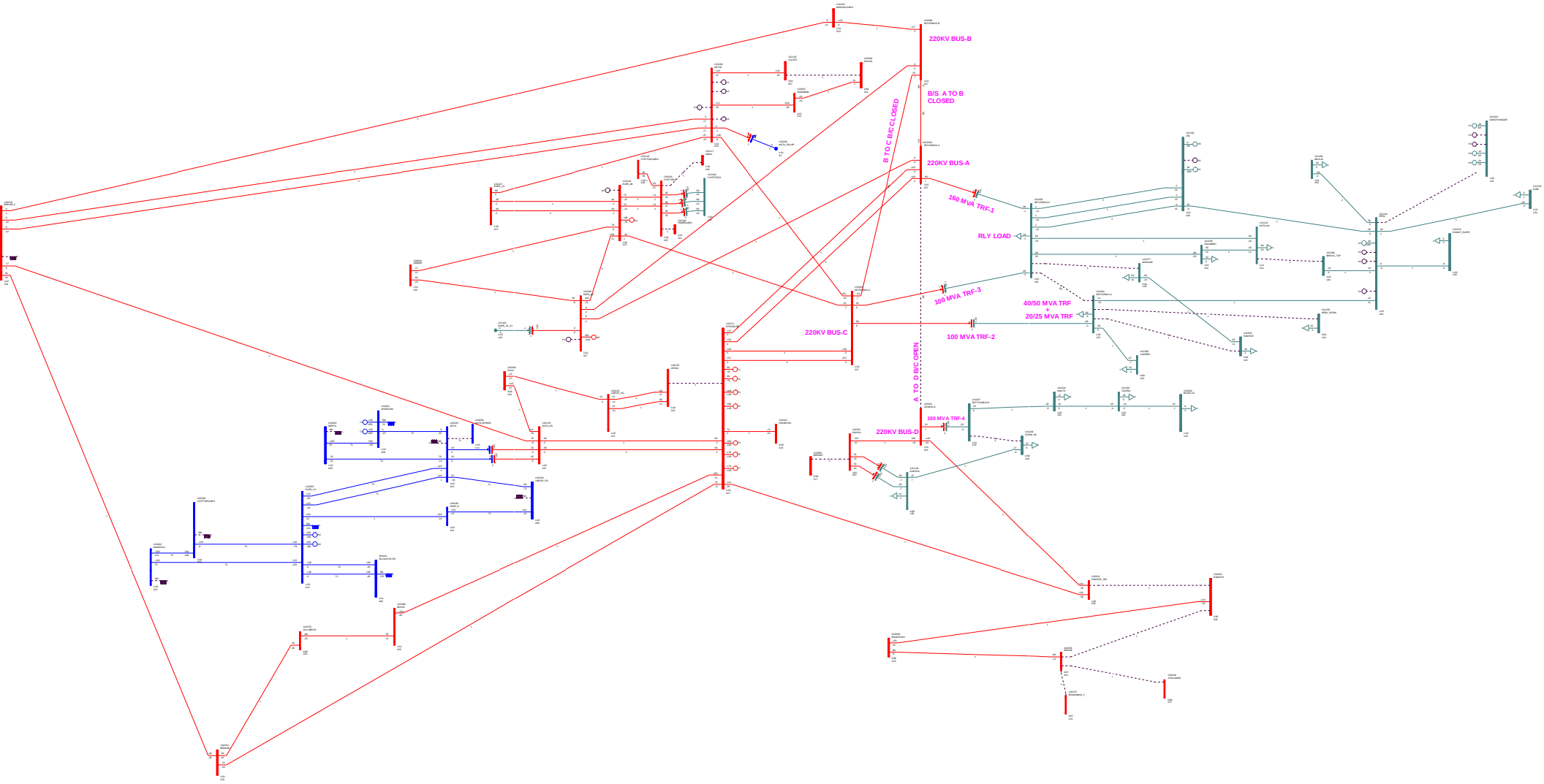
Contingency-17 (Case-1Q, Exhibit-1Q) : Outage of 220 kV S/C Kota(PG)-Bhilwara line



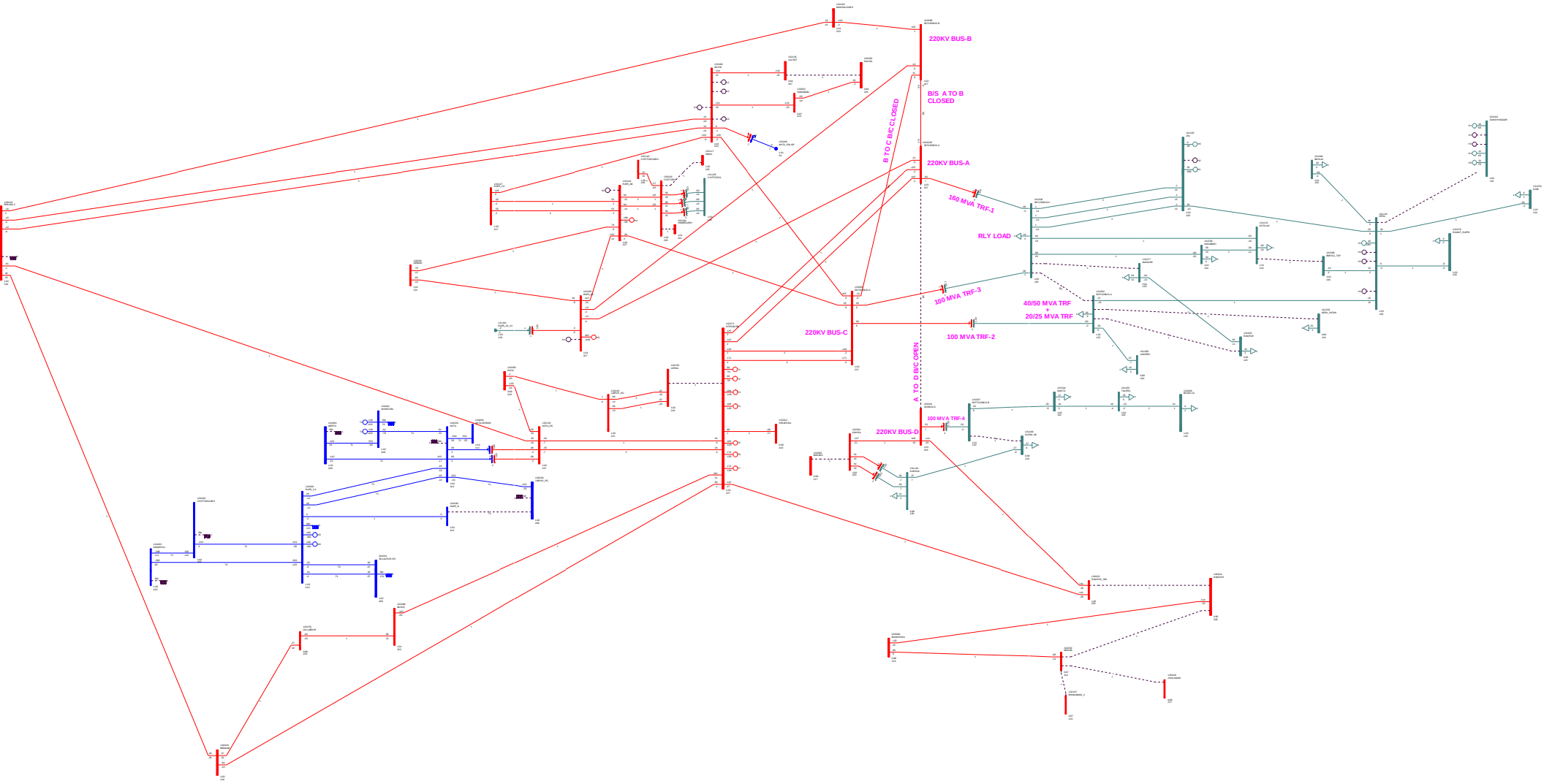
Contingency-18 (Case-1R, Exhibit-1R): Outage of 220 kV S/C Kota(PG)-Duni line



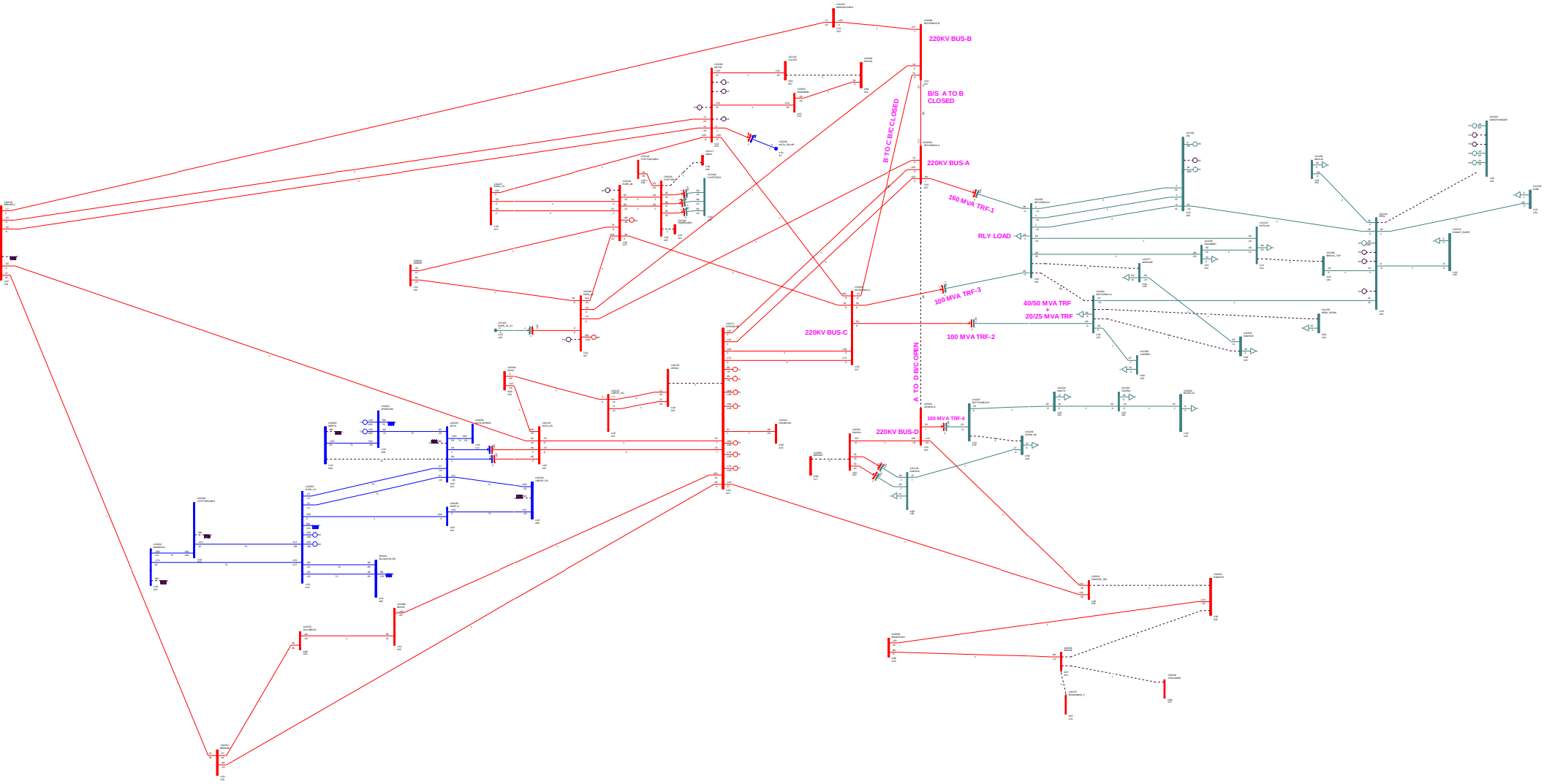
Contingency-19 (Case-1S, Exhibit-1S): Outage of 400 kV S/C Kota(PG)-Anta –Chhabra TPS line



Contingency-20 (Case-1T, Exhibit-1T): Outage of 400 kV S/C Kota(PG)-Jaipur(PG) line



Contingency-21 (Case-1U, Exhibit-1U): Outage of 400 kV S/C Kota(PG)-Merta line



PROPOSED REVISED ISLANDING SCHEME FOR RAPS-A&B

A. **Objective:** The Existing Islanding Scheme for RAPS-A&B was planned in 2013 and again reviewed in 2022. Major Grid disturbance occurred in KTPS & RAPP Generation complex leading tripping of all running generating units of KTPS and RAPP generation complex. In this regard NRPC vide letter dated 6.6.2024 has constituted a committee of members from NRPC Secretariat, NRLDC, NLDC, POWERGRID, NPCIL, RVUNL (KTPS) and RVPN to review the protection system and load management in the KTPS, RAPS generation complex. In the various committee meetings existing Islanding scheme was also discussed and deliberated as per following: -

I. M/s NPCIL member vide email dated 01/07/2024 and also in the committee meetings intimated that the reason for exclusion of RAPP-C and RAPP-D auxiliary loads from islanding scheme is the introduction of new ATS initiation scheme that will changeover auxiliary loads to UT side in case of grid disturbances (including islanding condition). In normal operation, these loads are still being fed from SUT only.

II. M/s NPCIL member vide email dated 19.11.2024 intimated that in event of Grid disturbance occurred on 29.3.2024, RAPP-A unit-2 was survived on Islanding but could not survived more than 20 minutes due to four long transmission lines (2 for Debari GSS and 2 for Chhittorgarh GSS) remained connected to it and this could have been the possible reason for higher 220 kV bus voltage at RAPP-

A. In view of above M/s NPCIL requested to separate Islanding Scheme of RAPP(A) and RAPP(B). In view of NPCIL concern in the committee meetings two Stage island for RAPS complex was discussed and deliberated and it was concluded that two stage Islanding Scheme is not feasible.

III. In the meeting Rajasthan SLDC Member also apprized that :-

a. Due to transmission system constraints load of 132 kV GSS Mavli & Sanwad is not being fed from 220 kV GSS Debari and also load of 132 kV GSS Dakan Kotra is being fed from 220 kV GSS Debari via Auxiliary bus of 220 kV GSS Madri

b. After construction of 132 kV GSS Soniyana alongwith LILO of 132 kV S/C Hamirgarh-Rashmi line at Soniyana load of 132 kV GSS Rashmi is being fed from 220 kV GSS Hamirgarh instead of 220 kV GSS Chhittorgarh.

c. Due to transmission system constraints load of 132 kV GSS Badisadri is being fed from 220 kV GSS Nimbahera via Auxiliary bus of 132 kV GSS Choitisadri.

d. In integrated operation 132 kV S/C Chhitorgarh-Sawa line got over loaded, therefore, for load management 132 kV S/C Chhitorgarh-Sawa line kept charged at no load to balance the load between 220 kV transformers at Chhitorgarh and Sawa. Under this condition during Island formation 220 kV S/C Chhitorgarh-Sawa line would be critically over loaded to feed the load of 220 kV GSS Sawa & Nimbahera.

IV. In view of above in the committee meetings it is also discussed and deliberated that after

Island formation load of 220 kV GSS Sawa & Nimbahera would be fed from 220 kV S/C Chhitorgarh-Sawa- Nimbahera line, therefore, to increase the reliability it would be appropriate to consider load of 220 kV GSS Hamirgarh part of the Island and some load of 220 kV GSS Sawa and Nimbahera may be disconnected.

V. Further M/s NPCIL member vide email dated 4.2.2025 intimated that the frequency setting for islanding for RAPP-A and RAPPB is as follows:

   a. For under frequency: One of the unit shall be brought to house load operation at 47.5 Hz with a delay time of 2 sec and another unit with time delay of 4 secs. and instantaneous house load operation of all units at 47.3 Hz.
   b. For over frequency: One unit shall be brought to house load at 51.5 Hz with time delay of 1 SEC and another unit with time delay of 2 sec. and instantaneous house load operation of all units at 51.7Hz.

Accordingly, as per detailed discussions and deliberations in the various 7 meetings of the committee Islanding scheme has been reviewed and redesigned considering updated load scenario and transmission system configuration and discussed in the subsequent paragraphs.

B. Generation Details

I. RAPS-A

- The total generation of Unit-II is around 200 MW.
- Auxiliary load plus load of Heavy Water Plant is 30 MW.
- Net generation of unit-II is 170 MW.

II. RAPS-B

- The generation of Unit-III and Unit-IV is each around 220 MW. The total generation is around 440 MW if both units are running.
- Auxiliary load is 20 MW per unit, i.e. total 40 MW for both units of RAPS-B.
- Net generation of RAPS-B is 400 MW.

C. Transmission System at RAPP-A&B

- 220 kV S/C RAPS-A - RAPS-B Line (3.00 km)
- 220 kV S/C RAPS-A - 220 kV GSS Debari line (192.70 km)
- 220 kV S/C RAPS-A - 220 kV GSS Kota (Sakatpura) Ckt-I (39.70 km)
- 220 kV S/C RAPS-A - 220 kV GSS Kota (Sakatpura) Ckt-II (42.50 km)
- 220 kV S/C RAPS-B - 220 kV GSS Debari line (198.00 km)
- 220 kV S/C RAPS-B - 220 kV GSS Chittorgargh line Ckt-I (95.00 km)
- 220 kV S/C RAPS-B - 220 kV GSS Chittorgargh line Ckt-II (95.00 km)

- 220 kV S/C RAPS-B - 220 kV GSS Kota (Sakatpura) Line (41.00 km)
- 220 kV S/C RAPS-B – RAPP-C Tie Line-I (2.00 km)
- 220 kV S/C RAPS-B – RAPP-C Tie Line-II (1.80 km)
- 220 kV S/C RAPS-C – Anta (80 km)
- 220 kV Switchyard for RAPS-C and RAPS-D is common.

D. Load Details

The identified load for island of RAPS-A&B is 507.0 MW which is placed at **Annexure-A.** Additional **30 MW load** on 220 kV bus of RAPS-A bus also considered to represent the auxiliary load of RAPP-A & heavy water load. Also, Additional **40 MW load** on 220 kV bus of RAPS-B also considered to represent the auxiliary load of RAPP-B units. Additional load of 115 MW is also identified which can be considered for lean load period. There are heavy seasonal variations of load in the region. Similarly, day and night load variations are also high in the region. Hence, islanding scheme is planned considering some of the transmission lines with both operative/blocked modes so that SLDC, Rajasthan can monitor and decide upon mode of the lines so as to match the load with generation in the island. Further, additional lines with blocked/operative status are also identified which helps to manage the load-generation during the lean load period.

E. Proposed Islanding Scheme

1. Islanding shall take place at 48 Hz without time delay.
2. Islanding is designed for the current scenario for load of 507.0MW. Additional **30 MW load** on 220 kV bus of RAPS-A bus also considered to represent the auxiliary load of RAPP-A & heavy water load. Also, Additional **40 MW load** on 220 kV bus of RAPS-B is also considered to represent the auxiliary load of RAPP-B units.
3. Further, if generation is low then load generation balance may be maintained by changing the blocked/operative status of the identified transmission lines depending on the available generation.
4. All the transmission lines with operative status may be operated at 48 Hz instantaneous to form Island.
5. Tie lines between RAPS-A & RAPS-B and RAPS-B & RAPS-C will be kept blocked during island formation.
6. If load in the network of island is very high and frequency is going further down then at RAPS-B unit-3 & unit-4 will come to house load at 47.5Hz with a delay time of 2 seconds and 47.5Hz with a delay time of 4 seconds respectively and instantaneously house load of both the units at 47.3 Hz. Similarly, at RAPS-A, unit-2 will come to house load at 47.5Hz with a delay time of 4 seconds and instantaneously house load at 47.3 Hz.

7. If load in the network of island is very low and frequency is increasing after island formation then at RAPS-B unit-3 & unit-4 will come to house load at 51.5 Hz with a delay time of 1 second and 51.5 Hz with a delay time of 2 seconds respectively and instantaneously house load of both the units at 51.7 Hz. Similarly, at RAPS-A, unit-2 will come to house load at 51.5 Hz with a delay time of 2 seconds and instantaneously house load at 51.7 Hz.
8. Blocked and operative status of all transmission lines of 220 kV and 132 kV voltage levels considered for the islanding are placed at **Annexure-B**. During the condition of light loads, the load-generation balance is to be maintained by changing the blocked/operative status of the additional lines which have also been identified to include additional GSS in the island.
9. A single line diagram of 400 kV network, 220 kV & 132 kV network is at **Annexure-C.**
10. House load frequency settings of RAPS-A & RAPS-B units in condition of under and over frequency are based on the information provided by M/s NPCIL vide email dated 4.2.2025.

F. Results of Load Flow Study

I. A load flow study is carried out considering the blocked and operative status of line included in **Annexure-B** as per SLD diagram indicated in **Annexure-C** for a total identified load of 577.0 MW (including **70 MW** auxiliary load of RAPP-A & RAPP-B units and also heavy water load) which is placed at **Annexure-A.**

II. In the load flow study Unit-2 of RAPP-A is considered swing bus and voltage of all units is set to 1.03 pu. Power flow plot of the network included in the island is placed at **Exhibit-1**. The results of load flow study indicate the following load-generation balance:-

   i. Generation=640 MW (Unit-1 : 200 MW, Unit-3:220 MW, Unit-4 : 220 MW)

   ii. Load=577 MW (Network load : 507.0 MW , Auxiliary + heavy water load : 70 MW)

   iii. Network Losses: 34 MW

   iv. Generation vs Load Ratio (G/L) : 1.11 (i.e. 640/577)

III. Power flow on 220 kV lines and transformers are tabulated at **Annexure-D**. It is observed that loading on all the lines and transformers included in the island of RAPS-A&B is normal and overloading is not observed.

IV. Single Line Diagram of proposed island is attached at **Annexure-E.**

G. Conclusion

Proposed islanding scheme is designed after detailed discussion and deliberations in 7

meetings of NRPC Sub-Committee. Based on the results of load flow studies, it is concluded that:

i. Results of load flow study indicate that load generation balance can be maintained in the network considered for the island of RAPS-A & B.

ii. All the transmission lines included in the island will be equipped with under frequency relays (UFRs) and additional transmission lines are considered for the island to manage the load generation balance for different load scenario considering the large seasonal variations of load in the region.

iii. The proposed islanding scheme can be practically implemented on the transmission network of RVPN for the current scenario for load of 507.0 MW (excluding system losses) when all three units of RAPS- A&B are running. However, continuous monitoring of load-generation balance is required and action to change status of UFRs from blocked to operative and vice-versa will be needed for load-generation balance during the event of change in generation and load.

iv. Islanding scheme is designed considering total auxiliary load of 70 MW which consists of 20 MW (Unit-II of RAPS-A) + 10 MW (Heavy water plant) + 40 MW (RAPS-B both units).

*****

Annexure-A

Load in Islanding Scheme for RAPP-A&B (Unit-2 : 200 MW, Unit-3 &4 : 2x220 MW)

S. No.	Name of GSS		Load before Island formation		Load which is part of the Island		Load which is tripped at 48 Hz at time of Island formation		Load which is available for lean load period by blocking the operation of UFR		Remarks
			Maximum Load	Average Load	Maximum Load	Average Load	Maximum Load	Average Load	Maximum Load	Average Load	
A-1	**Load at 220 kV GSS Debari**										
1	220 kV GSS Debari (load of 132/33 kV transformers)	MW	27	20	27	20	-	-	-	-	
		MVAR	9	7	9	7	-	-	-	-	
2	132 kV GSS Mavii	MW	34	22	34	22	-	-	-	-	
		MVAR	11	7	11	7	-	-	-	-	
3	132 kV GSS Bhatewar	MW	36	19	36	19	-	-	-	-	
		MVAR	17	4	17	4	-	-	-	-	
4	132 kV GSS Bhinder	MW	19	10	19	10	-	-	-	-	
		MVAR	1	1	1	1	-	-	-	-	
5	132 kV GSS Jhojhopura	MW	19	11	19	11	-	-	-	-	
		MVAR	12	6	12	6	-	-	-	-	
6	132 kV GSS Dakankotda	MW	27	20	27	20	-	-	-	-	
		MVAR	4	1	4	1	-	-	-	-	
7	132 KV Hindustan Zinc Limited Line (Industry)	MW	51	36	51	36	-	-	-	-	
		MVAR	17	12	17	12	-	-	-	-	
8	132 KV GSS UCW Line (Industry)	MW	20	9	20	9	-	-	-	-	
		MVAR	7	3	7	3	-	-	-	-	
9	Railway load from 132 kV GSS Mavli	MW	2	1	2	1	-	-	-	-	
		MVAR	1	1	1	1	-	-	-	-	
	Total (A.1)	**MW**	**235**	**147**	**235**	**147**	**0**	**0**	**0**	**0**	
		MVAR	**79**	**41**	**79**	**41**	**0**	**0**	**0**	**0**	

S. No.	Name of GSS		Load before Island formation		Load which is part of the Island		Load which is tripped at 48 Hz at time of Island formation		Load which is available for lean load period by blocking the operation of UFR		Remarks
			Maximum Load	Average Load	Maximum Load	Average Load	Maximum Load	Average Load	Maximum Load	Average Load	
A-2	**Load at 220 kV GSS Chittorgarh**										
1	Load of 132/33 kv transformers at 220 KV GSS Chittorgarh	MW	58	32	58	32	0	0	0	0	
		MVAR	30	16	30	16	0	0	0	0	
2	132 KV BCW feeder from 220 kV GSS Chittorgarh	MW	3	2	3	2	0	0	0	0	
		MVAR	1	0	1	0	0	0	0	0	
3	132 KV CCW feeder from 220 kV GSS Chittorgarh	MW	19	9	0	0	19	9	19	9	
		MVAR	9	2	0	0	9	2	9	2	
4	132 KV HZL-1 feeder from 220 kV GSS Chittorgarh	MW	23	4	0	0	23	4	23	4	
		MVAR	8	1	0	0	8	1	8	1	
5	132 KV HZL-2 feeder from 220 kV GSS Chittorgarh	MW	23	4	0	0	23	4	23	4	
		MVAR	8	1	0	0	8	1	8	1	
6	132 KV GSS Ajolia Khera	MW	36	21	36	21	0	0	0	0	
		MVAR	10	7	10	7	0	0	0	0	
7	132 KV GSS Bassi	MW	28	12	28	12	0	0	0	0	
		MVAR	12	3	12	3	0	0	0	0	
8	132 KV GSS Senthi	MW	29	15	29	15	0	0	0	0	
		MVAR	3	1	3	1	0	0	0	0	
9	Railway load from 132 kV GSS Senthi	MW	10	1	10	1	0	0	0	0	
		MVAR	3	1	3	1	0	0	0	0	
10	132 kV GSS Rasoolpura		16	8	16	8	0	0	0	0	
			5	2	5	2	0	0	0	0	
11	132 KV JK MANGROL feeder from 132 kV GSS Rasoolpur		4	1	0	0	4	1	4	1	
			1	0	0	0	1	0	1	0	
	Total (A.2)	**MW**	**249**	**110**	**179**	**92**	**70**	**18**	**70**	**18**	
		MVAR	**89**	**35**	**64**	**30**	**25**	**4**	**25**	**4**	

S. No.	Name of GSS		Load before Island formation		Load which is part of the Island		Load which is tripped at 48 Hz at time of Island formation		Load which is available for lean load period by blocking the operation of UFR		Remarks
			Maximum Load	Average Load	Maximum Load	Average Load	Maximum Load	Average Load	Maximum Load	Average Load	
A-3	**Load at 220 kV GSS Sawa**										
1	Load of 132/33 kv transformers at 220 KV GSS Sawa	MW	26	13	26	13	0	0	0	0	
		MVAR	7	2	7	2	0	0	0	0	
2	132 kV ACW at Sawa	MW	30	19	0	0	30	19	30	19	
		MVAR	4	1	0	0	4	1	4	1	
3	132 kV NUVOCO at Sawa	MW	11	3	0	0	11	3	11	3	
		MVAR	1	0	0	0	1	0	1	0	
4	132 KV GSS Kapasan	MW	38	18	38	18	0	0	0	0	
		MVAR	9	2	9	2	0	0	0	0	
5	132 KV GSS Bhopalsagar	MW	13	8	13	8	0	0	0	0	
		MVAR	9	2	9	2	0	0	0	0	
6	132 kV GSS Bhadesar	MW	36	17	36	17	0	0	0	0	
		MVAR	7	3	7	3	0	0	0	0	
	Total (A.3)	**MW**	**154**	**79**	**113**	**57**	**41**	**22**	**41**	**22**	
		MVAR	**37**	**11**	**32**	**9**	**5**	**2**	**5**	**2**	
B	**Group -B**										
B-1	**Load at 220 kV GSS Nimbahera**										
1	220 kV GSS Nimbahera	MW	50	37	50	37	0	0	0	0	
		MVAR	11	6	11	6	0	0	0	0	
2	132 kV GSS Kanera	MW	12	8	12	8	0	0	0	0	
		MVAR	9	6	9	6	0	0	0	0	
3	132 kV GSS Bijapur	MW	14	7	14	7	0	0	0	0	
		MVAR	7	3	7	3	0	0	0	0	
4	132 WGSS Mangalwad	MW	38	24	38	24	0	0	0	0	
		MVAR	8	4	8	4	0	0	0	0	
5	132 KV GSS Dhoriya Choraha	MW	21	12	21	12	0	0	0	0	
		MVAR	15	7	15	7	0	0	0	0	
6	132 KV GSS Badisadri	MW	54	38	54	38	0	0	0	0	
		MVAR	18	8	18	8	0	0	0	0	
7	132 kVJKCW at Nimbahera	MW	19	10	0	0	19	10	19	10	
		MVAR	3	2	0	0	3	2	3	2	

S. No.	Name of GSS		Load before Island formation		Load which is part of the Island		Load which is tripped at 48 Hz at time of Island formation		Load which is available for lean load period by blocking the operation of UFR		Remarks
			Maximum Load	Average Load	Maximum Load	Average Load	Maximum Load	Average Load	Maximum Load	Average Load	
8	132 kV WCL at Rasoorpura	MW	48	35	0	0	48	35	48	35	
		MVAR	10	6	0	0	10	6	10	6	
	Total (B)	**MW**	**257**	**171**	**189**	**126**	**67**	**45**	**67**	**45**	
		MVAR	**80**	**42**	**67**	**34**	**13**	**8**	**13**	**8**	
C	**Group -C**										
C-1	**Load at 220 kV GSS Hamirgarh**										
1	220 kV GSS Hamirgarh	MW	66	50	66	50	0	0	0	0	
		MVAR	3	2	3	2	0	0	0	0	
2	132 kV GSS RICCO Growth	MW	46	35	46	35	0	0	0	0	
		MVAR	6	5	6	5	0	0	0	0	
3	132 kV GSS SONIYANA	MW	5	2	0	0	5	2	5	2	
		MVAR	3	1	0	0	3	1	3	1	
4	132 kV GSS Rashmi	MW	31	19	0	0	31	19	31	19	
		MVAR	13	7	0	0	13	7	13	7	
5	132 kV GSS RSWML line connected from 220 kV GSS Hamirgarh	MW	6	6	0	0	6	6	6	6	
		MVAR	0	0	0	0	0	0	0	0	TRIPPED at 48.0 HZ .
6	132 kV RSWML line connected from 132 kV GSS RIICO Grwoth Center Hamirgarh	MW	3	2	0	0	3	2	3	2	Available for Lean load period
		MVAR	0	0	0	0	0	0	0	0	
7	132 kV NITIN SPINNER line connected from 132 kV GSS RIICO Grwoth Center Hamirgarh	MW	30	27	0	0	30	27	30	27	
		MVAR	4	4	0	0	4	4	4	4	
8	132 kV GSS ASAHI GLASS line connected from 132 kV GSS SONIYANA	MW	2	2	0	0	2	2	2	2	
		MVAR	0	0	0	0	0	0	0	0	
	Total (C)	**MW**	**158**	**116**	**112**	**86**	**46**	**31**	**46**	**31**	
		MVAR	**25**	**15**	**9**	**7**	**17**	**8**	**17**	**8**	
	Total (A+B+C)	**MW**	**1054**	**623**	**829**	**507**	**225**	**115**	**225**	**115**	
		MVAR	**311**	**144**	**251**	**122**	**60**	**22**	**60**	**22**	

S. No.	Name of GSS		Load before Island formation		Load which is part of the Island		Load which is tripped at 48 Hz at time of Island formation		Load which is available for lean load period by blocking the operation of UFR		Remarks
			Maximum Load	Average Load	Maximum Load	Average Load	Maximum Load	Average Load	Maximum Load	Average Load	
D	**Group -D**	**Auxiliary load of RAPS-A & B**									
	Auxiliary load of RAPS-A + Heavy Water Plant load	MW	30	30	30	30	0	0	0	0	
		MVAR	10	10	10	10	0	0	0	0	
	Auxiliary load of RAPS-B	MW	40	40	40	40	0	0	0	0	
		MVAR	13	13	13	13	0	0	0	0	
	Total (D)	MW	70	70	70	70	0	0	0	0	
		MVAR	23	23	23	23	0	0	0	0	
	Total (A+B+C+D)	**MW**	**1124**	**693**	**899**	**577**	**225**	**115**	**225**	**115**	
		MVAR	**334**	**167**	**274**	**145**	**60**	**22**	**60**	**22**	
E	Total Generation Available										
	Unit-2 of RAPP(A)	**MW**				200					
	Unit-3 of RAPP(B)	**MW**				220					
	Unit-4 of RAPP(B)	**MW**				220					
	Total-E	MW				640					
	Generation/Load ratio in Island					1.11	"640/577= 1.11"				

Note: Maximum Load is maximum value out of all the maximums among hourly data(7hrs to 18hrs) of each day during 1st to 7th day of Jan'24. Average load is average of all the averages of hourly data (7hrs to 18hrs) of each day during 1st to 7th day of Jan'24.

Annexure-B

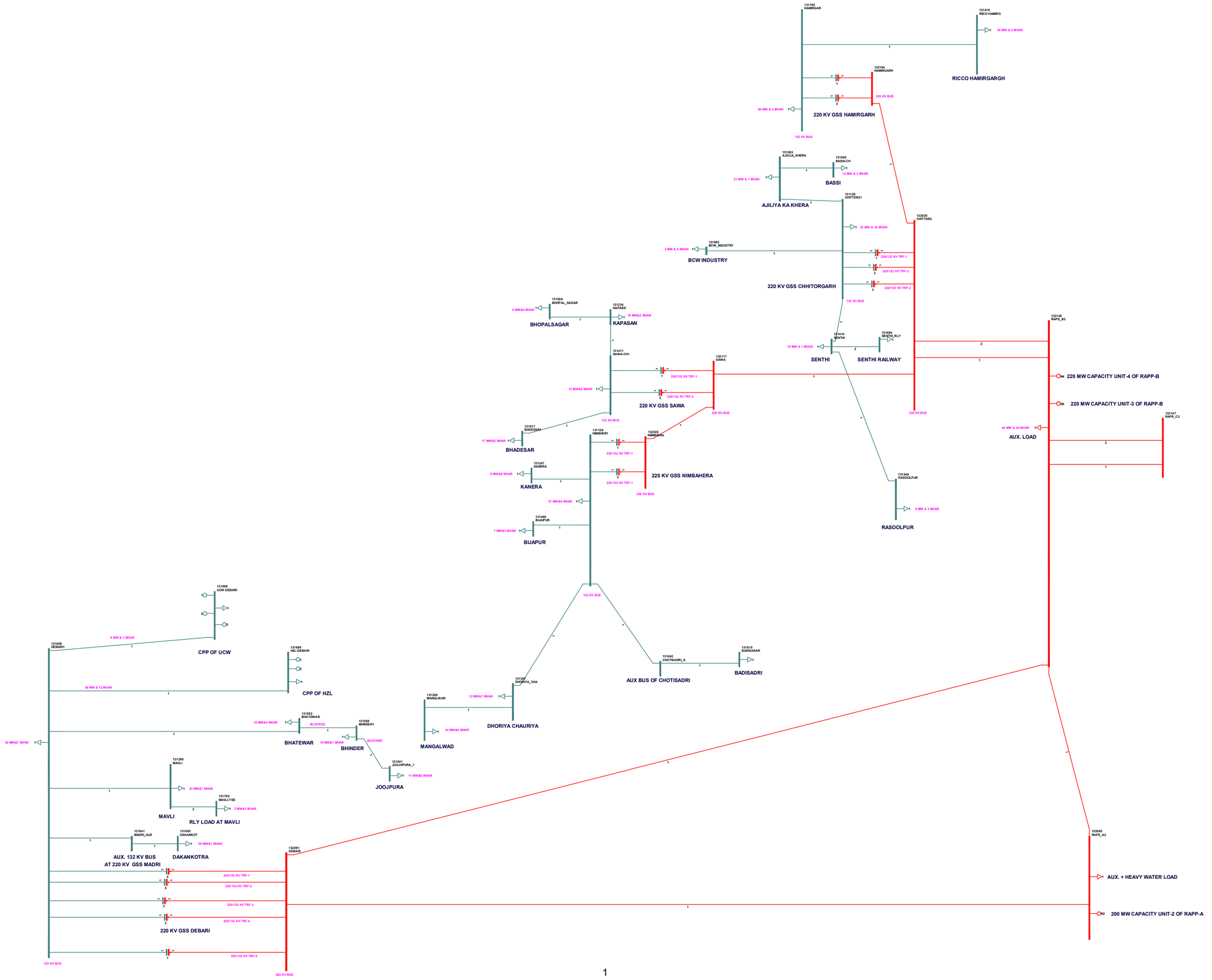
Transmission Lines and Status of Under Frequency Relays for RAPP-A&B Island

S. No.	Name of Line	Status	Remark
A.	**Transmision Lines at RAPP-A**		
1	220 kV S/C RAPS-A-Kota (Sakatpura)Line Ckt-I	Operative	
2	220 kV S/C RAPS-A-Kota (Sakatpura)Line Ckt-II	Operative	
3	132 kV S/C RAPS-A to RAPS-B Line	Blocked	
4	220 kV S/C Debari-RAPS-A Line	Blocked	
B.	**Transmision Lines at RAPP-B**		
1	220 kV S/C RAPS-B-Kota (Sakatpura)Line Ckt-III	Operative	
2	220 kV S/C RAPS-C-Anta line	Operative	
3	220 kV S/C RAPS-B-RAPS-C Tie line Ckt-I	Blocked	
4	220 kV S/C RAPS-B-RAPS-C Tie line Ckt-II	Blocked	
5	220 kV S/C Chittorgarh (220 kV GSS)-RAPS-B line Ckt-I	Blocked	
6	220 kV S/C Chittorgarh (220 kV GSS)-RAPS-B line Ckt-II	Blocked	
7	220 kV S/C Debari-RAPS-B Line	Blocked	
C.	**Transmision Lines at 220 kV GSS Debari**		
1	220 kV S/C Debari-RAPS-A Line	Blocked	In present arrangement only 220 kV S/C Debari-RAPS-A line and 220 kV S/C Debari-RAPS-B lines with all 220/132 kV transformers are connected to 220 kV Main bus-1 and bus coupler is opened.
2	220 kV S/C Debari-RAPS-B Line	Blocked	
3	220 kV S/C Debari-Amberi Line	Blocked	220 kV S/C Debari-Amberi line and 220 kV S/C Debari-Aspur lines are conncted to 220 kV main bus-2. In this arrangement UFR relays should be kept blocked. If in real time grid operation these lines are connected to 220 kV main bus-1 then UFR relays should be made operative
4	220 kV S/C Debari-Aspur Line	Blocked	
5	220 kV S/C Debari-Chhittorgarh(400 kV GSS) Line	Blocked	220 kV S/C Debari-Chhittorgarh(400 kV GSS) line and 220 kV S/C Debari-Madri lines are conncted to 220 kV Auxiliary bus. In this arrangement UFR relays should be kept blocked. If in real time grid operation these lines are connected to 220 kV main bus-1 then UFR relays should be made operative
6	220 kV S/C Debari- Madri Line	Blocked/Operative	
7	132 kV S/C Debari-Nathdwara line with T-off at Mavli	Operative	Line generally remains charged at no load
8	132 kV S/C Debari-Amberi Line	Operative	Line generally remains charged at no load
9	132 kV S/C Debari-Madri Line	Blocked	Load of 132 kV GSS Dakan Kotra is fed being from 220 kV GSS Debari via 132 kV Auxiliary bus of 220 kV GSS Debari, therefore, UFR realy should be kept blocked. If in future any other arrangement is made then it should be reviewd by SLDC, Rajasthan with intimation to NRPC.
10	132 kV S/C Debari-Mavli Ckt-I Line	Blocked	
11	132 kV S/C Debari-Bhatewar Line	Blocked	
12	132 kV S/C Bhatewar-Bhinder Line	Blocked	
13	132 kV S/C Bhinder-Jhoojhpura Line	Blocked	
14	132 kV S/C Bhinder-Mangalwad Line	Operative	Line generally remains charged at no load.
15	132 kV S/C Debari-UCW Line	Blocked	
16	132 kV S/C Debari-HZL Line	Blocked	
17	132 kV S/C Mavli-TSS Line	Blocked	

S. No.	Name of Line	Status	Remark
D.	**Transmision Lines at 220 kV GSS Chittorgrah**		
1	220 kV S/C Chittorgarh (400 kV GSS)-Chittorgarh (220 kV GSS) line	Operative	-
2	220 kV D/C Chittorgarh (220 kV GSS)-RAPP(B) line (Circuit-1)	Blocked	
3	220 kV D/C Chittorgarh (220 kV GSS)-RAPP(B) line (Circuit-2)	Blocked	
4	220 kV S/C Chittorgarh (220 kV GSS)-Sawa line	Blocked	
5	220 kV S/C Chittorgarh (220 kV GSS)-Hamirgarh line	Blocked	-
6	132 kV S/C Ajoliya Khera-Rashmi Line	Operative	Line generally remains charged at no load
7	132 kV S/C Chittorgarh-Ajoliya Khera Line	Blocked	
8	132 kV S/C Ajoliya Khera-Bassi Line	Blocked	-
9	132 kV S/C Chittorgarh-Senthi Line	Blocked	
10	132 kV S/C Senthi-Rasoolpura Line	Blocked	
11	132 kV S/C Chittorgarh-BCW Line	Blocked	
12	132 kV S/C Chittorgarh-Sawa Line	Operative	Line generally remains charged at no load
13	132 kV S/C Chittorgarh-CCW Line	Operative/blocked	Normal condition operative but available for lean load period
14	132 kV D/C Chittorgarh-HZL Line (Circuit-1)	Operative/blocked	
15	132 kV D/C Chittorgarh-HZL Line (Circuit-2)	Operative/blocked	
16	132 kV S/C Rasoolpura-WCL Line	Operative/blocked	
17	132 kV S/C Senthi-Gosunda TSS Line	Blocked	
E.	**Transmision Lines at 220 kV GSS Sawa**		
1	220 kV D/C Sawa-Chittorgarh (400 kV GSS) Line (Circuit-1)	Operative	
2	220 kV D/C Sawa-Chittorgarh (400 kV GSS) Line (Circuit-2)	Operative	
3	132 kV S/C Sawa-Chittorgarh (220 kV GSS) Line	Operative	Line generally remains charged at no load
4	220 kV S/C Sawa-Chittorgarh (220 kV GSS) Line	Blocked	
5	220 kV S/C Sawa-Nimbahera Line	Blocked	
6	132 kV S/C Sawa-BhadesarLine	Blocked	
7	132 kV S/C Sawa-Kapasan Line	Blocked	
8	132 kV S/C Kapasan-Bhopal Sagar Line	Blocked	
9	132 kV S/C Sawa-ACW Line	Operative/blocked	Normal condition operative but available for lean load period
10	132 kV S/C Sawa-NUVOCO Line	Operative/blocked	
F.	**Transmision Lines at 220 kV GSS Nimbahera**		
1	220 kV S/C Nimbahera-Pratapgarh Line	Operative	
2	220 kV S/C Nimbahera-Chittorgarh (400 kV GSS) Line	Operative	
3	132 kV S/C Rasoolpura-JKCW Line	Operative	
4	132 kV S/C Nimbahera-JKCW Line	Operative	
5	220 kV S/C Nimbahera-Sawa Line	Blocked	
6	132 kV S/C Nimbahera-Bhadesar Line	Operative	Line generally remains charged at no load
7	132 kV S/C Nimbahera-Rasoolpura Line	Operative/blocked	Normal condition operative but available for lean load period
8	132 kV S/C Nimbahera-Kaneri Line	Blocked	
9	132 kV S/C Nimbahera-Bijapur Line	Blocked	
10	132 kV S/C Nimbahera-Chhotisadari Line	Blocked	Load of 132 kV GSS Badisadri is fed via 132 kV Auxiliary bus of Chotisadri
11	132 kV S/C Nimbahera-Dhoriya Chouraha Line	Blocked	
12	132 kV S/C Dhoriya Chouraha-Mangalwad Line	Blocked	
13	132 kV S/C Mangalwad-Bhinder Line	Blocked	
G	**Transmision Lines at 220 kV GSS Hamirgarh**		
1	220 kV S/C Bhilwara (400 kV GSS)-Hamirgarh line	Operative	-
2	220 kV S/C Chittorgarh (220 kV GSS)-Hamirgarh line	Blocked	-
3	132 kV S/C Hamirgarh-RICCO Growth Center Hamirgarh line	Blocked	
4	132 kV S/C Hamirgarh-RSWML line	Operative/Blocked	Normal condition operative but available for lean load period
5	132 kV S/C Hamirgarh-Soniya line	Operative/Blocked	
6	132 kV S/C Soniya-Rasmi line	Operative/Blocked	
7	132 kV S/C Soniya-Asahi Glass line	Operative/Blocked	
8	132 kV S/C RICCO Growth Center Hamirgarh-Nitin Spinner line	Operative/Blocked	
9	132 kV S/C RICCO Growth Center Hamirgarh-RSWML line	Operative/Blocked	
10	132 kV S/C Hamirgarh-RICCO Bhilwara Line	Operative	

TRANSMISSION NETWORK INCLUDED IN ISLANDING SCHEME OF RAPP-A & B

Annexure-C



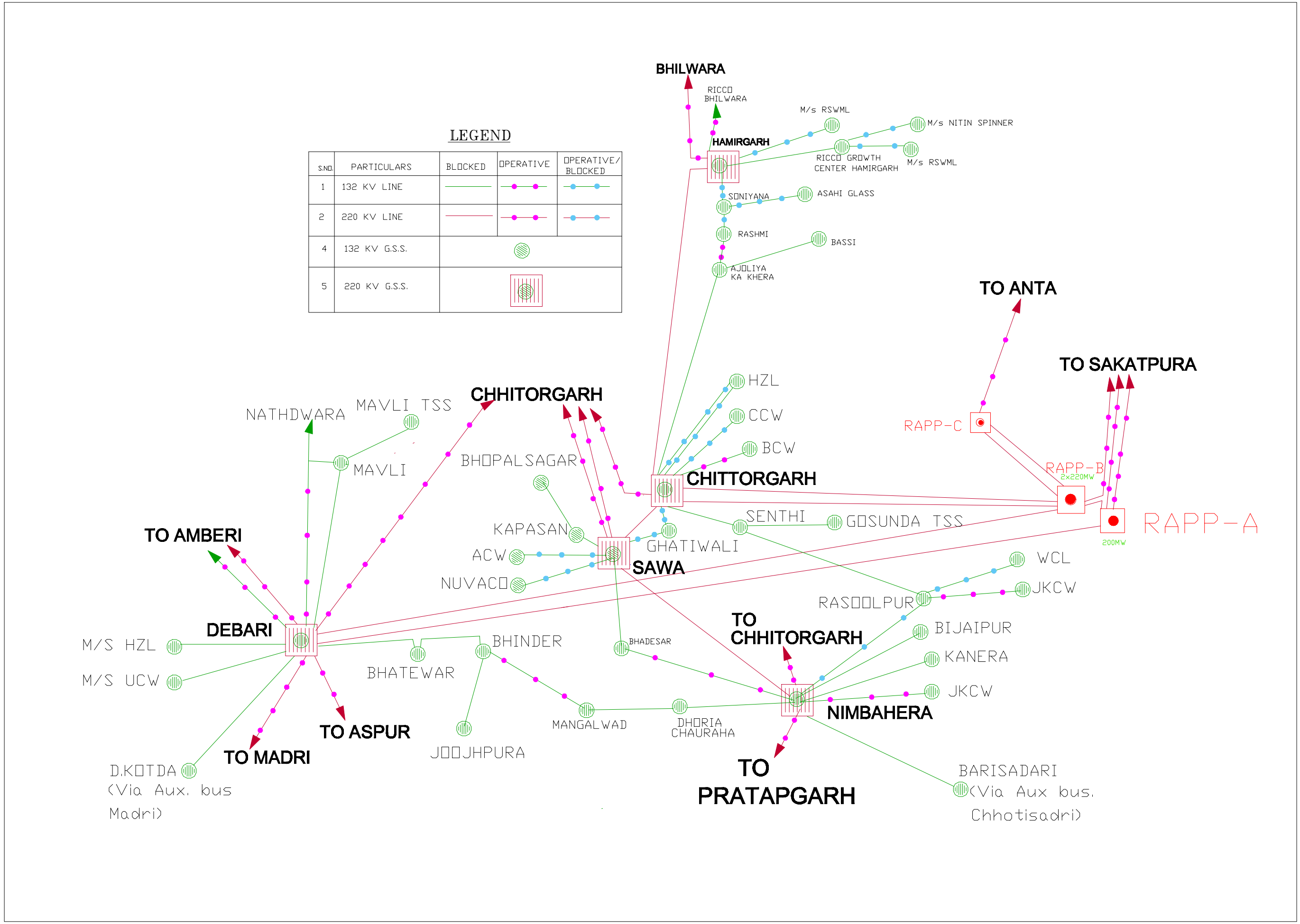
Annexure-D

Power flow on Lines and transformers in Island

S. No.	Name of Line/transformers	Power flow		Remark
		MW	**MVAR**	
A	**Generation**			
1	Unit-2 of RAPP-A	200	5	Swing bus
2	Unit-3 of RAPP-B	220	93	-
3	Unit-4 of RAPP-B	220	93	-
	Total (A)	640	191	-
B	**Power flow on network**			
B-1	**220/132 kV Transformers**			
1	220/132 kV transformers at Debari (570 MVA 220 kV transformers capacity) (Group-A1)	150	40	Connected load : 147 MW & 41 MVAR
2	220/132 kV transformers at Chhitorgarh (260 MVA 220 kV transformers capacity) (Group-A2)	98	31	Connected load : 92 MW & 30 MVAR
3	220/132 kV transformers at Sawa (260 MVA 220 kV transformers capacity) (Group-A3)	57	11	Connected load : 57 MW & 9 MVAR
4	220/132 kV transformers at Nimbahera (320 MVA 220 kV transformers capacity) (Group-B1)	128	38	Connected load : 126 MW & 34 MVAR
5	220/132 kV transformers at Hamirgarh (200 MVA 220 kV transformers capacity) (Group-C1)	86	12	Connected load : 86 MW & 7 MVAR
	Total (B1)	**519**	**132**	
B-2	**220 kV Lines**			
1	220 kV S/C RAPP(A)-Debari line	78	2	-
2	220 kV S/C RAPP(A)- RAPP(B)line	61	12	-
3	220 kV S/C RAPP(B)-Debari line	74	2	-
4	220 kV D/C RAPP(B)-Chhitorgarh line (Ckt-1)	193	2	-
5	220 kV D/C RAPP(B)-Chhitorgarh line (Ckt-1)	193	2	-
6	220 kV S/C Chhitorgarh-Hamirgarh line	86	2	-
7	220 kV S/C Chhitorgarh-Sawa line	187	57	-
8	220 kV S/C Sawa-Nimbahera line	129	40	-

Annexure-E

SINLE LINE DIAGRAM OF ISLANDING SCHEME OF RAPP GENERATION COMPLEX



CEA-GO-17-11/1/2023-NRPC

I/52747/2025

सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

विषय: प्रचालन समन्वय उप-समिति की 234 वीं बैठक की कार्यसूची ।

Subject: Agenda of the 234th OCC meeting.

प्रचालन समन्वय उप-समिति की **234 वीं** बैठक का आयोजन वीडियो कॉन्फ्रेंसिंग के माध्यम से दिनांक **14.08.2025** को **10:30** बजे से किया जायेगा । उक्त बैठक की कार्यसूची उत्तर क्षेत्रीय विद्युत् समिति की वेबसाइट http://164.100.60.165 पर उपलब्ध है ।

बैठक में सम्मिलित होने के लिए लिंक व पासवर्ड सभी सदस्यों को ई-मेल द्वारा प्रदान किया जाएगा।

कृपया बैठक में उपस्थित होने की सुविधा प्रदान करें।

The **234th** meeting of the Operation Co-ordination sub-committee will be conducted through Video Conferencing on **14.08.2025** from **10:30 Hrs**. The agenda of this meeting has been uploaded on the NRPC web-site http://164.100.60.165.

The link and password for joining the meeting will be e-mailed to respective e-mail IDs in due course.

Kindly make it convenient to attend the meeting.

(डी. के. मीना) 12/8/25
अधीक्षण अभियंता (प्रचालन)

सेवा में : प्रचालन समन्वय उप समिति के सभी सदस्य।
To : All Members of OCC

18-ए, शहीदजीतसिंहमार्ग, कटवारियासराय, नईदिल्ली- 110016 फोन:011-26513265 ई-मेल: seo-nrpc@nic.in वेबसाईट: www.nrpc.gov.in
18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016 Phone: 011-26513265 e- mail: seo-nrpc@nic.in Website: www.nrpc.gov.in

A.10.2. The status of MTDL achieved in intra-state thermal generating stations of Punjab, Rajasthan and Haryana noted in 223rd OCC meeting of NRPC is attached at **Annexure-A.V**.

A.10.3. NRPC Secretariat vide letter dated 31.07.2025 **(Annexure-A.VI)** had requested thermal generating stations mentioned at **Annexure-A.V** are requested to submit the reasons for not achieving 55% Technical Minimum Level.

Members may kindly deliberate.

A.11. Unit-wise Planned Maintenance schedule of Generating Units for the year 2026-27

(Agenda by NRPC Secretariat)

A.11.1. Central Electricity Authority vide mail dated 10.07.2025 has sought information regarding the Unit Wise Planned Maintenance schedule for the year 2026-27.

A.11.2. NRPC Secretariat vide letter dated 22.07.2025 (**Annexure-A.VII**) had requested respective SLDC's of Northern Region to co-ordinate with IPPs and State Generating Companies within their control area and submit the data as per **Annexure-A.VIII**. Further, Central Generating utilities are also requested to submit the abovementioned data as per **Annexure-A.VIII**.

A.11.3. All generating stations of NR are requested to submit Unit Wise Planned Maintenance schedule for the year 2026-27 in the format **Annexure-A.VIII** attached by email to seo-nrpc@nic.in by the 31st August 2025.

Members may kindly deliberate.

A.12. Approval of SPS at 400kV substation Bareilly (Agenda by UPSLDC)

A.12.1. UP SLDC has submitted that during peak load condition, ICTs at 400 kV substation Bareilly are observed to be N-1 noncompliant.

A.12.2. Meeting regarding identification of feeders for load shedding, logic of SPS and over current setting was held on 25.07.2025.

A.12.3. Based on discussion, UPSLDC has finalized SPS logic, which are enclosed as **Annexure-A.IX.**

A.12.4. UPSLDC has requested approval for its implementation of SPS.

Members may kindly deliberate.

A.13. Approval of SPS at 400 kV substation Panki (Agenda by UPSLDC)

A.13.1. UP SLDC has submitted that during peak load condition, ICTs at 400 kV S/S Panki are observed to be N-1 non-compliant. SPS for ICTs at 400 kV S/S Panki has been finalized by UPSLDC.

A.13.2. Agenda for approval of the same was put up in 232nd OCC Meeting wherein OCC forum found the SPS logic technically in order as per requirement. However, forum advised that Over Current settings may be reviewed in Protection Sub-Committee Meeting of NRPC.

A.13.3. UP SLDC has informed that over current settings at 400kV substation Panki has been implemented on 15.07.2025 as per NRPC Protection philosophy. The same

was communicated to NRLDC and NRPC vide e-mail on dated 16.07.2025 & 30.07.2025 respectively.

A.13.4. SPS logic and over current settings are attached as **Annexure-A.X.**

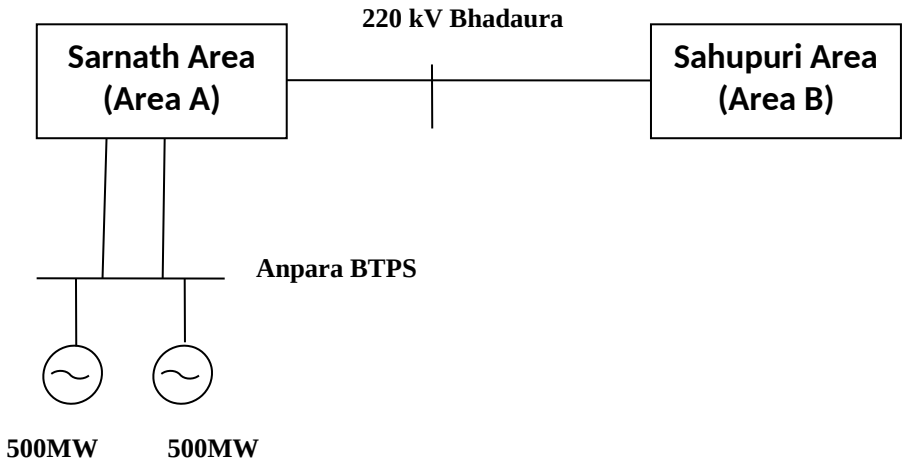
A.13.5. Therefore, UPSLDC has requested approval for its implementation of SPS.

Members may kindly deliberate.

A.14. Agenda on Varanasi Islanding Scheme (Agenda by UPSLDC)

A.14.1. UPSLDC has submitted that it has conducted steady state load flow study of Varanasi Islanding Scheme using generation of Anpara BTPS (2X500MW).

A.14.2. 400 kV Anpara BTPS is connected to 400 kV S/S Sarnath through 400 kV double circuit lines.



A.14.3. Study was conducted in various scenarios which are given as follows:-

Sl. No.	Case	Area	Number of Machine	Generation	Load	Remarks
1	Case-1	A and B	2	874 MW	806 MW (Summer Peak)	Not Feasible
2	Case-2	A and B	2	442 MW	435 MW (Winter Peak)	Not Feasible
3	Case-3	A	1	452 MW	440 MW (Summer Peak)	Feasible
4	Case-4	A	1	310 MW	305 MW (Summer Off Peak)	Feasible
5	Case-5	A and B	1	409 MW	402 MW (Winter Peak)	Feasible
6	Case-6	A and B	1	326 MW	322 MW (Winter Off Peak)	Feasible

A.14.4. As per the study, Islanding Scheme does not seem feasible in cases 1, due to under voltage observed at various node when 2 machine are taken considering area A & B

Electricity Test & Commissioning Circle,Lucknow

Priority wise opening of feeders connected on SPS at 400KV Sub - stations Bareilly

Name of S/S	T/F Rating	Tripping Logic Stage		Tripping Logic Stage			
		% Setting	Time	%Setting	Time	Priority of Feeders for load cut off	Average Load in MW Load in MW
400KV S/S Bareilly	315MVA - I	100-110 (454-500 A)	5 Sec	Above 110% (>500 A)	1500 ms	1-220KV Amariya DC	32
						2-20KV Faridpur	20
						3-20KV Pilibhit DC	130
	315MVA - II	100-110 (454-500 A)	5 Sec	Above 110% (>500 A)	1500 ms	4- 220 KV Pantnagar	118
						5- 220 KV CB Ganj DC	84
	315MVA - III	100-110 (454-500 A)	5 Sec	Above 110% (>500 A)	1500 ms	6- 220 KV Dohna DC	70

Note: Delay as mentioned in the above Tripping logics I& II is for initiation of tripping command. After initiation of tripping command, feeders will continue to trip as per priority without any time delay untill loading on ICT recahes below 100%.

Overcurrent setting of ICTs at 400KV Sub - stations Bareilly		
Fault current with respect to full load (FL) current	Current in A	OC trip time (in Sec)
100% of FL	-	-
105% of FL	-	-
110% of FL pikup (500A)	501	1051
120% of FL	545	24
130% of FL	590	7.983
140% of FL	635	6.22

Logic for proposed SPS (System Protection Scheme) for ICTs at 400kV Substation Panki							
Name of Substation	ICT Rating	Tripping Logic-I			Tripping Logic-II		
		% Setting	Time Delay	Priority of feeder for load cut off	% Setting	Time Delay	Priority of feeder for load cut off
400kV Substation Panki	315MVA ICT- I	100-110% of rated current	5 sec	1. 220kV Chibramau 2. 220kV RPH 3. 220kV Bithoor 4. 220kV Raniya 5. 132kV Dibiyapur 6. 132kV Dadanagar 7. 132kV Azad Nagar Ckt I & II	Above 110% of rated current	1500 msec	1. 220kV Chibramau 2. 220kV RPH 3. 220kV Bithoor 4. 220kV Raniya 5. 132kV Dibiyapur 6. 132kV Dadanagar 7. 132kV Azad Nagar Ckt I & II
	500MVA ICT- II	100-110% of rated current	5 sec	1. 220kV Chibramau 2. 220kV RPH 3. 220kV Bithoor 4. 220kV Raniya 5. 132kV Dibiyapur 6. 132kV Dadanagar 7. 132kV Azad Nagar Ckt I & II	Above 110% of rated current	1500 msec	1. 220kV Chibramau 2. 220kV RPH 3. 220kV Bithoor 4. 220kV Raniya 5. 132kV Dibiyapur 6. 132kV Dadanagar 7. 132kV Azad Nagar Ckt I & II

Note: Delay as mentioned in the above Tripping logics I& II is for initiation of tripping command. After initiation of tripping command, feeders will continue to trip as per priority without any time delay untill loading on ICT recahes below 100%.

Overcurrent setting of ICTs at Panki	
Fault current with respect to full load (FL) current	OC trip time (in Sec)
100% of FL	-
105% of FL	-
110% of FL	Pickup
120% of FL	11.498
130% of FL	7.983
140% of FL	6.22

RAJASTHAN RAJYA VIDYUT PRASARAN NIGAM LIMITED
[Corporate Identity Number (CIN): U40109RJ2000SGC016485]
Regd. Office: Vidyut Bhawan, Janpath, Jyoti Nagar, Jaipur-302005

RVPN
An ISO 9001:2015 Certified Company

OFFICE OF THE CHIEF ENGINEER (LD)
New Prasaran Bhawan, TCC Building, Heerapura, Jaipur Tel. No. 0141-2948293
E-mail: ce.ld@rvpn.co.in website: www.http://energy.rajasthan.gov.in/rvpnl

Annexure-A.IX

No. RVPN/ CE (LD)/ SE(SOLD)/XEN(SA)/A-1/F. / D. Jaipur dt.

The Member Secretary
NRPC, New Delhi

Sub: -Agenda for inclusion in 62nd PSC Meeting SCHEDULED on 14.8.2025 - permission for opening of 6 nos. 50 MVAR capacity non-switchable line reactors installed on various 400 kV lines to improve voltage and reduce MVAR drawal from NR Grid in Rajasthan Control area

Ref:-1. Discussions held in 234th OCC meeting held on 14.8.2025

On the above captioned subject and under references, an Agenda item is enclosed herewith for inclusion in 62nd PSC meeting scheduled on 26.8.2025 for discussion and deliberation. It is also informed that aforesaid agenda item was also discussed in the 234th OCC meeting held on 14.8.2025 wherein it was advised to putup agenda in the forthcoming PSC meeting.

Encl: As above

(Sudhir Jain)
Chief Engineer (LD)
RVPN, Jaipur

Copy to the following for information and necessary action :-
1. The Director (Operations/Technical), RVPN, Jaipur
2. The Chief Engineer (PP&D), RVPN, Jaipur.
3. The General Manager, NRLDC, New Delhi
4. The Chief Engineer(PP&D), RVPN, Jaipur
5. The Zonal Chief Engineer(T&C), RVPN, Jodhpur/Ajmer
6. The Superintending Engineer (P&P), RVPN, Jaipur
7. TA to the MD, RVPN, for kind perusal of MD, RVPN, Jaipur

Encl: As above

Chief Engineer (LD)
RVPN, Jaipur

Document certified by SUDHIR JAIN <jain.sudhir@rvpn.co.in>
Digitally Signed by SUDHIR JAIN
Designation: Chief Engineer
Date :18-08-2025 05:54:55

RajKaj Ref No.: 17221333
eSign DSC

Agenda Item- Opening of 6 nos. 50 MVAR capacity non-switchable line reactors installed on various 400 kV lines to improve voltage and reduce MVAR drawal from NR Grid in Rajasthan Control area

In the various NRPC/OCC meetings regarding critically low voltage issues in Rajasthan control area has been discussed and Rajasthan SLDC has been advised to improve voltage and reduce MVAR drawal from NR grid.

In this regard it is intimated that various measures viz. regular pursuance with intrastate generators for injection MVAR as per their capability curve, MVAR injection by RE Generators as per CEA Regulations, proper maintenance & operation of the shunt capacitor banks etc. are being taken by SLDC, Rajasthan. In this regard SLDC Rajasthan has also explored to open non-switchable line reactors installed on 400 kV lines sothat in day time voltage can be improved. 50 MVAR capacity non-switchable line reactors are installed on following 400 kV lines which line lengths are less than 200 kM :-

i. 400 kV S/C Bikaner-Merta line (Twin moose) with 50 MVAR non switchable line reactors at both ends of line (172 kM)
ii. 400 kV D/C Bhadla-Bikaner line (quad moose) with 50 MVAR non switchable line reactors on each circuit at Bhadla end (189.1 kM)
iii. 400 kV S/C Ramgarh-Bhadla line (Twin moose) with 50 MVAR non switchable line reactor at Ramgarh end of line (160 kM)
iv. 400 kV S/C Jaisalmer 2-Kankani line (Quad moose) with 50 MVAR non switchable line reactor at Kankani end of line (176.84 kM)

Rajasthan SLDC has carried out load flow studies in latest PSSE file shared by NRLDC to assess the impact of opening of above 6 nos. 50 MVAR capacity non-switchable line reactors installed on aforesaid 400 kV lines to improve day time low Grid voltage in Rajasthan Control area. Following two scenarios have been simulated:-

i. Case-1: Load flow study with 17000 MW system demand and aforesaid 6 nos. 50 MVAR line are in circuit
ii. Case-2: Load flow study with 17000 MW system demand and aforesaid 6 nos. 50 MVAR line reactors are out of circuit

Load flow study results are tabulated hereunder :

Table-1: Impact on Voltage and system losses

S. No.	Particulars	Voltage (kV)		Change in voltage in Case-2 with respect to Case-1
		Case-1	Case-2	
1	400 kV GSS Merta	388	391	-3
2	400 kV GSS Bikaner	393	395	-2
3	400 kV GSS Kankani	384	387	-3
4	400 kV GSS Bhadla	390	393	-3
5	400 kV GSS Jodhpur	386	388	-2
6	400 kV GSS Ramgarh	393	397	-4
7	Transmission losses(MW)	840.2	834.6	5.6

Impact of switching off 06 nos 50 MVAR reactors (Total 300 MVAR Capacity) on MVAR loss of transmission lines on which installed line reactors are proposed to take out of circuit are placed at Annexure-1 and tabulated hereunder :-

Table-2: Impact on Line MVAR loss

S. No.	Particulars	Line reactor capacity(MVAR)		Line Conductor	Line length (km)	Line MVAR loss reduction in Case-2 as compare to Case-1
		End1	End2			
1	400 kV S/C Bikaner-Merta line	50	50	Twin Moose	172	51
2	400 kV D/C Bhadla-Bikaner line (Ckt-1)	50	-	Quad Moose	189.1	51
3	400 kV D/C Bhadla-Bikaner line (Ckt-2)	50	-	Quad Moose	189.1	51
4	400 kV S/C Ramgarh-Bhadla line (Ckt-1)	50	-	Twin Moose	160	65
5	400 kV S/C Jaisalmer2-Kanknai line	-	50	Quad Moose	176.84	44
	Total	**200**	**100**			**262**

In view of above load flow study results case is submitted for grant permission to open of 6 nos. 50 MVAR capacity non-switchable line reactors installed on aforesaid 400 kV to improve day time low Grid voltage in Rajasthan Control area. If required night time voltage would be controlled by opening of lines and MVAR absorption by Generators. Aforesaid agenda was also discussed in the 234th OCC meeting held on 14.8.2025 wherein it was advised to putup agenda in the forthcoming PSC meeting. Issue is submitted for discussion and deliberation.

Annexure-1

Impact of switching off 06 nos 50 MVAR reactors (Total 300 MVAR Capacity) on line MVAR loss

S. No.	Particulars	Line reactor capacity(MVAR)		Line Conductor	Line length (km)	Power flow on lines in case-1				Power flow on lines in case-2				Line MVAR loss		Line MVAR loss reduction in Case-2 as compare to Case-1
						End1		End2		End1		End2				
		End1	End2			MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	Case-1	Case-2	
1	400 kV S/C Bikaner-Merta line	50	50	Twin Moose	172	227	10	-225	2	-225	2	229	-41	12	-39	51
2	400 kV D/C Bhadla-Bikaner line (Ckt-1)	50	-	Quad Moose	189.1	744	7	-734	82	746	-38	-736	76	89	38	51
3	400 kV D/C Bhadla-Bikaner line (Ckt-2)	50	-	Quad Moose	189.1	744	7	-734	82	746	-38	-736	76	89	38	51
4	400 kV S/C Ramgarh-Bhadla line (Ckt-1)	50	-	Twin Moose	160	204	14	-203	-36	205	-29	-204	-43	-22	-72	65
5	400 kV S/C Jaisalmer2-Kanknai line	-	50	Quad Moose	176.84	942	109	-927	73	946	97	-931	41	182	138	44
	Total	200	100												Total	262

Backup O/C protection in lines at NTPC

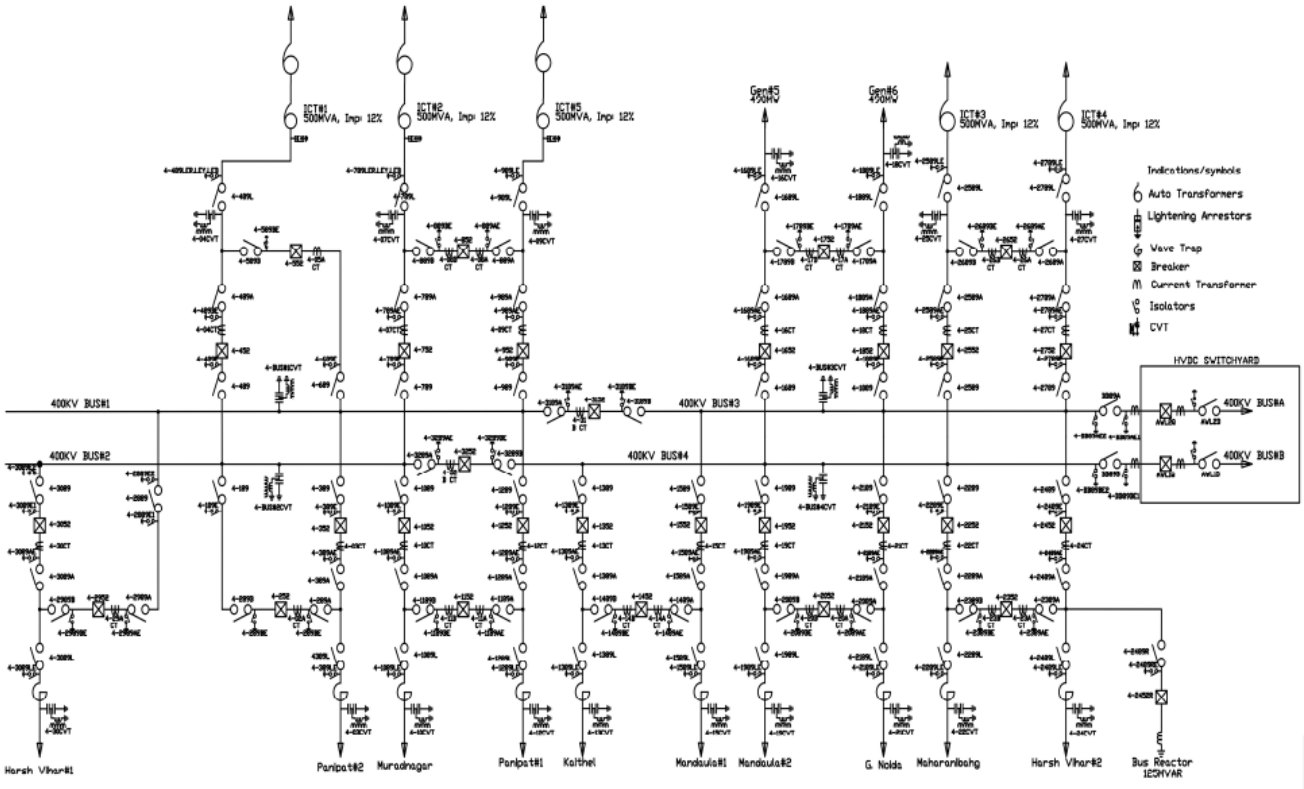
NTPC Dadri is having Thermal generation (**1820 MW**), Gas power generation (**829.78 MW**) & Solar(**5MWp**) generation capacity amounting to a total of **2654.78MW** of power generation capacity.

In addition to generation capacity, ±500kV, **1500MW**, HVDC Rihand – Dadri Link operating with power flow from Rihand to Dadri Switchyard.

NTPC Dadri is having 400kV and 220kV Switchyard. 400kV Switchyard from NTPC Dadri is evacuating a total **maximum power capacity** of **4154.78MW**.

This is w.r.t. Backup O/C protection in lines at NTPC overcurrent protection settings in 400kV Lines from NTPC Dadri.

We are having 10 Nos. of lines from NTPC Dadri. 400kV Switchyard Single Line diagram is given below: -



CEA philosophy for Line Backup Overcurrent Protection:

As per CEA construction standards 2022, there should be no Backup Over current protection enabled in 220KV & above rating transmission lines. (Recommendation attached in **Annexure:1**)

However, as per recommendation of CEA regulations 2022, it is mentioned that if main 1 and main 2 distance protections are being installed then overcurrent feature is not required. It is not mentioned that it cannot be enabled as backup protection.

NTPC philosophy for Line Overcurrent protection:

Definite Time, VT Fuse Failure-Enabled, Non-Directional Phase Overcurrent Protection in Main-1

and Main-2 Distance protection Relays:

- **Activation Condition:**

Non-Directional Overcurrent (OC) protection shall only be enabled with VT Fuse Failure. If there is no VT Fuse Failure, Overcurrent Protection shall not issue any trip. Additionally, Directional

Overcurrent protection shall not be used.

During VT fuse fail condition, Distance Protection will not be active. During such condition only, Definite time (DT) Backup O/C will be enabled with VT fuse fail & will act for breaker tripping (3ph trip relay) as per setting parameters.

Purpose to enable Backup O/C protection in lines at NTPC generating stations:

NTPC Engineering has provided a guiding philosophy for lines at NTPC stations, in which 'fuse failure enabled phase over current protection' shall get enabled in case of VT fuse failure only and pickup value around 1.7 times of thermal rating of line conductors with time delay.

we have adopted '**fuse failure enabled phase over current protection'** in all transmission lines connected to our generating stations because of **following reason**:

"Distance protection relays protect the transmissions during electrical faults. However, during a PT/CVT fuse failure condition, distance relays cannot detect the faults. If any transmission line of a generating does not trip during electrical faults, Generators will continue to feed the faults, there is a risk of operation of backup protections of all Generators connected to that substation, leading to blackout of that substation.

Therefore, to avoid the tripping of multiple Generators, station outages and to reduce fault feeding time of generators and GTs during such special cases, we have adopted fuse failure enabled phase over current protection. This Over Current protection is programmed to operate only in case of PT/CVT fuse failure and remains inactive during PT/CVT fuse healthy conditions."

Moreover, the over current setting for this protection is kept far beyond the thermal overloading capacity of the transmission lines.

Consent to enable BUOC as per NTPC philosophy by ERPC:

A meeting was held between ERPC, ERLDC, PGCIL & NTPC team dtd 08.01.2025 regarding enabling of BU O/C feature in NTPC transmission lines. NTPC team explained the requirement of enabling VT fuse fail enabled O/C protection in generating stations.

The matter was also discussed in the ERPC meetings and recorded in the ERPC OCC meeting-223 and 224 MOM.

All NTPC ROS/Station representatives are requested to take up the matter in their respective RLDC/RPC meetings.

Annexure:1

SCHEDULE-V

[See sub-regulation (3) of regulation 48]

Protection Details of Transmission Lines, Transformers, Reactors and Bus Bars

1. Transmission Line Protection

No.	Protection	765 kV	400 kV	220 kV/230 kV	132 kV/110 kV/ 66 kV
(a)	Main I- Distance protection*	Y	Y	Y	Y (for 132 kV/110 kV) Y/N (for 66 kV)
(b)	Main II- Distance protection* or directional comparison protection or phase segregated line	Y	Y	Y/N 'N' if Directional IDMT over	N

	differential protection			current and earth fault back up protection is provided otherwise 'Y'	
(c)	Directional inverse definite minimum time (IDMT) type earth fault relay	Y	Y	'Y' if both Main-I & Main-II are distance protections otherwise 'N'	N
(d)	Directional IDMT over current and earth fault back up protection	N	N	'Y' if Main-II is not provided otherwise 'N'	Y
(e)	Two stage over voltage protection	Y	Y	Y/N	Y/N
(f)	Auto reclosing#	Y (Single phase and three phase)	Y (Single phase and three phase)	Y (Single phase and three phase)	Y/N (three phase)

***For short line (less than 10 km) or cable or combination of overhead line and cable, line differential protection shall be used with built-in backup distance protection.**

 # For cable or combination of overhead line and cable, autoreclosing shall not be provided.

Note: (1) Y- Required; N- Not required; Y/N- Optional.

(2) Transmission lines with distance protection shall, in general, have carrier aided or fibre optic based inter-tripping or blocking feature.

Annexure-B.I

Status of actions points recommended during previous PSC meetings (to be discussed in 62nd PSC meeting)

S. No	Agenda	Remdial actions recommended during PSC meeting	Status of remdial action taken	
			61st PSC (26.06.2025)	62nd PSC (26.08.2025)
1	Frequent multiple elements tripping at 220kV Kunihar, Baddi, Upperla Nangal complex and load loss event in HP control area	**51 PSC:** PSC Forum requested HP to complete the protection audit as per mentioned timelines (protection audit of 220kV Kunihar has been awarded and it would be completed within next 15-20 days. In next phase, by 15th September, protection audit of substations in downstream and upstream of 220kV Kunihar S/s would be completed.) and resolve the protection related issues. HP was also requested to share the reports of protection audit to NRPC & NRLDC after completion of audits.	HPSEBL representative stated that option of PSDF fund haven't been successful. Therefore, followup is being done to complete the work through own fund sources. Further update will be shared. *PSC forum requested HPSEBL to take expeditious actions at their end and ensure the healthiness of protection system in this complex.*	
2	Multiple elements tripping at 220kV Hissar(BBMB) 07th May 2024, 11:16 hrs	**51 PSC:** a) Expedite the implementation of differential protection in short lines to avoid undesired operation of distance protection.	HVPNL representative informed that status mentioned in 60th PSC minutes need to be corrected. As informed during earlier PSC meetings, all the differential protection requirement in state is being compiled and shall be processed. *PSC forum recommended HVPNL to expedite the implementation of differential protection in short lines and also share the expected timeline.*	
3	Multiple elements tripping at 400kV Sainj (HP), 400kV Parbati2 & Parbti3 (NHPC) Stations on 07th May 2024, 16:17 hrs	**51 PSC:** a) NHPC shall follow up with the relay engineer and taken necessary remedial actions to ensure proper operation of A/R scheme at Parbati2 end. b) NHPC and HPPTCL shall review the healthiness of PLCC at Parbati3 and Sainj end and take necessary actions to ensure their proper operation. c) Expedite the implementation of differential protection in 400kV Parbati2-Sainj line. d) Standardisation of recording instruments (DR/EL) need to be ensured.	NHPC representaitve stated that status is same. Estimated time for completion of OPGW work and differential protection implementation is by Oct-Nov 2025. HPPCL representative stated that they will confirm the status and share. No further updates received during the meeting. *PSC forum recommended NHPC & HPPCL to take expeditious action at their end and ensure healthiness of protection system.*	
4	Multiple elements tripping at 400kV Koteshwar(PG) on 17th May 2024, 17:21 hrs	**51 PSC:** a) In view of short line length of 400KV Koteshwar(PG)-Tehri D/C, POWERGRID shall plan for the differential protection in the line on priority in near future to avoid overreach of distance protection.	POWERGID(NR-1) representative informed that status is same as previous meeting, estimated time for completion of work is ~6 months. *PSC forum requested POWERGID to expedite the work related to implementation of differential protection scheme on 400kV Koteshwar(PG)-Tehri(TH) D/C.*	
5	Multiple elements tripping at 220kV Sarna (PS) on 04th May 2024, 07:10 hrs	**51 PSC:** a) Punjab shall expedite the commissioning of new bus scheme. B) POWERGRID shall revise the Z-4 time delay setting of Kishenpur lines at Sarna (PS) end as 160msec till bus bar get operational.	PSTCL representative informed that status is same as previous meeting, estimated time for completion of work is by October 2025. *PSC forum requested PSTCL to expedite the work related to implementation of bus bar protection at Sarna S/s.*	
6	Multiple elements tripping at 220kV KTPS (RVUN) on 21st June 2024, 11:37 hrs	**51 PSC:** a) Commissioning of bus coupler between 220kV Bus-3 & 5 need to be expedited.	RVUNL representatives were not present. PSC forum requested RVUNL for expeditious actions at their end.	
7	Frequent tripping of 220 KV Anta(NT)-Sakatpura(RS) (RS) Ckt-1	**52 & 53 PSC:** RVPN was requested to expedite the process of relay replacement and rectification of issues related to A/R operation.	RVPNL representative informed that work is getting delayed due to trench issue in yard. Control room is ready but due to space constraint work is getting delayed. *PSC forum requested RVPNL to expedite the actions at their end.*	
8	Frequent tripping of 220 KV Khara(UP)-Saharanpur(PG) (UP) Ckt-1	**52 & 53 PSC:** UP was requested to expedite the process of relay replacement at Khara end. POWERGRID shall review and ensure the A/R operation at their end.	SLDC UP representative informed that status is same as previous meeting, relay replacement will be done as per shutdown availability. *PSC forum requested UPPTCL to expedite the replacement of relay at Khara(UP) end.*	
9	Multiple elements tripping at 220kV Khodri HEP & Chibro HEP on 5th, 11th & 19th September 2024	**53 PSC:** a)Timely submission of disturbance recorder (DR) and event logger (EL) files need to be ensured. As per IEGC clause 37.2 (c), Disturbance Recorder (DR), station Event Logger (EL), Data Acquisition System (DAS) shall be submitted within 24 hrs of the event. b)HPPTCL shall taken necessary actions to rectify the protection related issue in 220kV Khdori-Majri ckt-2. c)OV protection needs to be disabled in 220kV lines at the earliest. d)Over frequency and over current protection operation in units at Khodri HEP need to be reviewed. e)A/R should be made operational in Sarsawan line at the earliest. f)UJVNL shall share the CPRI audit report and details of remedial action taken within one week. g)Replacement of Units breakers need to be expedited.	UJVUNL representative informed that status is same as previous meeting, tender is at approval stage. *PSC forum requested UJVUNL & HPSEBL to expedtie the necessary remedial action at their end and ensure proper operation of protection system. UJVUNL shall expedite the action plan at khodri end and HPSEBL shall review the protection setting of 220kV Khodri-Majri line-II.*	
10	Multiple elements tripping at 400/220kV Obra_A(UP) on 9th October 2024	**54 PSC Recommendations:** a)UPPTCL & Obra_A(UP) shall ensure the implementation of LBB protection at the earliest at 220kV side. b)GPS scheme shall be implemented at Obra_B(UP) by the **end of January 2025** and time sync of recording devices will be ensured.	UPPTCL representative informed that status is same as previous meeting, work will be completed within 4 months and LBB relay will be replaced by FY 2026-27. *PSC forum requested UPPTCL for expedited corrective actions.*	
11	Multiple elements tripping at 220/132kV Obra_A(UP) on 9th October 2024	**54 PSC Recommendations:** Commissioning and Implementation of numerical relays in 132kV ICT-1&2 at Obra_A(UP) need to be expedited. Timely commissioning of the same need to be ensured.	UPPTCL representative informed that status is same as previous meeting, work will be completed within 4 months and LBB relay will be replaced by FY 2026-27. *PSC forum requested UPPTCL for expedited corrective actions.*	
12	Frequent tripping of 220 KV RAPS_A(NP)-Sakatpura (RS) (RS) Ckt-1 &2	**55 PSC Recommendations: E**xpeditious corrective actions to minimise frequent faults in line.	RAPS represenative stated that A/R scheme is not available at RAPS-A end. Issue has been raised to the NPCIL design team. Necessary actions will be taken after review by design team. Estimate time required is ~2 months. *PSC forum requested RAPS to expedite the necessary remedial actions .*	
13	Frequent tripping of 400 KV Amritsar(PG)-Makhu(PS) (PSTCL) Ckt-1 & 400 KV Talwandi Saboo(PSG)-Nakodar (PSG) (PS) Ckt-1	**55 PSC Recommendations:** PSTCL was requested to plan replacement of porcelain insulators with polymer type.	PSTCL representative informed that work will be coompleted by October 2025. *PSC forum requested PSTCL for expeditious actions and esnure insulators replacement before November 2025 to avoid frequent trippings during fog.*	
14	Multiple element tripping event at 400kV Aligarh(UP) on 02nd November, 2024	**55 PSC Recommendations:** UPPTCL shall ensure the healthiness of carrier communication and A/R operation at Muradnagar_1(UP) end.	UPPTCL representative informed that status is same as previous meeting, carrier cabinets are yet to be alloted. *PSC forum requested UPPTCL for expedited corrective actions.*	
15	Frequent tripping of 400 KV Anpara_B(UPUN)-Sarnath(UP) (UP) Ckt-2	**57 PSC Recommendations:** Healthiness of carrier communication need to be reviewed.	UPPTCL representative informed that status is same as previous meeting, carrier cabinets are yet to be alloted. *PSC forum requested UPPTCL for expedited corrective actions.*	
16	Multiple elements tripping at 220/132kV Ropar(PS) on 06th January, 2025	**57 PSC Recommendations:** PSTCL need to share the DR/EL & tripping details within one week	Event details was not shared by PSPCL representaitve. PSPCL agreed to share the event analysis report within 01 week. *PSC forum requested PSPCL to share detailed report along with observations and remedial action taken.*	

17	Multiple elements tripping at 400/220KV Heerapura(RS) on 10th January, 2025	**57 PSC Recommendations:** a) Instantaneous OC relay (High set) settings of ICTs at Heerapura(RS) may be reviewed. b) Replacement of remaining electromechanical/ static relays & schemes with numerical relay need to be expedited at Heerapura(RS).	RVPNL representative informed that case has been moved for both 220kV & 400kV bus. Estimated timeline for bus bar relay replacement is approx. 6 months (by Nov 2025). *PSC forum requested RVPNL to share the timeline of replacement of relays and take expedited corrective actions at their end.*	
18	Frequent tripping of 220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1	**58 PSC Recommendations: E**xpeditious corrective actions to minimise frequent faults in line.	RVPNL representative informed that 2-3 towers need to be replaced estimate time required for completion of work is 6-7 months (by end of Dec25). *PSC forum requested RVPNL to take expeditious corrective action to minimise frequent faults in line.*	
19	Frequent tripping of 400 KV Merta-Kankani (RS) Ckt-1	**59 PSC Recommendations:** A/R operation need to be reviewed at both the ends.	RVPNL representative stated that A/R is enabled at Kankani end also. Review is to be done on the next available shutdown. *PSC forum requested RVPNL to review A/R operation at Kankani end at the earliest.*	
20	Multiple elements tripping at 400kV AGE25L & 220kV Nokhra(IP) at 10:00 hrs on 18th March, 2025	**59 PSC Recommendations:** NTPC need to ensure over-voltage is disabled at Nokhra end of 220kV Nokhra-Bhadla2 Ckt.	*NTPC representative informed that they are yet to confirm the status of over-voltage protection operation (disabled or not) at Nokhra end .* *PSC forum requested NTPC to ensure over-voltage is disabled at Nokhra end of 220kV Nokhra-Bhadla2 Ckt. Further, it was sugegsted to take up the issue in RE subcommitte meeting scheduled in July 2025.*	
21	Multiple elements tripping at 765/220 kV Lalitpur TPS(UP) at 15:32 hrs on 03rd May, 2025	**61 PSC Recommendation:** a) In line with the NRPC protection philosophy, UPPTCL shall implement the DT scheme at 220kV level also. b) A/R need to be reviewed in 220kV Lalitpur-Jhansi line and 220kV Lalitpur-Dunara line.	Lalitpur TPS representative stated that at their 220kV remote end, DT signals are not considered for Overvoltage & LBB. Implementation of DT scheme shall be done in coordination with UPPTCL.	
22	Multiple elements tripping at 400/220KV Jaisalmer(RS) at 01:53 hrs on 05th May, 2025	**61 PSC Recommendation:** a) Reach setting of distance protection in 400kV lines at Jaisalmer(RS) (zone-2 of 400kV Akal-Jaisalmer Ckt) need to be reviewed and corrected. b) Reason of non-operation of bus bar protection on R_N fault need to be identified and necessary corrective actions need to be taken to ensure its proper operation.	NRLDC representative stated that Z-2 reach of 400kV Akal-Jaislamer line distance protection need to be reviewed as it shouldn't have tripped on fault at 220kV level and delayed fault clearance was due to non operation of bus bar protection on R-N fault. RVPNL representative agreed the same and stated that Z-2 reach setting and non operation of bus bar protection shall be reviewed. Necessary corrective actions shall be taken to rectify the protection related issue at 400/220kV Jaisalmer S/s.	
23	Multiple elements tripping at 400 kV Uri-II HEP (NHPC) at 21:35 hrs on 18th May, 202	**61 PSC Recommendation:** NHPC in coordination with the POWERGRID(NR-2) shall review the healthiness of carrier protection in 400kV Uri_2-Wagoora line	NRLDC representative stated that as per PMU, fault cleared with the delay of 400msec. As per DR of Wagoora end, fault was sensed in Z-2 and tripped with the delay of Z-2. It seems that carrier aided tripping didn't occur. Hence, carrier aided protection needs to be reviewed. NHPC agreed for the same.	
24	Multiple elements tripping at 765/400 kV Meerut(PG) and 400kV Dadri TPS(NTPC) at 19:55 hrs & 20:00 hrs respectively on 21st May, 2025	**61 PSC Recommendation:** a) DTL shall review whether any UFR relay is still in service at 400kV Dadri, Mandola complex or any other stations which is not part of present Delhi islanding scheme. b) POWERGRID shall study the philosophy for implementing O/C E/F relay as back up in case of VT fuse fail in both Main-I & II relay to avoid such major grid event.	POWERGRID representative stated that it is being planned to implement non directional O/C E/F protection in case of VT fail alarm in both Main-&II. This proposal is being reviewed internally at POWERGRID.	

Grid Event summary for June-July 2025

S.No.	Category of Grid Incident/ Disturbance	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Event (As reported)	Loss of generation / loss of load during the Grid Disturbance		Fault Clearance time (in ms)	Remarks
	(GI-I to GD-V)				Date	Time		Generation Loss(MW)	Load Loss (MW)		
1	GD-1	i)220kV Kaithal(PG)-Kaithal(HR) (HR) Line-1 ii)220kV Kaithal(PG)-Kaithal(HR) (HR) Line-2 iii)220kV Kaithal-Nising Line-1 iv)220kV Kaithal-Nising Line-2 v)220kV Kaithal-Phowa Line-1 vi)220kV Kaithal-Phowa Line-2	Haryana	PGCIL & HVPNL	10-Jun-25	00:20	i)220/132kV Kaithal(HR) has double main bus scheme. ii)As reported, at 00:20 hrs, all the elements connected at 220/132kV Kaithal(HR) tripped. 220kV lines tripped from remote end. iii)As per PMU at Kaithal(PG), B-N phase to earth fault followed by Y-B fault with delayed clearance of 560msec is observed. iv)It is suspected that due to non clearance of fault from Kaithal(HR), all the 220kV lines tripped from remote end in Z-2. v)As per SCADA, drop in Haryana demand of ~970 MW is observed out of which ~670 MW recovered within 05 minutes and complete load recovered within ~15 minutes. Reason of load drop yet to be received from SLDC-Haryana.	0	970	560	i)Exact location and nature of fault needs to be shared. ii)Reason of delayed clearance of fault also need to be shared. iii)The exact reason and sequence of protection operated during tripping need to be shared. iv)DR/EL along with tripping report not received yet from Haryana and POWERGRID end. Details need to be shared at the earliest. v)Tripping of elements is not recorded in SCADA SOE. Availability of SCADA SOE data need to be ensured. vi)Reason of significant quantum of load drop in Haryana control area during the event need to be shared. vii)Remedial action taken report to be shared.
2	GD-1	i)220kV Maharanibagh-Gazipur (DTL) line-1 ii)220kV Maharanibagh-Gazipur (DTL) line-2 iii)220kV Maharanibagh-Pragati (DTL) Line-1 iv)220kV Maharanibagh-Pragati (DTL) Line-2 v)220kV Pragati-IPPOS (DTL) line-1 vi)220kV Pragati-IPPOS (DTL) line-2 vii)220kV Pragati-Park Street (DTL)line-1 viii)220kV Pragati-Park Street (DTL) line-2 ix)220/66kV 160 MVA ICT-1 at Pragati(DTL) x)220/66kV 160 MVA ICT-2 at Pragati(DTL) xi)104 MW GT-1 at Pragati GPS xii)104 MW GT-2 at Pragati GPS xiii)122 MW STG-1 at Pragati GPS xiv)220kV Maharanibagh-Lodhi Road (DTL) line-2	Delhi	DTL	15-Jun-25	03:48	i)220kV Maharanibagh(DTL) is basically 220kV side of 400/220kV Maharanibagh(PG) station and has double main bus scheme. 220/66kV Pragati(DTL) also has double main bus scheme. ii)During antecedent condition, 220kV Maharanibagh-Gazipur (DTL) D/C was feeding load of 220/66kV Gazipur and 220/66kV Patparganj. Further 220/66kV Pragati(DTL) was having generation from Pragati GPS (generating ~277 MW) and feeding load of 220/66kV Pragati and 220/66kV Parkstreet. iii)As reported at 03:48 hrs, 220kV Maharanibagh-Gazipur (DTL) line-1 & 2 tripped on Y-N phase to earth fault. As per PMU at Maharanibagh(PG) and DR of the line (Maharanibagh end), Y-N phase to earth fault with fault current of ~6.6kA and cleared with the delay of ~200msec is observed with no A/R operation. Exact location of fault, reason of delayed clearance and reason of tripping of both the lines yet to be received from DTL. iv)With the tripping of 220kV Maharanibagh-Gazipur (DTL) line-1 & 2, load of 220/66kV Gazipur(DTL) and 220/66kV Patparganj(DTL) affected. v)Further at 03:52 hrs, Y-ph bus bar differential protection, 18.1kA, Z-1 & Z-2 at 220kV Pragati(DTL operated leading to tripping of all the elements connected at 220kV Bus-1 & 2 at 220/66kV Pragati(DTL). As per PMU, Y-N phase to earth fault cleared within 120msec is observed. As per DR of Y-ph bus bar differential at 220kV Pragati(DTL), Z-1 bus bar protection followed by Z-2 bus bar protection operated. vi)Due to tripping of all the elements at 220/66kV Pragati(DTL), load of 220/66kV Park Street(DTL) and 220/66kV Pragati(DTL) affected. Approx. 277 MW generation of Pragati GPS also lost due to loss of evacuation path. vii)Further at 03:55 hrs, 220kV Maharanibagh-Lodhi Road (DTL) line-2 tripped on B-N fault. As per DR and PMU, B-N fault in Z-1, Ib=17.4kA with no A/R operation and cleared within 100msec is observed. viii)As reported by SLDC-Delhi, due to tripping of aforementioned elements, load loss of approx. 640 MW occurred in Delhi control area. Complete details of the load affected during the event are attached in Annexure. ix)As per SCADA, change in demand of approx. 700MW in Delhi control area and loss in generation of ~277 MW at Pragati GPS is observed. x)As reported, restoration started from 04:48 hrs and completed by 06:04 hrs.	0	640	200	i)At 03:48 hrs, 220kV Maharanibagh-Gajipur Line-1&2 tripped on Y-N fault. Observation w.r.t. tripping are as follows: a.Relay flags related to fault location and distance protection initiation not available. b.Reason of tripping of both the lines on single Y-N fault yet to be ascertained. In DR files, "BB OPTD" flag is there, reason of its initiation also needs to be identified. c.Fault cleared with the delay of ~200msec, reason of delayed clearance of fault also needs to be identified. ii)It is also observed that all the DR files i.e., bus bar relay DR of Pragati end, line protection relay DR w.r.t. Maharanibagh lines tripping are not in standard format. DRs nomenclature are not as per standard, time is not GPS synced. Therefore, standardization of recording instruments (DR/EL) needs to be ensured. iii)Station Event logger file of 220kV Maharanibagh and 220kV Pragati(DTL) has not been shared yet. It also needs to be extracted for further analysis of the event. iv)Details of remedial action taken to avoid such events in future along with detailed analysis of the event need to be shared
3	GD-1	1) 220 KV Wagoora(PG)-Pampore(PDD) (PG) Ckt-1 2) 220 KV Wagoora(PG)-Pampore(PDD) (PG) Ckt-2	Jammu and Kashmir	PGCIL, JKPTCL	20-Jun-25	23:25	i)400/220kV Wagoora(PG) has double main and transfer Bus arrangement at both 400KV and 220KV side. 220/132kV Pampore(J&K) has double bus scheme at 220kV level however SCADA data is not healthy there. ii)During antecedent condition, power flow from Wagoora(PG) S/s to Pampore(PDD) S/s was approx. 162 MW (81 MW each) through 220 KV Wagoora(PG)-Pampore(PDD) (PG) D/C. Load of 220/132kV Pampore(J&K) was being fed from Wagoora only. iii)As reported at 23:25 hrs, Y-phase Transformer Bushing at Pampore failed. On this fault, 220kV Wagoora(PG)-Pampore(PDD) (PG) Ckt-1 & 2 tripped from Wagoora end. iv)As per PMU at Amargarh(INDIGRID), Y-N phase to earth fault clearing time of 160ms is observed. v)As per DR of Wagoora end, distance protection relay of both the lines sensed the fault in Z-2, fault current was ~11kA in line-2 and ~8.5kA in line-1. vi)Due to tripping of both the lines, load of 220/132kV Pampore(J&K) affected. As per SCADA, change in demand of approx. 190 MW is observed in J&K control area.	0	190	160	i)Exact location of fault and nature of protection operated need to be shared. ii)Why did both 220kV line trip from Wagoora end? Time delay setting of Z-2 at Wagoora end also need to be shared as line tripped within ~160msec. iii)SCADA data was not available for 220/132kV Pampore(PDD JK) S/s during the event. Tripping is also not recorded in SCADA SOE. Availability and healthiness of SCADA data need to be ensured. iv)DR/EL (.dat/.cfg file) along with tripping report of the tripped elements at Pampore(J&K) end need to be shared. v)Remedial action taken report need to be shared.
4	GD-1	1) 220 KV Moga(PG)-Moga(PS) (PSTCL) Ckt-2 2) 220 KV Moga(PG)-Moga(PS) (PSTCL) Ckt-3 3) 220 KV Moga(PG)-Moga(PS) (PSTCL) Ckt-4 4) 220 KV Moga(PS)-Kotkaror (PSTCL) Ckt-1 5) 220 KV Moga(PS)-Kotkaror (PSTCL) Ckt-2 6) 220kV Moga(PS)-Sadiq Ckt 7) 220kV GHTP-Himmatpura (PS) Ckt-1 8) 220kV GHTP-Himmatpura (PS) Ckt-2 9) 220 KV Moga(PG)-Badhni kalan(PS) (PSTCL) Ckt-1 10) 220 KV Moga(PG)-Ajitwal(PS) (PSTCL) Ckt-1 11) 220kV Ajitwal-Himmatpura (PS) Ckt 12) 220kV Badhni kalan-Himmatpura (PS) Ckt	Punjab	PGCIL, PSTCL	1-Jul-25	11:06	i)220/132 KV Moga (PS) has double main bus system at 220KV level.During antecedent condition, 220 KV Moga(PS)-Bajakhana (PSTCL) Ckt was under outage and also 220kV Moga(PS)-Baghapurana Ckt-1 & 2 was already under tripped condition. As reported, at 10:50 hrs, R-phase conductor of 220kV Moga(PS)-Baghapurana Ckt-2 snapped and both the lines tripped in zone-1 protection operation at Moga end (exact reason of tripping of 220kV Moga(PS)-Baghapurana Ckt-1 need to be analysed). ii)As reported at 11:06 hrs, R-phase jumper of 220 KV Moga(PG)-Moga(PS) (PSTCL) Ckt-3 snapped and came in contact with Y-phase conductor. On this fault O/C E/F relay at Moga(PS) end did not pick up (which was only in operation during the event) and line tripped from Moga(PG) end only. iii)This fault was also fed by 220 KV Moga(PG)-Moga(PS) (PSTCL) Ckt-2 & 4 and these Ckt-2 also tripped from Moga(PG) end only while Ckt-4 tripped from both the ends (exact nature of protection operated yet to be shared). iv)220 KV Moga(PS)-Kotkaror (PSTCL) Ckt-1 & 2 tripped from Moga(PS) end sensing the fault in zone-4. Further, 220kV Moga(PS)-Sadiq Ckt also tripped from Moga(PS) end, but reason of tripping could not be identified due to connectivity issue in Main-2 relay. Due to tripping of all 220kV lines connected to Moga(PS), complete blackout occurred at 220/132kV Moga(PS) S/s. v)During the same time, busbar protection operated at Ajitwal(PS) and 220kV Ajitwal-Himmatpura (PS) Ckt and 220 KV Moga(PG)-Ajitwal(PS) (PSTCL) Ckt-1 tripped. (exact reason of busbar protection operation at Ajitwal(PS) need to be shared). vi)As per SCADA SOE and as reported, 220kV Badhni kalan-Himmatpura (PS) Ckt, 220kV GHTP-Himmatpura(PS) Ckt-1 & 2 and 220 KV Moga(PG)-Badhni kalan(PS) (PSTCL) Ckt-1 also tripped during the same time (exact reason and nature of protection operated need to be shared). vii)Due to this tripping, complete blackout occurred at 220/66kV Badhni kalan(PS) & 220/66 kV Himmatpura(PS) S/s also. viii)As per PMU at Ludhiana(PG), R-Y phase to phase fault followed by B-N phase to earth fault was observed with fault clearance time of 240 ms & 120 ms respectively. ix)As per SCADA, change in demand of approx. 1005 MW was observed in Punjab control area. However, as reported by SLDC Punjab, load loss of approx. 582 MW occurred in Punjab control area. x)As reported by Punjab, line differential along with distance protection will be installed within one week for 220 KV Moga(PG)-Moga(PS) (PSTCL) Ckt-1, 2, 3 & 4.	0	582	240	i)Exact reason of tripping of 220kV Moga(PS)-Baghapurana Ckt-1 at 10:50 hrs need to be shared. ii)Issue in O/C E/F relay at Moga(PS) of 220 KV Moga(PG)-Moga(PS) (PSTCL) Ckt-3 need to be addressed at the earliest. iii)Connectivity issue in Main-2 relay at Moga(PS) end of 220kV Moga(PS)-Sadiq Ckt need to be resolved. iv)Exact nature of protection operated need to be shared for 220 KV Moga(PG)-Moga(PS) (PSTCL) Ckt-2, 3 & 4 from PG end. v)Exact reason of busbar protection operation at Ajitwal(PS) need to be shared. vi)Exact reason and nature of protection operated need to be shared 220kV Badhni kalan-Himmatpura (PS) Ckt, 220kV GHTP-Himmatpura(PS) Ckt-1 & 2 and 220 KV Moga(PG)-Badhni kalan(PS) (PSTCL) Ckt-1 vii)SCADA data was freezed at 220/132kV Moga(PS) during the event. Avaialbility and healthiness of SCADA data need to be ensured. viii)DR/EL (.dat/.cfg file) of all tripped elements along with detailed tripping report need to be shared. ix)Remedial action taken report need to be shared.
5	GI-1	1) 220 kV Patparganj-IPPOS (DTL) Ckt-1 2) 220 kV Patparganj-IPPOS (DTL) Ckt-2 3) 220 kV Patparganj-Geeta Colony (DTL) Ckt-1 4) 220 kV Patparganj-Geeta Colony (DTL) Ckt-2 5) 220 kV Patparganj-Ghazipur (DTL) Ckt 6) 220/66kV 100MVA ICT-1 at Patparganj(DTL) 7) 220/66kV 100MVA ICT-2 at Patparganj(DTL) 8) 220 kV Rajghat-IPPOS (DTL) Ckt-1 9) 220 kV Rajghat-IPPOS (DTL) Ckt-2 10) 104 MW GT-1 at Pragati (PPCL) 11) 122 MW STG at Pragati (PPCL)	Delhi	DTL, PPCL	9-Jul-25	17:31	i)220/66kV Patparganj(DTL) has double main Bus arrangement at 220kV side. ii)During antecedent condition, 220 kV Patparganj-IPPOS (DTL) Ckt-1 & 2, 220 kV Patparganj-Geeta Colony (DTL) Ckt-1 & 2, 220 kV Patparganj-Ghazipur (DTL) Ckt and 220/66kV 100MVA ICT-1 & 2 at Patparganj(DTL) were connected to 220kV Bus-2 at Patparganj(DTL) and 220kV Patparganj-Preet Vihar Ckt-1 & 2 and 220/33kV 100MVA ICT-1 & 3 were connected to 220kV Bus-1 at Patparganj(DTL). 220kV Bus coupler was in OFF position. 104 MW GT-1 and 122 MW STG at Pragati (PPCL) were generating approx. 80 MW and 104 MW respectively. iii)As reported, at 17:31 hrs, bus bar protection operated at 220kV Bus-2 at Patparganj(DTL) and all the elements connected to Bus-2 tripped and Bus-2 became dead (exact nature, location and reason of fault yet to be shared). iv)During the same time, 220 kV Rajghat-IPPOS (DTL) Ckt-1 & 2 also tripped (exact reason and nature of protection operated yet to be shared). v)As reported by SLDC Delhi, 104 MW GT-1 and 122 MW STG at Pragati (PPCL) tripped during the same time (exact reason and nature of protection operated yet to be shared). vi)As per PMU at Dwarka(PG), R-Y phase to phase fault with fault clearance time of 120msec was observed. vii)As per SCADA, change in demand of approx. 405 MW in Delhi control area was observed. However, as reported by SLDC Delhi, load loss of approx. 270 MW in Delhi control area and generation loss of approx. 184 MW at Pragati(PPCL) occurred. viii)As reported by SLDC Delhi, at 17:38 hrs, 220kV Bus coupler was closed at Pragati and IPPOS normalised.	184	270	120	i)Exact nature, location and reason of fault need to be shared. ii)Reason of tripping of 220 kV Rajghat-IPPOS (DTL) Ckt-1 & 2 and 104 MW GT-1 and 122 MW STG at Pragati (PPCL) need to be shared. iii)SCADA data was freezed at 220kV Geeta Colony and Pragati(PPCL) during the event. Availability and healthiness of SCADA data need to be ensured. iv)DR/EL (.dat/.cfg file) of all tripped elements along with detailed tripping report need to be shared. v)Remedial action taken report need to be shared.
6	GI-1	1) 220 KV Mandola(PG)-Narela(DV) (DTL) Ckt-1 2) 220 KV Mandola(PG)-Narela(DV) (DTL) Ckt-2	Delhi	PGCIL, DTL	10-Jul-25	15:41	i)220/66kV Narela(DTL) has double main Bus arrangement at 220kV side. ii) As reported, at 15:41 hrs, 220 KV Mandola(PG)-Narela(DV) (DTL) Ckt-1 tripped on B-N phase to earth fault; fault sensed in zone-1 at Narela(DTL) end (exact nature, location and reason of fault yet to be shared). iii)During the same time, 220 KV Mandola(PG)-Narela(DV) (DTL) Ckt-2 also tripped on B-N phase to earth fault; fault sensed in zone-2 at Narela(DTL) end (exact nature, location and reason of fault yet to be shared). iv)As per PMU at Mandaula(PG), Y-N phase to earth fault followed by two consecutive B-N faults with fault clearance time of respectively 120 ms, 480 ms (delayed) and 160 ms was observed. v)As per SCADA, change in demand of approx. 280 MW in Delhi control area was observed.	0	280	480	i)Exact nature, location and reason of fault need to be shared. ii)Reason of delayed clearance of fault need to be shared. iii)SCADA data was freezed at 220/66kV Narela(DTL) during the event. Availability and healthiness of SCADA data need to be ensured. iv)DR/EL (.dat/.cfg file) of all tripped elements along with detailed tripping report need to be shared. v)Remedial action taken report need to be shared.
7	GD-1	1) 220 KV Khodri(UK)-Majri(HP) (UK) Ckt-1 2) 220 KV Khodri(UK)-Majri(HP) (UK) Ckt-2 3) 220 KV Khodri - Chhibro (UK) Ckt-1 4) 220 KV Khodri - Chhibro (UK) Ckt-2 5) 220 KV Sarsawan(UP)-Khodri(UK) (UP) Ckt 6) 220 KV Saharanpur(UP)-Khodri(UK) (UP) Ckt 7) 220/132 kV 100 MVA ICT at Khodri(UK) 8) 30 MW Unit-1 at Khodri(UK) 9) 30 MW Unit-2 at Khodri(UK) 10) 30 MW Unit-3 at Khodri(UK) 11) 30 MW Unit-4 at Khodri(UK) 12) 60 MW Unit-1 at Chhibro(UK) 13) 60 MW Unit-2 at Chhibro(UK) 14) 60 MW Unit-3 at Chhibro(UK) 15) 60 MW Unit-4 at Chhibro(UK)	Uttarakhand	PTCUL, HPPTCL, UPPTCL	15-Jul-25	12:28	i)220KV Khodri(UK) and 220kV Chhibro(UK) generating station have 4 generating units each of 30MW and 60MW respectively and have double main bus scheme. ii)During antecedent condition, 30 MW Unit-1, 2, 3 & 4 at Khodri(UK) were in running condition and were generating approx. 23 MW, 22 MW, 23 MW and 22 MW respectively. Also, 60 MW Unit-1, 2, 3 & 4 at Chhibro(UK) were in running condition and were generating approx. 51 MW, 52 MW, 47 MW and 52 MW respectively (as per SCADA). 220kV Khodri-Jhajra Ckt was under shutdown for tracing the DC supply fault in its control circuit. iii)As reported, at 12:28 hrs, heavy flashover was observed at B-phase insulator bushing of 220kV Khodri-Jhajra Ckt which created bus fault at 220kV Khodri(UK). iv)As bus bar protection was not healthy at 220kV Khodri(UK), all the feeders except 220 KV Khodri - Chhibro (UK) Ckt-1 & 2 tripped from Khodri end sensing the fault in zone-4. However, 220 KV Khodri - Chhibro (UK) Ckt-1 tripped from Chhibro end only (exact nature of protection operated at Chhibro yet to be shared). v)As per DR of Main-2 relay at Khodri end of 220 KV Sarsawan(UP)-Khodri(UK) (UP) Ckt, fault was sensed in zone-3 at Khodri end (it seems that there is wrong DR channel configuration); fault current=~2.215kA from Khodri end and fault clearing time=~220ms. vi)As per DR at Khodri end of 220 KV Khodri(UK)-Majri(HP) (UK) Ckt-2, line tripped due to direction E/F protection operation at Khodri end. vii)At the same time, all the units at Khodri(UK) and Chhibro(UK) tripped on over-current protection operation and complete blackout occurred at 220kV Khodri(UK) and 220kV Chhibro(UK). viii)As per PMU at Dehradun(PG), B-N phase to earth fault with fault clearing time of 240 ms was observed. ix)As per SCADA, generation loss of approx. 290 MW was observed in Uttarakhand control area.	290	0	240	i)Reason of delayed clearance of fault need to be shared. ii)Busbar protection need to be made healthy at Khodri at the earliest. iii)Exact reason of non-operation of protection in 220 KV Khodri - Chhibro (UK) Ckt-1 need to be shared. iv)Exact nature of protection operated in 220 KV Khodri - Chhibro (UK) Ckt-2 at Chhibro end need to be shared. v)Direction E/F protection settings at Khodri end of 220 KV Khodri(UK)-Majri(HP) (UK) Ckt-2 need to be shared and reviewed. vi)Reason of sensing the fault in zone-3 by Main-2 relay at Khodri end of 220 KV Sarsawan(UP)-Khodri(UK) (UP) Ckt need to be analysed. vii)DR/EL(.dat/.cfg file) of all tripped units need to be shared along with detailed tripping report. viii)Remedial action taken report need to be shared.
8	GI-1	1) 220 KV Khodri(UK)-Majri(HP) (UK) Ckt-1 2) 220 KV Khodri(UK)-Majri(HP) (UK) Ckt-2 3) 220 KV Khodri - Chhibro (UK) Ckt-2 4) 220 KV Saharanpur(UP)-Khodri(UK) (UP) Ckt 5) 220/132 kV 100 MVA ICT at Khodri(UK) 6) 30 MW Unit-2 at Khodri(UK) 7) 30 MW Unit-3 at Khodri(UK) 8) 30 MW Unit-4 at Khodri(UK) 9) 60 MW Unit-3 at Chhibro(UK)	Uttarakhand	PTCUL, HPPTCL, UPPTCL	20-Jul-25	18:44	i)220KV Khodri(UK) and 220kV Chhibro(UK) generating station have 4 generating units each of 30MW and 60MW respectively and have double main bus scheme. ii)During antecedent condition, 30 MW Unit-1, 2, 3 & 4 at Khodri(UK) were in running condition and were generating approx. 23 MW, 22 MW, 23 MW and 22 MW respectively. Also, 60 MW Unit-1, 2, 3 & 4 at Chhibro(UK) were in running condition and were generating approx. 51 MW, 53 MW, 47 MW and 52 MW respectively (as per SCADA). iii)As reported, at 18:44 hrs, R-ph LA at Majri end of 220kV Majri-VISCO feeder blast. It led to the tripping of 220 KV Khodri(UK)-Majri(HP) (UK) Ckt-1 & 2. 220 KV Khodri(UK)-Majri(HP) (UK) Ckt-1 tripped from Majri end only. (exact reason, nature and location of fault yet to be shared). iv)As per DR at Khodri end of 220 KV Khodri(UK)-Majri(HP) (UK) Ckt-2, direction E/F protection operated at Khodri end. v)Due to this disturbance, Stand-by E/F protection operated at 30 MW Unit-2, 3 & 4 at Khodri(UK). But due to delayed opening of CB at Unit-4, LBB protection operated which led to further tripping of 220 KV Khodri - Chhibro (UK) Ckt-2, 220 KV Saharanpur(UP)-Khodri(UK) (UP) Ckt, and 220/132 kV 100 MVA ICT at Khodri(UK). vi)As per DR at Khodri end of 220 KV Saharanpur(UP)-Khodri(UK) (UP) Ckt, line tripped from Khodri end only. R-N fault with fault current of ~1.05kA from Khodri and fault clearing time of ~160ms was observed. vii)During the same time, 60 MW Unit-3 at Chhibro(UK) also tripped (exact reason of protection operated yet to be shared). viii)As per PMU at Dehradun(PG), R-N phase to earth fault with fault clearing time of 160 msec was observed. ix)As per SCADA, generation loss of approx. 114 MW was observed in Uttarakhand control area.	114	0	160	i)Exact reason, nature and location of fault need to be shared. ii)Exact nature of protection operated at 60 MW Unit-3 at Chhibro(UK) need to be shared. iii)Exact reason of non-operation of protection in 220 KV Khodri - Chhibro (UK) Ckt-1 need to be shared. iv)DR/EL(.dat/.cfg file) of all tripped units need to be shared along with detailed tripping report. v)Remedial action taken report need to be shared.

S.No.	Category of Grid Incident/ Disturbance	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Event (As reported)	Loss of generation / loss of load during the Grid Disturbance		Fault Clearance time (in ms)	Remarks
	(GI-I to GD-V)				Date	Time		Generation Loss(MW)	Load Loss (MW)		
9	GD-1	1) 220 KV Amargarh (INDIGRID)-Ziankote(JK) (PDD JK) Ckt-1 2) 220 KV Amargarh (INDIGRID)-Ziankote(JK) (PDD JK) Ckt-2	Jammu and Kashmir	INDIGRID, PDD JK	24-Jul-25	10:18	i)220/132kV Ziankote S/s have two bus at 220kV side i.e., main bus & reserve bus. 220kV Amargarh-Ziankote ckt-1&2 are on the same tower (D/C tower) and line length is ~21.4km. ii)During antecedent condition, 220kV Amargarh (INDIGRID) –Ziankote (JK) D/C were carrying 194 MW each and feeding load of Ziankote & Alustang both. 220kV Wagoora-Ziankote D/C were under planned outage. iii)As reported, at 10:18 hrs 220 KV Amargarh (INDIGRID)-Ziankote(JK) (PDD JK) Ckt-2 tripped on B-N fault. Fault current was ~4.7kA and fault location was 11.7km from Ziankote end. At the same time, 220 KV Amargarh (INDIGRID)-Ziankote(JK) (PDD JK) Ckt-1 also tripped. iv)As per telephonic communication with Ziankote S/s, 220 KV Amargarh (INDIGRID)-Ziankote(JK) (PDD JK) Ckt-2 tripped within 100 msec from Ziankote end. As Z-2 time delay setting of 220 KV Amargarh (INDIGRID)-Ziankote(JK) (PDD JK) D/C is kept as instantaneous, Line-1 also tripped instantaneously from Amargarh end. v)As per PMU at Amargarh (INDIGRID), B-N phase to earth fault cleared within 120msec is observed. vi)As per SCADA, change in demand of approx. 400 MW is observed in J&K control area.	0	400	120	i)SCADA data of 220/132kV Ziankote(JK) S/s is not available. Availability and healthiness of the same need to be ensured. ii)DR/EL (.dat/.cfg) file of all the tripped elements along with tripping report need to be shared from both the ends. iii)Z-2 time delay setting at Amargarh (INDIGRID) end need to be reviewed and revised so that both the lines don't trip instantaneously. iv)Remedial action taken report to be shared.
10	GD-1	1) 220kV Kangoo-Rarui(HP) Ckt 2) 220 KV Dehar(BB)-Kangoo(HP) (HP) Ckt 3) 132 KV Dehar(BB)-Kangoo(HP) (HPPTCL) Ckt 4) 220/132kV 80/100 MVA ICT at Kangoo(HP)	Himachal Pradesh	HPPTCL, BBMB	27-Jul-25	16:46	i)220/132kV Kangoo(HP) S/s has single main and transfer bus scheme at 220kV and 132kV level. During antecedent condition, 220/132kV 80/100 MVA ICT at Kangoo(HP) was carrying ~30 MW. ii)As reported, at 16:46 hrs, B-N phase to earth fault occurred in 220kV Kangoo-Rarui(HP) Ckt (exact nature, location and reason of fault yet to be shared). However, due to non-clearance of fault, LBB protection operated. iii)Due to LBB operation, 220 KV Dehar(BB)-Kangoo(HP) (HP) Ckt and 220/132kV 80/100 MVA ICT at Kangoo(HP) tripped along with all the 132 kV elements connected at Kangoo(HP). iv)Due to tripping of all 220kV and 132kV elements at Kangoo(HP), both 220kV and 132kV bus at Kangoo(HP) became dead and complete blackout occurred at 220.132kV Kangoo(HP) S/s. v)As per PMU at Dehar(BB), B-N phase to earth fault was observed with fault clearing time of 120 ms. vi)As per SCADA, change in demand of approx. 100 MW in HP control area was observed. However, as reported by SLDC HP, load loss of 75 Mw occurred in HP control area.	0	75	120	i)Exact reason, location and nature of fault need to be shared. ii)Exact reason of non-clearance of fault/LBB operation need to be analysed. LBB time delay settings need to be shared. iii)DR/EL (.dat/.cfg file) of all tripped elements along with tripping report needs to be shared from both the ends. iv)SCADA data at 220/132kV Kangoo(HP) S/s was suspected after the event. Availability and healthiness of SCADA data need to be ensured. v)Remedial action taken report need to be shared.

Annexure-B.III

Frequent Tripping during June 2025

Sr No	Element Name	Outage Date	Outage Time	Reason
1	250 MW (PSP) TEHRI HPS - UNIT 5	07-Jun-25	09:00	Due to low head.
		09-Jun-25	12:36	PSP Unit taken out (earlier running in Pumping mode). Later Tehri HEP units were synchronised from 1300 hrs onwards.
		09-Jun-25	21:17	Oil leakage in GOPU Unit led to SPMAX Major fault
		11-Jun-25	01:19	Due to Communication failure in SPMAX System (Specific Power Maximum).
		13-Jun-25	15:30	Tripped due to Rotor over frequency
		14-Jun-25	23:10	Tripping due to disturbance in the Unit Controller System
		17-Jun-25	09:00	Failure of K105 relay in Unit controller, which further triggered multiple relays for zero speed signal in SPMAX & Unit protection relays.
		26-Jun-25	10:12	Generator Fault due to failure of Generator Remote I/O field controller
		28-Jun-25	08:00	Tripped due to absence of communication of SPMax with UCS
		28-Jun-25	18:00	DC fail due to Diode bridge in DCDB at GIS burnt
2	220 KV Meerut(PG)-Nara(UP) (PG) Ckt	06-Jun-25	03:33	Phase to earth fault Y-N
		18-Jun-25	02:34	Phase to earth fault R-N
		23-Jun-25	17:28	Phase to earth fault R-N
		25-Jun-25	17:45	Phase to earth fault R-N
		29-Jun-25	18:29	Phase to earth fault B-N
		30-Jun-25	02:28	Phase to earth fault Y-N
		30-Jun-25	15:20	Phase to earth fault B-N
3	220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1	10-Jun-25	13:46	Phase to earth fault B-N
		11-Jun-25	13:51	Phase to earth fault B-N
		14-Jun-25	14:58	Phase to earth fault B-N
		14-Jun-25	16:50	Phase to Phase Fault R-Y
		16-Jun-25	14:28	Phase to earth fault R-N
4	220 KV RAPS_B(NP)-Sakatpura(RS) (RS) Ckt-1	10-Jun-25	12:11	Phase to earth fault B-N
		10-Jun-25	15:06	Phase to Phase Fault Y-B
		16-Jun-25	00:28	Phase to earth fault B-N
		27-Jun-25	10:10	Phase to Phase Fault R-Y
5	220 KV Sarsawan(UP)-Khodri(UK) (UP) Ckt-1	05-Jun-25	20:05	Phase to earth fault R-N
		18-Jun-25	09:30	Phase to earth fault Y-N
		24-Jun-25	09:05	Phase to earth fault B-N
		26-Jun-25	14:01	Phase to earth fault R-N

Frequent Tripping during July 2025

Sr No	Element Name	Outage Date	Outage Time	Reason
1	250 MW (PSP) TEHRI HPS - UNIT 5	01-Jul-25	18:30	Non equalization of pressure in MIV
		04-Jul-25	08:24	VSI fault due to Improper AC voltage feedback to VSI
		05-Jul-25	18:30	HP oil injection system fault.
		09-Jul-25	09:15	HP Oil Injection Combined Fault
		13-Jul-25	09:13	Labyrinth CWS system MOV Stuck
		14-Jul-25	14:36	Stator Differential protection 87G operated
		15-Jul-25	12:32	QSD due to Shaft seal cooling water flow too low.
		16-Jul-25	09:29	ESD due to grid voltage assymetrical dip detected by VSI
		17-Jul-25	19:40	Manually tripped because of sudden rise in unit speed above dead band
		19-Jul-25	18:45	Governor OPU Safety Solenoid Valve did not pick up due to loose wiring connection
		22-Jul-25	19:46	Loss of evacuation path
		25-Jul-25	08:05	Machine went into dead band due to higher head which requires further tunning of machine by the experts.
2	250 MW (PSP) TEHRI HPS - UNIT 6	10-Jul-25	09:00	Stator under power protection fault
		10-Jul-25	10:02	Tripped on ESD Due to Oil Pressure too high at BFV
		14-Jul-25	14:36	Turbine RTU IHR Controller Failure.
		16-Jul-25	09:29	ESD due to grid voltage assymetrical dip detected by VSI
		16-Jul-25	21:03	VSI Fault
		20-Jul-25	18:45	VSI crowbar fault due to ingress of carbon dust in slip ring
		21-Jul-25	00:00	Generator Fault
		27-Jul-25	13:30	VSI Chopper temperature increased leading to tripping of Unit
		31-Jul-25	09:00	Absence of pump operation readiness condition (Internal logic for head condition)
3	220 KV NAPP(NP)-Simbholi(UP) (UP) Ckt-1	05-Jul-25	04:04	Phase to earth fault B-N
		05-Jul-25	09:25	Snapping of Earth wire
		10-Jul-25	17:06	Phase to earth fault R-N
		11-Jul-25	08:11	Phase to earth fault B-N
		16-Jul-25	18:42	Phase to earth fault R-N
		17-Jul-25	03:14	Phase to earth fault B-N
		23-Jul-25	19:11	Phase to earth fault B-N
		27-Jul-25	09:05	Phase to earth fault B-N
4	220 KV Nara(UP)-Roorkee(UK) (UP) Ckt-1	07-Jul-25	11:53	Phase to earth fault R-N
		28-Jul-25	19:11	Phase to earth fault R-N
		30-Jul-25	17:57	Phase to earth fault R-N
		31-Jul-25	12:09	Phase to Ground Fault R-N
		31-Jul-25	22:22	Phase to earth fault R-N
5	220 KV Panipat-Kurukshetra (BB) Ckt-1	16-Jul-25	12:58	Phase to earth fault Y-N
		16-Jul-25	12:58	Phase to earth fault Y-N
		24-Jul-25	09:49	Bus Bar Protection Operated
		26-Jul-25	12:22	Phase to earth fault Y-N
		26-Jul-25	14:55	Phase to earth fault B-N

S. No.	Name of Transmission Element Tripped	Owner/ Utility	Outage		Load Loss/ Gen. Loss	Brief Reason (As reported)	Category as per CEA Grid standards	# Fault Clearance Time (>100 ms for 400 kV and 160 ms for 220 kV)	*FIR Furnished (YES/NO)	DR/EL provided in 24 hrs (YES/NO)	Other Protection Issues and Non Compliance (inference from PMU, utility details)	Remarks
			Date	Time								
1	800 KV HVDC Kurukshetra(PG) Pole-4	POWERGRID	09-Jun-25	12:21	770 MW	Pole-4 tripped due to Convertor Transformer differential protection operated at Kurukshetra. Due to tripping of Pole 4 at high power there was disturbance in grid, resulting in Instability Detection protection operated in HVDC Pole-1 and Pole-3 at Champa.	GI-2	NA	Yes (After 24 hours)	Yes (After 24 hours)		As reported, Converter Differential Protection of YY - B phase operated. As per information received from PGCIL, during site inspection, it was found that differential current above the set threshold appeared only in the Main 2 differential relay while Main 1 relay currents were normal. Remedial Action: PowerGrid replaced the faulty card in Main 2 relay.
2	800 KV HVDC Kurukshetra(PG) Pole-3	POWERGRID	09-Jun-25	12:22				NA	Yes (After 24 hours)	Yes (After 24 hours)		As reported and as per EL, Rectifier instability protection operated at Champa end and Pole 3 and Pole 1 blocked from Champa end.
3	800 KV HVDC Kurukshetra(PG) Pole-1	POWERGRID	09-Jun-25	12:22				NA	Yes (After 24 hours)	Yes (After 24 hours)		
4	220 KV Modak(RS)-Bhanpura(MP) (MPSEB) Ckt-1	MPSEB	11-Jun-25	11:59	Nil	Phase to earth fault B-N	NA	120	Yes (After 24 hours)	Yes	3-ph A/R observed as per DR. DR time sync issue observed at Modak end.	As per PMU & DR, line tripped on B-N fault; line auto-reclosed successfully from Modak end (3-ph A/R observed). Fault was in Z-1 from Modak end and fault current was ~ 1.24kA. DR time sync issue observed at Modak end.
5	765 KV Orai-Jabalpur (PG) Ckt-2	POWERGRID	13-Jun-25	20:16	Nil	Phase to Phase Fault R-B	NA	80	Yes	Yes		As per PMU & DR, line tripped on R-B fault. Fault was in Z-1 from Orai end and fault current was Ir=~2.888kA and Ib=~3.092kA.
6	765 KV Varanasi-Gaya (PG) Ckt-1	POWERGRID	17-Jun-25	01:47	Nil	Phase to earth fault Y-N	NA	80	Yes	Yes		As per PMU & DR, line tripped on Y-N fault with unsuccessful A/R. Fault was in Z-1 from Varanasi end and fault current was ~ 15.933kA.
7	220 KV Auraiya(NT)-Mehgaon(MP) (MPSEB) Ckt-1	POWERGRID	22-Jun-25	09:21	Nil	Bus Bar Protection Operated	NA	120	No	Yes (After 24 hours & EL not received)	EL and detailed tripping report not received. DR time sync issue observed at Auraiya end.	As per PMU & DR, line tripped on B-N fault. Fault was in Z-4 from Auraiya end and fault current was ~ 1.451kA. DR time sync issue observed at Auraiya end.
8	765 KV Orai-Jabalpur (PG) Ckt-1	POWERGRID	22-Jun-25	09:32	Nil	Over Voltage	NA	NA	Yes	Yes		As per PMU & DR, fluctuation in voltage is observed and line tripped on over-voltage stage-1 protection operation at Jabalpur end and DT received at Orai end.
9	765 KV Phagi(RS)-Gwalior(PG) (PG) Ckt-1	POWERGRID	02-Jul-25	02:22	Nil	Phase to earth fault R-N	NA	80	Yes (After 24 hours)	Yes		As per PMU and DR, R-N phase to earth fault with unsuccessful A/R is observed. Fault current was ~3.6kA.
10	400 KV Sahupuri(UP)-Biharshariff(PG) (PG) Ckt-1	POWERGRID	02-Jul-25	08:03	Nil	malfunction of BCU at Sahupuri end	NA	NA	Yes (After 24 hours)	Yes	Malfunction of BCU at Sahupuri end	As per PMU and DR, no fault in system is observed. As reported, line tripped due to malfunction of BCU at Sahupuri end.
11	800 KV HVDC Kurukshetra(PG) Pole-1	POWERGRID	02-Jul-25	08:41	Nil	Pole-1 blocked on Converter differential protection Operated due to maloperation of DCCT sensor (Idc) at Kurukshetra end	NA	NA	Yes (After 24 hours)	Yes (After 24 hours)		As per PMU, fluctuation in voltage is observed. As reported, Pole-1 blocked on Converter differential protection Operated due to maloperation of DCCT sensor (Idc) at Kurukshetra end
12	800 KV HVDC Kurukshetra(PG) Pole-2	POWERGRID	03-Jul-25	15:03	Nil	Tripping of Pole 2 on VBO(Valve BreakOver) REDUNDANCY LOST PROTECTION	NA	NA	Yes (After 24 hours)	Yes (After 24 hours)		As per PMU, fluctuation in voltage is observed. As reported, Pole 2 tripped on VBO(Valve BreakOver) REDUNDANCY LOST PROTECTION
13	400 KV Gorakhpur(PG)-Muzaffarpur(PG) (POWERLINK) Ckt-1	POWERLINK	13-Jul-25	12:37	Nil	Phase to Phase Fault R-B	NA	80	Yes	Yes		As per PMU and DR, B-N phase to earth fault with unsuccessful A/R is observed. Fault current was ~5.2kA.
14	765 KV Agra-Gwalior (PG) Ckt-1	POWERGRID	13-Jul-25	21:19	Nil	Phase to earth fault B-N	NA	80	Yes	Yes		As per PMU and DR, B-N phase to earth fault with unsuccessful A/R is observed. Fault current was ~10.4kA.
15	400 KV Balia-Biharshariff (PG) Ckt-2	POWERGRID	15-Jul-25	15:31	Nil	Phase to earth fault Y-N	NA	80	Yes	Yes		As per PMU & DR, Y-N phase to earth fault in reclaim time is observed.
16	220 KV Auraiya(NT)-Mehgaon(MP) (MPSEB) Ckt-1	POWERGRID	26-Jul-25	05:01	Nil	Phase to earth fault B-N	NA	80	No	Yes (After 24 hours)	No A/R operation	As per PMU, no fault in system is observed. As per DR, Y-N fault with unsuccessful A/R operation at Auraiya end is observed. Fault current was ~2.8kA.
17	220 KV Auraiya(NT)-Mehgaon(MP) (MPSEB) Ckt-1	POWERGRID	26-Jul-25	21:29	Nil	Phase to earth fault R-N	NA	80	No	Yes (After 24 hours)	Issue in A/R operation	As per PMU, no fault in system is observed. As per DR, R-N fault with no A/R operation at Auraiya end is observed. Fault current was ~1.9kA.
18	400 KV Gorakhpur(PG)-Motihari(BS) (PG) Ckt-2	POWERGRID	28-Jul-25	14:18	Nil	Phase to earth fault B-N	NA	80	Yes	Yes		As per PMU and DR, B-N phase to earth fault with unsuccessful A/R is observed. Fault current was ~10.28kA.
19	765 KV Orai-Jabalpur (PG) Ckt-1	POWERGRID	29-Jul-25	13:05	Nil	Over Voltage. DT received at Orai end.	NA	NA	Yes	Yes		As per PMU, no fault in system is observed. As per DR, DT received at Orai end. During antecedent condition, phase voltages at Orai(PG) were Vr=469kV, Vy=469kV, Vb=464.5kV
20	400 KV Vindhyachal(PG)-Vindhyachal(NT) (PG) Ckt-1	POWERGRID	30-Jul-25	20:25	Nil	Tripped from Vindhyachal NTPC end due to tripping of both auxiliary supply of Block Due to Loss of Both West Bus	GI-2	NA	Yes	Yes		As per Event log, 400 KV Vindhyachal(PG)-Vindhyachal(NT) (PG) D/C namely AWL1 and AWL2 are connected to West bus 1B and 2B. As both 400 kV feeder Tripped, it caused De-Energization of west
21	400 KV Vindhyachal(PG)-Vindhyachal(NT) (PG) Ckt-2	POWERGRID	30-Jul-25	20:25	Nil			NA	Yes	Yes		
22	70 KV Vindhyachal(PG) Pole-1	POWERGRID	30-Jul-25	20:25	Nil	Tripping Of Vindhyachal HVDC Dual		NA	Yes	Yes		As per Event log, Pole Control System of Block#1 issued trip command on "81AC Under Frequency"
23	70 KV Vindhyachal(PG) Pole-1	POWERGRID	30-Jul-25	20:25	Nil			NA	Yes	Yes		Protection. Pole Control System of Block#2 issued trip command on "Trip by Change over Logic" due to

 # Fault Clearance time has been computed using PMU Data from nearest node available and/or DR provided by respective utilities (*Annexure- II****)***

****Yes, if written Preliminary report furnished by constituent(s)***

R-Y-B phase sequencing (Red, Yellow, Blue) is used in the list content.All information is as per Northern Region unless specified.

^^ tripping seems to be in order as per PMU data, reported information. However, further details may be awaited.

Reporting of Violation of Regulation for various issues for above tripping

1	Fault Clearance time(>100ms for 400kV and >160ms for 220kV)	1. CEA Grid Standard-3.e 2. CEA Transmission Planning Criteria
2	DR/EL Not provided in 24hrs	1. IEGC 37.2(c) 2. CEA Grid Standard 15.3
3	FIR Not Furnished	1. IEGC 37.2(b) 2. CEA Grid Standard 12.2 (Applicable for SLDC, ALDC only)
4	Protection System Mal/Non Operation	1. CEA Technical Standard of Electrical Plants and Electric Lines: 43.4.A 2. CEA (Technical Standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1. (6.1, 6.2, 6.3)
5	A/R non operation	1. CEA Technical Standard of Electrical Plants and Electric Lines: 43.4.C 2. CEA Technical Planning Criteria

ग्रिड-इंडिया GRID-INDIA
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
भारत सरकार का उद्यम
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]
उत्तर क्षेत्रीय भार प्रेषण केन्द्र / Northern Regional Load Despatch Centre
कार्यालय : 18-ए, शहीद जीत सिंह सनसनवाल मार्ग, कटवारिया सराय, नई दिल्ली–110016
Office : 18-A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi-110016
CIN : U40105DL2009GOI188682, Website : www.nrldc.in, E-mail : nrldc@grid-india.in, Tel.: 011 26519406, 26523869, Fax: 011 26852747

Report on Multiple elements tripping at 220kV Salal(NHPC)

1. **Date & Time of event:** 11:17 hrs on 15.07.2025

2. **Location/Control Area:** Jammu and Kashmir

3. **Plant/Substation Name:** 220kV Salal(NH)

4. **GD/GI Category:** GD-1

5. **Antecedent Condition:**
   - NR Load : 65841 MW
   - Affected state load (J&K) : 2289 MW
   - Frequency : 49.97 Hz
   - Weather condition : Heavy Rain/Thunderstorm
   - IR exchange : 6251 MW

6. **Generation loss/Load loss:** Change in load of ~175 MW in J&K control area and generation loss of approx. 395MW at Salal HEP(NHPC) (as per SCADA).

7. **Duration of interruption:** ~00:43 (hh:mm) (Restoration time : 12:00 hrs); Energy Unserved: 0.125 MUs

8. **Tripped elements:**

S. No	Name of Elements	Outage Time	Revival Time	Reason of tripping
1.	220 KV Kishenpur(PG)-Salal(NH) (PG) Ckt-1	11:17 hrs	12:41 hrs	Bus Bar protection operated at Salal HEP due to Unit-4 isolator flashover
2.	220 KV Kishenpur(PG)-Salal(NH) (PG) Ckt-2		12:00 hrs	
3.	220 KV Kishenpur(PG)-Salal(NH) (PG) Ckt-3		12:00 hrs	
4.	220 KV Kishenpur(PG)-Salal(NH) (PG) Ckt-4		12:00 hrs	
5.	220 KV Salal(NH)-Jammu(PDD) (PG) Ckt-1		12:01 hrs	

6.	220 KV Salal(NH)-Jammu(PDD) (PG) Ckt-2		12:09 hrs	
7.	115 MW Unit-1 at Salal HEP		12:04 hrs	
8.	115 MW Unit-2 at Salal HEP		12:05 hrs	
9.	115 MW Unit-3 at Salal HEP		12:07 hrs	
10.	115 MW Unit-5 at Salal HEP		12:07 hrs	
11.	115 MW Unit-6 at Salal HEP		12:18 hrs	

9. Details of fault (if any) :

i) Nature of fault: R-B phase to phase fault as per PMU

ii) Fault clearing time: 80 msec

10. Brief description of event:

i) During antecedent condition, 115 MW unit-1, 3 & 5 and 220kV feeders to Kishenpur-II & III, Jammu-II were connected to 220kV Bus-1 at Salal HEP and 115 MW unit-2 & 4 and 220kV feeders to Kishenpur-I & IV, Jammu-I were connected to 220kV Bus-2 at Salal HEP. Total generation of Salal HEP was ~395 MW.

ii) As reported by NHPC, at 11:02 hrs, an attempt was made to out the 115 MW Unit-4 at Salal HEP. However, B-ph CB of Unit-4 got stuck. LBB protection initiated but due to some issue in LBB relay operation, tripping command to adjacent bays didn't initiate.

iii) Multiple attempts were made by the plant operator to open the CB of unit-4 however it couldn't open and LBB relay also didn't operate as per scheme.

iv) Further at 11:17 hrs, the plant operator made an attempt to open the unit-4 isolators with the purpose of isolating the unit-4. However, as the isolator was opened in ON load condition, flashover occurred which resulted in fault in system.

v) As per PMU at Kishenpur(PG), R-B phase to phase fault cleared within 100 msec is observed.

vi) At the same time, all the running units at Salal HEP and 220kV lines tripped. The exact details of protection operation yet to be received from NHPC.

vii) As per SCADA, change in load of ~175 MW in J&K control area and generation loss of approx. 395MW at Salal HEP(NHPC). Load of J&K affected due to tripping of 220kV Salal-Jammu D/C.

11. Preliminary Observations:

i) Reason of non-operation of LBB protection as per scheme need to be investigated and issue need to be resolved at the earliest.

ii) Necessary monitoring and mechanical healthiness of circuit breakers needs to be ensured to avoid such event in future.

iii) Plant operators need to be sensitized to follow the standard operating procedure for any switching operations and such unwanted incidents can be avoided.

iv) Exact nature of fault occurred due to isolator flashover need to be shared.

v) Details of protection operation, DR(.dat/.cfg) files of all the tripped elements need to be shared.

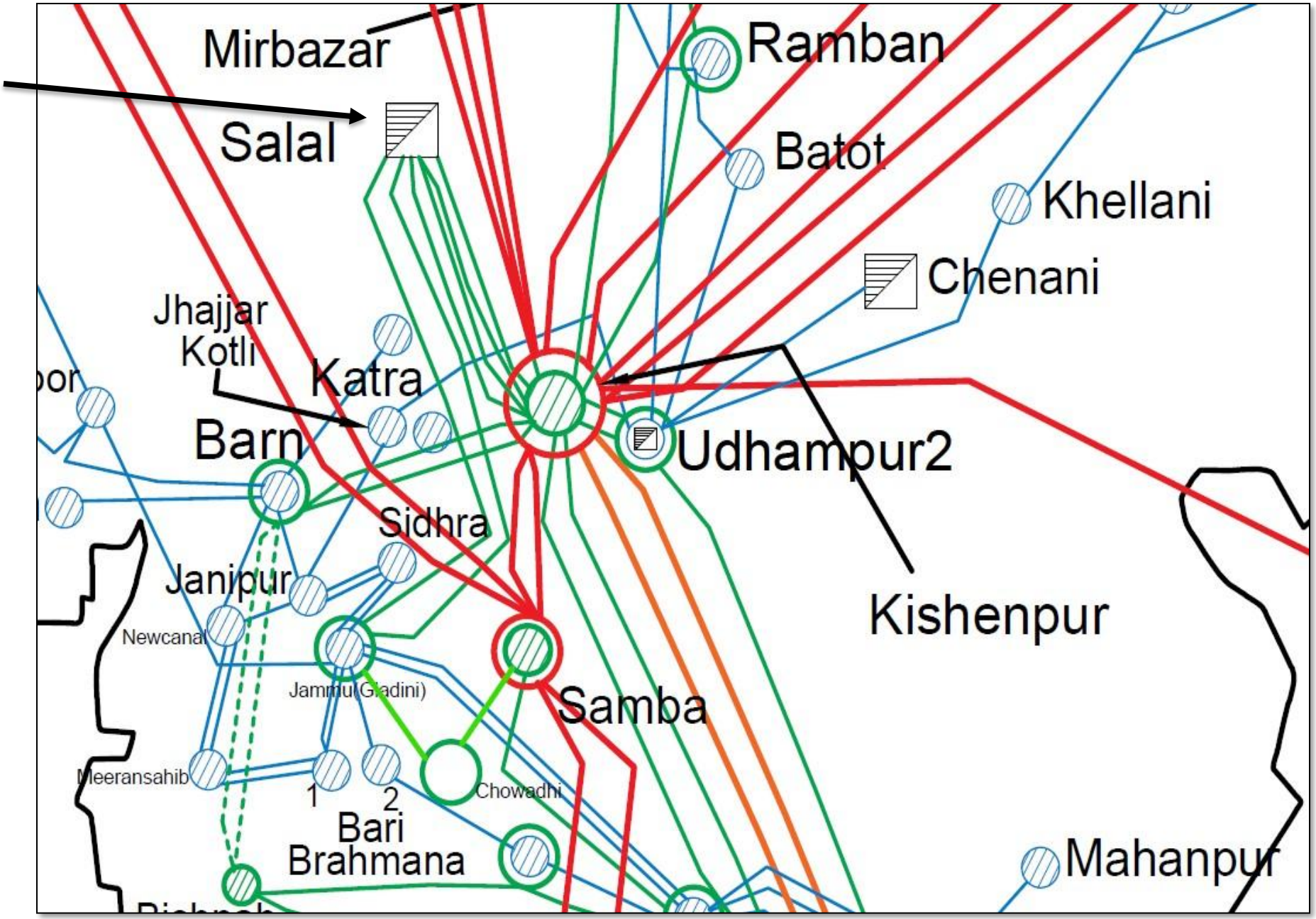
vi) Tripping of elements is not recorded in SCADA SOE. Availability of SOE data in SCADA needs to be ensured.

vii) DR received from NHPC are not in standard format. Non standardization of recording instruments affects the tripping analysis. DR/EL at Salal needs to be standardized.

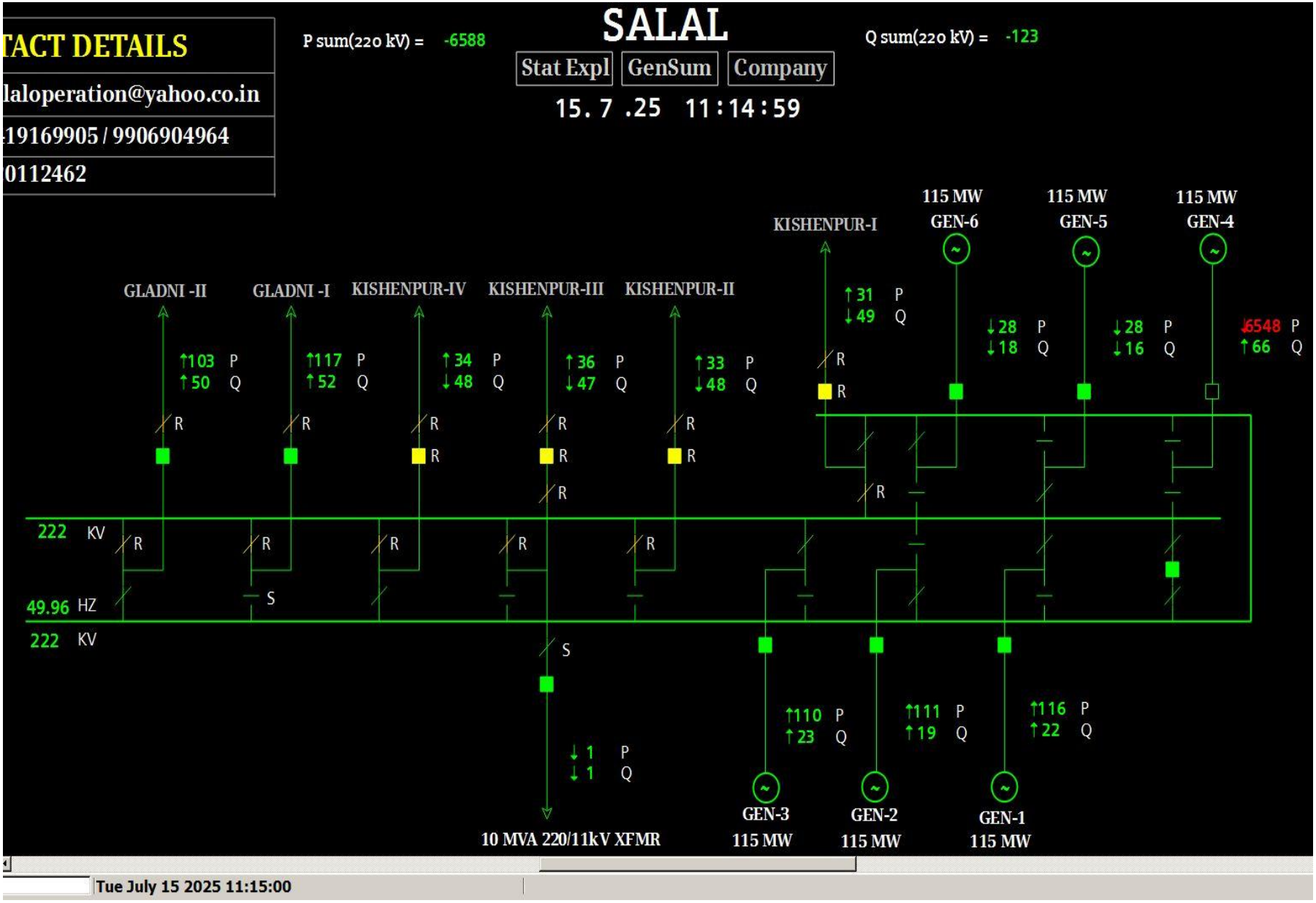
viii) Station Event logger details of the period 17:00 hrs to 17:20 hrs need to be shared.

ix) Remedial action taken report to be shared.

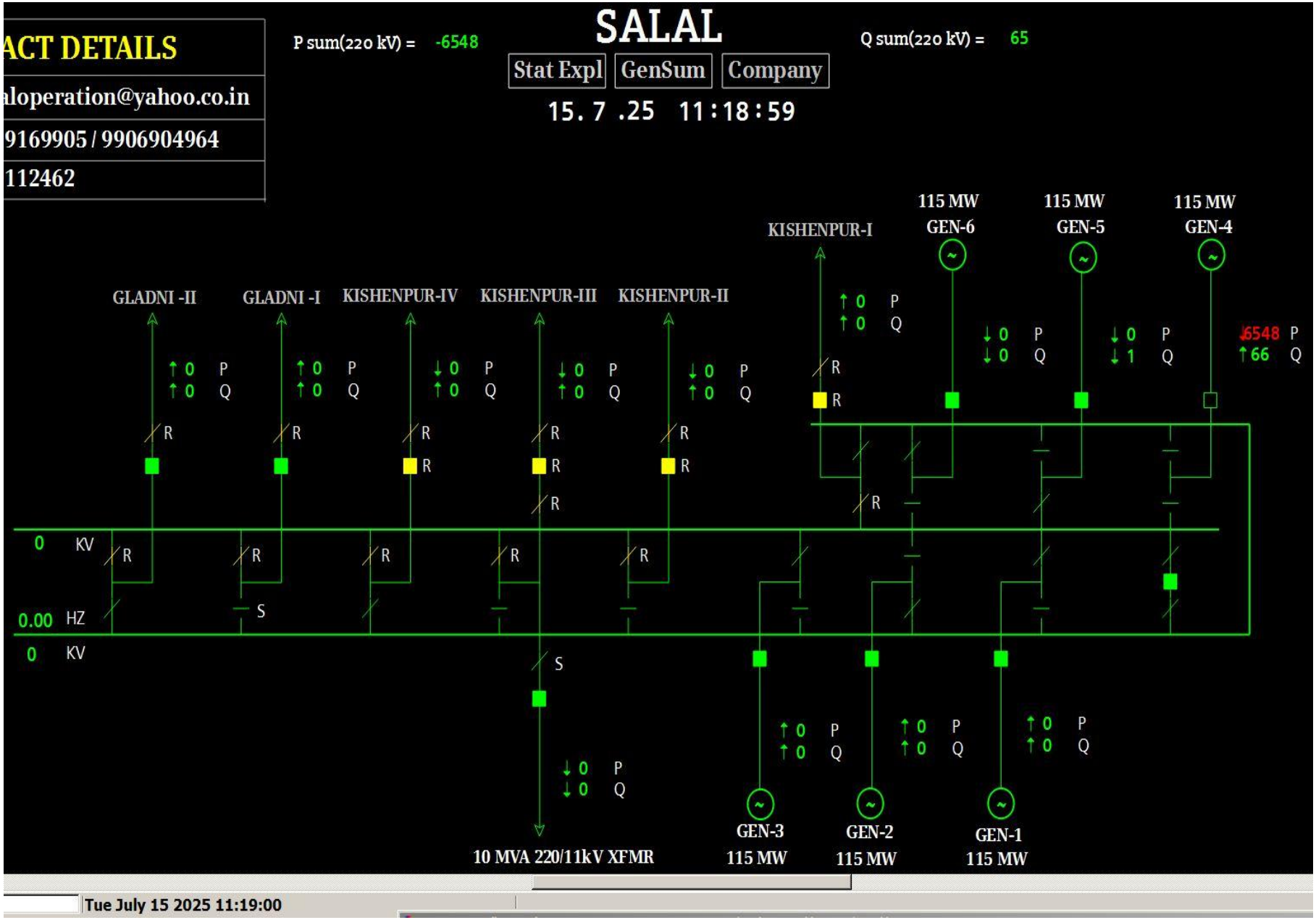
Network Diagram



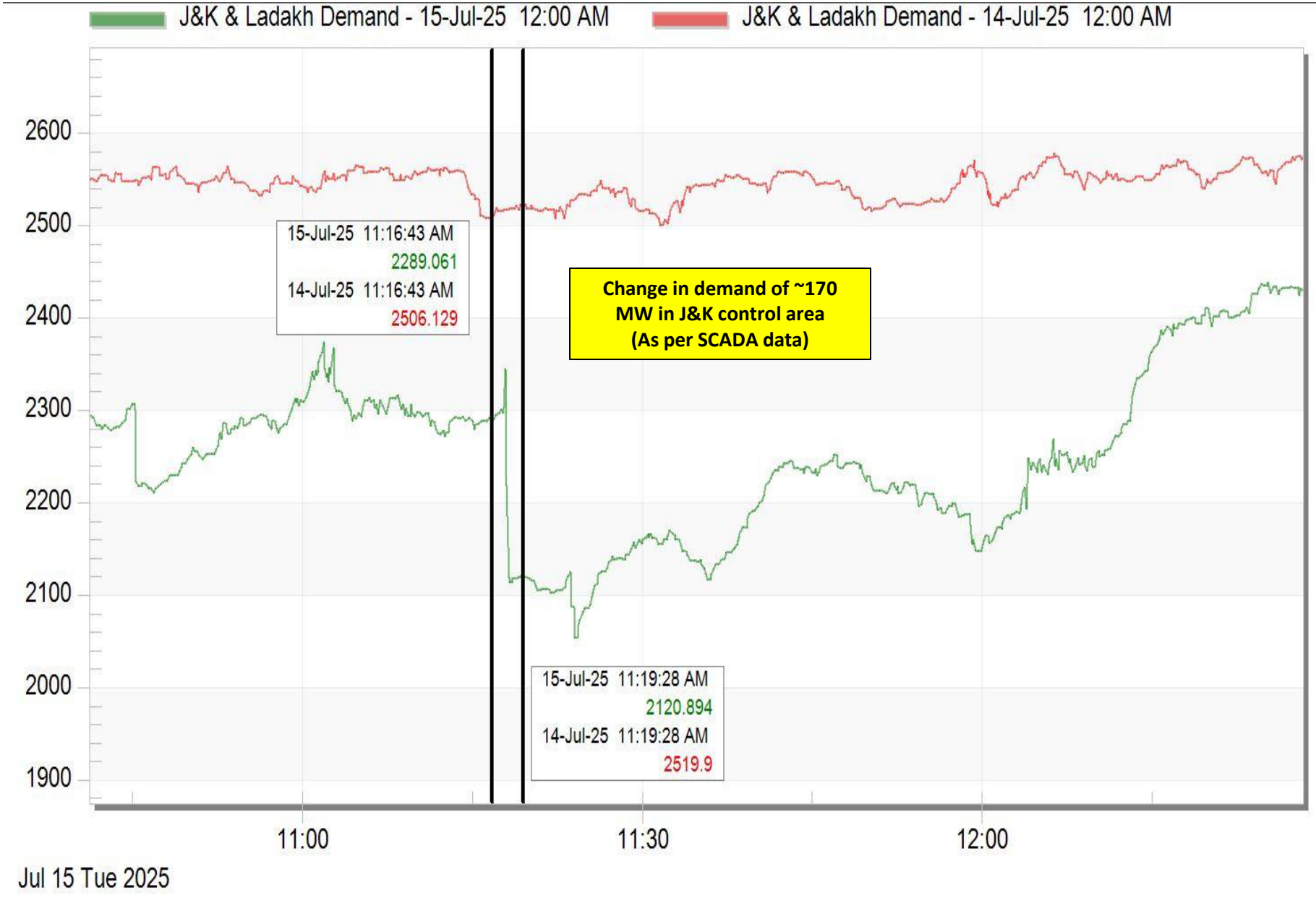
SLD of 220kV Salal(NHPC) before the event



SLD of 220kV Bairasiul(NHPC) after the event



J&K Demand during the event



PMU Plot of frequency at Kishenpur(PG)

11:17hrs/15-July-25

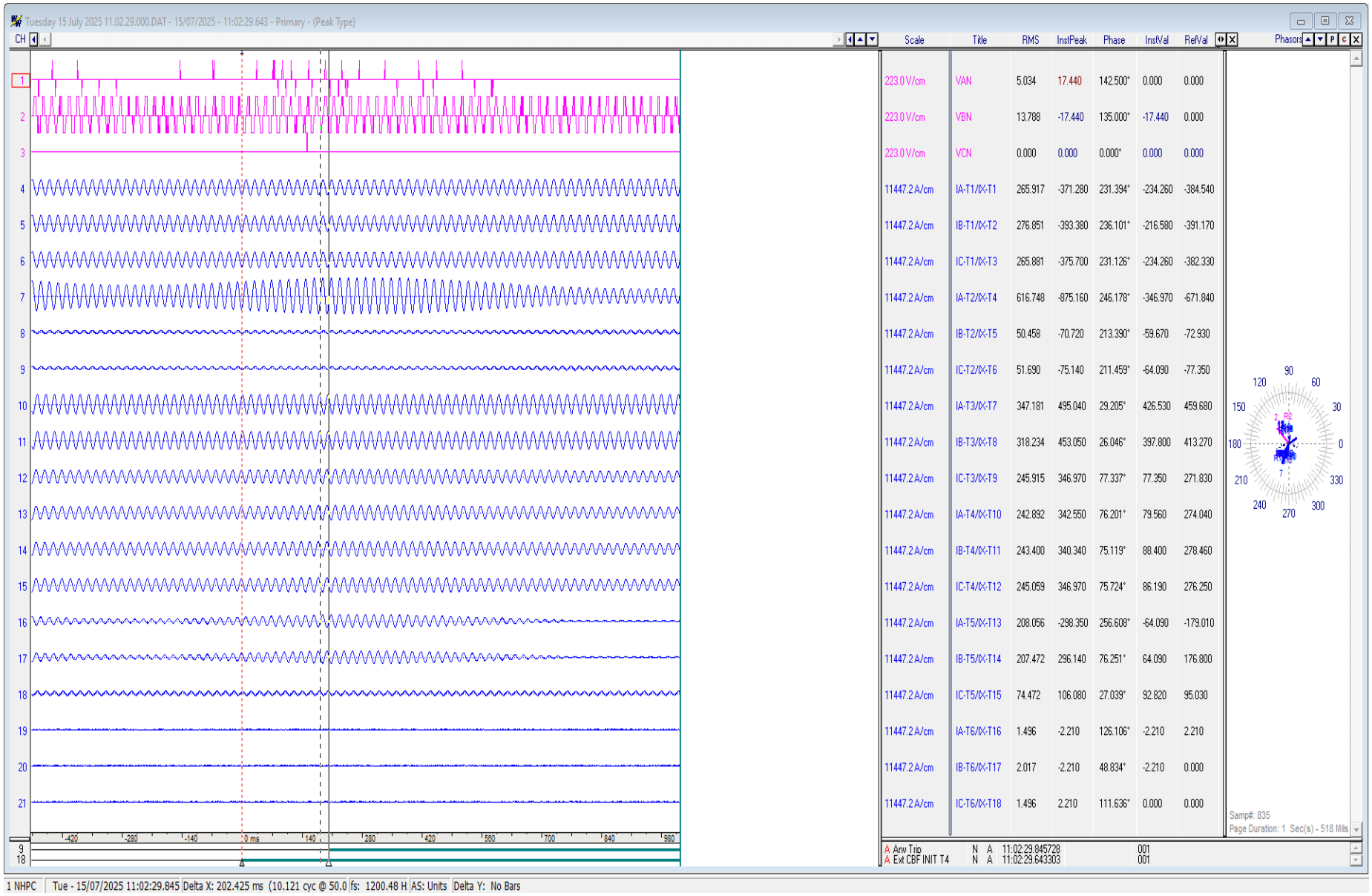


PMU Plot of phase voltage magnitude at Kishenpur(PG)

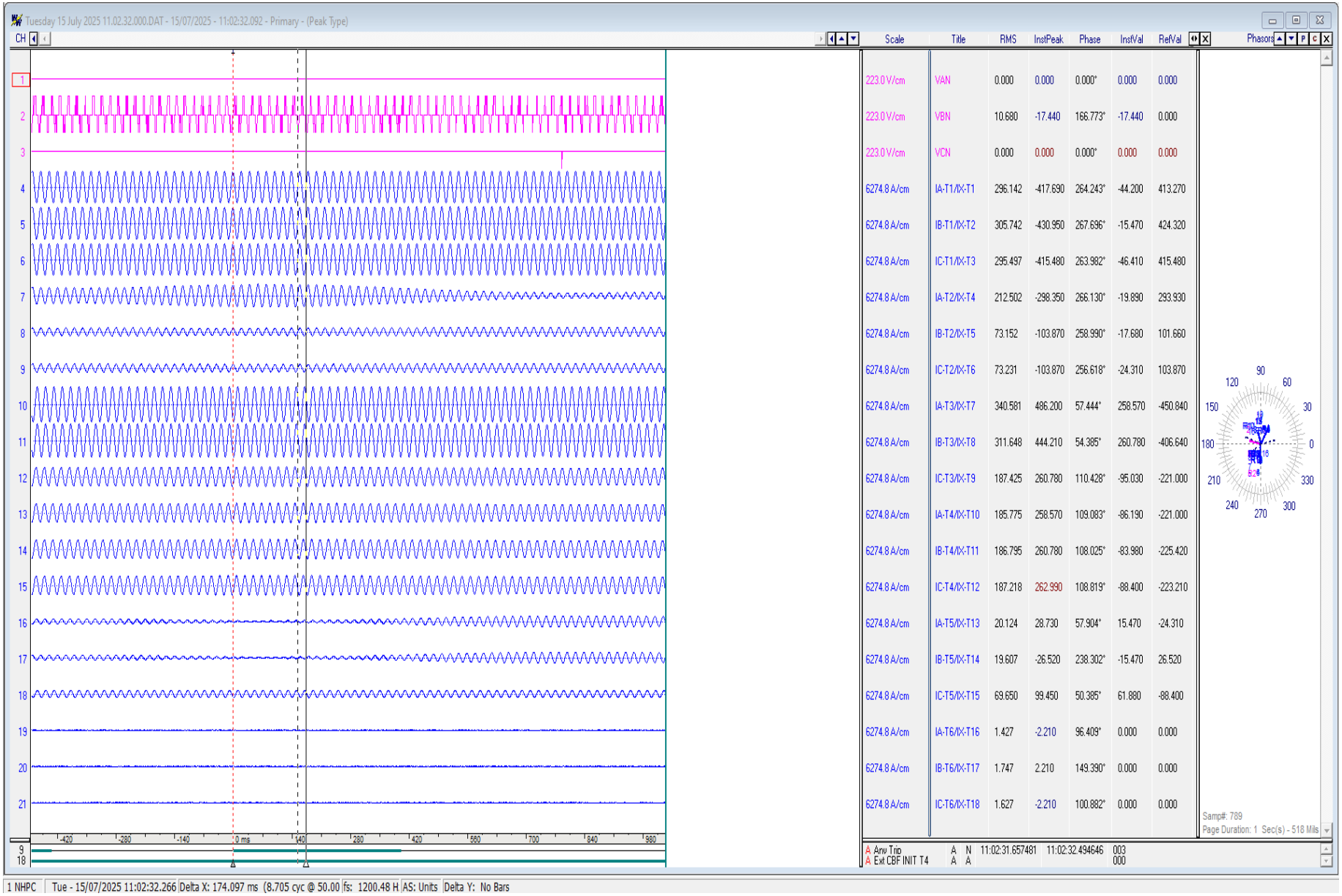
11:17hrs/15-July-25



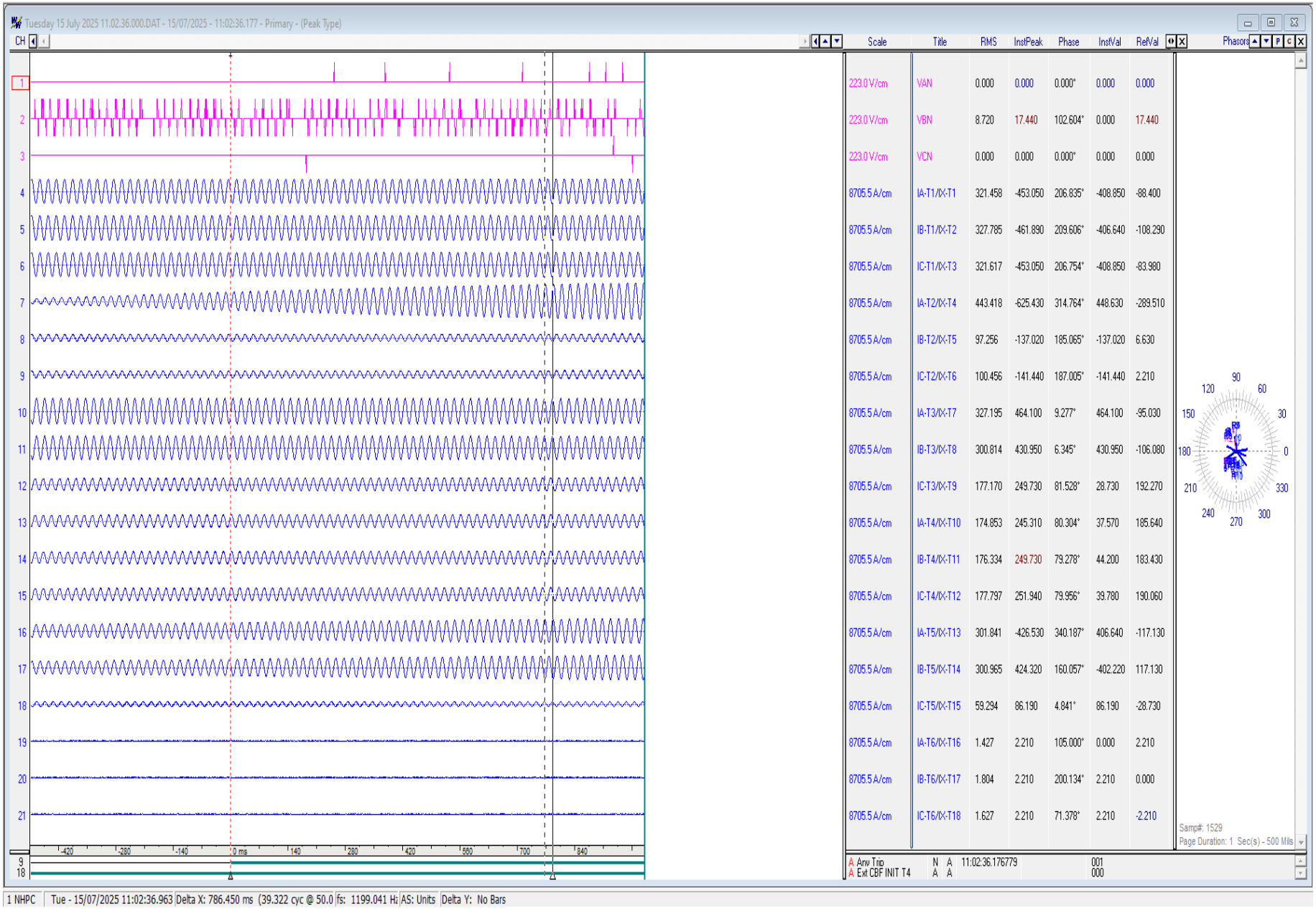
DR of …. At Salal HEP



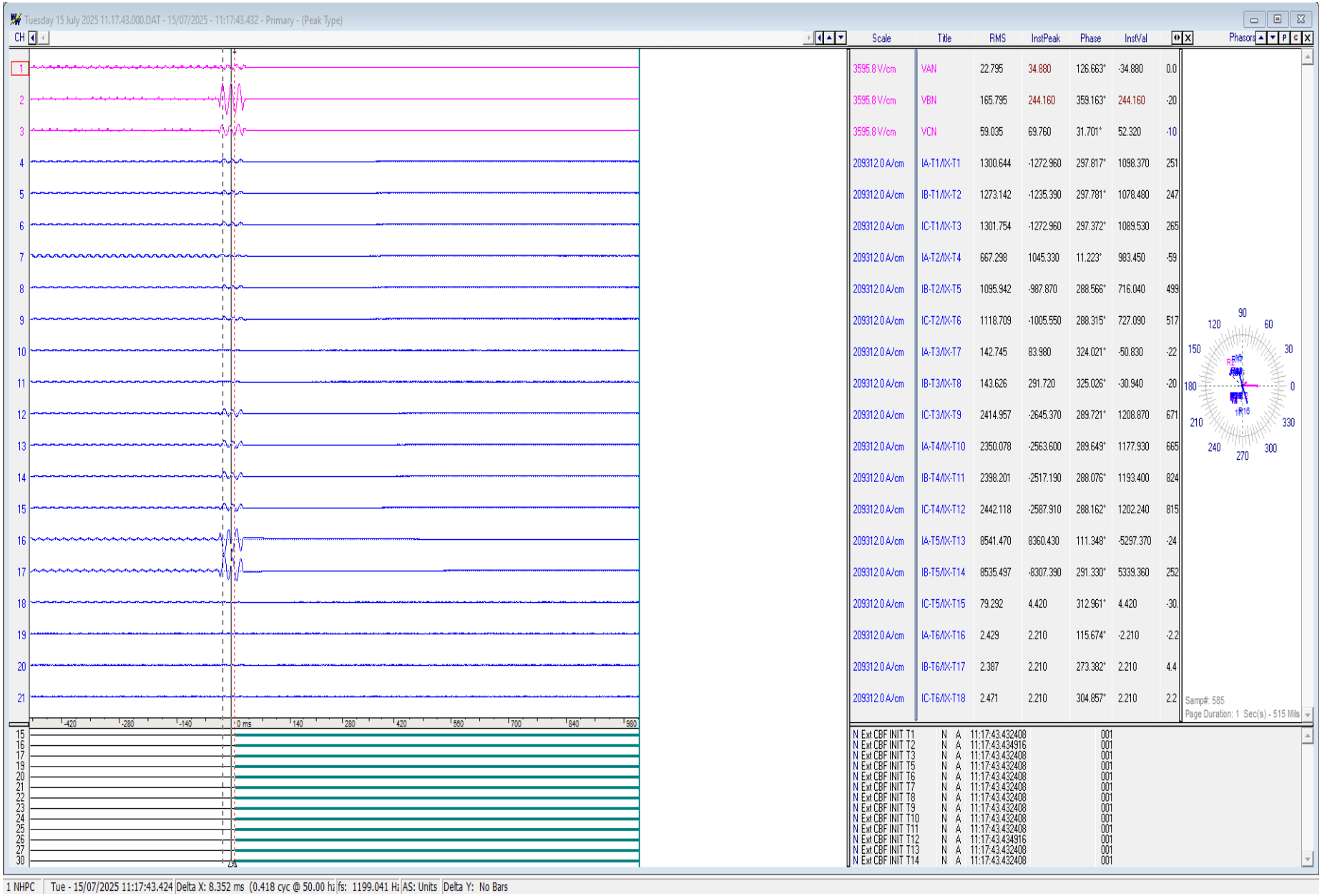
DR of …. At Salal HEP



DR of …. At Salal HEP



DR of …. At Salal HEP



SCADA SOE

SOE data of Salal S/s not available in SCADA SOE

ग्रिड-इंडिया GRID-INDIA
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
भारत सरकार का उद्यम
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]
उत्तर क्षेत्रीय भार प्रेषण केन्द्र / Northern Regional Load Despatch Centre
कार्यालय : 18-ए, शहीद जीत सिंह सनसनवाल मार्ग, कटवारिया सराय, नई दिल्ली-110016
Office : 18-A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi-110016
CIN : U40105DL2009GOI188682, Website : www.nrldc.in, E-mail : nrldc@grid-india.in, Tel.: 011 26519406, 26523869, Fax: 011 26852747

Report on multiple elements tripping at 400/220 kV Panipat(BBMB)

1. **Date & Time of event:** 09:49 hrs on 24.07.2025

2. **Location/Control Area:** Haryana

3. **Affected Plant/Substation Name:** 400/220 kV Panipat(BBMB), 220/132kV Pipli(HR), 220/66kV Jagadhri(BBMB), 220/66kV Dhulkote(BBMB) and 220kV Rotak Road(BBMB)

4. **GD/GI Category:** GD-1 (Blackout at 220/132kV Pipli(HR), 220/66kV Jagadhri (BBMB))

5. **Antecedent Condition:**
   - NR Load : 70779 MW
   - Affected state load (Haryana) : 10947 MW
   - Frequency : 50.01 Hz
   - Weather condition : Normal
   - IR exchange : 4842 MW

6. **Generation loss/Load loss:** Change in demand of approx. 515 MW in Haryana control area (as per SCADA).

7. **Duration of interruption:** 00:59 (hh:mm) (Restoration time: 10:48 hrs); Energy Unserved: 0.506 MUs.

8. **Tripped elements:**

S. No	Name of Elements	Outage Time	Revival Time	Reason of tripping
1.	220KV Bus 2A at Panipat(BB)	09:49 hrs	10:48 hrs	R-Y ph-ph fault occurred due to isolator flashover of 220/66kV
2.	400/220kV 500 MVA ICT-2 at Panipat(BB)		10:48 hrs	
3.	220 KV Panipat-Dhulkote(BB) Ckt-2		10:55 hrs	

4.	220 KV Panipat(BB)-Panipat Th(HR) Ckt-2		11:28 hrs	Transforfmer-2 at Panipat)BBMB).
5.	220 KV Panipat(BB)-Narela (DTL) Ckt-2		11:01 hrs	Bus Bar protection of 220kV Bus-2A operated.
6.	220 KV Panipat(BB)-Charkhi Dadri Ckt		11:04 hrs	
7.	220/66kV 60 MVA Transformer-2 at Panipat(BB)		11:11 hrs	
8.	400/220kV 450 MVA ICT-1 at Panipat(BB)			O/C E/F protection of ICT operated
9.	220 KV Ganguwal-Jagadhri Ckt		10:48 hrs	B-N Phase to earth fault

9. Details of fault, as per PMU (if any):

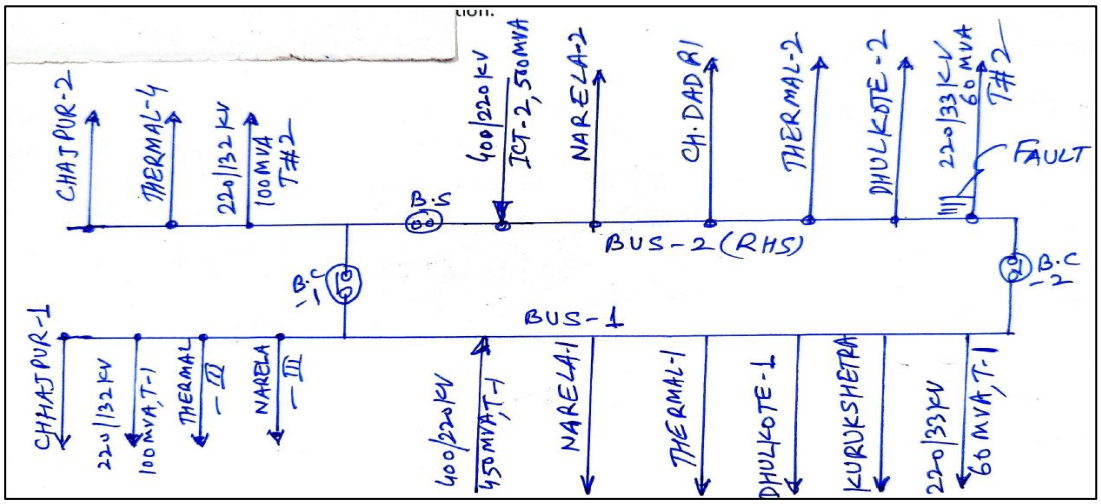
i) Nature of fault: R-Y phase to phase fault at 09:49 hrs as per PMU at Panipat(BBMB) and B-N phase to earth fault at 09:58

ii) Fault clearing time: 80 msec & 240 msec respectively.

10. Brief description of event:

i) 400/220/132/33kV Panipat(BB) has double main Bus arrangement at 220kV side. There are two 220kV bus i.e., Bus-1 & 2. Further, Bus-2 is divided into two-part Bus-2A & Bus-2B. 400/220kV Panipat(BBMB) feeds the load of 220kV Dhulkote, Narela (Rohtak Road), Pipli and some radial load connected through Panipat Th(HR).

ii) During antecedent condition, load connected at Panipat(BB) was being fed through 400/220kV ICT-1 & 2 at Panipat(BB) which were carrying 286 MW & 319 MW respectively and 220kV Panipat-Charkhi Dadri Ckt which was carrying ~112 MW. Apart from this, 220kV Dhulkote-Miss Ganguwal D/C were under shutdown and bus wise elements connectivity at 220kV Panipat(BB) are as per below:



iii) As reported, at 09:49 hrs, operator at 220kV Panipat S/s, inadvertently opened the 220kV side isolator of 220/33kV 60 MVA Transformer-2 at Panipat(BB) which was in charged condition. Prior to this incident, 220/33kV 60 MVA Transformer-1 at Panipat(BB) was taken out and isolator of Transformer-1 was to be opened for its isolation.

iv) As isolator was opened in charged condition, heavy flashover occurred in isolator leading to R-Y phase to phase bus fault on 220kV Bus-2A.

v) On this fault, bus bar protection operated, and all the elements connected to 220kV Bus-2A i.e., 400/220kV 500 MVA ICT-2, 220/33kV Trannsformer-2, 220kV feeder to Panipat TH-II, Narela-II, Dhulkote-II, Charkhi Dadri tripped. 220kV Bus coupler and sectionalise breaker opened and fault got isolated from the system.

vi) Further, due to tripping of 400/220kV 500 MVA ICT-2, load got shifted on 400/220kV 450 MVA ICT-1 led to its overloading and ICT-1 tripped on overcurrent protection operation.

vii) Further, as source from 400kV side got lost, all the load at 220kV side was met through Ganguwal→Jagadhri→Pipli→Panipat→loads. Loading of 220kV Ganguwal-Jagadhri increased to 259 MW.

viii) Further at 09:58 hrs, 220kV Ganguwal-Jagadhri Ckt tripped on B-N fault.

ix) With the tripping of this Ckt, supply to 220/132kV Pipli(HR), 220/66kV Jagadhri(BBMB), 220/66kV Dhulkote(BBMB) and 220kV Rotak Road(BBMB) got lost.

x) As per PMU at Panipat(BBMB), R-Y phase to phase fault which cleared within 100msec is observed at 09:49 hrs and as per PMU at Bhakhra(BBMB), B-N fault cleared with the delay of ~240msec at 09:58 hrs is observed.

xi) As per SCADA, change in demand of approx. 515 MW in Haryana control area was observed during the event.

xii) Further, at 10:11 hrs, 220kV Ckts at Panipat which were already dead, manually opened. Restoration work started at around 10:48 hrs and all the elements were revived by 11:30 hrs.

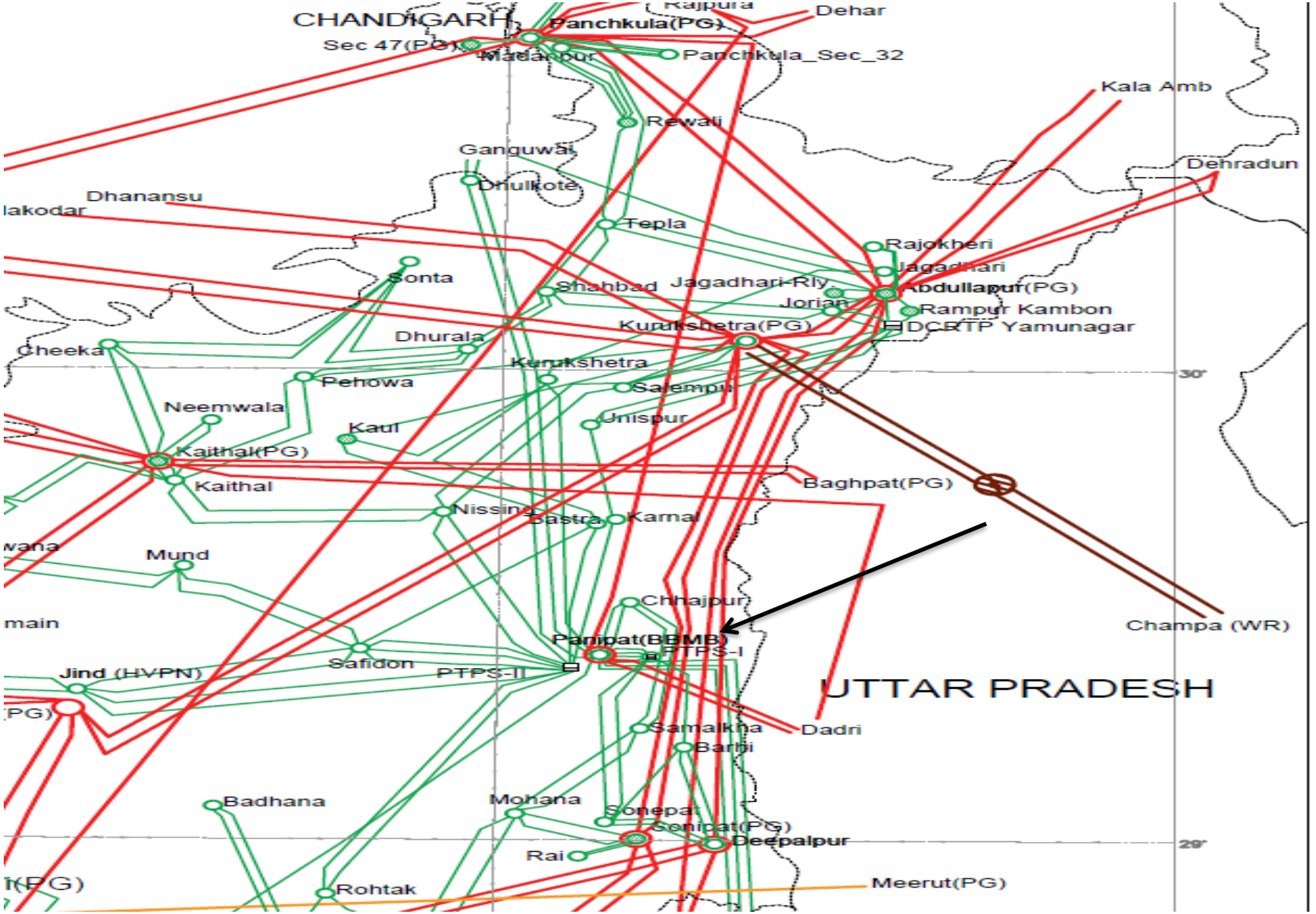
11. Preliminary Observations:

i) DR/EL (.dat/.cfg file) of all tripped elements along with detailed tripping report need to be shared.

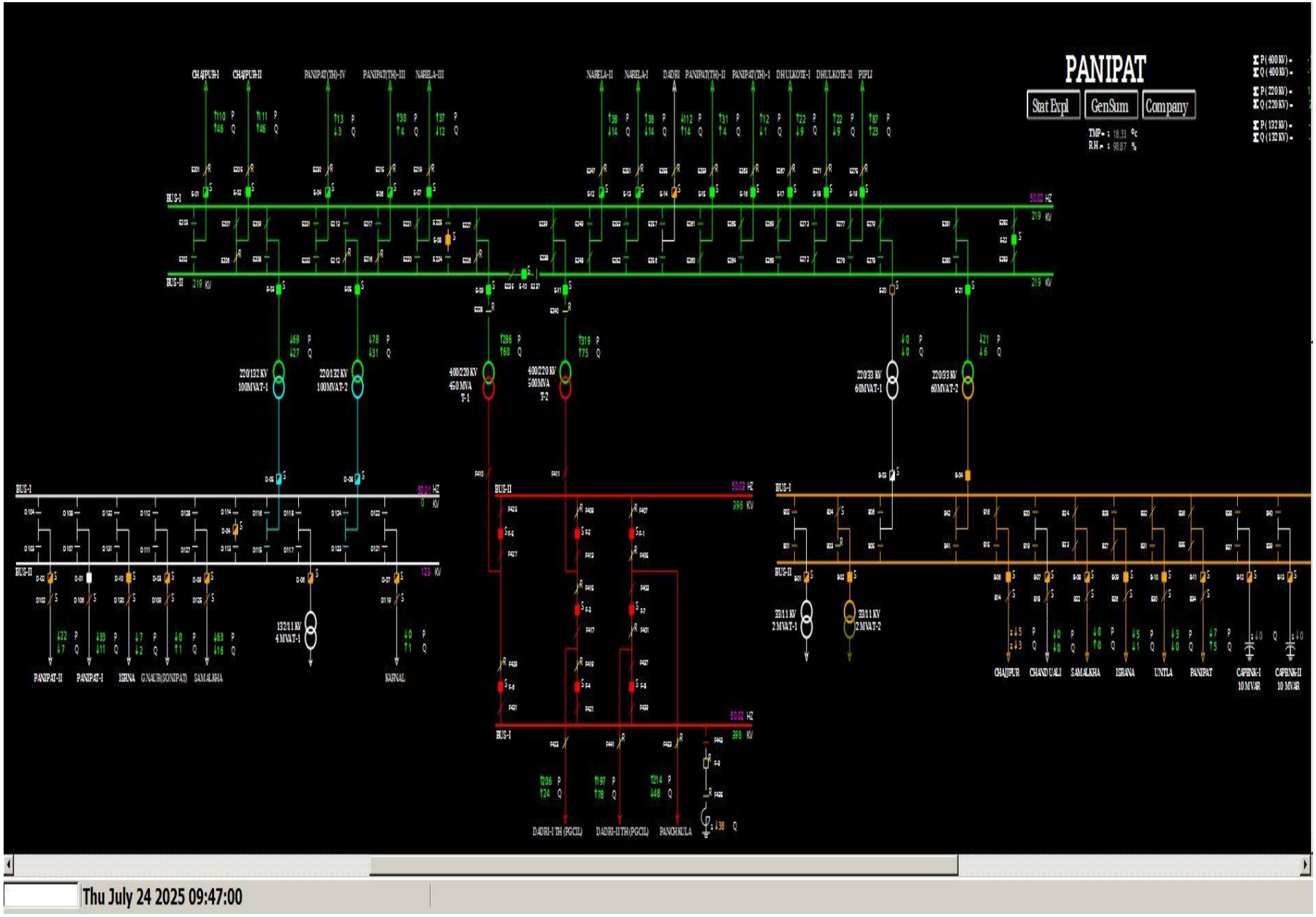
ii) Standard operating procedure need to be followed during any switching operation. Necessary instruction may be given to site operators to avoid such event in future.

iii) Remedial action taken report need to be shared.

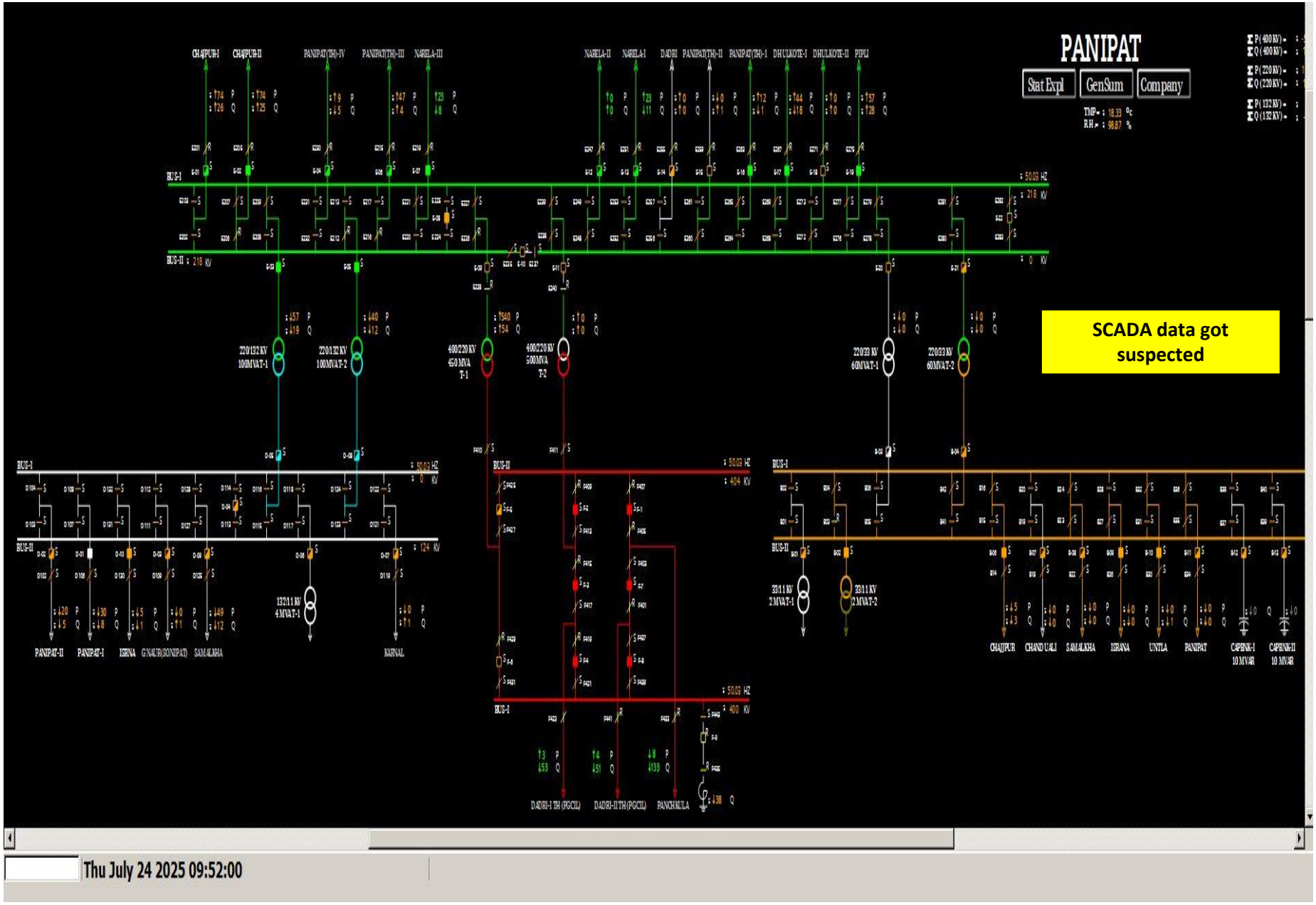
Network Diagram



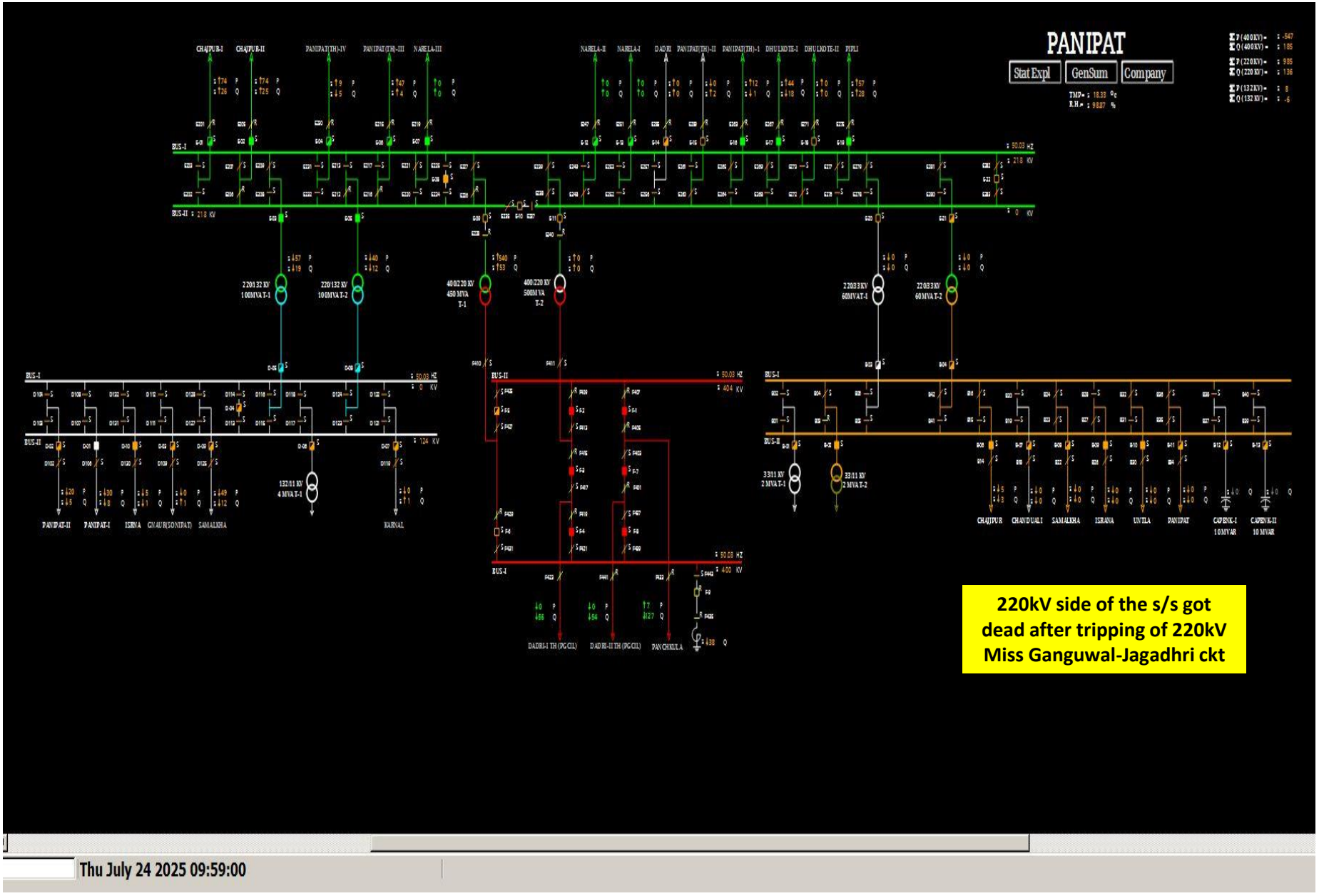
SLD of 400/220kV Panipat(BBMB) before the event



SLD of 400/220kV Panipat(BBMB) after the event



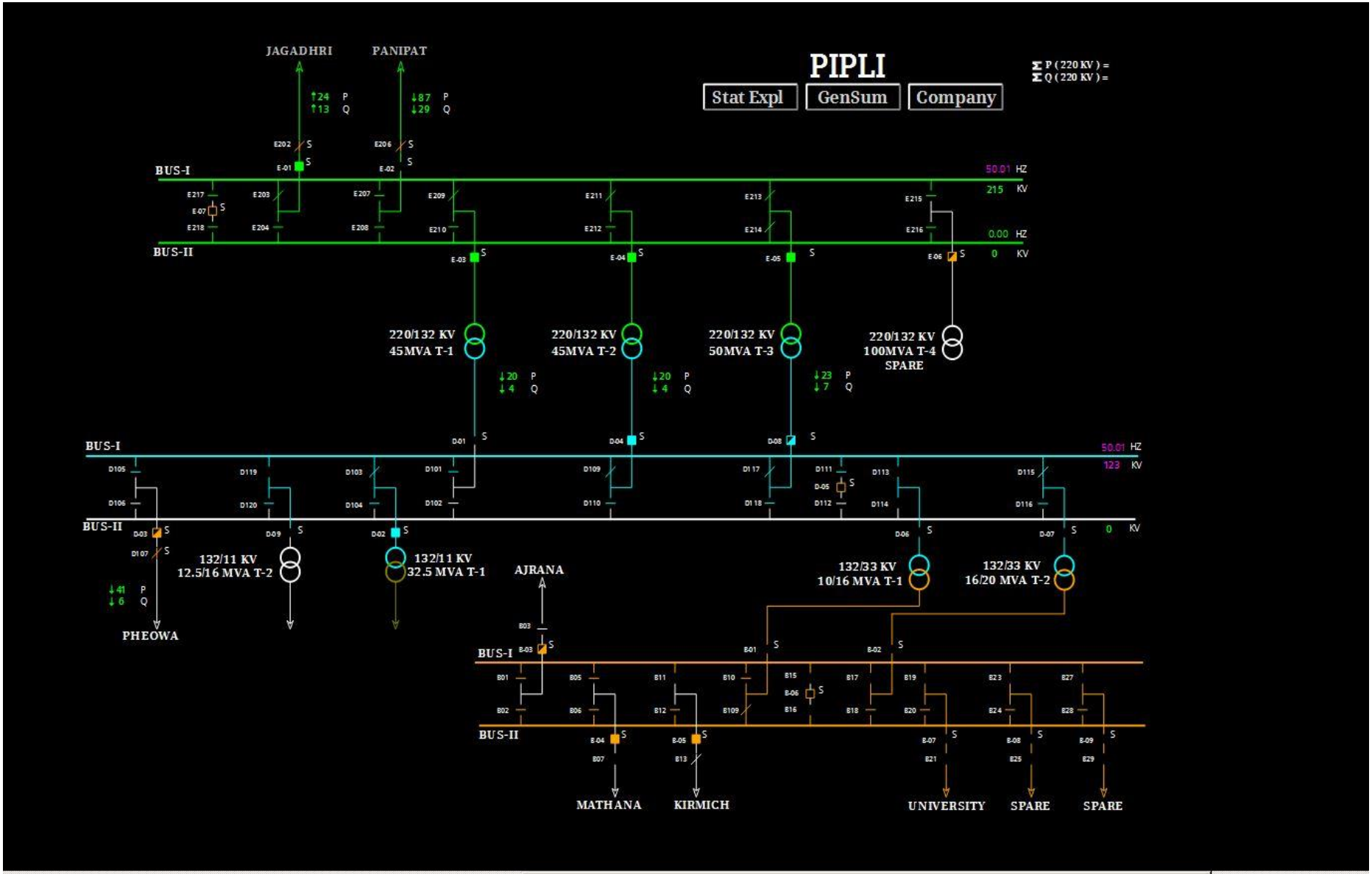
SLD of 400/220kV Panipat(BBMB) after the event



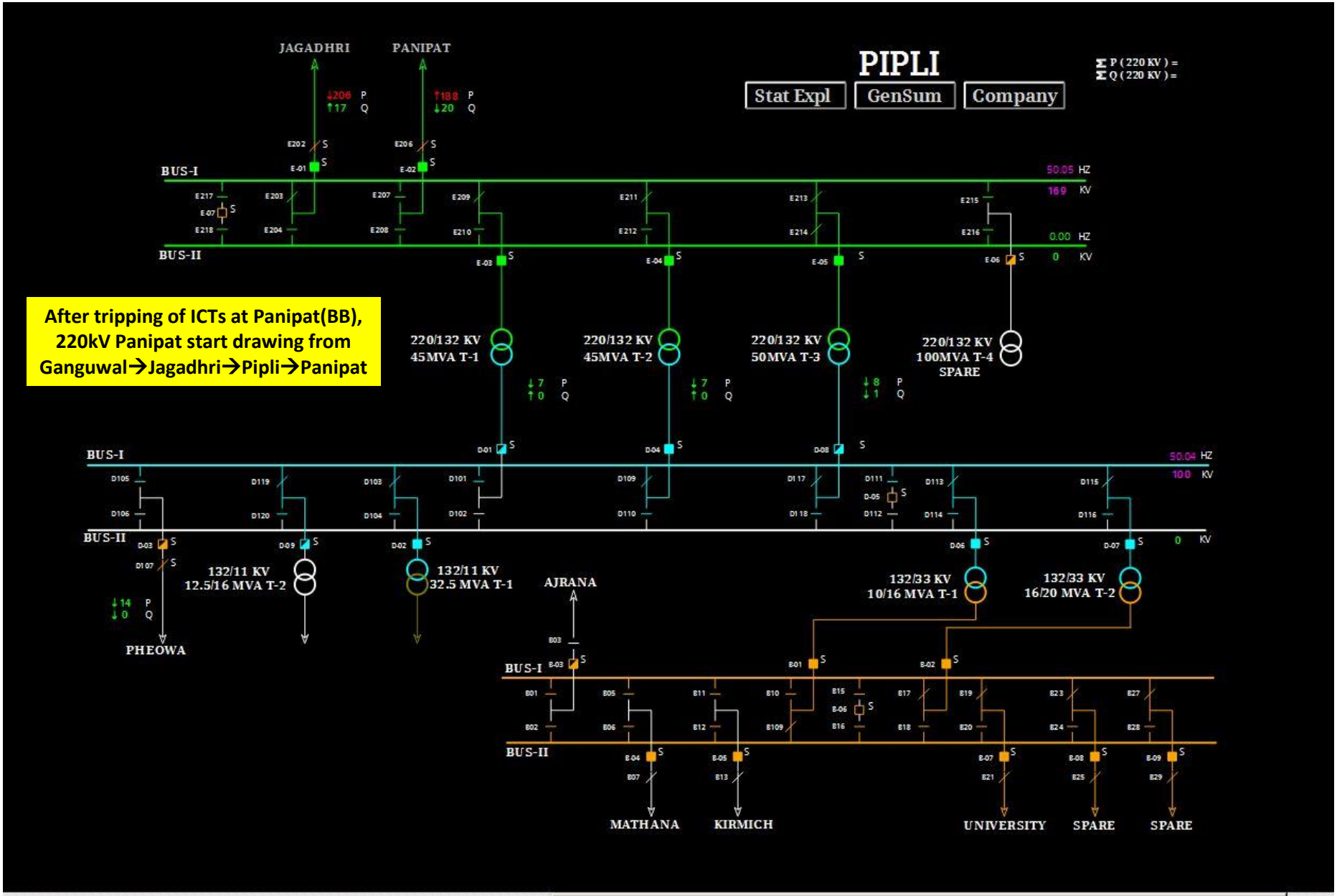
220kV side of the s/s got dead after tripping of 220kV Miss Ganguwal-Jagadhri ckt

Thu July 24 2025 09:59:00

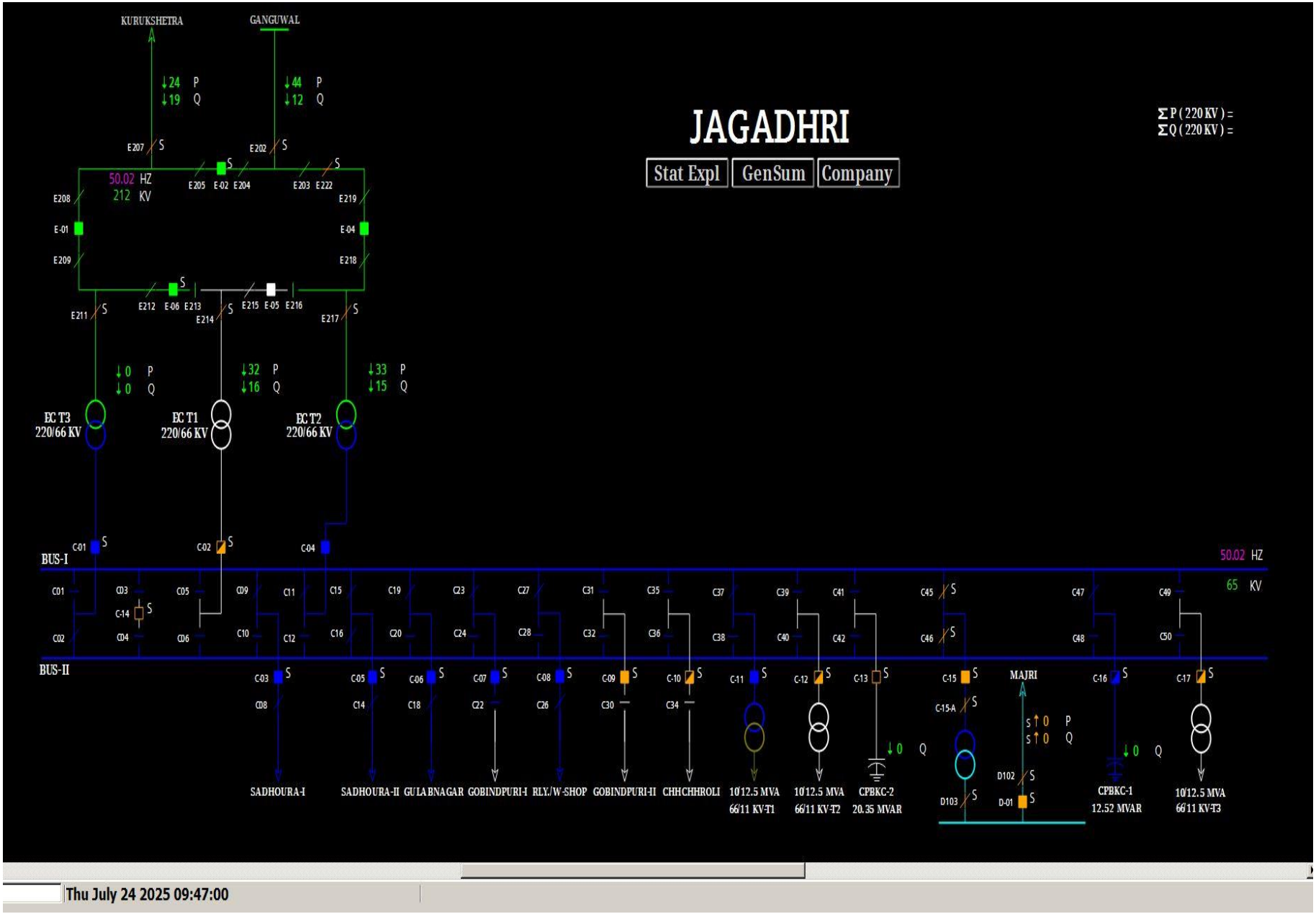
SLD of 220/132kV Pipli(Kurukshetra)(HR) before the event



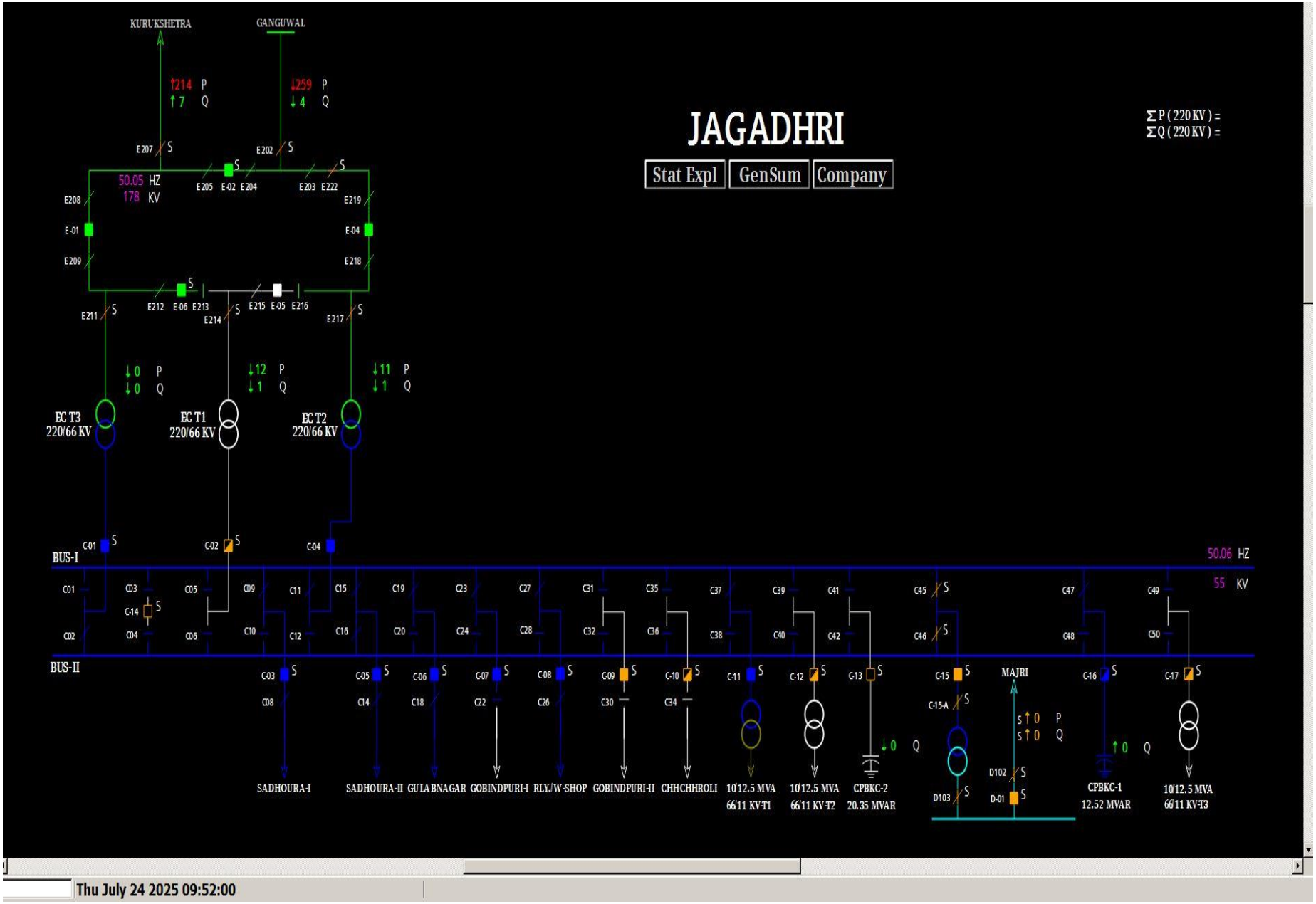
SLD of 220/132kV Pipli(Kurukshetra)(HR) after the event



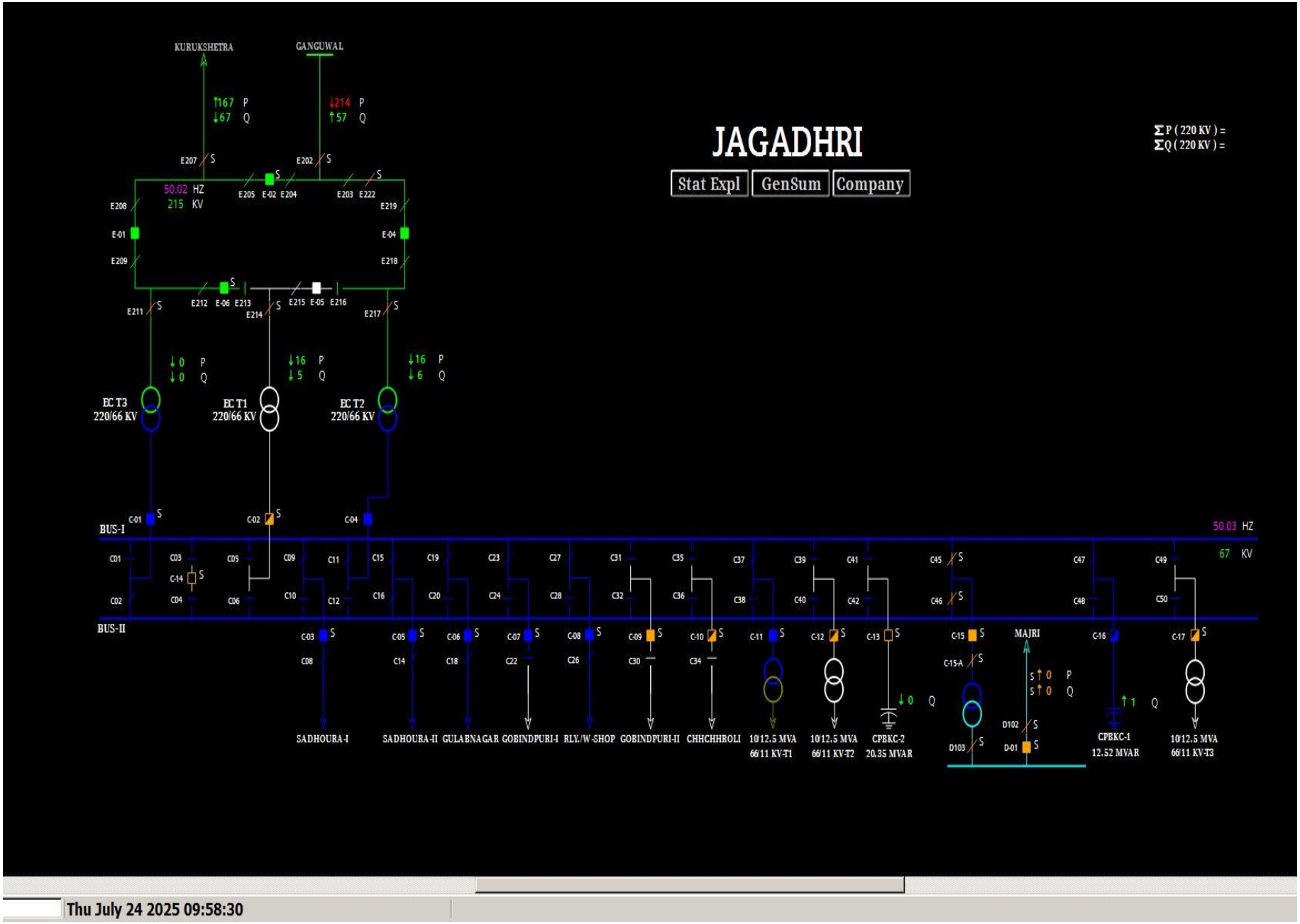
SLD of 220/66kV Jagadhri(BBMB) before the event



SLD of 220/66kV Jagadhri(BBMB) after the event

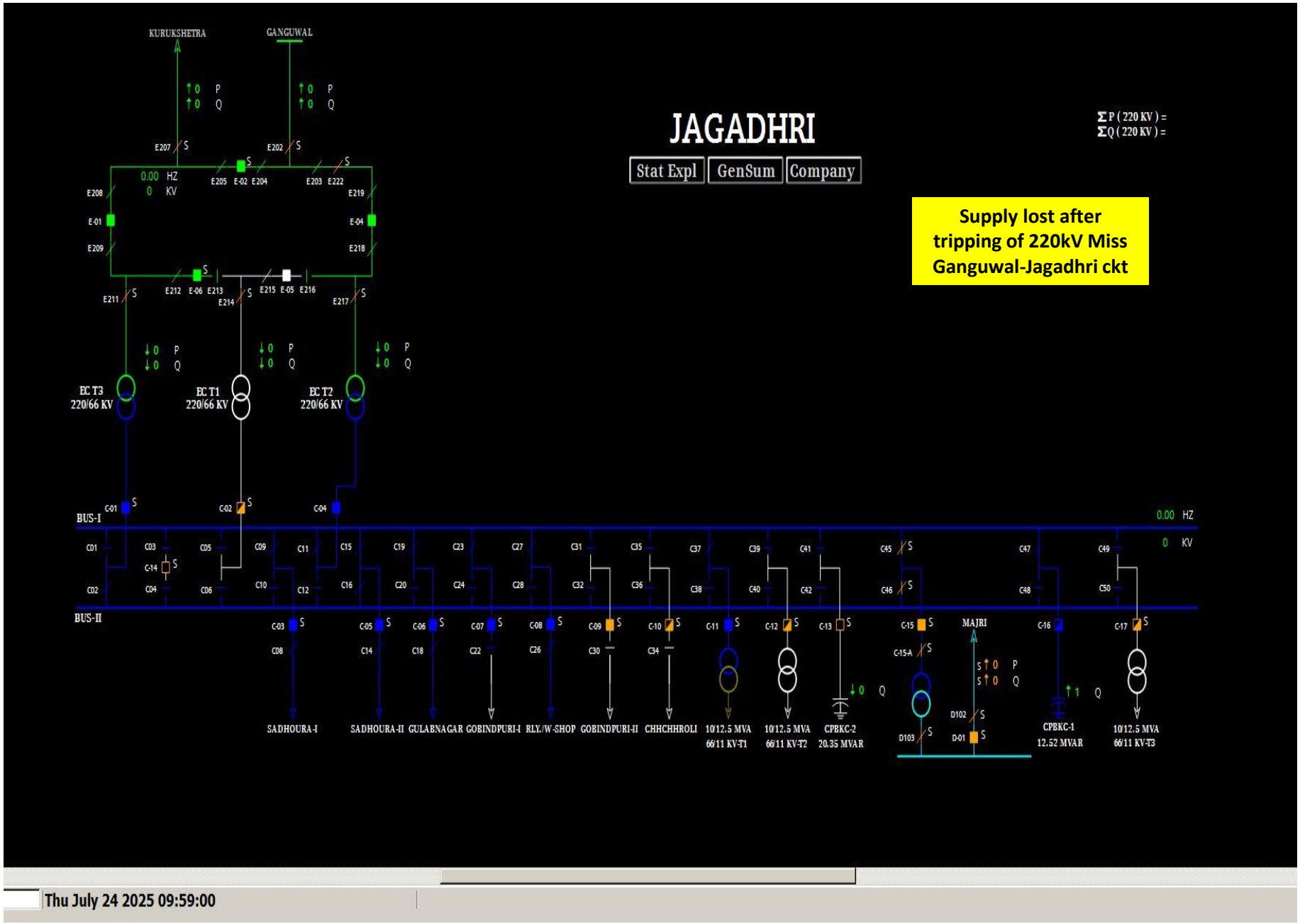


SLD of 220/66kV Jagadhri(BBMB) after the event



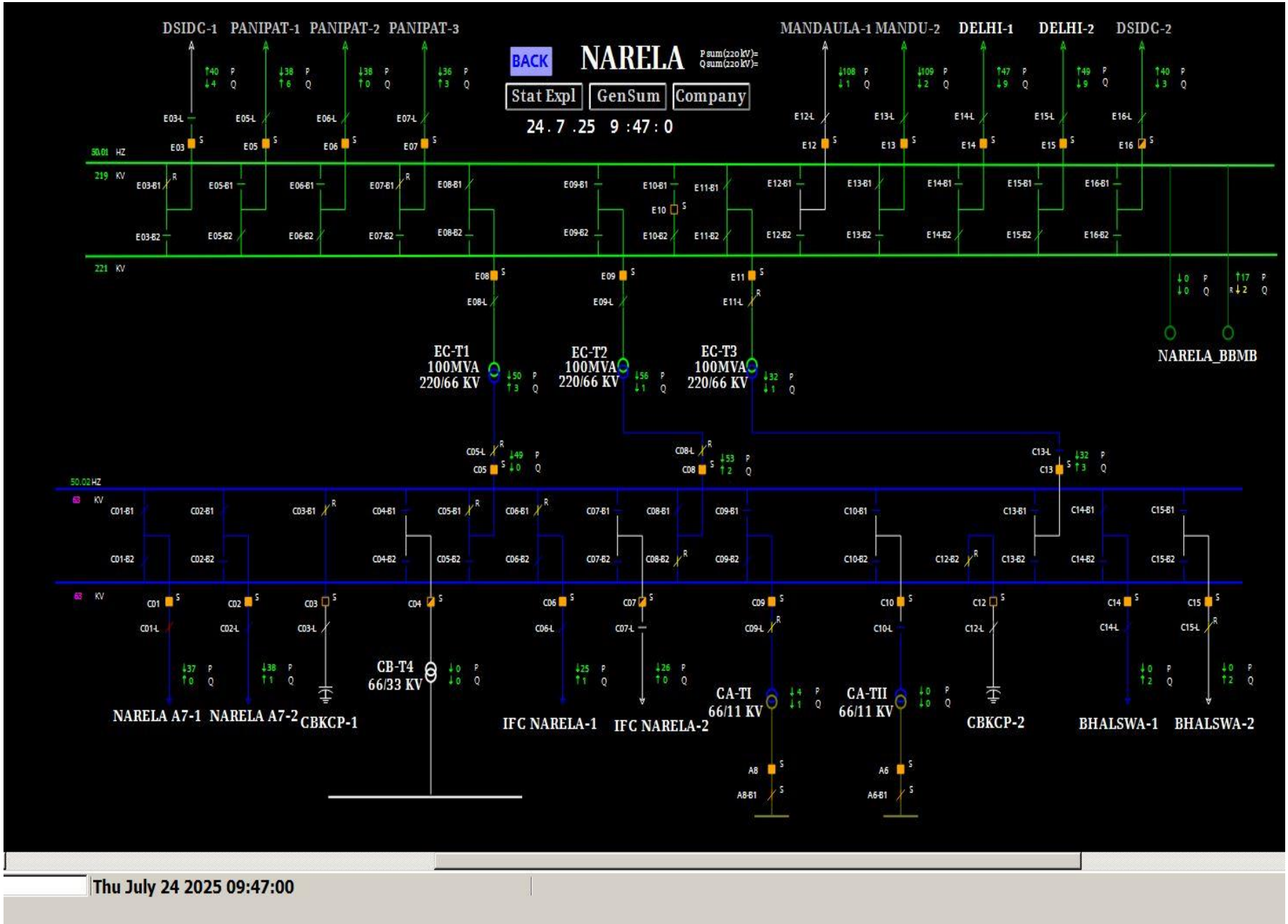
Thu July 24 2025 09:58:30

SLD of 220/66kV Jagadhri(BBMB) after the event

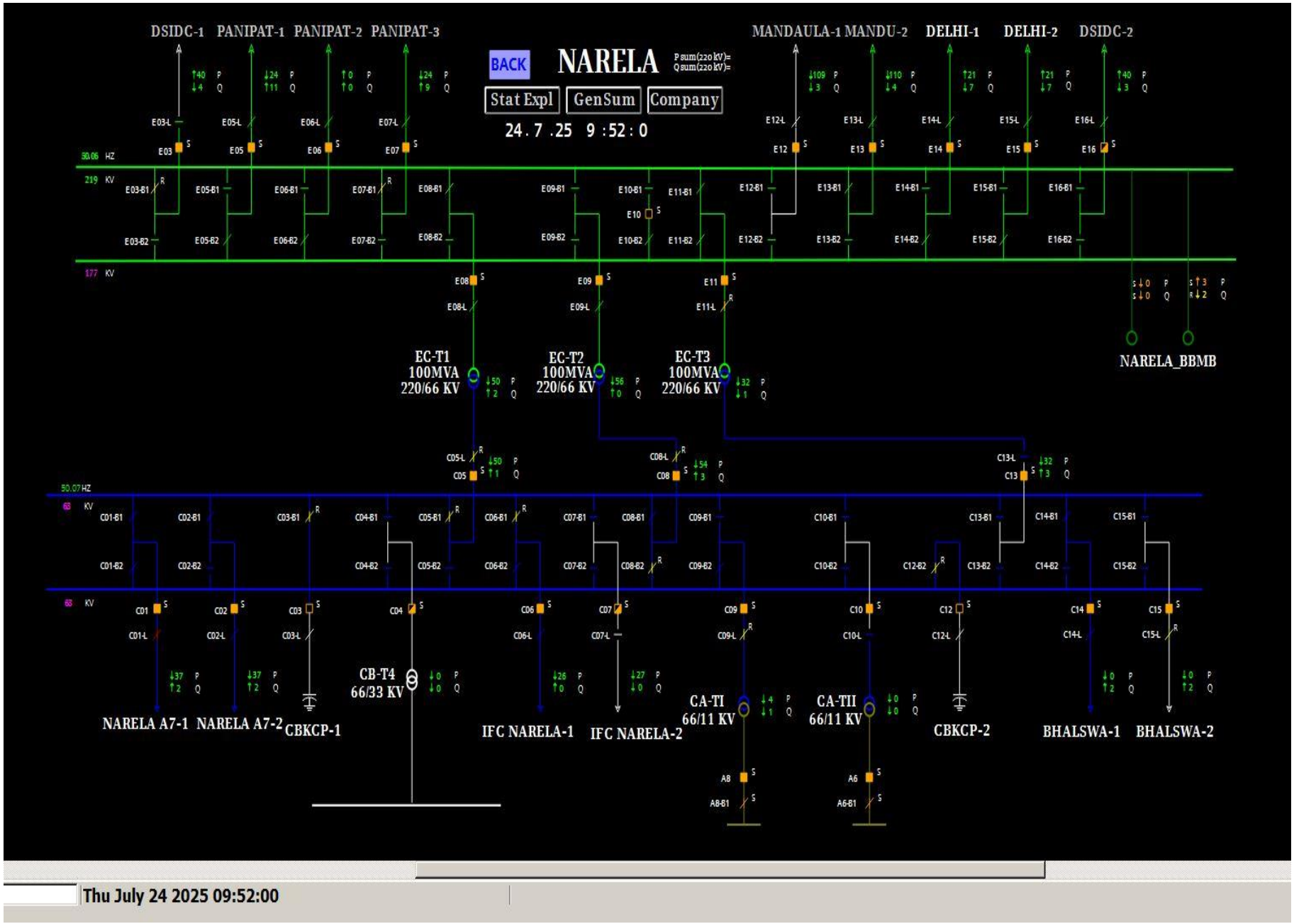


Thu July 24 2025 09:59:00

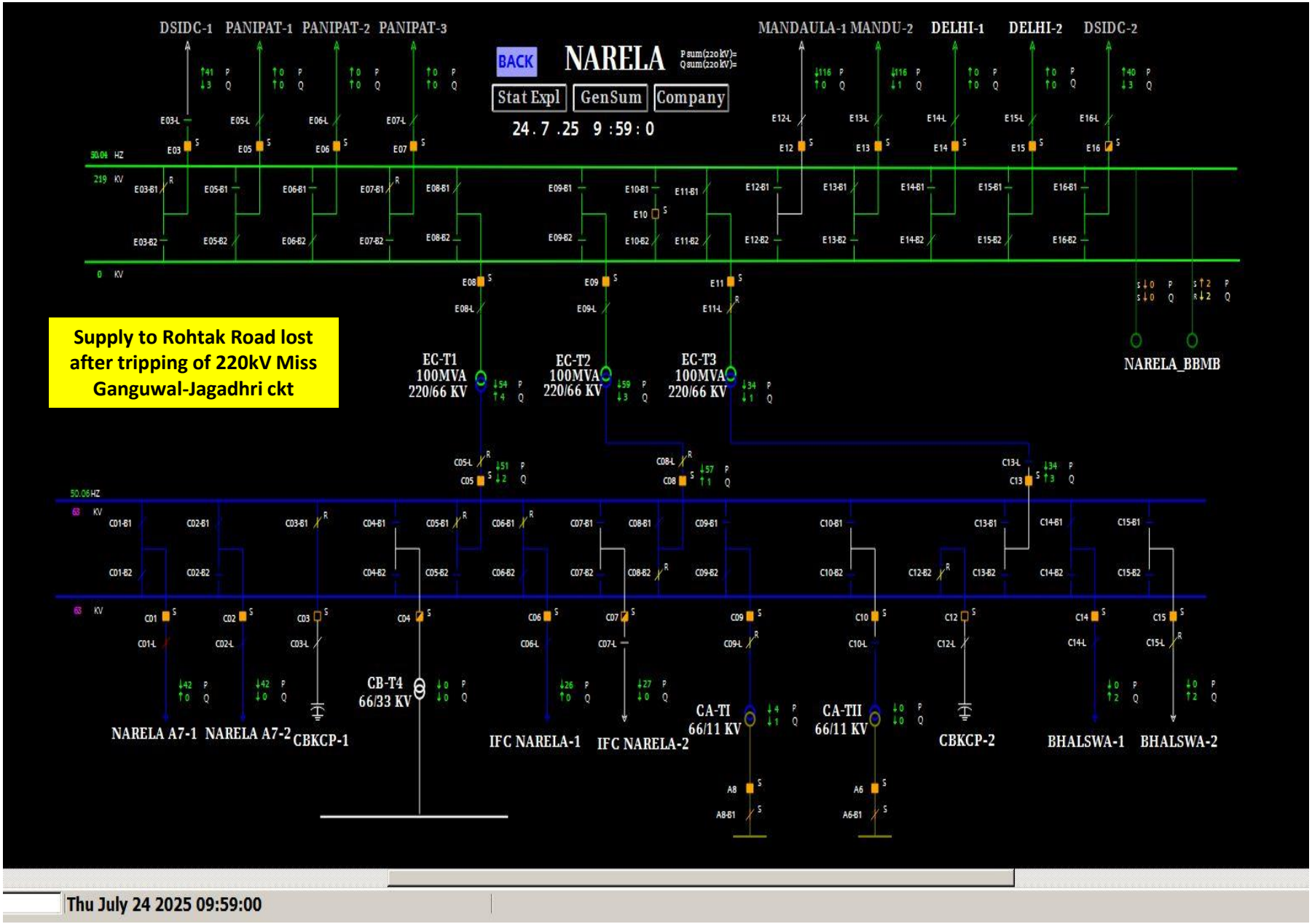
SLD of 220/66kV Narela(DTL) before the event



SLD of 220/66kV Narela(DTL) after the event

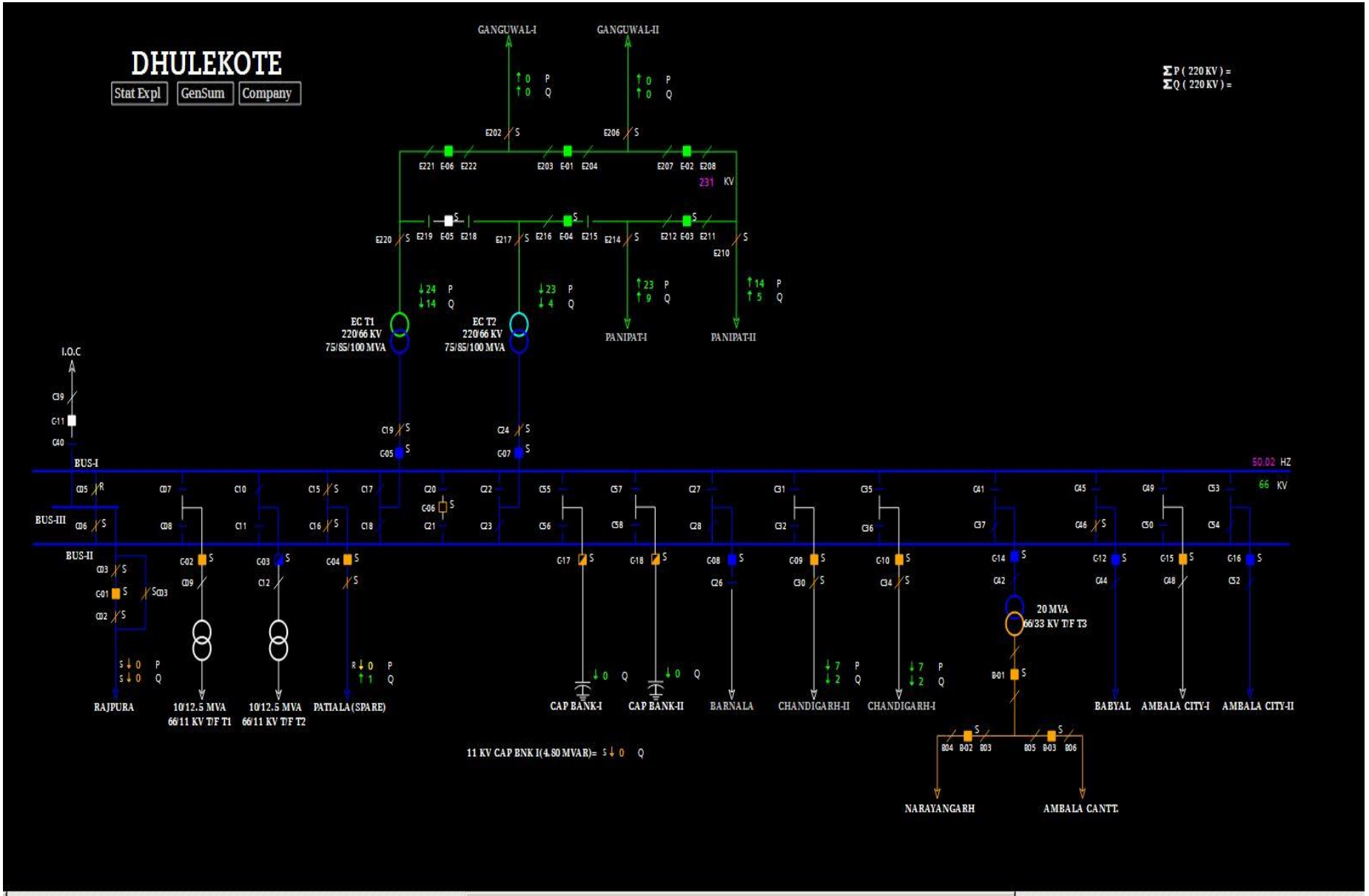


SLD of 220/66kV Narela(DTL) after the event

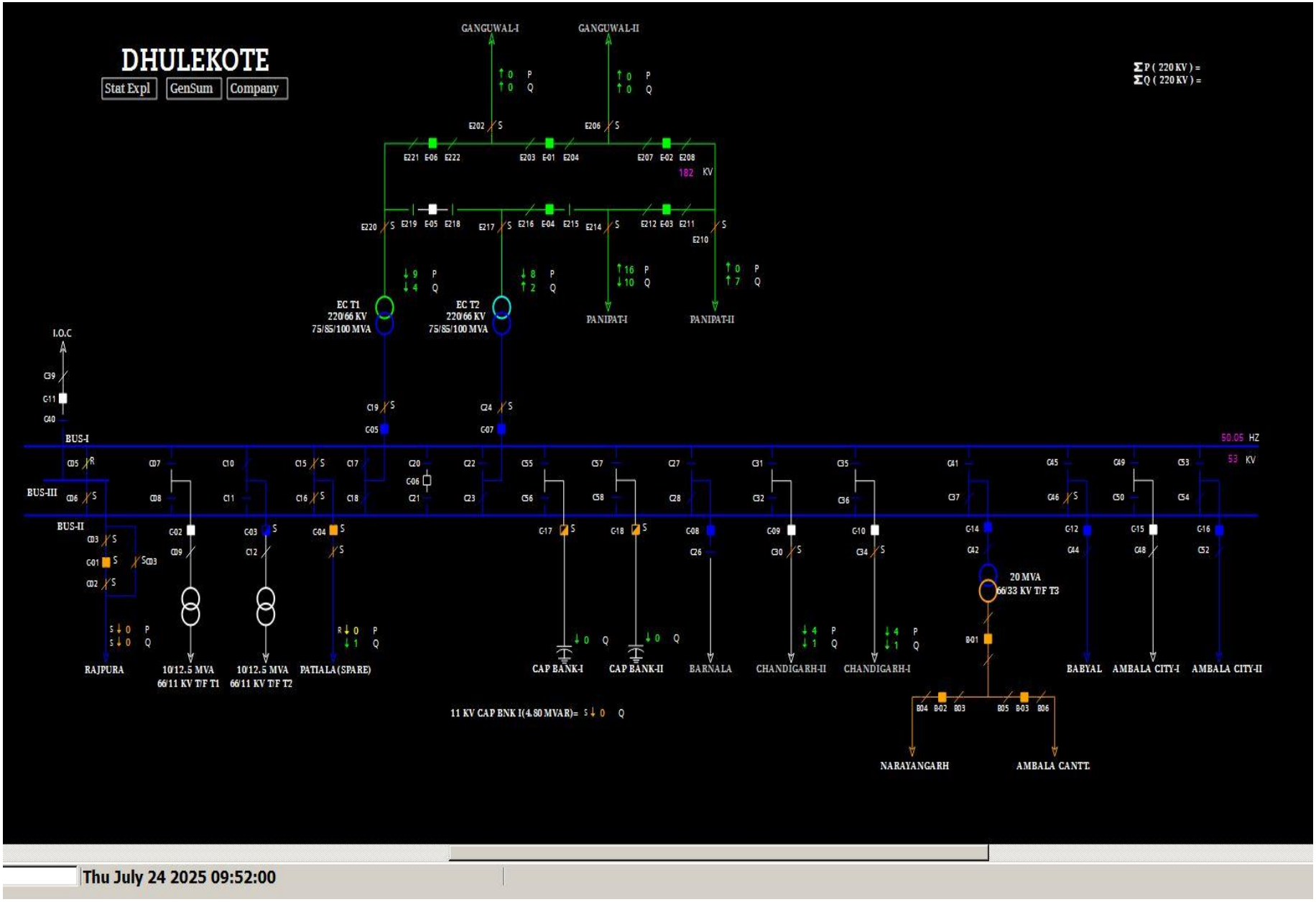


Thu July 24 2025 09:59:00

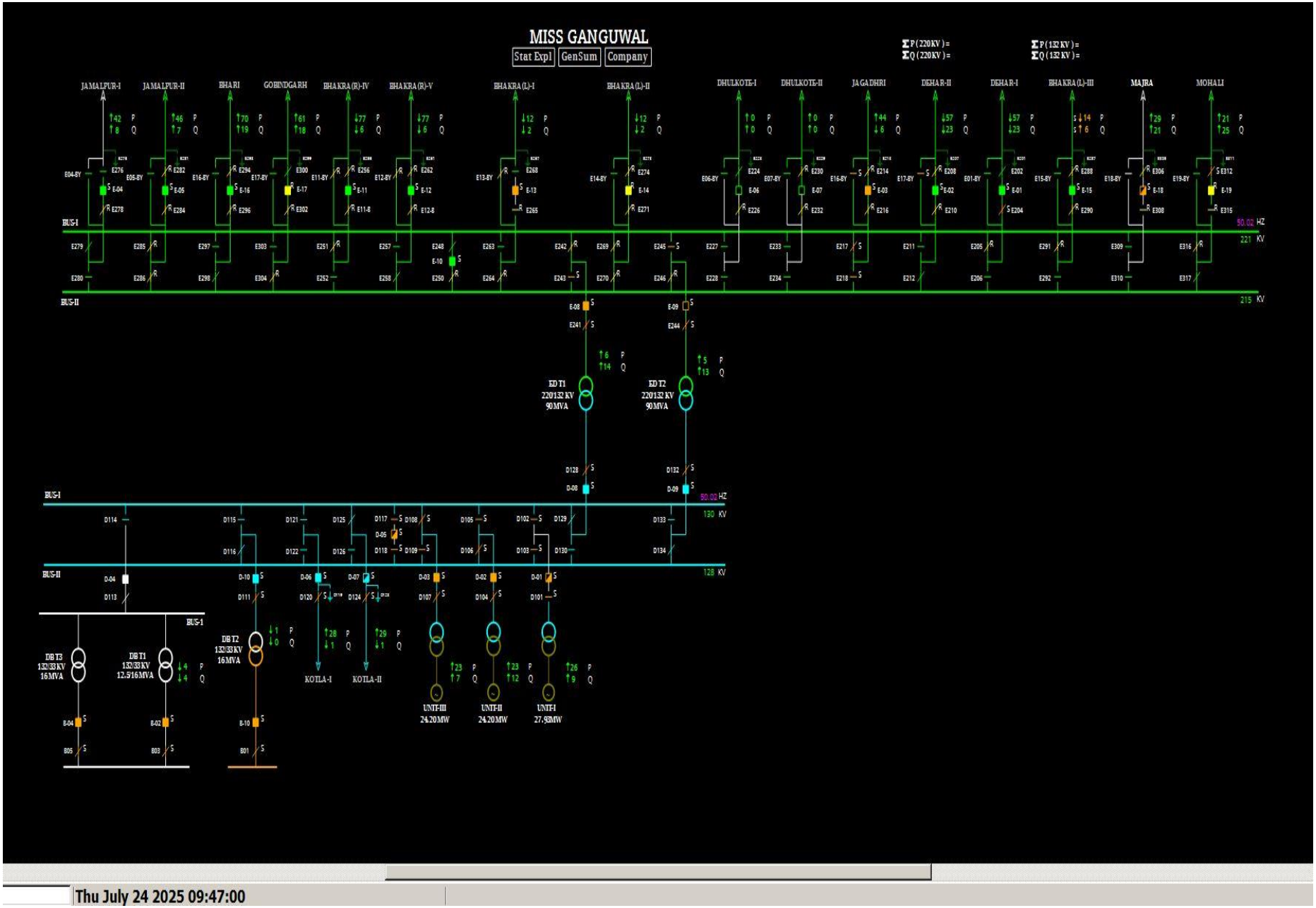
SLD of 220/66kV Dhulkote(BBMB) before the event



SLD of 220/66kV Dhulkote(BBMB) after the event

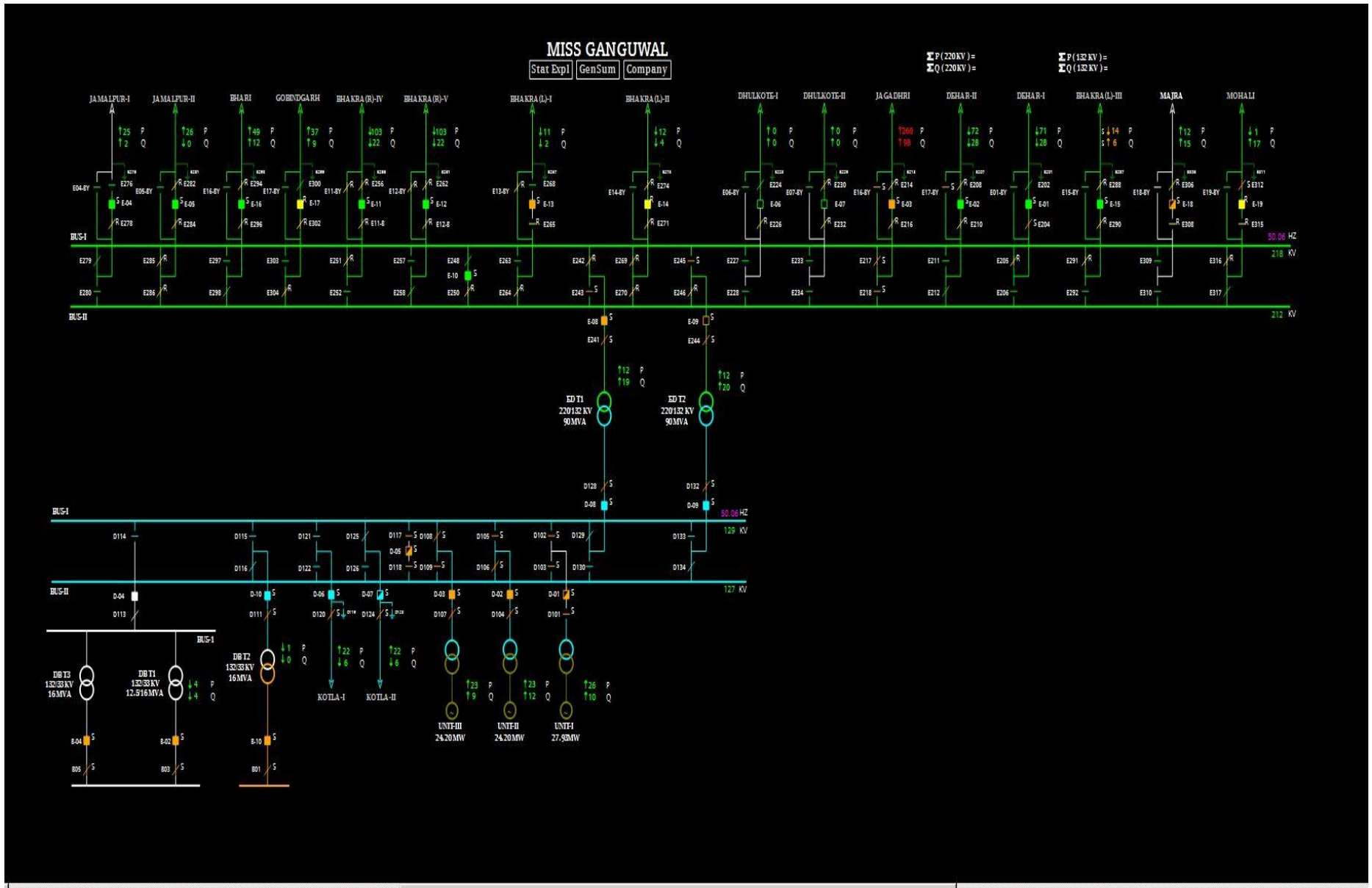


SLD of 220/132kV Miss Ganguwal(BBMB) before the event

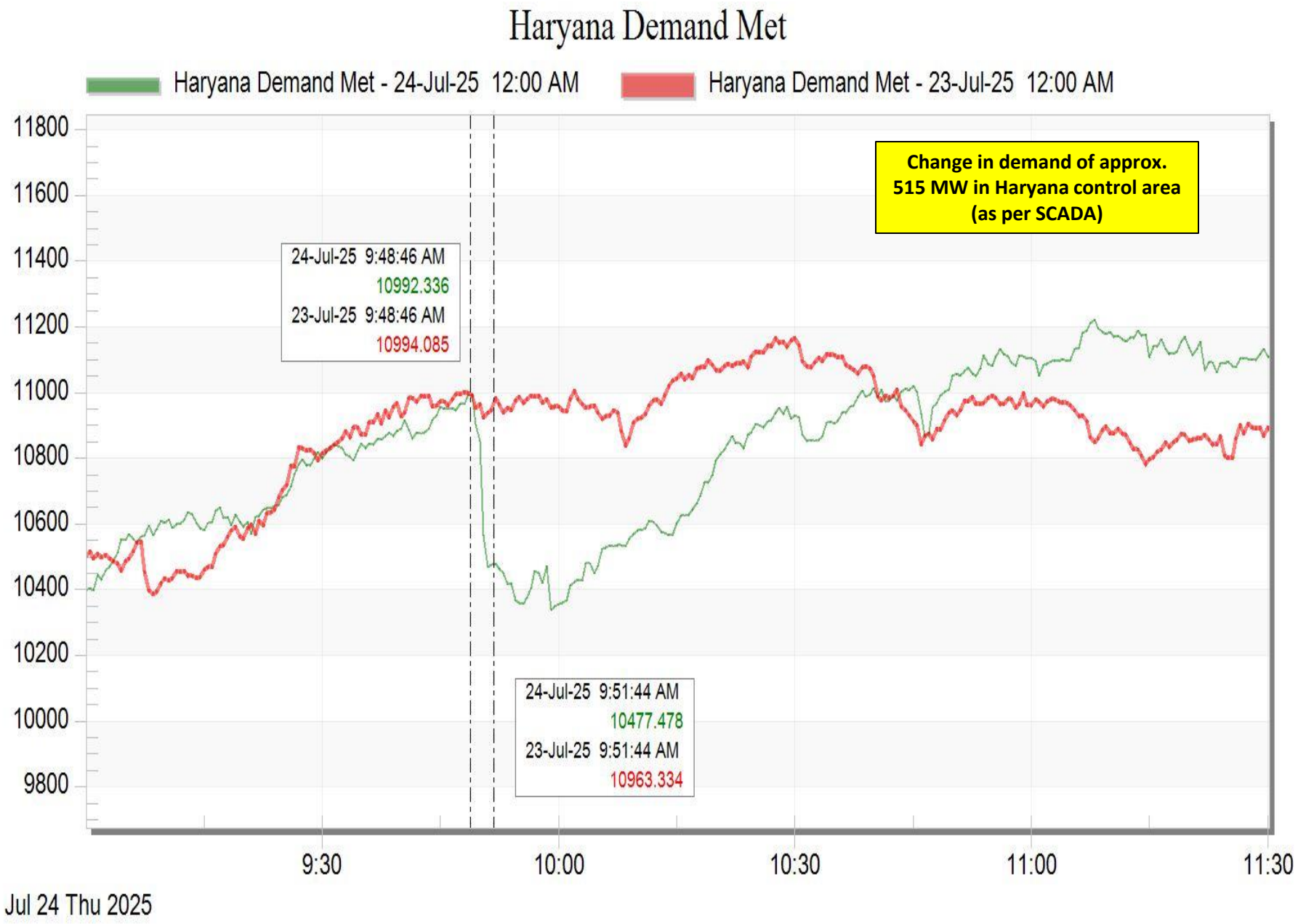


Thu July 24 2025 09:47:00

SLD of 220/132kV Miss Ganguwal(BBMB) after the event

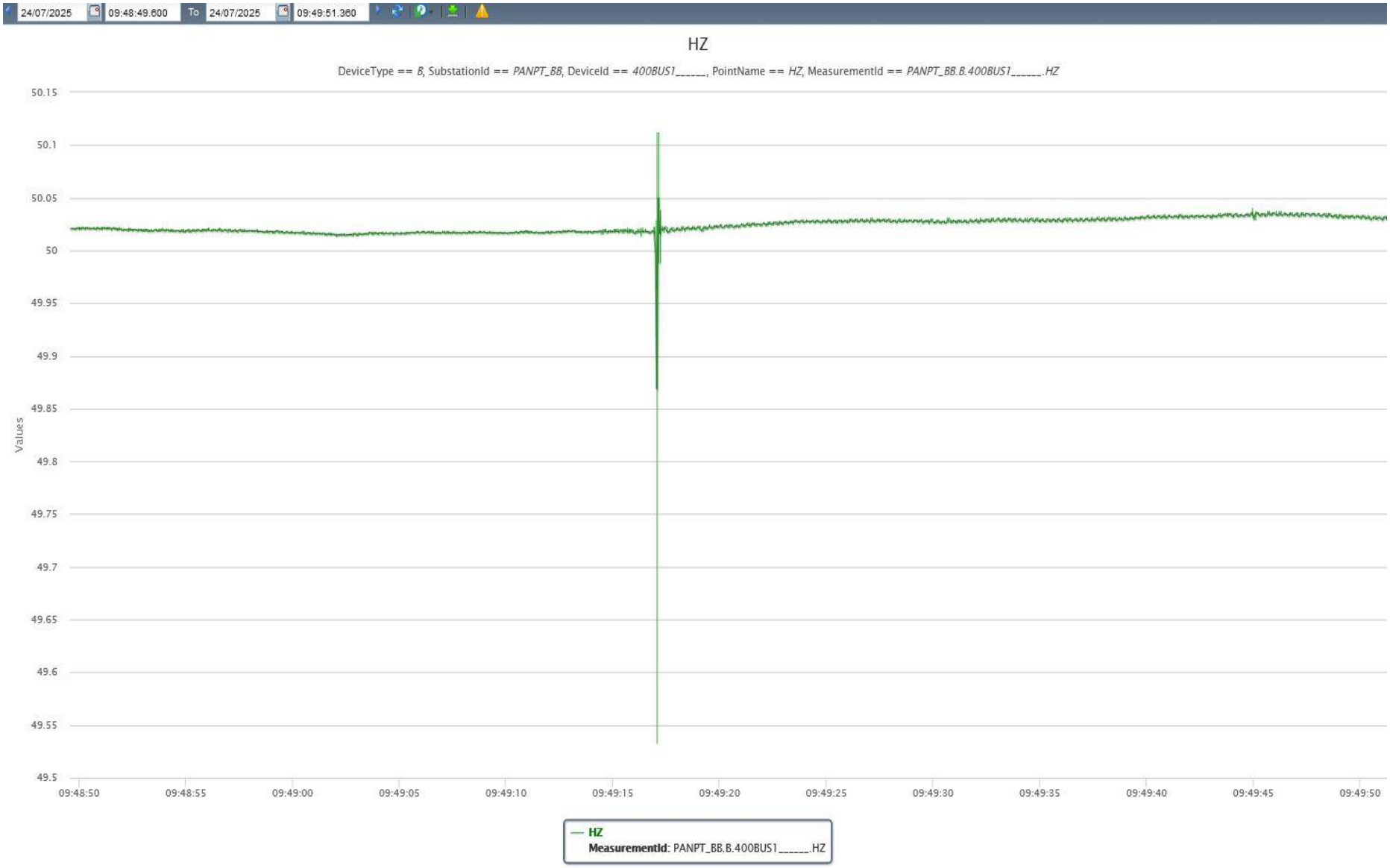


Haryana Demand during the event



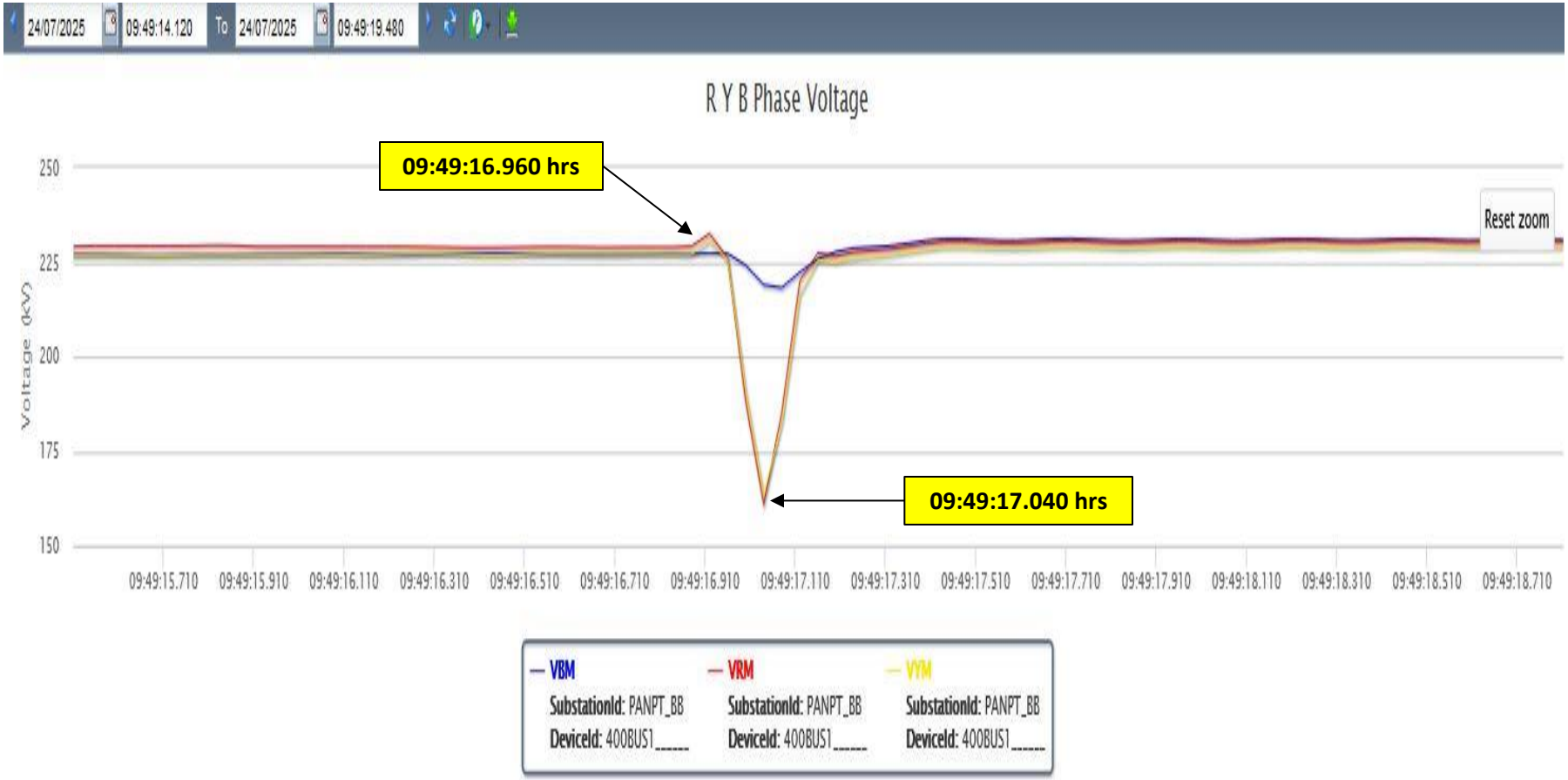
PMU Plot of frequency at Panipat(BBMB)

09:49 hrs/24-Jul-25



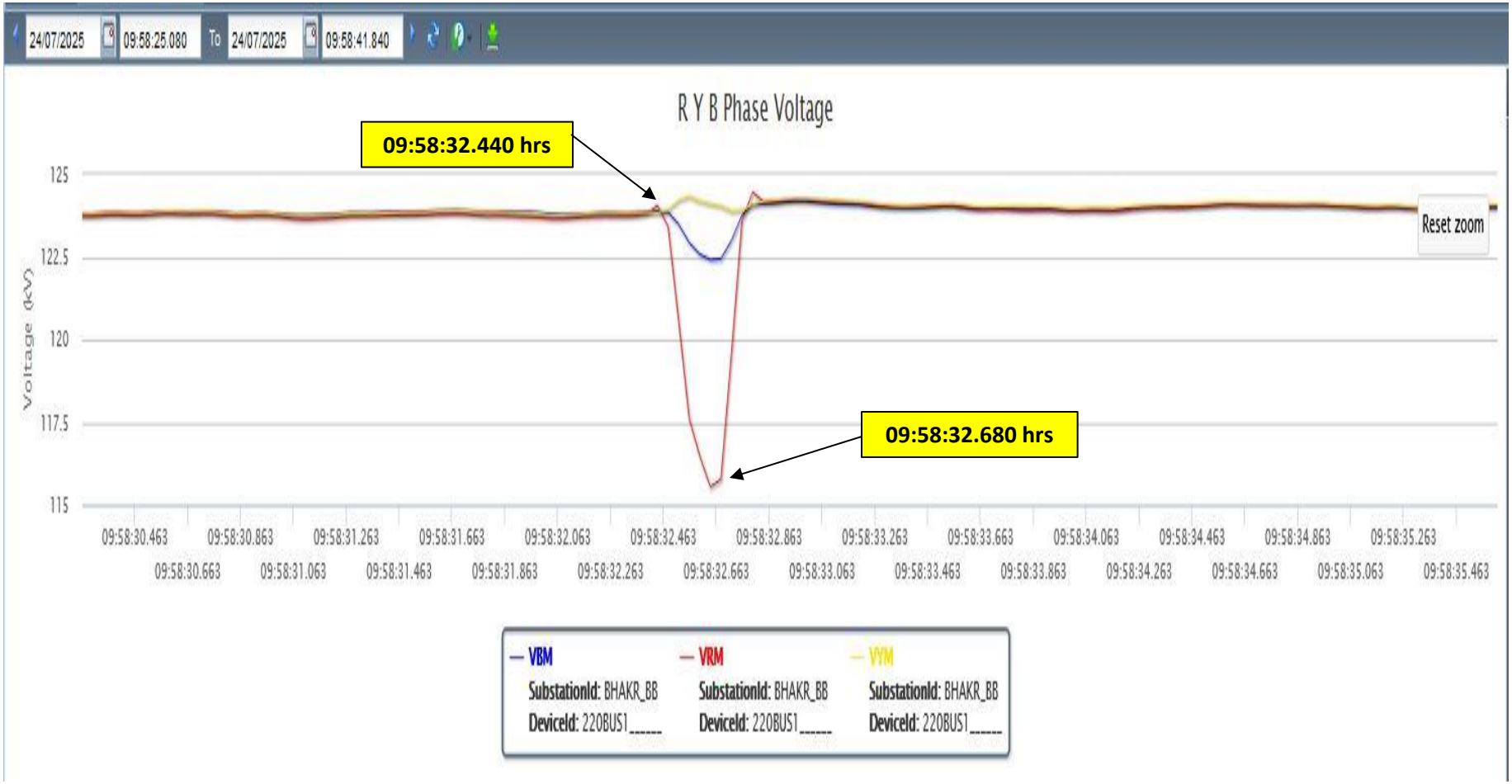
PMU Plot of phase voltage magnitude at Panipat(BBMB)

09:49 hrs/24-Jul-25



PMU Plot of phase voltage magnitude at Panipat(BBMB)

09:58 hrs/24-Jul-25

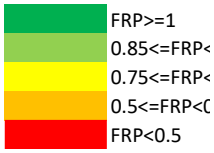


SCADA SOE

Time	Station Name	Voltage(kV)	Element Name	Element Type	Element Status	Remarks
09:49:17,111	PANIPAT	220kV	15PANTH2	Circuit Breaker	Open	Line CB at Panipat end of 220kV Panipat-Panipat Th(HR) line-2 opened
09:49:17,160	PANIPAT	220kV	21T2	Circuit Breaker	disturbe	
09:49:17,170	PANIPAT	220kV	18DHULK2	Circuit Breaker	Open	Line CB at Panipat end of 220kV Panipat-Dhulkote line-2 opened
09:49:17,190	PANIPAT	220kV	22MBC	Circuit Breaker	Open	Bus coupler breaker between 220kV Bus-1 & 2 opened
09:49:17,223	PANIPAT	220kV	10BS	Circuit Breaker	Open	Bus sectionaliser between Bus-2A & 2B opened
09:49:17,250	PANIPAT	220kV	11T2	Circuit Breaker	Open	CB at 220kV side of 400/220kV 500 MVA ICT-2 at Panipta(BB) opened
09:50:09,751	PANIPAT	220kV	09T1	Circuit Breaker	Open	CB at 220kV side of 400/220kV 450 MVA ICT-1 at Panipta(BB) opened
09:50:09,751	PANIPAT	400kV	6T1	Circuit Breaker	Open	Main CB (Bus-2) at 400kV side of 400/220kV 450 MVA ICT-1 at Panipta(BB) opened
09:50:09,820	PANIPAT	400kV	5T1	Circuit Breaker	disturbe	

FRC computation and data submission status						
S. No	Control Area	Event Date				
		11-05-2024	12-06-2025	16-06-2025	22-07-2025	29-07-2025
1	Punjab	Not Received	Received	Received	Received	Received
2	Haryana	Received	Received	Received	Received	Received
3	Rajasthan	Not Received	Received	Received	Received	Received
4	Delhi	Received	Received	Not Received	Received	Received
5	Uttar Pradesh	Received	Received	Received	Received	Received
6	Uttarakhand	Received	Received	Received	Not Received	Not Received
7	Chandigarh*	NA	NA	NA	NA	NA
8	Himachal Pradesh	Not Received	Received	Received	Received	Received
9	J&K(UT) and Ladakh(UT)	Not Received	Not Received	Not Received	Not Received	Not Received
10	Dadri -1 (TH)	Received	Received	Received	Received	Received
11	Dadri -2 (TH)	Received	Received	Received	Received	Received
12	Jhajjar (TH)	Received	Received	Received	Received	Received
13	Rihand-1 (TH)	Received	Received	Received	Received	Received
14	Rihand-2 (TH)	Received	Received	Received	Received	Received
15	Rihand-3 (TH)	Received	Received	Received	Received	Received
16	Shree Cement (TH)	Not Received	Not Received	Not Received	Not Received	Not Received
17	Singrauli (TH)	Not Received	Not Received	Not Received	Not Received	Not Received
18	Tanda-2 (TH)	Received	Received	Received	Received	Received
19	Unchahar-I (TH)	Received	Received	Received	Received	Received
20	Unchahar-II (TH)	Received	Received	Received	Not Received	Received
21	Unchahar-III (TH)	Received	Received	Received	Received	Received
22	Unchahar-IV (TH)	Received	Received	Received	Received	Received
23	Anta (G)	Received	Not Received	Not Received	Not Received	Received
24	Auraiya (G)	Not Received	Not Received	Not Received	Not Received	Not Received
25	Dadri (G)	Not Received	Not Received	Not Received	Not Received	Not Received
26	AD Hydro (H)	Received	Received	Received	Received	Received
27	Bairasiul (H)	Received	Received	Received	Received	Received
28	Bhakra (H)	Received	Received	Received	Received	Received
29	Budhil (H)	Not Received	Not Received	Not Received	Not Received	Not Received
30	Chamera-1 (H)	Received	Received	Received	Received	Received
31	Chamera-2 (H)	Received	Received	Received	Received	Received
32	Chamera-3 (H)	Not Received	Received	Received	Not Received	Not Received
33	Dehar (H)	Received	Received	Received	Received	Received
34	Dhauliganga (H)	Not Received	Received	Received	Received	Not Received
35	Dulhasti (H)	Received	Received	Received	Received	Received
36	Karcham (H)	Not Received	Received	Received	Received	Received
37	Kishenganga	Not Received	Received	Received	Received	Received
38	Koldam (H)	Received	Received	Received	Received	Received
39	Koteshwar (H)	Received	Received	Received	NA	Received
40	Malana-2 (H)	NA	NA	NA	NA	NA
41	Nathpa Jhakri (H)	Received	Received	Received	Received	Received
42	Parbati-2 (H)	Received	Received	Received	Received	Received
43	Parbati-3 (H)	Received	Received	Received	Received	Received
44	Pong (H)	Received	Received	Received	Received	Received
45	Rampur (H)	Received	Received	Received	Received	Received
46	Sainj (H)	Not Received	Not Received	Not Received	Not Received	Not Received
47	Salal (H)	Received	Received	Received	Received	Received
48	Sewa-II (H)	Received	Received	Received	Not Received	Received
49	Singoli Bhatwari (H)	Not Received	Not Received	Not Received	Not Received	Not Received
50	Sorang (H)	Not Received	Not Received	Not Received	Not Received	Not Received
51	Tanakpur (H)	Received	Received	Received	Received	Received
52	Tehri (H)	Received	Received	Received	NA	Received
53	Uri-1 (H)	Received	Received	Received	Received	Received
54	Uri-2 (H)	Not Received	Not Received	Not Received	Not Received	Not Received

Frequency response Performance						
S. No	Control Area	Event Date				
		11-05-2024	12-06-2025	16-06-2025	22-07-2025	29-07-2025
1	Punjab	4.83	0.68	-0.25	0.92	0.69
2	Haryana	4.89	0.07	0.07	2.61	-0.01
3	Rajasthan	21.55	0.05	0.83	-0.88	-1.44
4	Delhi	2.08	1.55	-1.01	-1.01	-0.86
5	Uttar Pradesh	1.32	0.56	0.00	1.83	-0.34
6	Uttarakhand	0.56	3.31	-1.21	-1.02	-0.31
7	Chandigarh*	NA	NA	NA	NA	NA
8	Himachal Pradesh	-5.69	2.67	1.62	1.34	0.00
9	J&K(UT) and Ladakh(UT)	-2.60	0.81	0.26	-0.34	-0.34
10	Dadri -1 (TH)	20.35	8.78	15.81	3.12	-0.62
11	Dadri -2 (TH)	47.48	0.11	7.10	16.95	0.65
12	Jhajjar (TH)	48.45	2.59	15.06	7.62	0.73
13	Rihand-1 (TH)	40.65	2.88	8.85	12.93	0.00
14	Rihand-2 (TH)	16.87	6.52	12.32	3.72	2.11
15	Rihand-3 (TH)	31.17	3.69	11.09	5.13	0.73
16	Shree Cement (TH)	-10.81	4.06	-0.01	2.86	16.17
17	Singrauli (TH)	10.90	2.75	0.78	0.75	0.02
18	Tanda-2 (TH)	8.04	5.02	9.35	-0.01	0.85
19	Unchahar-I (TH)	32.66	4.00	5.90	8.35	1.84
20	Unchahar-II (TH)	31.78	8.98	14.77	0.02	6.51
21	Unchahar-III (TH)	34.02	7.75	12.53	6.31	2.78
22	Unchahar-IV (TH)	51.88	2.86	3.73	18.97	3.25
23	Anta (G)	No Gen	1.09	No Gen	3.13	No Gen
24	Auraiya (G)	No Gen	3.79	No Gen	1.04	No Gen
25	Dadri (G)	No Gen	22.37	No Gen	10.35	No Gen
26	AD Hydro (H)	0.96	-0.97	0.27	-1.29	1.50
27	Bairasiul (H)	4.59	2.26	0.36	0.00	0.00
28	Bhakra (H)	0.00	0.02	0.02	-0.42	0.09
29	Budhil (H)	No Gen	0.20	0.00	No Gen	0.35
30	Chamera-1 (H)	6.86	1.78	No Gen	-2.14	0.67
31	Chamera-2 (H)	-1.46	1.55	0.37	No Gen	2.12
32	Chamera-3 (H)	7.73	0.00	0.00	0.00	0.00
33	Dehar (H)	0.06	0.04	0.01	0.54	0.76
34	Dhauliganga (H)	No Gen	3.48	0.33	-0.11	8.33
35	Dulhasti (H)	4.34	2.04	-0.20	0.32	3.22
36	Karcham (H)	17.10	4.45	0.49	No Gen	8.24
37	Kishenganga	-2.52	0.30	0.14	-3.55	-0.40
38	Koldam (H)	23.63	0.55	-0.45	-0.69	-0.14
39	Koteshwar (H)	11.62	3.27	1.91	0.00	6.73
40	Malana-2 (H)	NA	NA	NA	NA	NA
41	Nathpa Jhakri (H)	6.29	0.41	0.41	No Gen	3.86
42	Parbati-2 (H)	11.77	0.91	1.37	No Gen	No Gen
43	Parbati-3 (H)	2.02	13.75	1.72	-1.12	1.37
44	Pong (H)	0.30	0.03	0.07	-1.68	-0.52
45	Rampur (H)	13.62	-4.33	-1.15	No Gen	3.42
46	Sainj (H)	-0.61	0.26	0.37	No Gen	No Gen
47	Salal (H)	-0.18	-1.22	-0.43	1.53	0.00
48	Sewa-II (H)	No Gen	No Gen	No Gen	0.00	-0.76
49	Singoli Bhatwari (H)	-0.58	0.21	0.31	-0.43	No Gen
50	Sorang (H)	-0.27	0.07	0.28	0.20	0.19
51	Tanakpur (H)	3.32	-1.32	27.57	-0.58	6.74
52	Tehri (H)	4.57	No Gen	No Gen	0.00	No Gen
53	Uri-1 (H)	-0.90	-3.04	-0.36	0.12	-0.11
54	Uri-2 (H)	0.00	0.00	-2.33	-2.45	-1.43



Status of Mock Test of SPS in NR during 2025-26

Sr. No.	Scheme Name	Owner / Agency	Commission Year	Last Review	Mock testing conducted before 2025-26	Tentative Schedule of SPS Mock testing to be conducted during 2025-26	Date of SPS Mock testing conducted during 2025-26	Remarks
1	SPS for WR-NR corridor - 765kV Agra-Gwalior D/C	POWERGRID			27-03-2025	Feb-26		
2	SPS for contingency due to tripping of HVDC Mundra-Mahendergarh	ADANI				SPS Unhealthy		As reported by ADANI, work order has been placed and action plan also have been rceived. Tentative timeline for revival of SPS is by December 2025.
3	SPS for high capacity 400 kV Muzaffarpur-Gorakhpur D/C Inter-regional tie-line related contingency	POWERGRID				Schedule awaited		Not conducted in 2024-25 also.
4	SPS for 1500 MW HVDC Rihand-Dadri Bipole related contingency	POWERGRID			19-03-2025 and 20-03-2025	Jan-26		During mock testing, issue identified at Singrauli, Malerkotla. During recent operation on 21.05.2025, non-operation of SPS at Muradnagar, Modipuram, Malerkotla, Singrauli observed.
5	System Protection Scheme (SPS) for HVDC Balia-Bhiwadi Bipole	POWERGRID				Sep-25		Not conducted in 2024-25 also
6	SPS for reliable evacuation of power from NJPS, Rampur, Sawra Kuddu, Baspa Sorang and Karcham Wangtoo HEP	SJVN/HPPTCL/JSW/POWERGRID/SORANG			19-12-2024	Dec-25		Case-6(i): Under implemetation stage (tentative by 15th August 2025), Case 6(ii): communication card issue at Wangtoo(HP)
7	SPS for Reliable Evacuation of Ropar Generation	PSTCL				SPS Unhealthy		As reported by PSTCL, SPS need to be reviewed whether it is requird or not.
8	SPS for Reliable Evacuation of Rosa Generation	UPPTCL			20-04-2024	conducted	12-04-2025	Mock test report received (Review to be done in view of commissioning of 400kV Rosa-Badaun D/C in April 2021.)
9	SPS for contingency due to tripping of evacuating lines from Narora Atomic Power Station	NAPS / UPPTCL				Schedule awaited		Not conducted in 2024-25 also. As reported by UPPTCL, no SPS system is in service at Narora S/s.
10	SPS for evacuation of Kawai TPS, Kalisindh TPS generation complex	RVPNL			14-03-2025 (Partial)	conducted	26-04-2025	Study w.r.t. Automatic load shedding part has been done. Proposed Will be put up in 234 OCC
11	SPS for evacuation of Anpara Generation Complex	UPPTCL			08-10-2024 (unit-7) and 19-10-2024 (unit-6)	Schedule awaited		
12	SPS for evacuation of Lalitpur TPS Generation	UPPTCL			21-05-2024	conducted	09-04-2025	Mock test report received
13	SPS for Reliable Evacuation of Bara TPS Generation	UPPTCL			20-11-2024	conducted	23-05-2025	Mock test report received
14	SPS for Lahal Generation	HPPTCL			08-07-2020	Schedule awaited		As reported by HPPTCL, SPS at Lahal not required now.
15	SPS for Transformers at Ballabhgarh (PG) substation	POWERGRID				Schedule awaited		Not conducted in 2024-25 also. SPS. SPS may be kept with revised logic (logic based on the loading)
16	SPS for Transformers at Maharanibagh (PG) substation	POWERGRID				conducted	Apr-25	Mock test report received
17	SPS for Transformers at Mandola (PG) substation	POWERGRID				conducted	Apr-25	Mock test report received
18	SPS for Transformers at Bamnauli (DTL) Substation	DTL				Schedule awaited		Not conducted in 2024-25 also. SPS. SPS may be kept with revised logic (logic based on the loading)
19	SPS for Transformers at Moradabad (UPPTCL) Substation	Uttar Pradesh			20-04-2024	conducted	02-04-2025	Mock test report pending
20	SPS for Transformers at Muradnagar (UPPTCL) Substation	UPPTCL			27-03-2025	Mar-26		
21	SPS for Transformers at Muzaffarnagar(UPPTCL) Substation	UPPTCL			27-03-2025	Mar-26		
22	SPS for Transformers at Greater Noida(UPPTCL) Substation	UPPTCL				SPS Unhealthy		SPS Unhealthy; SPS may be kept with revised logic (logic based on the loading)
23	SPS for Transformers at Agra (UPPTCL) Substation	UPPTCL			21-03-2025	Schedule awaited		
24	SPS for Transformers at 400kV Sarojininagar (UPPTCL) Substation	UPPTCL			15-05-2024	conducted	23-07-2025	Mock test report received
25	SPS for Transformers at 220kV Sarojininagar (UPPTCL) Substation	UPPTCL			06-06-2024	conducted	23-07-2025	Mock test report received
26	SPS for Transformers at 400kV Unnao (UPPTCL) Substation	UPPTCL			19-05-2023	SPS made healthy on 27.05.2025		Mock test report received
27	SPS for Transformers at 400kV Sultanpur (UPPTCL) Substation	UPPTCL				SPS made healthy on 05.05.2025		Mock test report pending

28	SPS for Transformers at 400kV Bareilly (UPPTCL) Substation	UPPTCL				**SPS disabled without approval**		**Not conducted in 2024-25 also. SPS. SPS need to be enabled at the earliest. Case of SPS has been put up with transmission wing**
29	SPS for Transformers at 400kV Azamgarh (UPPTCL) Substation	UPPTCL			06-05-2024	**conducted**	**19-04-2025**	**Mock test report pending**
30	SPS for Transformers at 400kV Mau (UPPTCL) Substation	UPPTCL			27-04-2024	**conducted**	**21-04-2025**	**Mock test report pending**
31	SPS for Transformers at 400kV Gorakhpur (UPPTCL) Substation	UPPTCL			27-04-2024	**conducted**	**21-04-2025**	**Mock test report pending**
32	SPS for Transformers at 400kV Sarnath (UPPTCL) Substation	UPPTCL			23-05-2024	**conducted**	**01-04-2025**	**Mock test report received**
33	SPS for Transformer at 400kV Rajpura (PSTCL) Substation	PSTCL			31-01-2025	Schedule awaited		
34	SPS for Transformers at 400kV Mundka (DTL) Substation	DTL			03-02-2025	Schedule awaited		
35	**SPS for Transformers at 400kV Deepalpur (JKTPL) Substation**	**HVPNL**				**conducted**	**08-05-2025**	**Mock test report pending**
36	SPS for Transformers at 400kV Ajmer (RVPN) Substation	RVPNL			10-09-2024	10-09-2025		
37	SPS for Transformers at 400kV Merta (RVPN) Substation	RVPNL			12-09-2024	12-09-2025		
38	SPS for Transformers at 400kV Chittorgarh (RVPN) Substation	RVPNL			31-08-2024 and 05-09-2024	05-09-2025		
39	SPS for Transformers at 400kV Jodhpur (RVPN) Substation	RVPNL			24-09-2024	24-09-2025		
40	SPS for Transformers at 400kV Bhadla (RVPN) Substation	RVPNL			27-09-2024	27-09-2025		
41	SPS for Transformers at 400kV Ratangarh (RVPN) Substation	RVPNL			20-09-2024	20-09-2025		
42	SPS for Transformers at 400kV Nehtaur(WUPPTCL) Substation	UPPTCL			11-01-2025	Schedule awaited		
43	SPS for Transformers at Obra TPS	UPPTCL			20-05-2024	Schedule awaited		
44	SPS for Transformers at 400KV Kashipur (PTCUL) substation	PTCUL			Septemeber 2024	Sep-25		
45	**SPS for Transformers at 400KV Fatehgarh Solar Park (AREPRL)**	**ADANI**				**conducted**	**19-04-2025**	**Mock test report received.**
46	SPS to relive transmission congestion in RE complex (Bhadla2)	POWERGRID				Schedule awaited		**Not conducted in 2024-25 also**
47	SPS for Transformers at 400kV Bikaner (RVPN) Substation	RVPNL			26-09-2024	26-09-2025		
48	SPS for Transformers at 400kV Bawana (DTL) Substation	DTL			04-01-2025	Dec-25		
49	SPS for Transformers at 400kV Bhilwara (RVPN) Substation	RVPNL			09-07-2024 and 10-07-2024	10-07-2025		
50	SPS for Transformers at 400kV Hinduan (RVPN) Substation	RVPNL			26-09-2024	26-09-2025		
51	SPS for Transformers at 400kV Suratgarh (RVPN) Substation	RVPNL			20-10-2024	20-10-2025		
52	SPS for Transformers at 400kV Babai(RS) Substation	RVPNL			20-10-2024	20-10-2025		
53	SPS for Transformers at 400kV Allahabad(PG) Substation	UPPTCL				Schedule awaited		**Not conducted in 2024-25 also**
54	SPS for Transformers at 400kV Jaunpur(UP) Substation	UPPTCL						**Yet to be implemented**
55	SPS for Transformers at 765kV Jhatikara(PG) Substation (Bamnauli section)	POWERGRID				**conducted**	**Jun-25**	**Mock test report received.**
	SPS for Transformers at 765kV Jhatikara(PG) Substation (Mundka section)					**conducted**	**Jun-25**	
56	SPS for Transformers at 765kV Bhiwani(PG) Substation	POWERGRID				**SPS implemented**		**Mock test report received.**
57	SPS for Transformers at 400kV Panki (UPPTCL) Substation	UPPTCL				**Approved in 234 OCC**		**Yet to be implemented**

Fw: Mundra-Mohindergarh HVDC , SPS-NR defect resolutions

Deepak Kumar

Tue 04-Feb-25 17:04

To:Sugata Bhattacharya (सुगाता भट्टाचार्या) <sugata@grid-india.in>;

1 attachments (23 KB)

Revised Schedule for Site Visit.xlsx;

From: Sumeet Sharma <Sumeet.Sharma@adani.com>
Sent: Monday, February 3, 2025 6:58 PM
To: aen.com; m.alwar@rvpn.co.in; aen.mpt&s.rtg@rvpn.co.in; aen.comm.ratangarh@rvpn.co.in; aen.subsldc.bhl@rvpn.co.in; xen.mpts.bhl@rvpn.co.in; aen.prot.mertacity@RVPN.CO.IN; aen.comm.merta@RVPN.CO.IN; nainwal@powergrid.in; vinaykumargupta@powergrid.in; ravindra_kumar@powergrid.in; smahajan1999@powergrid.in; rkagrawal83@powergrid.in; dharmendrameena@powergrid.in; vineet@powergrid.in; bhakalramjash@powergrid.in; dhanonda400kv@gmail.com; sse220kvlulaahir@hvpn.org.in; sse220kvrwr@hvpn.org.in; sse132kvdadri@hvpn.org.in; ae-220kvg1-mgg@pstcl.org; sse-pm-lalton@pstcl.org; sse-pm-mlrk@pstcl.org; eeetdshamli@upptcl.org; ee400mrd2@upptcl.org; aeprotection@upsldc.org; ase-sldcop@pstcl.org; bl.gujar@dtl.gov.in; ce.ld@rvpn.co.in; ce-sldc; dtldata@yahoo.co.in; dtlscheduling@gmail.com; eesldccontrol@upsldc.org; ldrvpnl@rvpn.co.in; ldshutdown@gmail.com; ldshutdown@rvpn.co.in; paritosh.joshi@dtl.gov.in; pccont@bbmb.nic.in; pc-sldcop@pstcl.org; rajbir-walia79@yahoo.com; rtamc.nr1@powergrid.in; pankaj.jha@powergrid.in; neerajk@powergrid.in; se.mpts.udr@rvpn.co.in; se.prot.engg@rvpn.co.in; se.sold@rvpn.co.in; sera@upsldc.org; sesc@upsldc.org; sesldcop@hvpn.org; se-sldcop; setncmrt@upptcl.org; sldcdata@gmail.com; sldcharyanacr@gmail.com; sldcmintoroad@gmail.com; system.uppcl@gmail.com; xenemtcbhpp2@bbmb.nic.in; xenmpccggn@hvpn.org; xenplgss@hvpn.org
Cc: NRLDC SO 2; Somara Lakra (सोमारा लाकरा); Mahavir Prasad Singh (महावीर प्रसाद सिंह); Deepak Kumar; Sunil Kumar Raval; Namandeep Matta; Kali Charan Sahu; RAVINDRA ATALE; Nihar Raj; Milan Popat; Abhishek Kukreja; Naman Vyas; Abhishek Kumar Singh
Subject: Mundra-Mohindergarh HVDC , SPS-NR defect resolutions

****Warning****
This email has not originated from Grid-India. Do not click on attachment or links unless sender is reliable. Malware/ Viruses can be easily transmitted via email.

Dear Sirs,

This refers to the matter discussed during recent Protection subcommittee (PSC) meetings with regards to the requirement of rectifications of SPS-NR implemented for Mundra-Mohindergarh HVDC transmission. We have awarded the service to M/s commtel for survey and restoration of possible elements installed at the locations.

Please note that Engineers from M/s Commtel shall be visiting your stations as per the attached schedule and necessary coordination shall be done by Mr. Abhishek Singh (Station -in charge) of Mohindergarh HVDC station (AESL-GD). He can be contacted at Mobile: 9671306831.

We request your kind permission and necessary support in carrying out the observations/possible restorations of the installations at your respective stations.

Thank you.

Regards,

Sumeet Sharma
Head- Automation, Communications , OT-Cyber & Technology
Adani Energy Solutions Limited.(Grid Division)
Mob +91 90990 05648 | sumeet.sharma@adani.com | www.adani.com
KP Epitome|10th Floor South Wing | SG Highway |Ahmedabad-382421| Gujarat

DISCLAIMER: The information contained in this electronic message and any other attachment to this message are intended solely for the addressee and may contain information that is confidential, privileged and exempt from disclosure under applicable law. If you are not the intended recipient, you are hereby formally notified that any use, copying or distribution of this e-mail, in whole or in part, is strictly prohibited. Please immediately notify the sender by return e-mail and delete all copies of this e-mail and any attachments from your system. Any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the company.

WARNING: Computer viruses can be transmitted via email. The recipient should check this email and any attachments for the presence of viruses. Adani Group accepts no liability for any damage caused by any virus transmitted by this email.
Follow Grid-India on:

Project : To check Sytem healthiness anc configuration of system installed Under M/s Adani

S. No	Site name	Region	Site visit
1	laltokalan	Punjab	03.02.2025
2	Gobidngarh		04.02.2025
3	Malerkotla		05.02.2025
4	Mandula	UP	06.02.2025
5	Bamnauli	DTL	07.02.2025
6	Ratangarh	Rajasthan	06.02.2025
7	Bhilwara		07.02.2025
8	Merta		07.02.2025
9	Alwar		08.02.2025
10	PG Bhiwani	Haryana	10.02.2025
11	BBMB bhiwani		10.02.2025
12	Hissar		11.02.2025
13	Dadri		11.02.2025
14	Bahadurgah		12.02.2025
15	Dhanoda		12.02.2025
16	Shamli	UP	12.02.2025

RE: Mock testing of SPS of 500kV HVDC Mundra-Mahindergarh link

Thu 8/29/2024 7:29 PM

To:NRLDC SO 2 <nrldcso2@grid-india.in>; CPCC1 <rtamc.nr1@powergrid.in>;

Cc:seo-nrpc <seo-nrpc@nic.in>; Somara Lakra (सोमारा लाकरा) <somara.lakra@grid-india.in>; Mahavir Prasad Singh (महावीर प्रसाद सिंह) <mahavir@grid-india.in>; Arunkumar P <Arunkumar.P@adani.com>; Sugata Bhattacharya (सुगाता भट्टाचार्या) <sugata@grid-india.in>; Deepak Kumar <deepak.kr@grid-india.in>; AMIT SHARMA <amsharma@grid-india.in>; Bikas Kumar Jha (बिकास कुमार झा) <bikaskjha@grid-india.in>; Manas Ranjan Chand (मानस रंजन चंद) <manas@grid-india.in>; Aman Gautam (अमन गौतम) <amangautam@grid-india.in>; Gnanaguru . <Gnanaguru.1@adani.com>; Sumeet Sharma <Sumeet.Sharma@adani.com>; Naman Vyas <Namany.Vyas@adani.com>; Milan Popat <Milan.Popat@adani.com>; Nihar Raj <nihar.raj@adani.com>; Abhishek Kukreja <Abhishek.Kukreja@adani.com>;

5 attachments (9 MB)

Counter (2).jpg; Counter.jpg; TPS (2).jpg; TPS.jpg; 220KV Alwar ss.jpg;

****Warning****
This email has not originated from Grid-India. Do not click on attachment or links unless sender is reliable.
Malware/ Viruses can be easily transmitted via email.

Dear Sir,

Please find the attached Photos. on 28-08-2024, a representative from M/s. Commtel Networks visited the Mahendragarh site and confirmed the healthiness of the SDH and TPS, along with their associated cards.

All SPS System equipment are functioning properly. The 15 TPS installed in the remote substation.

The details and status of TPS and Counter at Mahendragarh End.

S.No	TPS	TPS Status	Counter	Counter Status
1	PG Hissar	ON	17	OKAY
2	Bhiwani	ON	17	OKAY
3	Dadari	ON	17	OKAY
4	Alwar	ON	-	OFF
5	Bhilwara	ON	12	OKAY
6	Merta	ON	14	OKAY
7	Ratangarh	ON	-	OFF
8	Gobinugarg	ON	-	OFF
9	Malerkotla	ON	-	OFF
10	Laton Kalan	ON	6	OKAY
11	Mandula	ON	12	OKAY
12	Bamnauli	ON	-	OFF
13	Shamli	ON	-	OFF
14	Bahadurgarh	ON	10	OKAY

15	Dhanonda	ON	-	OFF

There alarms on the system are due to the following reasons.

1. Equipment Failure/ card failure/ power failure at Remote Sites.
2. Cable connectivity break between the remote System and cable coming from Field.
3. E1 connectivity outage at remote Sites.

Our team, with support from Commtel Networks, visited the nearest TPS installed at the 220/132 kV Alwar Substation to check its healthiness. However, during the inspection, the panel was found to be de-energized, necessitating an end-to-end test. (Photo Attached) Similarly, each substation needs to be ensured the healthiness of the TPS by respective Substation owner.

We request you to please confirm the healthiness of the Sr no 1 and 2 .

Thanks and Regards,

Kalicharan Sahu
(O&M) HVDC & EHV Substations,
Adani Energy Solutions Limited
| ±500kV HVDC Mahendragarh Terminal Sub Station I
Village-Kheri- Aghiyar, Taluka- Kanina, Mahendragarh 123 029, Haryana, India
Mob +91 9764006167| Off +91 1285 277326



From: NRLDC SO 2 <nrldcso2@grid-india.in>
Sent: Tuesday, August 27, 2024 10:07 AM
To: SLDC Punjab <se-sldcprojects@pstcl.org>; PC PSTCL SLDC PUNJAB <pcpstcl@gmail.com>; Haryana <sldcharyanacr@gmail.com>; Delhi <sldcmintoroad@gmail.com>; UP <sera@upsldc.org>; Rajasthan <SE.LDRVPNL@RVPN.CO.IN>; ce.ld@rvpn.co.in; CPCC1 <rtamc.nr1@powergrid.in>; neerajk@powergrid.in; setncmrt@upptcl.org; bharatlalgujar@gmail.com; akashdeep3433786@gmail.com; xenemtcbhpp2@bbmb.nic.in; PC Control Room <pccont@bbmb.nic.in>; se.prot.engg@rvpn.co.in; Arunkumar P <Arunkumar.P@adani.com>; Kali Charan Sahu <Kalicharan.Sahu@adani.com>; rajbir-walia79@yahoo.com; ase-sldcop@pstcl.org; sesldcop@hvpn.org.in; cepso@upsldc.org; se-sldcop <se-sldcop@pstcl.org>; SICHVDC Controlroom <SICHVDC.Controlroom@adani.com>
Cc: seo-nrpc <seo-nrpc@nic.in>; somara.lakra <somara.lakra@grid-india.in>; Mahavir Prasad Singh (महावीर प्रसाद सिंह) <mahavir@grid-india.in>; Sugata Bhattacharya (सुगाता भट्टाचार्या) <sugata@grid-india.in>; deepak.kr <deepak.kr@grid-india.in>; AMIT SHARMA <amsharma@grid-india.in>; bikaskjha <bikaskjha@grid-india.in>; Manas Ranjan Chand (मानस रंजन चंद) <manas@grid-india.in>; Aman Gautam (अमन गौतम) <amangautam@grid-india.in>
Subject: Re: Mock testing of SPS of 500kV HVDC Mundra-Mahindergarh link

***CAUTION**: This mail has originated from outside Adani. Please exercise caution with links and attachments.*

Sir,

उत्तर प्रदेश राज्य भार प्रेषण केन्द्र लि०
यू०पी०एस०एल०डी०सी०परिसर, विभूति
खण्ड II,गोमती नगर, लखनऊ–226010
ई मेल : sera@upsldc.org

U.P. State Load Despatch Centre Ltd.
UPSLDC Complex, Vibhuti Khand II
Gomti Nagar, Lucknow- 226010
E-mail: sera@upsldc.org

No: - 2661 /SE(R&A)/EE-II/SPS Dated:- 07/08/ 2024

General Manager, NRLDC18-A,
SJSS Marg, Katwaria Sarai,
New Delhi – 110016

Subject- Regarding SPS of HVDC Mundra-Mahendargarh line

Kindly refer to SE (ETC) Muzaffarnagar letter no/062/E.T.C./MZN/400 kV S/S Shamli dated 05.05.2024. (copy enclosed) regarding feeder wise load of Shamli area. As per the letter, at present complete load relief (i.e. 300MW) may not be provided by 220 kV Shamli, so that alternatively feeder and load details of 400 kV Shamli has also been provided. Also it is informed that at present SPS system at 220 kV Shamli is not healthy which is being maintained by PGCIL.

It is therefore requested to kindly instruct the concerned to incorporate 132 kV feeders of 220 kV Shamli & 400 kV Shamli in SPS of HVDC Mundra-Mahendargarh line so that appropriated load relief may be provided from UP Control area and take necessary action regarding healthiness of SPS system

Sangeet

(Sangeeta)
Superintending Engineer (R&A)

No: - /SE(R&A)/EE-II/SPS Dated: - 2024

Copy forwarded to following via e-mail for kind information and necessary action:-

1. Director, UPSLDC, Vibhuti Khand – II, Gomti Nagar, Lucknow.
2. Director (Operation), UPPTCL, 11th Floor, Shakti Bhawan Extn., Lucknow.
3. Chief Engineer (PSO), Vibhuti Khand – II, Gomti Nagar, Lucknow.
4. Chief Engineer (Trans. West),PareshanBhawan, 130D, Hydel Colony, Victoria Park, Meerut 250001.
5. SE (Operations), 18 – A SJSS Marg, Katwaria Sarai, New Delhi, 110016.

(Sangeeta)
Superintending Engineer (R&A)

कार्यालय
अधीक्षण अभियन्ता
विद्युत पारेषण मण्डल
उ०प्र०पावर ट्रांसमिशन कारपोरेशन लि०
132 के०वी० भोपारोड उपकेन्द्र
मुजफ्फरनगर-251001

OFFICE OF THE
SUPERINTENDING ENGINEER
Electricity Transmission Circle
U.P. Power Transmission Corporation Ltd.
132 KV Bhopa Road Sub-station
Muzaffarnagar-251001

दूरभाष : 0131-2608038 Ph. 0131-2608038
E-mail : seetcmzn@upptcl.org, seetcmzn@gmail.com

संख्या / No. 1062 /E.T.C./MZN/400 KV S/S Shamli दिनांक / DATED 5.8.24

Subject: - Regarding SPS of HVDC Mundra-Mahendargarh.

Superintending Engineer (R & A)
U.P State Load Despatch Centre Ltd.
UPSLDC Complex, Vibhuti Khand-II
Gomti Nagar, Lucknow.
Email. sera@upsldc.org

Please refer to your office letter no. 2187 dt. 01.07.2024, forwarded to this office by SE (T&C), Meerut vide endorsement no. 2237/CE(TW)/MT/SPS dt. 23.07.2024 vide which it has been requested to provide details of 132 KV feeders for planned relief to HVDC Mundra-Mahendargarh SPS.

In this reference, it is to apprise that following is the details of 132 KV feeders being fed from 220 KV Sub-Station Shamli.

S.No.	Name of feeder	Connected Load (MVA)	Maximum Load (MW)	Average Load (MW)
1	132 KV Lalukheri	63+63	72	47
2	132 KV Jhinjhana	63+40+40	80	52
3	132 KV Kairana-I/II	63+63	41	27
4	132 KV Jasala	63+40	58	38
	Total		251	164

1. Following Case wise Trippings of 132 KV Feeders at 220 KV Sub-Station, Shamli for tripping of HVDC Mundra-Mahendergarh Line may be used.

(A) In Maximum Load Condition:-

S. No.	State.L.S quantum	Name of feeding substation	Feeder/line/ equipment	MW	Case-1 50 MW	Case-2 100 MW	Case-3 200MW	Case-4 300 MW
1	Uttar Pradesh Case-1 =50 MW Case-2 =100 MW Case-3 =200 MW Case-4 =300 MW	220 KV Subsatation, Shamli	132 KV Jasala	58	1	1	1	1
2			132 KV Kairana-I	20.5		1		1
3			132 KV Kairana-II	20.5	-	1		1
4			132 KV Lalukheri	72	-	-	1	1
5			132 KV Jinjhana	80	-		1	1
			Total Relief	251	58	99	210	251

(B) In Average Load Condition :-

S. No.	State.L.S quantum	Name of feeding substation	Feeder/line/ equipment	MW	Case-1 50 MW	Case-2 100 MW	Case-3 200MW	Case-4 300 MW
1	Uttar Pradesh Case-1 =50 MW Case-2 =100 MW Case-3 =200 MW Case-4 =300 MW	220 KV Subsatation, Shamli	132 KV Jasala	38	1		1	1
2			132 KV Kairana-I	13.5	1		1	1
3			132 KV Kairana-II	13.5	-		1	1
4			132 KV Lalukheri	47	-	1	1	1
5			132 KV Jinjhana	52	-	1	1	1
			Total Relief	164	51.5	99	164	164

Alternatively HVDC Mundra-Mahendargarh SPS may be shifted to 400 KV Sub-Station Shamli, details of 132 KV feeders from 400 KV Sub-Station Shamli with its Maximum and Average load is as follows :

S.No.	Name of feeder	Connected Load (MVA)	Maximum Load (MW)	Average Load (MW)
1	132 KV Budhana	63+40	82	53
2	132 KV Kharad	63+40	78	51
3	132 KV Jalalpur	40+40	41	27
4	132 KV Thanabhawan	63+63+40	74	48
5	132 KV Kaniyan	40+40	35	23
	Total		**310**	**202**

2. Following Case wise Trippings of 132 KV Feeders at 400 KV Sub-Station, Shamli for tripping of HVDC Mundra-Mahendergarh Line is hereby recommended

(A). In Maximum Load Condition :-

S. No.	State.L.S quantum	Name of feeding substation	Feeder/line/ equipment	MW	Case-1 50 MW	Case-2 100 MW	Case-3 200MW	Case-4 300 MW
1	Uttar Pradesh Case-1 =50 MW Case-2 =100 MW Case-3 =200 MW Case-4 =300 MW	400 KV Subsatatio n, Shamli	132 KV Budhana	82	-	-	1	1
2			132 KV Kharad	78	-	-	1	1
3			132 KV Jalalpur	41	1	-	1	1
4			132 KV Thanabhawan	74	-	1	-	1
5			132 KV Kaniyan	35	1	1	-	1
			Total Relief	**310**	**76**	**109**	**201**	**310**

(B). In Average Load Condition :-

S. No.	State.L.S quantum	Name of feeding substation	Feeder/line/ equipment	MW	Case-1 50 MW	Case-2 100 MW	Case-3 200MW	Case-4 300 MW
1	Uttar Pradesh Case-1 =50 MW Case-2 =100 MW Case-3 =200 MW Case-4 =300 MW	400 KV Subsatatio n, Shamli	132 KV Budhana	53	-	1	1	1
2			132 KV Kharad	51	1	1	1	1
3			132 KV Jalalpur	27	-	-	1	1
4			132 KV Thanabhawan	48	-	-	1	1
5			132 KV Kaniyan	23	-	-	1	1
			Total Relief	**202**	**51**	**104**	**202**	**202**

Submitted for information and necessary action

(Nikhil Kumar)
Superintending Engineer

संख्या / No. /E.T.C./MZN/ दिनांक / DATED

Copy forwarded to the following for information and necessary action :

1. Chief Engineer (TW) UPPTCL Meerut.
2. Superintending Engineer, Electricity (T&C) Circle, UPPTCL Meerut.
3. Executive Engineer Electricity Transmission Division, Shamli

(Nikhil Kumar)
Superintending Engineer

कार्यालय
अधीक्षण अभियन्ता
विद्युत परीक्षण एवं परिचालन मण्डल
उ0प्र0 पावर ट्रांसमिशन कारपोरेशन लि0
प्रथम तल पारेषण भवन, 130–डी, विक्टोरिया पार्क
मेरठ– 250 003
मोबाइल: 9412749817

OFFICE OF THE
SUPERINTENDING ENGINEER
Electricity Test & Commissioning Circle
U.P. POWER TRANSMISSION CORPORATION LTD.
1st Floor Pareshan Bhawan, 130-D, Victoria Park,
Meerut 250 003
Mobile: 9412749817

No. 82 / ETCC-MT / Dated- 30/05/24

Sub :- SPS related to HVDC Mundra-Mahendargarh.

Superintending Engineer (R&A) **(By e-mail)**
UPSLDC Vibhuti Khand ,
Gomti Nagar,
Lucknow.

In reference to the above cited subject, UPSLDC via email on 22.05.2024 informed that on 17.05.2024 at 16:20 hrs, Case-3 of SPS related to HVDC Mundra - Mahendergarh operated. As per action in case-3 operation of this line SPS, 200MW load relief at 220kV Shamli (UP) is desired. However, no load relief at 220kV Shamli was observed at given date and time. It is to bring in your notice that due to commissioning of 400kV Shamli S/s entire power flow scenario has been changed. Current situation is summarized as below.

At 220kV Shamli S/s feeders shown in the list	Planned load relief (MW)	Current situation
Thana Bhawan -1	25	The only line cateting Thana Bhawan has been made LILO at 132kV Jalalpur. Now Jalalpur is fed from 220kV Shamli S/s while load of Thana Bhawan is fed from 400kV Shamli S/s.
Thana Bhawan -2	25	
Jasala-1	25	Only one line exists.
Jasala-2	25	
Kharad-1	50	Only one line exists which is normally kept open at Kharad and load of Kharad is normally fed from 400kV Shamli S/s.
Kharad-2	50	
Baraut-1	150 (case-4)	No such line exist at 220kV Shamli S/s.
Baraut-2	150 (case-4)	

In view of the above facts, entire load relief strategy needs to be reviewed and redesigned for SPS. On 17.05.2024 at 16:20 hrs, no tripping observed at 220kV S/S Shamli as SPS system is unhealthy, which is being maintained by M/s PGCIL.

Hence it is requested to you to kindly coordinate with M/s PGCIL for modification of the scheme and rectification of the fault in SPS.

(Pramod Kumar Mishra)
Superintending Engineer

No. 82 /ETCC-MT/ Dated/– 30/05/24

Copy forwarded to the following for information & necessary action:-

1. Chief Engineer (TW), UPPTCL Victoria Park, Meerut.
2. Executive Engineer, Electricity Test & Commissioning Div., Muzaffarnagar.

(Pramod Kumar Mishra)
Superintending Engineer

SK/SENew/NewEngLetter01

Rajasthan Details

Revised updated feeder details (radial) along with expected average Load Relief

S.No.	Name of Sub- Station	Feeder name as per existing detail	Revised name of Existing Feeder /Line/Equipment	Average Load relief (MW)	Remark
1	220 kV GSS Alwar	132 kV GSS Mundawar	132 kV GSS Pinan	25	
		132 kv GSS Bansoor	132 kV GSS Telco	45	
		132 kV GSS Ramgarh	132 kV GSS Ramgarh	65	
		132 kV GSS Malakhera	132 kV GSS Malakhera	50	
		132 kV Alwar (LOCAL)	132 kV GSS Alwar (LOCAL)	120	
2	220 kV GSS Ratangarh	132 kV Sardar Sher			Generally Feed from 220 kV Halasar
3	220 kV GSSV Bhilwara	132 kV GSS Gangapur	132 kv GSS Karoi	15	
		132 kV GSS Danta	132 kV GSS Danta	30	
		132 kV GSS Devgarh	132 kV GSS Bankali	18	
		132 kV GSS Kareda			
4	400 kV GSS Merta	132 kV GSS Kuchera	132 kV GSS Dhawa	25	
		132 kV GSS Lamba	132 kV GSS Lamba jatan	55	
		132 kV GSS Gotan			

Email **Control Room CONTROL ROOM SLDC**

Re: Review of SPS installed for 500kV HVDC Mundra - Mahindergarh.

From : Executive Engineer TS Rewari <xentsrwr@hvpn.org.in> Thu, Aug 29, 2024 01:20 PM

Subject : Re: Review of SPS installed for 500kV HVDC Mundra - Mahindergarh.

To : Control Room CONTROL ROOM SLDC <controlroomsldc@hvpn.org.in>

Cc : SE TS GGN <setsggn@hvpn.org.in>, Executive Engineer Executive Engineer <xen400kvdhanoda@hvpn.org.in>, Substation Engineer <sse220kvlulaahir@hvpn.org.in>

In continuation of trailing email and discussion held today telephonically, it is gathered that desired load relief shall not get as load of 220 kV Lula Ahir shall be fed through 220 kV Dadri-Lula Ahir line being synchronized. Therefore, it is proposed that in the existing scheme SPS, the tripping of 220 kV D/C Lula Ahir line at 400 kV Dhanonda end may be removed and tripping of all incomers (2 no. 132 kV Incomers of 100 MVA 220/132 kV TFs and one no. 33 kV incomer of 100 MVA 220/33 kV TF) at 220 kV Lula Ahir substation may be added.

The maximum load (for FY 2023-24) on three no. 100 MVA TFs installed at 220 kV Lula Ahir is 53.46 MVA, 86.26 MVA and 87.02 MVA

The average load on three no. 100 MVA TFs installed at 220 kV Lula Ahir is 50 MVA, 70 MVA and 70 MVA

From: "Executive Engineer TS Rewari" <xentsrwr@hvpn.org.in>
To: "Control Room CONTROL ROOM SLDC" <controlroomsldc@hvpn.org.in>
Cc: "SE TS GGN" <setsggn@hvpn.org.in>, "Executive Engineer Executive Engineer" <xen400kvdhanoda@hvpn.org.in>, "Substation Engineer" <sse220kvnarnaul@hvpn.org.in>
Sent: Wednesday, August 28, 2024 12:46:13 PM
Subject: Re: Review of SPS installed for 500kV HVDC Mundra - Mahindergarh.

In reference of trailing email it is submitted that 220 kV Lula Ahir is connected with 400 kV Dhanonda through 220kV D/C line and with 220 kV Dadri through 220kV S/C line and with 220 kV Rewari with 220kV S/C line.
In general circuits of 400 kV Dhanonda and 220 kV Dadri runs in synchronization. The maximum load (for FY 2023-24) on three no. 100 MVA TFs installed at 220 kV Lula Ahir is 53.46 MVA, 86.26 MVA and 87.02 MVA. It is further added that in general 220 kV Dadri takes load from 220 kV Lula Ahir substation and thus act as sink.

In case of operation of SPS at 400 kV Dhanonda, the desired load relief as mentioned in trailing email (90+95 MW) can be achieved through existing scheme (by outage of three no. 100 MVA TFs and 220 kV Dadri (acting as sink)).

Regards
XEN/TS Division
HVPNL Rewari.

From: "Control Room CONTROL ROOM SLDC" <controlroomsldc@hvpn.org.in>
To: "Executive Engineer TS Rewari" <xentsrwr@hvpn.org.in>, "Executive Engineer TS Rohtak" <xentsrtk@hvpn.org.in>, "Executive Engineer Ts Bhiwani" <xentsbhw@hvpn.org.in>, "Executive Engineer Executive Engineer" <xen400kvdhanoda@hvpn.org.in>, xendhanonda@gmail.com
Cc: "Chief Engineer SO Commercial" <cesocomml@hvpn.org.in>, "Chief Engineer TS Panchkula" <cetspkl@hvpn.org.in>, "Chief Engineer TS Hisar" <cetshsr@hvpn.org.in>, "Superintending Engineer SLDC OP" <sesldcop@hvpn.org.in>, "SE TS Rohtak" <setsrtk@hvpn.org.in>, "SE TS GGN" <setsggn@hvpn.org.in>, "Superintending Engineer TS Hisar" <setshsr@hvpn.org.in>, "Superintending Engineer MP CC Dhulkote" <sempccdkt@hvpn.org.in>, "Superintending Engineer MP CC Delhi" <sempccdelhi@hvpn.org.in>, "Executive Engineer MP Rohtak" <xenmpccrtk@hvpn.org.in>, "XEN MP Hisar" <xenmpcchsr@hvpn.org.in>, "XEN MP CC" <xenmpccggn@hvpn.org.in>
Sent: Wednesday, August 21, 2024 11:57:59 AM
Subject: Review of SPS installed for 500kV HVDC Mundra - Mahindergarh.

Sir,

Please see the attachments.

--
Regards,
SCE (पाली प्रभारी अभियंता)/SLDC Control room,
HVPNL Panipat
Contact No- 9053090722,9053090721,0180-2664095

Every 8333.3 sheets of paper costs us a tree.
Please don't print this e-mail unless you really need to. Save Paper Save Trees

---

Fwd: Review of SPS installed for 500kV HVDC Mundra - Mahindergarh.

Control Room CONTROL ROOM SLDC <controlroomsldc@hvpn.org.in>

Fri 8/30/2024 12:44 PM

To:NRLDC SO 2 <nrldcso2@grid-india.in>; NRLDC SO-II <nrldcso2@gmail.com>; Deepak Kumar <deepak.kr@grid-india.in>;

Cc:Superintending Engineer SLDC OP <sesldcop@hvpn.org.in>;

2 attachments (209 KB)

Email SPS Rewari.pdf; Regarding SPS Bhiwani.pdf;

****Warning****

This email has not originated from Grid-India. Do not click on attachment or links unless sender is reliable. Malware/ Viruses can be easily transmitted via email.

Sir,

In reference to the SPS installed for 500kV HVDC Munda - Mahindergarh link the information received from TS wing (copy attached) is as under:

1. At 400kV Dhanonda through Lula Ahir substation:- It is proposed that in the existing scheme SPS, the tripping of 220 kV D/C Lula Ahir line at 400 kV Dhanonda end may be removed and tripping of all incomers (2 no. 132 kV Incomers of 100 MVA 220/132 kV TFs and one no. 33 kV incomer of 100 MVA 220/33 kV TF) at 220 kV Lula Ahir substation may be added. The maximum load (for FY 2023-24) on three no. 100 MVA TFs installed at 220 kV Lula Ahir is 53.46 MVA, 86.26 MVA and 87.02 MVA. The average load on three no. 100 MVA TFs installed at 220 kV Lula Ahir is 50 MVA, 70 MVA and 70 MVA.

2. At 400/220kV Bhiwani BBMB: It is proposed that in the existing scheme SPS, the tripping of 220 kV Bapora (Bhiwani HVPNL) D/C line at Bhiwani BBMB end may be removed and tripping of all incomers (2 no. 132 kV Incomers of 100 MVA 220/132 kV T-1 & T-2 TFs) at 220 kV Bapora (Bhiwani HVPNL) substation may be added. The maximum load on two no. 100 MVA TFs installed at 220kV Bhiwani HVPNL is 80 MW and 85 MW respectively. The average load on two no. 100 MVA TFs installed at 220kV Bhiwani HVPNL is 70 MW and 70 MW respectively.

3. At 132kV Charkhi Dadri: It is proposed that in the existing scheme SPS, the tripping of 132kV Kalanaur line at Dadri BBMB end may be removed and tripping of 132kV Haluwas & 132kV Dadri old at Dadri BBMB may be added. The maximum load on 132kV Haluwas & 132kV Dadri old line is 45 MW and 50 MW respectively. The average load on 132kV Haluwas & 132kV Dadri old line is 40 MW and 40 MW respectively.

Rest information kept unchanged. It is also added here that the fiber connectivity is also available on all the above substations.
It is also pertinent to mention here that 700 MW load relief is expected from Haryana. Rest of the states have been allotted with a relative less amount of relief as compared to Haryana for 500kV HVDC Mundra - Mahendargarh link. The Haryana share from APL Mundra has also been reduced now. In view of the above, the expected load relief from the NR states is required to be reviewed accordingly. The same was also pointed out by this office during the online meeting held on dated 20.08.2024.

This is for information & further necessary action please.

From: "Executive Engineer TS Rewari" <xentsrwr@hvpn.org.in>
To: "Control Room CONTROL ROOM SLDC" <controlroomsldc@hvpn.org.in>
Cc: "SE TS GGN" <setsggn@hvpn.org.in>, "Executive Engineer Executive Engineer" <xen400kvdhanoda@hvpn.org.in>, "Substation Engineer" <sse220kvlulaahir@hvpn.org.in>
Sent: Thursday, August 29, 2024 1:20:08 PM
Subject: Re: Review of SPS installed for 500kV HVDC Mundra - Mahindergarh.

In continuation of trailing email and discussion held today telephonically, it is gathered that desired load relief shall not get as load of 220 kV Lula Ahir shall be fed through 220 kV Dadri-Lula Ahir line being synchronized. Therefore, it is proposed that in the existing scheme SPS, the tripping of 220 kV D/C Lula Ahir line at 400 kV Dhanonda end may be removed and tripping of all incomers (2 no. 132 kV Incomers of 100 MVA 220/132 kV TFs and one no. 33 kV incomer of 100 MVA 220/33 kV TF) at 220 kV Lula Ahir substation may be added.

The maximum load (for FY 2023-24) on three no. 100 MVA TFs installed at 220 kV Lula Ahir is 53.46 MVA, 86.26 MVA and 87.02 MVA
The average load on three no. 100 MVA TFs installed at 220 kV Lula Ahir is 50 MVA, 70 MVA and 70 MVA

From: "Executive Engineer TS Rewari" <xentsrwr@hvpn.org.in>
To: "Control Room CONTROL ROOM SLDC" <controlroomsldc@hvpn.org.in>
Cc: "SE TS GGN" <setsggn@hvpn.org.in>, "Executive Engineer Executive Engineer" <xen400kvdhanoda@hvpn.org.in>, "Substation Engineer" <sse220kvnarnaul@hvpn.org.in>
Sent: Wednesday, August 28, 2024 12:46:13 PM
Subject: Re: Review of SPS installed for 500kV HVDC Mundra - Mahindergarh.

In reference of trailing email it is submitted that 220 kV Lula Ahir is connected with 400 kV Dhanonda through 220kV D/C line and with 220 kV Dadri through 220kV S/C line and with 220 kV Rewari with 220kV S/C line.
In general circuits of 400 kV Dhanonda and 220 kV Dadri runs in synchronization. The maximum load (for FY 2023-24) on three no. 100 MVA TFs installed at 220 kV Lula Ahir is 53.46 MVA, 86.26 MVA and 87.02 MVA. It is further added that in general 220 kV Dadri takes load from 220 kV Lula Ahir substation and thus act as sink.

In case of operation of SPS at 400 kV Dhanonda, the desired load relief as mentioned in trailing email (90+95 MW) can be achieved through existing scheme (by outage of three no. 100 MVA TFs and 220 kV Dadri (acting as sink)).

Regards
XEN/TS Division
HVPNL Rewari.

From: "Control Room CONTROL ROOM SLDC" <controlroomsldc@hvpn.org.in>
To: "Executive Engineer TS Rewari" <xentsrwr@hvpn.org.in>, "Executive Engineer TS Rohtak" <xentsrtk@hvpn.org.in>, "Executive Engineer Ts Bhiwani" <xentsbhw@hvpn.org.in>, "Executive Engineer Executive Engineer" <xen400kvdhanoda@hvpn.org.in>, xendhanonda@gmail.com
Cc: "Chief Engineer SO Commercial" <cesocomml@hvpn.org.in>, "Chief Engineer TS Panchkula" <cetspkl@hvpn.org.in>, "Chief Engineer TS Hisar" <cetshsr@hvpn.org.in>, "Superintending Engineer SLDC OP" <sesldcop@hvpn.org.in>, "SE TS Rohtak" <setsrtk@hvpn.org.in>, "SE TS GGN" <setsggn@hvpn.org.in>, "Superintending Engineer TS Hisar" <setshsr@hvpn.org.in>, "Superintending Engineer MP CC Dhulkote" <sempccdkt@hvpn.org.in>, "Superintending Engineer MP CC Delhi" <sempccdelhi@hvpn.org.in>, "Executive Engineer MP Rohtak" <xenmpccrtk@hvpn.org.in>, "XEN MP Hisar" <xenmpcchsr@hvpn.org.in>, "XEN MP CC" <xenmpccggn@hvpn.org.in>
Sent: Wednesday, August 21, 2024 11:57:59 AM
Subject: Review of SPS installed for 500kV HVDC Mundra - Mahindergarh.

Sir,

Please see the attachments.

--
Regards,
SCE (पाली प्रभारी अभियंता)/SLDC Control room,
HVPNL Panipat
Contact No- 9053090722,9053090721,0180-2664095

Every 8333.3 sheets of paper costs us a tree.
Please don't print this e-mail unless you really need to. Save Paper Save Trees

--
Regards,
SCE (पाली प्रभारी अभियंता)/SLDC Control room,
HVPNL Panipat
Contact No- 9053090722,9053090721,0180-2664095

Every 8333.3 sheets of paper costs us a tree.
Please don't print this e-mail unless you really need to. Save Paper Save Trees

HARYANA VIDYUT PRASARAN NIGAM LIMITED

Regd. Office: Shakti Bhawan, Plot No. C-4, Sector-6, Panchkula, 134109.
Corporate Identity Number: U40101HR1997SGC033683
Website: www.hvpn.org.in, E-mail - xentsbhw@hvpn.org.in
Phone No: 01664-242797(O)

To

The Executive Engineer,
LDPC, HVPNL,
Panipat.

Memo No.Ch-116/OMBE-7 Dated: 29.08.2024

Subject: SPS scheme at HVPNL substations for getting load relief due to tripping of 500Kv HVDC Mundra – Mahendargarh

Please refer to this O/Memo No. 108/OMBE-7 dated 27.08.2024 and O/Email dated 09.08.2024 on the subject cited matter.

In this continuation to above, the details of SPS under TS division, HVPNL, Bhiwani is as under:

S No.	Name of feeding S/Stn	Feeder/Line/Equipment	SPS Installed	Max. Load	Load Relief (Avg Load)	Remarks
1	220KV S/Stn Bhiwani	132KV IA Bhiwani Line	UFR	50MW	40 MW	SPS (UFR)Installed and healthy
2	220KV S/Stn Bhiwani	132KV Bhiwani Ckt 2	UFR	50MW	40 MW	SPS (UFR)Installed and healthy
3	220KV S/Stn Bhiwani	132KV Tosham	UFR	-	-	SPS (UFR) Installed and healthy but line is running on No load as 2nd source to 132KV Tosham
4	220KV S/Stn Bhiwani	132KV Incomer of Transformer 100MVA Transformer T2	-	85MW	70 MW	SPS may be provided for load relief as mentioned on subject above.
5	220KV S/Stn Bhiwani	132KV Incomer of 100MVA Transformer T1	-	80MW	70 MW	SPS may be provided for load relief as mentioned on subject above.
6	132kV substation Dadri-2	132kV Dadri-kalanaur ckt	Yes		Nil	SPS Installed and healthy but line is running on No load as 2nd source to 132KV Kalanaur
7	132kV substation Dadri-2	132kV Dadri-Makrani ckt	Yes		Nil	SPS Installed and healthy but line is running on No load as 2nd source to 132KV Makrani
8	132kV substation Dadri-2	132kV Dadri-Haluwas ckt	-	45MW	40MW	SPS may be provided for load relief as mentioned on subject above.
9	132kV substation Dadri-2	132kV Dadri-Dadri old	-	50MW	40MW	SPS may be provided for load relief as mentioned on subject above.

This is for kind information and necessary action please.

Executive Engineer,
Transmission System Division,
HVPNL, Bhiwani

CC to:

1. SE/TS Circle, HVPNL, Hisar for kind information, please.

Delhi Details

Re: Mock testing of SPS of 500kV HVDC Mundra-Mahindergarh link

SLDC, DELHI <sldcmintoroad@gmail.com>

Wed 8/28/2024 3:48 PM

To:NRLDC SO 2 <nrldcso2@grid-india.in>;

Cc:sinha.surendra <sinha.surendra@yahoo.com>; dgmsodelhisldc@gmail.com <dgmsodelhisldc@gmail.com>; Manager (T) SO <managersogd@gmail.com>;

****Warning****
This email has not originated from Grid-India. Do not click on attachment or links unless sender is reliable.
Malware/ Viruses can be easily transmitted via email.

In reference to trailing mail, the maximum load on 220kV feeders covered under SPS of 500kV HVDC Mundra-Mahindergarh link are as under:

S. No.	Name of the Element	MW
1	220 KV BAMNAULI-PAPANKALAN-I CKT.-I	120
2	220 KV BAMNAULI-PAPANKALAN-I CKT.-II	120
3	220 KV MANDAULA- GOPALPUR CKT.-I	212
4	220 KV MANDAULA- GOPALPUR CKT.-II	214

Regards,
SLDC Delhi

On Tue, Aug 27, 2024 at 10:07 AM NRLDC SO 2 <nrldcso2@grid-india.in> wrote:

> Sir,
>
> In reference of the trailing mail, it is to be mentioned that inputs have received from Rajasthan only. Members agreed to shared the details by 22nd August 2024, however no further details received from Haryana, Punjab, Delhi, UP & ADANI.
>
> Kindly share the details as discussed during the meeting held on 20th August 2024, so that further remedial actions can be initiated on the basis of those details.
>
> सादर धन्यवाद/ Thanks & Regards
> प्रणाली संचालन-II/ System Operation-II
> उ॰क्षे॰भा॰प्रे॰के॰/ NRLDC
> ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड/ Grid Controller of India Limited
> Formerly known as
> पोसोको / POSOCO

Punjab Details

	Name of S/S	66kV Feeders	Average Demand(Amp.)	Maximum Demand(Amp.)
Punjab Control Area	220/66kV Gobindgarh	66kV Talwara-19(ADANI SPS)	375	430
		66kV Talwara-2(ADANI SPS)	375	430
	220/66kV Lalton kalan	66kV Gill road-1(DADRI SPS)	543	610
		66kV Gill Road-2(DADRI SPS)	518	692
		66kV Dugri(DADRI SPS)	325	450
	220/66kV Malerkotla	66kV Malerkotla(ADANI SPS)	213	403
		66kV Amargarh(ADANI SPS)	238	405
		66kV Malaud ckt 1(DTPC SPS)	257	356

Note: 66kV Malaud at 220kV S/S Malerkotla was bifurcated into two circuits in the month of July 2024.

Nodal officers details

Control Area	Station Name	Nodal Person (SPS, communication system)	Contact details	Email Id
Rajasthan	220/132kV Alwar	Sh. Vijaypal Yadav XEN (Prot.) Ms. Pooja Verma AEN (Comm)	9413361407 9413375366	xen.prot.alwar@rvpn.co.in aen.comm.alwar@rvpn.co.in
	220/132kV Ratangarh	Sh. Mukesh Somra AEN (MPT&S) , Sh. Dharmender Singh (Comm.)	9414061442 9413383246	aen.mpt&s.rtg@rvpn.co.in aen.comm.ratangarh@rvpn.co.in
	220/132kV Bhilwara	Sh. Madhusudan Sharma, AEN (SLDC-comm Sh. Suresh Garg, XEN (MPT&S)	9413383176 9414061424	aen.subsldc.bhl@rvpn.co.in xen.mpts.bhl@rvpn.co.in
	220/132kV Merta	Mukesh Kumar (AEN Prot.) Mahip Singh (Aen) Comm)	7734806466 9413362995	aen.prot.mertacity@RVPN.CO.IN aen.comm.merta@RVPN.CO.IN
BBMB	400/220kV Bhiwani(BBMB)			
POWERGRID	400/220kV Hissar(PG)			
	Bhiwani(PG)			
	400/220kV Bahadurgarh(PG)			
Haryana	400/220kV Dhanonda	Gautam / SSE, 400kV Dhanonda	9313472669	dhanonda400kv@gmail.com
	220kV Lulahir	Er. Subhash Chander	9416373135	sse220kvlulaahir@hvpn.org.in
	220kV Rewari	Er. Kavinder Yadav	9315315649	sse220kvrwr@hvpn.org.in
	132kV Charkhi Dadri	Vivek Sangwan	9034459489	sse132kvdadri@hvpn.org.in
Punjab	220/66kV Gobindgarh	Er. Harwinder Singh	96461-18184	ae-220kvg1-mgg@pstcl.org
	220/66kV Laltokalan	Er. Supinder Singh	96461-24495	sse-pm-lalton@pstcl.org
	220/66kV Malerkotla	Er. Sanju Bala	96461-64007	sse-pm-mlrk@pstcl.org
UP	Shamli	Er. Krishna Nand	9412756631	eeetdshamli@upptcl.org,
	400kV Muradnagar	Er. D.S. Sengar	9412748666	ee400mrd2@upptcl.org
Delhi	400/220kV Bamnauli			
	400/220kV Mandola			

ULDC network for SPS Mundra-Mohindergarh 500kV HVDC

Sumeet Sharma <Sumeet.Sharma@adani.com>

Thu 4/10/2025 5:42 PM

To:nkmeena@powergrid.in <nkmeena@powergrid.in>;

Cc:Deepak Kumar <deepak.kr@grid-india.in>; seo-nrpc <seo-nrpc@nic.in>; Mahavir Prasad Singh (महावीर प्रसाद सिंह) <mahavir@grid-india.in>; Somara Lakra (सोमारा लाकरा) <somara.lakra@grid-india.in>; Afak Pothiawala <afak.pothiawala@adani.com>; Nihar Raj <nihar.raj@adani.com>; Milan Popat <Milan.Popat@adani.com>; Abhishek Kumar Singh <Abhishekk.Singh@adani.com>; Abhishek Kukreja <Abhishek.Kukreja@adani.com>; Sunil Kumar Raval <Sunil.Raval@adani.com>; Naman Vyas <Namany.Vyas@adani.com>; Namandeep Matta <Namandeep.Matta@adani.com>;

1 attachments (323 KB)

20250408 ULDC discussion..pdf;

****Warning****
This email has not originated from Grid-India. Do not click on attachment or links unless sender is reliable. Malware/ Viruses can be easily transmitted via email.

Dear Meena ji,

Kindly accept my sincere thanks for the courtesy extended during our meeting on 08-Apr-25 with regards to the subject requirements.

I also express my thanks on the confirmation from your end with regards to availability of the 'E1' links between Mohindergarh and respective locations where the SPS commands are being extended. Kindly find attached the list discussed and agreed, for our reference.

Looking forward to your continued support and cooperation during the execution of this activity.

Regards,

Sumeet Sharma
Head- Automation, Communications & OT-Cyber Technology
Adani Energy Solutions Limited.(Grid Division)
Mob +91 90990 05648 | sumeet.sharma@adani.com | www.adani.com
KP Epitome|10th Floor South Wing | SG Highway |Ahmedabad-382421| Gujarat

DISCLAIMER: The information contained in this electronic message and any other attachment to this message are intended solely for the addressee and may contain information that is confidential, privileged and exempt from disclosure under applicable law. If you are not the intended recipient, you are hereby formally notified that any use, copying or distribution of this e-mail, in whole or in part, is strictly prohibited. Please immediately notify the sender by return e-mail and delete all copies of this e-mail and any attachments from your system. Any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the company.

WARNING: Computer viruses can be transmitted via email. The recipient should check this email and any attachments for the presence of viruses. Adani Group accepts no liability for any damage caused by any virus transmitted by this email.

SPS Protection scheme for Mohindergarh-Mundra HVDC Transmisison System

Sr. No.	Load Station	Equipment Make	Tripping command Station	Equipment Make	Remarks	Comments
1	Mohindergarh	Tejas	Bhiwani BBMB	Tejas		
2	Mohindergarh	Tejas	Hissar PG	Tejas		
3	Mohindergarh	Tejas	Bahadurgarh- PG	Tejas		
4	Mohindergarh	Tejas	HVPNL Charki Dadri	Fibrehome	HVPNL Network	Inter-Patching at nearest Tejas Site
5	Mohindergarh	Tejas	Gobindgarh PSTCL	Fibrehome	PSTCL Network	Inter-Patching at nearest Tejas Site
6	Mohindergarh	Tejas	Lalokalan PSTCL	Fibrehome	PSTCL Network	Inter-Patching at nearest Tejas Site
7	Mohindergarh	Tejas	Malerkotla PSTCL	Fibrehome	PSTCL Network	Inter-Patching at nearest Tejas Site
8	Mohindergarh	Tejas	Alwar	Tejas		
9	Mohindergarh	Tejas	Ratangarh	Fibrehome	New Tejas equipment is being installed within 3 months	
10	Mohindergarh	Tejas	Bhilwada	Tejas		
11	Mohindergarh	Tejas	Merta City	Fibrehome	New Tejas equipment is being installed within 3 months	
12	Mohindergarh	Tejas	Samli - UPPTCL	Fibrehome	UPPTCL Network	Inter-Patching at nearest Tejas Site
13	Mohindergarh	Tejas	Bamnauli	Tejas		
14	Mohindergarh	Tejas	Mondola PG	Tejas		

adani
Energy Solutions

Ref No. : ATIL_NRPC_SPS-NR_20250410_1 10-Apr-25

To,
The Deputy General Manager (Grid-Operations)
Northern Region Load Dispatch Center
18-A, Shaheed Jeet Singh Marg
Katwaria Sarai
New Delhi,110016

Ref: Your letter # NRLDC/TS-15, dated 02-Apr-25

Subject: Corrective action for healthiness of +/- 500kV HVDC Mundra-Mohindergarh SPS

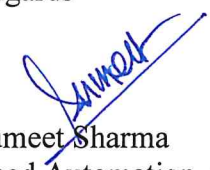
Sir,
We acknowledge the receipt of your letter mentioned in the reference above with regards to ensuring the healthiness of the SPS scheme implemented in 2012 during commissioning of the subject HVDC link.

It is to be noted that the systems and components installed at the commissioning time have lived their life and are now declared obsolete by the partner who has commissioned this system. Also the ULDC network which had been used to provide the E1 communication for the DTPCs to execute the commands and provide the required relief, has also undergone changes impacting the communication between the DTPCs. We are in discussion with ULDC for allocation of necessary links between the locations.

In order to make the scheme operational again in full, we had ordered a survey of the scheme by the original systems provider who have reverted with their observations and recommendations for upgrading the systems by the latest one. This upgrade requires activities from basics i.e. Designing, Manufacturing, Testing, transporting, installation , configuration and final field testing. We have initiated the internal approval for placing necessary orders to the partner for execution under RTM. We expect that complete execution of this activity in totality shall take 4-5 months in collaboration with all the stake holders from respective utilities and ULDC team.

We assure you of our best efforts towards comprehensive and timely completion of this scheme at the earliest and seek your guidance and support for necessary coordination between the respective stake holders during this process.

Regards



Sumeet Sharma
Head Automation, Communication and OT-Cyber
Adani Transmission (India)ltd.

Adani Transmission (India) Ltd
Adani Corporate House
Adani Shantigram, S.G Highway
Ahmedabad 382421
CIN: U40101GJ2013PLC077700

Tel +91 79 2555 6900
Fax +91 79 2555 7155
info@adani.com
www.adani.com

RE: Status of Corrective actions for healthiness of 500kV Mundra-Mahindergarh SPS

Sumeet Sharma <Sumeet.Sharma@adani.com>

Wed 7/30/2025 6:54 PM

To:NRLDC SO 2 <nrldcso2@grid-india.in>;

Cc:NARESH BHANDARI <ms-nrpc@nic.in>; seo-nrpc <seo-nrpc@nic.in>; Manoj Kumar Agarwal (मनोज कुमार अग्रवाल) <mkagarwal@grid-india.in>; S Usha (एस उषा) <susha@grid-india.in>; Sunil Kumar Raval <Sunil.Raval@adani.com>; Namandeep Matta <Namandeep.Matta@adani.com>; Kali Charan Sahu <Kalicharan.Sahu@adani.com>; RAVINDRA ATALE <Ravindra.Atale@adani.com>; Nihar Raj <nihar.raj@adani.com>; Milan Popat <Milan.Popat@adani.com>; Abhishek Kukreja <Abhishek.Kukreja@adani.com>; Naman Vyas <Namany.Vyas@adani.com>; Abhishek Kumar Singh <Abhishekk.Singh@adani.com>; Nikhil Singh <Nikhil.Singh1@adani.com>; Narendra Kumar Ojha <Narendran.Ojha@adani.com>; Afak Pothiawala <afak.pothiawala@adani.com>; Mahesh M. Mehendale (महेश एम. मेहंदले) <mehendale@grid-india.in>; Somara Lakra (सोमारा लाकरा) <somara.lakra@grid-india.in>; Mahavir Prasad Singh (महावीर प्रसाद सिंह) <mahavir@grid-india.in>; Sugata Bhattacharya (सुगाता भट्टाचार्या) <sugata@grid-india.in>; Deepak Kumar <deepak.kr@grid-india.in>; aen.com <xen.prot.alwar@rvpn.co.in>; m.alwar@rvpn.co.in <m.alwar@rvpn.co.in>; aen.mpt&s.rtg@rvpn.co.in <aen.mpt&s.rtg@rvpn.co.in>; aen.comm.ratangarh@rvpn.co.in <aen.comm.ratangarh@rvpn.co.in>; aen.subsldc.bhl@rvpn.co.in <aen.subsldc.bhl@rvpn.co.in>; xen.mpts.bhl@rvpn.co.in <xen.mpts.bhl@rvpn.co.in>; aen.prot.mertacity@RVPN.CO.IN <aen.prot.mertacity@RVPN.CO.IN>; aen.comm.merta@RVPN.CO.IN <aen.comm.merta@RVPN.CO.IN>; nainwal@powergrid.in <nainwal@powergrid.in>; vinaykumargupta@powergrid.in <vinaykumargupta@powergrid.in>; ravindra_kumar@powergrid.in <ravindra_kumar@powergrid.in>; smahajan1999@powergrid.in <smahajan1999@powergrid.in>; rkagrawal83@powergrid.in <rkagrawal83@powergrid.in>; dharmendrameena@powergrid.in <dharmendrameena@powergrid.in>; vineet@powergrid.in <vineet@powergrid.in>; bhakalramjash@powergrid.in <bhakalramjash@powergrid.in>; dhanonda400kv@gmail.com <dhanonda400kv@gmail.com>; sse220kvlulaahir@hvpn.org.in <sse220kvlulaahir@hvpn.org.in>; sse220kvrwr@hvpn.org.in <sse220kvrwr@hvpn.org.in>; sse132kvdadri@hvpn.org.in <sse132kvdadri@hvpn.org.in>; ae-220kvg1-mgg@pstcl.org <ae-220kvg1-mgg@pstcl.org>; sse-pm-lalton@pstcl.org <sse-pm-lalton@pstcl.org>; sse-pm-mlrk@pstcl.org <sse-pm-mlrk@pstcl.org>; eeetdshamli@upptcl.org <eeetdshamli@upptcl.org>; ee400mrd2@upptcl.org <ee400mrd2@upptcl.org>; aeprotection@upsldc.org <aeprotection@upsldc.org>; ase-sldcop@pstcl.org <ase-sldcop@pstcl.org>; bl.gujar@dtl.gov.in <bl.gujar@dtl.gov.in>; ce.ld@rvpn.co.in <ce.ld@rvpn.co.in>; ce-sldc <ce-sldc@pstcl.org>; dtldata@yahoo.co.in <dtldata@yahoo.co.in>; dtlscheduling@gmail.com <dtlscheduling@gmail.com>; eesldccontrol@upsldc.org <eesldccontrol@upsldc.org>; ldrvpnl@rvpn.co.in <ldrvpnl@rvpn.co.in>; ldshutdown@gmail.com <ldshutdown@gmail.com>; ldshutdown@rvpn.co.in <ldshutdown@rvpn.co.in>; paritosh.joshi@dtl.gov.in <paritosh.joshi@dtl.gov.in>; pccont@bbmb.nic.in <pccont@bbmb.nic.in>; pc-sldcop@pstcl.org <pc-sldcop@pstcl.org>; rajbir-walia79@yahoo.com <rajbir-walia79@yahoo.com>; rtamc.nr1@powergrid.in <rtamc.nr1@powergrid.in>; pankaj.jha@powergrid.in <pankaj.jha@powergrid.in>; neerajk@powergrid.in <neerajk@powergrid.in>; se.mpts.udr@rvpn.co.in <se.mpts.udr@rvpn.co.in>; se.prot.engg@rvpn.co.in <se.prot.engg@rvpn.co.in>; se.sold@rvpn.co.in <se.sold@rvpn.co.in>; sera@upsldc.org <sera@upsldc.org>; sesc@upsldc.org <sesc@upsldc.org>; sesldcop@hvpn.org <sesldcop@hvpn.org>; se-sldcop <se-sldcop@pstcl.org>; setncmrt@upptcl.org <setncmrt@upptcl.org>; sldcdata@gmail.com <sldcdata@gmail.com>; sldcharyanacr@gmail.com <sldcharyanacr@gmail.com>; sldcmintoroad@gmail.com <sldcmintoroad@gmail.com>; system.uppcl@gmail.com <system.uppcl@gmail.com>; xenemtcbhpp2@bbmb.nic.in <xenemtcbhpp2@bbmb.nic.in>; xenmpccggn@hvpn.org <xenmpccggn@hvpn.org>; xenplgss@hvpn.org <xenplgss@hvpn.org>; nrldc_hods_tech <nrldc_hods_tech@grid-india.in>; Rahul Shukla (राहुल शुक्ला) <rahulshukla@grid-india.in>;

****Warning****
This email has not originated from Grid-India. Do not click on attachment or links unless sender is reliable.
Malware/ Viruses can be easily transmitted via email.

Dear Sir,

I hope this message finds you well. I'm writing to provide you with an update on the actions for the healthiness of the 500kV Mundra-Mahindergarh SPS.

We are pleased to inform you that the order has been placed with our partner for the procurement and development of the scheme on new devices. Here is the timeline for the upcoming broader steps which has evolved based on discussions held with them-

a) The system is expected to be ready by the partner and complete the Factory Acceptance Test (FAT) by 15th September 2025.

b) Following the FAT, the material will be shipped to various sites and installed by 30th October 2025. We seek your support for necessary directions to concerned constituents to ensure the material is kept in a safe and secure area till commissioning at original location.
c) Implementation of the communication channel with the assistance of ULDC is also scheduled for completion parallelly by 30th October 2025.
d) Testing of the installation and wiring will be carried out by 15th November 2025. The same shall require support from respective site representatives.
e) Testing of the communication link between Mahindergarh and other locations is planned for completion by 30th November 2025.
f) Finally, the testing of the SPS scheme is expected to be completed by 31st December 2025.

We understand the importance of this project and will do our utmost to expedite the process to the maximum extent possible and shall seek your guidance and support for necessary alignment of efforts required with respective stake holders and facilitators.

Thank you for your attention and understanding.

Regards,

Sumeet Sharma
Head- Automation, Communications & OT-Cyber Technology
Adani Energy Solutions Limited.(Grid Division)
Mob +91 90990 05648 | sumeet.sharma@adani.com | www.adani.com
KP Epitome|10th Floor South Wing | SG Highway |Ahmedabad-382421| Gujarat

---

From: NRLDC SO 2 <nrldcso2@grid-india.in>
Sent: Thursday, July 24, 2025 11:16 AM
To: Sumeet Sharma <Sumeet.Sharma@adani.com>
Cc: NARESH BHANDARI <ms-nrpc@nic.in>; seo-nrpc <seo-nrpc@nic.in>; Manoj Kumar Agarwal (मनोज कुमार अग्रवाल) <mkagarwal@grid-india.in>; susha <susha@grid-india.in>; Sunil Kumar Raval <Sunil.Raval@adani.com>; Namandeep Matta <Namandeep.Matta@adani.com>; Kali Charan Sahu <Kalicharan.Sahu@adani.com>; RAVINDRA ATALE <Ravindra.Atale@adani.com>; Nihar Raj <nihar.raj@adani.com>; Milan Popat <Milan.Popat@adani.com>; Abhishek Kukreja <Abhishek.Kukreja@adani.com>; Naman Vyas <Namany.Vyas@adani.com>; Abhishek Kumar Singh <Abhishekk.Singh@adani.com>; Nikhil Singh <Nikhil.Singh1@adani.com>; Narendra Kumar Ojha <Narendran.Ojha@adani.com>; Afak Pothiawala <afak.pothiawala@adani.com>; Mahesh M. Mehendale (महेश एम. मेहंदले) <mehendale@grid-india.in>; somara.lakra <somara.lakra@grid-india.in>; Mahavir Prasad Singh (महावीर प्रसाद सिंह) <mahavir@grid-india.in>; Sugata Bhattacharya (सुगाता भट्टाचार्या) <sugata@grid-india.in>; deepak.kr <deepak.kr@grid-india.in>; aen.com <xen.prot.alwar@rvpn.co.in>; m.alwar@rvpn.co.in; aen.mpt&s.rtg@rvpn.co.in; aen.comm.ratangarh@rvpn.co.in; aen.subsldc.bhl@rvpn.co.in; xen.mpts.bhl@rvpn.co.in; aen.prot.mertacity@RVPN.CO.IN; aen.comm.merta@RVPN.CO.IN; nainwal@powergrid.in; vinaykumargupta@powergrid.in; ravindra_kumar@powergrid.in; smahajan1999@powergrid.in; rkagrawal83@powergrid.in; dharmendrameena@powergrid.in; vineet@powergrid.in; bhakalramjash@powergrid.in; dhanonda400kv@gmail.com; sse220kvlulaahir@hvpn.org.in; sse220kvrwr@hvpn.org.in; sse132kvdadri@hvpn.org.in; ae-220kvg1-mgg@pstcl.org; sse-pm-lalton@pstcl.org; sse-pm-mlrk@pstcl.org; eeetdshamli@upptcl.org; ee400mrd2@upptcl.org; aeprotection@upsldc.org; ase-sldcop@pstcl.org; bl.gujar@dtl.gov.in; ce.ld@rvpn.co.in; ce-sldc <ce-sldc@pstcl.org>; dtldata@yahoo.co.in; dtlscheduling@gmail.com; eesldccontrol@upsldc.org; ldrvpnl@rvpn.co.in; ldshutdown@gmail.com; ldshutdown@rvpn.co.in; paritosh.joshi@dtl.gov.in; pccont@bbmb.nic.in; pc-sldcop@pstcl.org; rajbir-walia79@yahoo.com; rtamc.nr1@powergrid.in; pankaj.jha@powergrid.in; neerajk@powergrid.in; se.mpts.udr@rvpn.co.in; se.prot.engg@rvpn.co.in; se.sold@rvpn.co.in; sera@upsldc.org; sesc@upsldc.org; sesldcop@hvpn.org; se-sldcop <se-sldcop@pstcl.org>; setncmrt@upptcl.org; sldcdata@gmail.com; sldcharyanacr@gmail.com; sldcmintoroad@gmail.com; system.uppcl@gmail.com; xenemtcbhpp2@bbmb.nic.in; xenmpccggn@hvpn.org; xenplgss@hvpn.org; nrldc_hods_tech <nrldc_hods_tech@grid-india.in>; Rahul Shukla (राहुल शुक्ला) <rahulshukla@grid-india.in>
Subject: Status of Corrective actions for healthiness of 500kV Mundra-Mahindergarh SPS

CAUTION: This mail has originated from outside Adani. Please exercise caution with links and attachments.

Sir,

The agenda regarding corrective actions for healthiness of 500kV Mundra-Mahindergarh SPS was discussed in 61st PSC meeting held on 26.06.2025. During the meeting, ADANI representative informed that work order will be released by 1st week of July 2025 to the vendor / OEM and expected timeline for completion of work is by the end of October 2025.

In view of above, it is requested to confirm whether work order to OEM has been placed or not. Further, as discussed in PSC meeting, it is also requested to share the status of actions taken and planned to be taken along with the timeline to NRPC & NRLDC weekly or fortnight basis.

सादर धन्यवाद/ Thanks & Regards
दीपक कुमार / Deepak Kumar
प्रणाली संचालन-II/ System Operation-II
उ॰क्षे॰भा॰प्रे॰के॰/ NRLDC
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड/ Grid Controller of India Limited
Formerly known as
पोसोको / POSOCO

From: Sumeet Sharma <Sumeet.Sharma@adani.com>
Sent: Tuesday, June 24, 2025 3:39 PM
To: NRLDC SO 2
Cc: NARESH BHANDARI; seo-nrpc; Manoj Kumar Agarwal (मनोज कुमार अग्रवाल); S Usha (एस उषा); Sunil Kumar Raval; Namandeep Matta; Kali Charan Sahu; RAVINDRA ATALE; Nihar Raj; Milan Popat; Abhishek Kukreja; Naman Vyas; Abhishek Kumar Singh; Nikhil Singh; Narendra Kumar Ojha; Afak Pothiawala; Mahesh M. Mehendale (महेश एम. मेहंदले); Somara Lakra (सोमारा लाकरा); Mahavir Prasad Singh (महावीर प्रसाद सिंह); Sudipto Sarkar (सुदिप्तो सरकार); Sugata Bhattacharya (सुगाता भट्टाचार्या); Deepak Kumar; aen.com; m.alwar@rvpn.co.in; aen.mpt&s.rtg@rvpn.co.in; aen.comm.ratangarh@rvpn.co.in; aen.subsldc.bhl@rvpn.co.in; xen.mpts.bhl@rvpn.co.in; aen.prot.mertacity@RVPN.CO.IN; aen.comm.merta@RVPN.CO.IN; nainwal@powergrid.in; vinaykumargupta@powergrid.in; ravindra_kumar@powergrid.in; smahajan1999@powergrid.in; rkagrawal83@powergrid.in; dharmendrameena@powergrid.in; vineet@powergrid.in; bhakalramjash@powergrid.in; dhanonda400kv@gmail.com; sse220kvlulaahir@hvpn.org.in; sse220kvrwr@hvpn.org.in; sse132kvdadri@hvpn.org.in; ae-220kvg1-mgg@pstcl.org; sse-pm-lalton@pstcl.org; sse-pm-mlrk@pstcl.org; eeetdshamli@upptcl.org; ee400mrd2@upptcl.org; aeprotection@upsldc.org; ase-sldcop@pstcl.org; bl.gujar@dtl.gov.in; ce.ld@rvpn.co.in; ce-sldc; dtldata@yahoo.co.in; dtlscheduling@gmail.com; eesldccontrol@upsldc.org; ldrvpnl@rvpn.co.in; ldshutdown@gmail.com; ldshutdown@rvpn.co.in; paritosh.joshi@dtl.gov.in; pccont@bbmb.nic.in; pc-sldcop@pstcl.org; rajbir-walia79@yahoo.com; rtamc.nr1@powergrid.in; pankaj.jha@powergrid.in; neerajk@powergrid.in; se.mpts.udr@rvpn.co.in; se.prot.engg@rvpn.co.in; se.sold@rvpn.co.in; sera@upsldc.org; sesc@upsldc.org; sesldcop@hvpn.org; se-sldcop; setncmrt@upptcl.org; sldcdata@gmail.com; sldcharyanacr@gmail.com; sldcmintoroad@gmail.com; system.uppcl@gmail.com; xenemtcbhpp2@bbmb.nic.in; xenmpccggn@hvpn.org;

xenplgss@hvpn.org; nrldc_hods_tech
Subject: RE: NRLDC Letter regarding Corrective action for healthiness of 500kV Mundra-Mahindergarh SPS

****Warning****
This email has not originated from Grid-India. Do not click on attachment or links unless sender is reliable.
Malware/ Viruses can be easily transmitted via email.

Dear Sir,

With reference to the trailing email we would like to inform you that the negotiations and the scope discussions have been completed with the partner and the necessary formalities for processing the order is in progress. We expect the order to be released by 30th-Jun-25. Further in parallel we have also put-up the issue in the 232nd OCC meeting for approval of the scheme on add-cap basis.

We regret the time taken in this process, however will expedite the further process to meet the expectation of putting the scheme back in service.

Regards,

Sumeet Sharma

Head- Automation, Communications & OT-Cyber Technology

Adani Energy Solutions Limited.(Grid Division)

Mob +91 90990 05648 | sumeet.sharma@adani.com | www.adani.com

KP Epitome|10th Floor South Wing | SG Highway |Ahmedabad-382421| Gujarat

---

From: NRLDC SO 2 <nrldcso2@grid-india.in>
Sent: Wednesday, June 18, 2025 11:43 AM
To: Sumeet Sharma <Sumeet.Sharma@adani.com>; Sunil Kumar Raval <Sunil.Raval@adani.com>; Namandeep Matta <Namandeep.Matta@adani.com>; Kali Charan Sahu <Kalicharan.Sahu@adani.com>; RAVINDRA ATALE <Ravindra.Atale@adani.com>; Nihar Raj <nihar.raj@adani.com>; Milan Popat <Milan.Popat@adani.com>; Abhishek Kukreja <Abhishek.Kukreja@adani.com>; Naman Vyas <Namany.Vyas@adani.com>; Abhishek Kumar Singh <Abhishekk.Singh@adani.com>; Nikhil Singh <Nikhil.Singh1@adani.com>; Narendra Kumar Ojha <Narendran.Ojha@adani.com>; Afak Pothiawala <afak.pothiawala@adani.com>
Cc: NARESH BHANDARI <ms-nrpc@nic.in>; seo-nrpc <seo-nrpc@nic.in>; Manoj Kumar Agarwal (मनोज कुमार अग्रवाल) <mkagarwal@grid-india.in>; susha <susha@grid-india.in>; Mahesh M. Mehendale (महेश एम. मेहंदले) <mehendale@grid-india.in>; somara.lakra <somara.lakra@grid-india.in>; Mahavir Prasad Singh (महावीर प्रसाद सिंह) <mahavir@grid-india.in>; Sudipto Sarkar (सुदिप्तो सरकार) <ssarkar@grid-india.in>; Sugata Bhattacharya (सुगाता भट्टाचार्या) <sugata@grid-india.in>; deepak.kr <deepak.kr@grid-india.in>; aen.com <xen.prot.alwar@rvpn.co.in>; m.alwar@rvpn.co.in; aen.mpt&s.rtg@rvpn.co.in; aen.comm.ratangarh@rvpn.co.in; aen.subsldc.bhl@rvpn.co.in; xen.mpts.bhl@rvpn.co.in; aen.prot.mertacity@RVPN.CO.IN; aen.comm.merta@RVPN.CO.IN; nainwal@powergrid.in; vinaykumargupta@powergrid.in; ravindra_kumar@powergrid.in; smahajan1999@powergrid.in; rkagrawal83@powergrid.in; dharmendrameena@powergrid.in; vineet@powergrid.in; bhakalramjash@powergrid.in; dhanonda400kv@gmail.com; sse220kvlulaahir@hvpn.org.in; sse220kvrwr@hvpn.org.in; sse132kvdadri@hvpn.org.in; ae-220kvg1-mgg@pstcl.org; sse-pm-lalton@pstcl.org; sse-pm-mlrk@pstcl.org; eeetdshamli@upptcl.org; ee400mrd2@upptcl.org; aeprotection@upsldc.org; ase-sldcop@pstcl.org; bl.gujar@dtl.gov.in; ce.ld@rvpn.co.in; ce-sldc <ce-sldc@pstcl.org>; dtldata@yahoo.co.in; dtlscheduling@gmail.com; eesldccontrol@upsldc.org; ldrvpnl@rvpn.co.in;

ldshutdown@gmail.com; ldshutdown@rvpn.co.in; paritosh.joshi@dtl.gov.in; pccont@bbmb.nic.in; pc-sldcop@pstcl.org; rajbir-walia79@yahoo.com; rtamc.nr1@powergrid.in; pankaj.jha@powergrid.in; neerajk@powergrid.in; se.mpts.udr@rvpn.co.in; se.prot.engg@rvpn.co.in; se.sold@rvpn.co.in; sera@upsldc.org; sesc@upsldc.org; sesldcop@hvpn.org; se-sldcop <se-sldcop@pstcl.org>; setncmrt@upptcl.org; sldcdata@gmail.com; sldcharyanacr@gmail.com; sldcmintoroad@gmail.com; system.uppcl@gmail.com; xenemtcbhpp2@bbmb.nic.in; xenmpccggn@hvpn.org; xenplgss@hvpn.org; nrldc_hods_tech <nrldc_hods_tech@grid-india.in>
Subject: Re: NRLDC Letter regarding Corrective action for healthiness of 500kV Mundra-Mahindergarh SPS

CAUTION: This mail has originated from outside Adani. Please exercise caution with links and attachments.

Sir,

In reference of the NRLDC communication dated 02.04.2025 it is requested to provide the present status regarding corrective actions for healthiness of 500kV Mundra-Mahindergarh SPS.

The agenda in this regard is under discussion since 51st PSC meeting held in July 2024. During last PSC meeting (60th PSC meeting held on 26.05.2025), ADANI representative informed that internal approval has been taken for placing the order for corrective actions and order will be released to vendor by end of May 2025. It was also informed that actions have been expedited and SPS of HVDC Mundra-Mahindergarh will be restored by the end of August 2025.

In view of above, it is requested to share the present status of corrective action. As discussed during 60th PSC meeting, weekly update on the corrective actions and action planned may be shared to NRLDC / NRPC so that necessary coordination with state counterpart may also be done for smooth coordination and actions.

सादर धन्यवाद/ Thanks & Regards

दीपक कुमार / Deepak Kumar

प्रणाली संचालन-II/ System Operation-II

उ॰क्षे॰भा॰प्रे॰के॰/ NRLDC

ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड/ Grid Controller of India Limited
Formerly known as

पोसोको / POSOCO





From: NRLDC SO 2
Sent: Wednesday, April 2, 2025 3:11:51 PM
To: Sumeet.Sharma@adani.com; Sunil Kumar Raval; Namandeep Matta; Kali Charan Sahu; RAVINDRA ATALE; Nihar Raj; Milan Popat; Abhishek Kukreja; Naman Vyas; Abhishek Kumar Singh; Nikhil Singh; Narendra Kumar Ojha; afak.pothiawala@adani.com
Cc: NARESH BHANDARI; seo-nrpc; Manoj Kumar Agarwal (मनोज कुमार अग्रवाल); S Usha (एस उषा); Mahesh M. Mehendale (महेश एम. मेहंदले); Somara Lakra (सोमारा लाकरा); Mahavir Prasad Singh (महावीर प्रसाद सिंह); Sudipto Sarkar (सुदिप्तो सरकार); Sugata Bhattacharya (सुगाता भट्टाचार्या); Deepak Kumar; aen.com; m.alwar@rvpn.co.in; aen.mpt&s.rtg@rvpn.co.in; aen.comm.ratangarh@rvpn.co.in; aen.subsldc.bhl@rvpn.co.in; xen.mpts.bhl@rvpn.co.in; aen.prot.mertacity@RVPN.CO.IN; aen.comm.merta@RVPN.CO.IN; nainwal@powergrid.in; vinaykumargupta@powergrid.in; ravindra_kumar@powergrid.in; smahajan1999@powergrid.in; rkagrawal83@powergrid.in; dharmendrameena@powergrid.in; vineet@powergrid.in; bhakalramjash@powergrid.in; dhanonda400kv@gmail.com; sse220kvlulaahir@hvpn.org.in; sse220kvrwr@hvpn.org.in; sse132kvdadri@hvpn.org.in; ae-220kvg1-mgg@pstcl.org; sse-pm-lalton@pstcl.org; sse-pm-mlrk@pstcl.org; eeetdshamli@upptcl.org; ee400mrd2@upptcl.org; aeprotection@upsldc.org; ase-sldcop@pstcl.org; bl.gujar@dtl.gov.in; ce.ld@rvpn.co.in; ce-sldc; dtldata@yahoo.co.in; dtlscheduling@gmail.com; eesldccontrol@upsldc.org; ldrvpnl@rvpn.co.in; ldshutdown@gmail.com; ldshutdown@rvpn.co.in; paritosh.joshi@dtl.gov.in; pccont@bbmb.nic.in; pc-sldcop@pstcl.org; rajbir-walia79@yahoo.com; rtamc.nr1@powergrid.in; pankaj.jha@powergrid.in; neerajk@powergrid.in; se.mpts.udr@rvpn.co.in; se.prot.engg@rvpn.co.in; se.sold@rvpn.co.in; sera@upsldc.org; sesc@upsldc.org; sesldcop@hvpn.org; se-sldcop; setncmrt@upptcl.org; sldcdata@gmail.com; sldcharyanacr@gmail.com; sldcmintoroad@gmail.com; system.uppcl@gmail.com; xenemtcbhpp2@bbmb.nic.in; xenmpccggn@hvpn.org; xenplgss@hvpn.org; nrldc_hods_tech
Subject: NRLDC Letter regarding Corrective action for healthiness of 500kV Mundra-Mahindergarh SPS

Sir,

Please find the attached NRLDC Letter dt 02-04-2025 regarding Corrective action for healthiness of 500kV Mundra-Mahindergarh SPS.

सादर धन्यवाद/ Thanks & Regards

प्रणाली संचालन-II/ System Operation-II

उ॰क्षे॰भा॰प्रे॰के॰/ NRLDC

ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड/ Grid Controller of India Limited
Formerly known as

पोसोको / POSOCO

Follow Grid-India on:
Qries Qries Qries Qries

---

* This e-mail is an official email of Grid Controller of India Limited (Grid-India), is confidential and intended to use by the addressee only. If the message is received by anyone other than the addressee, please return the message to the sender by replying to it and then delete the message from your computer. Internet e-mails are not necessarily secure. The Grid Controller of India Limited (Grid-India) does not accept responsibility for changes made to this message after it was sent. Whilst all reasonable care has been taken to avoid the transmission of viruses, it is the responsibility of the recipient to ensure that the onward transmission, opening or use of this message and any attachments will not adversely affect its systems or data. No responsibility is accepted by the Grid-India in this regard and the recipient should carry out such virus and other checks as it considers appropriate. Visit our website at www.grid-india.in *

DISCLAIMER: The information contained in this electronic message and any other attachment to this message are intended solely for the addressee and may contain information that is confidential, privileged and exempt from disclosure under applicable law. If you are not the intended recipient, you are hereby formally notified that any use, copying or distribution of this e-mail, in whole or in part, is strictly prohibited. Please immediately notify the sender by return e-mail and delete all copies of this e-mail and any attachments from your system. Any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the company.

WARNING: Computer viruses can be transmitted via email. The recipient should check this email and any attachments for the presence of viruses. Adani Group accepts no liability for any damage caused by any virus transmitted by this email.
Follow Grid-India on:
Qries Qries Qries

---

* This e-mail is an official email of Grid Controller of India Limited (Grid-India), is confidential and intended to use by the addressee only. If the message is received by anyone other than the addressee, please return the message to the sender by replying to it and then delete the message from your computer. Internet e-mails are not necessarily secure. The Grid Controller of India Limited (Grid-India) does not accept responsibility for changes made to this message after it was sent. Whilst all reasonable care has been taken to avoid the transmission of viruses, it is the responsibility of the recipient to ensure that the onward transmission, opening or use of this message and any attachments will not adversely affect its systems or data. No responsibility is accepted by the Grid-India in this regard and the recipient should carry out such virus and other checks as it considers appropriate. Visit our website at www.grid-india.in *

DISCLAIMER: The information contained in this electronic message and any other attachment to this message are intended solely for the addressee and may contain information that is confidential, privileged and exempt from disclosure under applicable law. If you are not the intended recipient, you are hereby formally notified that any use, copying or distribution of this e-mail, in whole or in part, is strictly prohibited. Please immediately notify the sender by return e-mail and delete all copies of this e-mail and any attachments from your system. Any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the company.

WARNING: Computer viruses can be transmitted via email. The recipient should check this email and any attachments for the presence of viruses. Adani Group accepts no liability for any damage caused by any virus transmitted by this email.

Proposed overvoltage protection setting for 400kV & 765kV lines in NR (approved in 58th PSC meeting held on 26.03.2025)

The philosophy to decide the overvoltage protection setting was finalised by the committee formed by NRPC to review the over voltage protection settings. The philosophy is as follows:

i. Pick up voltage & time delay setting of Antitheft lines to be kept low with sufficient time gap from other lines at S/s. In case of 400kV lines, it may be kept as 105%-107% pick up with 3-4 secs time delay and in case of 765kV lines, it may be kept as 104%-106% pick up with 3-4 secs time delay. Further, it may be decided on case-to-case basis.

ii. Parallel lines grading to be done such that one line should trip early by setting at low voltage and other line should trip last by keeping setting at high voltage. Stage-1 of over voltage protection setting in all the 400kV lines to be kept as 110 % with 5 sec delay and stage-2 setting to be kept as 140-150 % with 100msec delay.

iii. In case of parallel lines, both voltage and time grading need to be done (in line with the NRPC protection philosophy of lines). Voltage grading (110% & 112% with 5 & 6 sec time delay for double circuits and 110%, 111% & 112% with 5,6 & 7 sec time delay for triple circuits).

iv. Highly loaded lines should be given last priority in tripping.

v. Net MVAr relief (based on the line charging MVAr & MVAr compensation in line) based on the simulation to be considered for arriving at the priority of line tripping. Lines providing high net MVAr relief to be tripped early.

vi. Grading to be done in such a manner that one major incoming and outgoing line shall remain connected after tripping of lines at any node.

vii. Protection setting of remote end station of a line need to be coordinated so as to avoid tripping of line from the other end.

viii. Drop-off to pick-up ratio of relays implemented for overvoltage protection shall be more than 99%. In case of old relays in which there is no option for changing this setting, utilities may take up this issue with OEM for increasing this setting to 99% or higher.

S. No	Name of the Line	Circuit ID	Proposed Over Voltage protection setting							
			End I				End II			
			stage I pick up(%)	time (s)	stage II pick up(%)	time (s)	stage I pick up(%)	time (s)	stage II pick up(%)	time (s)
1. 765kV Transmission Line										
A. POWERGRID										
1	Agra-Aligarh	1	108	5	150	0.1	108	5	150	0.1
2	Agra-Fatehpur	1	107	5	150	0.1	107	5	150	0.1
3	Agra-Fatehpur	2	108	9	150	0.1	108	9	150	0.1
4	Agra-Gwalior IR	1	108	5	150	0.1	WR			
5	Agra-Gwalior IR	2	109	9	150	0.1	WR			
6	Agra-Jhatikara	1	106	5	140	0.1	106	5	140	0.1
7	Ajmer(PG)-Bhadla_2(PG)	1	109	8	140	0.1	109	8	140	0.1
8	Ajmer(PG)-Bhadla_2(PG)	2	110	15	140	0.1	110	15	140	0.1
9	Ajmer(PG)-Chittorgarh(PG)	1	110	9	140	0.1	110	9	140	0.1
10	Ajmer(PG)-Chittorgarh(PG)	2	110	15	140	0.1	110	15	140	0.1
11	Ajmer(PG)-Phagi(RS)	1	108	7	140	0.1	108	7	140	0
12	Ajmer(PG)-Phagi(RS)	2	110	12	140	0.1	110	12	140	0
13	Aligarh(PG) - Sikar_2(PSTL)	1	108	5	150	0.1	108	5	140	0.1
14	Aligarh(PG) - Sikar_2(PSTL)	2	108	9	150	0.1	108	9	140	0.1
15	Aligarh-Gr.Noida	1	109	7	150	0.1	109	7	140	0.1
16	Balia-Gaya IR	1	108	7	150	0.1	ER			
17	Balia-Lucknow_2(PG)	1	108	9	150	0.1	108	9	150	0.1
18	Bhadla_II(PG)-Sikar_2(PG)	1	109	6	150	0.1	109	6	150	0.1
19	Bhadla_II(PG)-Sikar_2(PG)	2	110	15	150	0.1	110	15	150	0.1
20	Bhiwani-Jhatikara	1	109	10	140	0.1	109	10	140	0.1
21	Bhiwani-Meerut	1	109	7	140	0.1	109	7	140	0.1
22	Bhiwani-Phagi	1	109	5	140	0.1	109	5	140	0
23	Bhiwani-Phagi	2	109	7	140	0.1	109	7	140	0
24	Bikaner(PG) - Bhadla(PG)	1	109	8	140	0.1	109	8	140	0.1
25	Bikaner(PG) - Bhadla(PG)	2	110	15	140	0.1	110	15	140	0.1

26	Bikaner(PG)-Bhadla_2(PG)	1	108	7	140	0.1	108	7	140	0.1
27	Bikaner(PG)-Bhadla_2(PG)	2	110	15	140	0.1	110	15	140	0.1
28	Bikaner(PG)-Moga	1	108	5	140	0.1	108	5	140	0.1
29	Bikaner(PG)-Moga	2	110	13	140	0.1	110	13	140	0.1
30	Chittorgarh(PG)-Banaskantha IR	1	110	9	140	0.1	WR			
31	Chittorgarh(PG)-Banaskantha IR	2	110	15	140	0.1	WR			
32	Fatehpur- Sasaram IR	1	108	5	150	0.1	ER			
33	Fatehgarh_2(PG)-Bhadla_2(PG)	1	109	9	140	0.1	109	9	140	0.1
34	Fatehgarh_2(PG)-Bhadla_2(PG)	2	110	15	140	0.1	110	15	140	0.1
35	Fatehgarh_2(PG)-Bhadla_2(PG)	3	107	5	140	0.1	107	5	140	0.1
36	Fatehgarh_2(PG)-Bhadla_2(PG)	4	108	8	140	0.1	108	8	140	0.1
37	Jhatikara-Aligarh	1	107	7	140	0.1	107	7	150	0.1
38	Jhatikara(PG)-Khetri(PKTSL)	1	108	5	140	0.1	108	5	140	0.1
39	Jhatikara(PG)-Khetri(PKTSL)	2	109	6	140	0.1	109	6	140	0.1
40	Kanpur(GIS)-Aligarh	1	109	9	150	0.1	109	9	150	0.1
41	Lucknow_2(PG)-Bareilly_2(PG)	1	109	5	150	0.1	109	5	150	0.1
42	Meerut-G. Noida	1	109	7	140	0.1	109	7	140	0.1
43	Meerut-Koteshwar(PG)	1	107	7	140	0.1	107	7	140	0.1
44	Meerut-Koteshwar(PG)	2	109	9	140	0.1	109	9	140	0.1
45	Moga-Bhiwani(PG)	1	109	5	140	0.1	109	5	140	0.1
46	Moga-Meerut	1	108	5	140	0.1	108	5	140	0.1
47	Orai-Aligarh	1	107	5	150	0.1	107	5	150	0.1
48	Orai-Aligarh	2	108	7	150	0.1	108	7	150	0.1
49	Orai-Jabalpur IR	1	107	5	150	0.1	WR			
50	Orai-Jabalpur IR	2	109	5	150	0.1	WR			
51	Orai-Satna IR	1	108	5	150	0.1	WR			
52	Orai-Gwalior IR	1	108	6	150	0.1	WR			
53	Phagi-Gwalior IR	1	110	5	140	0.1	WR			
54	Phagi-Gwalior IR	2	110	7	140	0.1	WR			
55	Varanasi-Balia	1	109	5	150	0.1	109	5	150	0.1
56	Varanasi-Fatehpur	1	109	5	150	0.1	109	5	150	0.1
57	Varanasi-Gaya IR	1	108	5	150	0.1	ER			

58	Varanasi-Gaya IR	2	109	9	150	0.1	ER			
59	Varanasi-Kanpur	1	108	5	150	0.1	108	5	150	0.1
60	Varanasi-Kanpur	2	110	5	150	0.1	110	5	150	0.1
61	Varanasi-Vindhyachal Pooling	1	108	5	150	0.1	WR			
62	Varanasi-Vindhyachal Pooling	2	109	9	150	0.1	WR			
B. Adani Transmission India Ltd. (ATIL) (BKTL, FBTL)										
1	Bikaner(PG)-Khetri(PKTSL)	1	109	9	140	0.1	109	9	140	0.1
2	Bikaner(PG)-Khetri(PKTSL)	2	110	15	140	0.1	110	15	140	0.1
3	Fatehgarh_II(PG)-Bhadla(PG)	1	108	6	140	0.1	108	6	140	0.1
4	Fatehgarh_II(PG)-Bhadla(PG)	2	110	12	140	0.1	110	12	140	0.1
C. UPPTCL										
1	Agra Fatehabad-Ghatampur	1	108	7	140	0.1	108	7	140	0.1
2	Agra Fatehabad-Gr. Noida	1	109	5	140	0.1	109	5	140	0.1
3	Anpara C-Anpara D	1	108	5	140	0.1	108	5	140	0.1
4	Anpara C-Unnao	1	109	5	140	0.1	110	7	140	0.1
5	Anpara D-Obra_C	1	110	7	140	0.1	110	7	140	0.1
6	Bara-Mainpuri	2	108	7	140	0.1	108	7	140	0.1
7	Ghatampur-Rampur_PRSTL	1	109	5	140	0.1	109	5	140	0.1
8	Hapur(UP)-Meerut_PMSTL	1	110	7	140	0.1	110	7	140	0.1
9	Hapur(UP)-Rampur_PRSTL	1	108	5	140	0.1	108	5	140	0.1
10	Hapur-Mainpuri	1	109	7	140	0.1	109	7	140	0.1
11	Jawaharpur-Gr.NOIDA	1	110	5	140	0.1	110	5	140	0.1
12	Lalitpur - Agra Fatehabad	1	108	5	140	0.1	108	5	150	0.1
13	Lalitpur - Agra Fatehabad	2	110	9	140	0.1	110	9	140	0.1
14	Meerut_PMSTL-G.Noida	1	110	5	140	0.1	110	5	140	0.1
15	Mainpuri(UP)-Jawaharpur	1	110	9	140	0.1	110	9	140	0
16	Obra_C-Unnao	1	110	5	140	0.1	110	5	140	0.1
D. Rajasthan										
1	Anta-Phagi	1	110	5	140	0.1	110	5	140	0.1

2	Anta-Phagi	2	110	7	140	0.1	112	6	140	0.1
2. 765kV Transmission Line charged at 400kV										
A. POWERGRID										
1	Kishenpur-Moga	1	110	5	150	0.1	110	5	150	0.1
2	Kishenpur-Moga	2	112	6	150	0.1	112	6	150	0.1
3	Tehri(TH)-Koteshwar(PG)	1	110	5	140	0.1	110	5	150	0.1
4	Tehri(TH)-Koteshwar(PG)	2	112	6	140	0.1	111	6	150	0.1
B. Adani Transmission India Ltd. (ATIL) (FBTL)										
1	Fatehgarh Pooling-Fatehgarh_II	1	110	5	150	0.1	110	5	150	0.1
2	Fatehgarh Pooling-Fatehgarh_II	2	112	6	150	0.1	111	5	150	0.1
3. 400kV HVAC Transmission Line										
A. POWERGRID										
2	Abdullapur(PG)-Deepalpur(JHKT)	1	112	6	150	0.1	112	6	150	0.1
1	Abdullapur(PG)-Bawana(DV)	1	110	5	150	0.1	110	5	150	0.1
3	Abdullapur- Kala Amb	1	110	5	150	0.1	110	5	150	0.1
4	Abdullapur- Kala Amb	2	112	6	150	0.1	112	6	150	0.1
5	Abdullapur-Kurukshetra	1	110	5	150	0.1	110	5	150	0.1
6	Abdullapur-Kurukshetra	2	112	6	150	0.1	112	6	150	0.1
7	Agra(PG)-Agra(UP)	1	110	5	150	0.1	111	6	150	0.1
8	Agra-Ballabgarh	1	110	5	150	0.1	110	5	150	0.1
9	Agra-Bassi	1	110	5	150	0.1	110	5	150	0.1
10	Agra-Bhiwadi	1	110	5	150	0.1	110	5	150	0.1
11	Agra-Bhiwadi	2	112	6	150	0.1	112	6	150	0.1
12	Agra PG-Fatehabad (765kV Agra UP)	1	112	6	150	0.1	110	5	150	0.1
13	Agra-Jaipur South	1	110	5	150	0.1	110	5	150	0.1
14	Agra-Jaipur South	2	112	6	150	0.1	112	6	150	0.1
15	Agra-Sikar	1	110	5	150	0.1	110	5	150	0.1
16	Agra-Sikar	2	112	6	150	0.1	112	6	150	0.1
17	Ajmer(RS)-Ajmer(PG)	1	110	5	150	0.1	110	5	150	0.1
18	Ajmer(RS)-Ajmer(PG)	2	112	6	150	0.1	112	6	150	0.1
19	Allahabad-Fatehpur	3	110	5	150	0.1	110	5	150	0.1

20	Allahabad-Fatehpur	1	111	6	150	0.1	111	6	150	0.1
21	Allahabad-Fatehpur	2	112	7	150	0.1	112	7	150	0.1
22	Allahabad-Kanpur	1	110	5	150	0.1	110	5	150	0.1
23	Allahabad-Kanpur_GIS(765/400kV)	1	112	6	150	0.1	111	6	150	0.1
24	Allahabad-Kanpur_GIS(765/400kV)	2	110	5	150	0.1	111	7	150	0.1
25	Allahabad(PG)-Meja(NT)	1	110	5	150	0.1	110	5	140	0.1
26	Allahabad(PG)-Meja(NT)	2	112	6	150	0.1	110	5	140	0.1
27	Allahabad-Sasaram IR	1	110	5	150	0.1	ER			
28	Allahabad-Varanasi	1	110	6	150	0.1	110	5	150	0.1
29	Amritsar-Jalandhar	1	110	5	150	0.1	110	5	150	0.1
30	Amritsar-Jalandhar	2	112	6	150	0.1	112	6	150	0.1
31	Amritsar-Parbati Pool Banala	1	110	5	150	0.1	110	5	150	0.1
32	Auraiya(NT)-Agra(PG)	1	110	5	140	0.1	110	5	150	0.1
33	Auraiya(NT)-Agra(PG)	2	112	5	140	0.1	112	6	150	0.1
34	Baghpat-Kaithal	1	110	5	150	0.1	110	5	150	0.1
35	Baghpat-Kaithal	2	112	6	150	0.1	112	6	150	0.1
36	Baghpat-Saharanpur	1	110	6	150	0.1	110	5	150	0.1
37	Bahadurgarh(PG)-Kabulpur(HV)	1	110	6	150	0.1	110	5	150	0.1
38	Bahadurgarh-Sonepat	1	110	5	150	0.1	110	5	150	0.1
39	Bahadurgarh-Sonepat	2	112	6	150	0.1	112	6	150	0.1
40	Balia-Biharshariff IR	1	110	5	150	0.1	ER			
41	Balia-Biharshariff IR	1	112	6	150	0.1	ER			
42	Balia(PG)-Mau(UP)	1	110	5	150	0.1	110	5	150	0.1
43	Balia-Naubatpur IR	1	111	6	150	0.1	ER			
44	Balia-Patna IR	1	110	5	150	0.1	ER			
45	Balia-Patna IR	2	112	6	150	0.1	ER			

46	Balia-Patna IR	3	110	6	150	0.1	ER			
47	Balia-Rasra	1	112	6	150	0.1	110	5	140	0.1
48	Balia-Sohawal	1	110	5	150	0.1	110	5	150	0.1
49	Balia-Sohawal	2	112	6	150	0.1	112	6	150	0.1
50	Ballabgarh-Gurgaon	1	110	5	150	0.1	110	5	150	0.1
51	Ballabgarh(PG)-Nawada(HV)	1	110	6	150	0.1	110	6	---	---
52	Bamnoli(DV)-Dwarka(PG)	1	110	5	150	0.1	110	5	150	0.1
53	Bareilly PG-Lucknow (UP)	1	111	6	150	0.1	110	5	150	0.1
54	Bareilly(PG)-Meerut	1	110	5	150	0.1	110	5	150	0.1
55	Bareilly(PG)-Meerut	2	112	6	150	0.1	112	6	150	0.1
56	Bareilly(PG)-Moradabad(UP)	1	110	5	150	0.1	110	5	150	0.1
57	Bareilly(PG)-Rampur_PRSTL	1	111	6	150	0.1	111	6	150	0.1
58	Bareilly(UP)-Bareilly(PG)	1	110	5	150	0.1	110	5	150	0.1
59	Bareilly(UP)-Bareilly(PG)	2	112	6	150	0.1	112	6	150	0.1
60	Bareilly_2(765/400)(PG)-Bareilly(PG)	1	110	5	150	0.1	110	5	150	0.1
61	Bareilly_2(765/400)(PG)-Bareilly(PG)	2	112	6	150	0.1	112	6	150	0.1
62	Bareilly_2(765/400)(PG)-Jauljivi(PG)	1	110	5	150	0.1	110	5	150	0.1
63	Bareilly_2(765/400)(PG)-Jauljivi(PG)	2	112	6	150	0.1	112	6	150	0.1
64	Bareilly_2(765/400)(PG)-Kashipur(UK)	1	110	5	150	0.1	110	5	150	0.1
65	Bareilly_2(765/400)(PG)-Kashipur(UK)	2	112	6	150	0.1	112	6	150	0.1
66	Baspa-Karcham Wangtoo	1	110	5	140	0.1	110	5	140	0.1
67	Baspa-Karcham Wangtoo	2	112	6	140	0.1	112	6	140	0.1
68	Bassi-Bhiwadi	1	110	6	150	0.1	110	5	150	0.1
69	Bassi(PG)-Heerapura(RS)	1	110	5	150	0.1	110	5	150	0.1
70	Bassi(PG)-Heerapura(RS)	2	112	6	150	0.1	112	6	150	0.1
71	Bassi-Kotputli	1	110	6	150	0.1	110	5	150	0.1
72	Bassi(PG)-Phagi(RS)	1	110	5	150	0.1	110	5	140	0.1

73	Bassi(PG)-Phagi(RS)	2	112	6	150	0.1	112	6	140	0.1
74	Bassi-Sikar	1	110	5	150	0.1	110	5	150	0.1
75	Bassi-Sikar	2	112	6	150	0.1	112	6	150	0.1
76	Basti (UP)-Lucknow(PG)	1	110	5	150	0.1	110	5	150	0.1
77	Basti (UP)-Lucknow(PG)	2	112	6	150	0.1	112	6	150	0.1
78	Bawana(CCGTB)(DTL)-Bahadurgarh(PG)	1	110	5	150	0.1	110	5	150	0.1
79	Bawana(CCGTB)(DTL)-Bhiwani(PG)	1	112	6	150	0.1	112	6	150	0.1
80	Bhadla(PG)-Bhadla(RS)	1	110	5	150	0.1	110	5	150	0.1
81	Bhadla(PG)-Bhadla(RS)	2	112	6	150	0.1	112	6	150	0.1
82	Bhensra (Jaisalmer2)(RS)-Fatehgarh_III(PG)	1	110	5	150	0.1	110	5	150	0.1
83	Bhensra (Jaisalmer2)(RS)-Fatehgarh_III(PG)	2	112	6	150	0.1	112	6	150	0.1
86	Bhiwadi-Gurgaon	1	110	6	150	0.1	110	5	150	0.1
87	Bhiwadi-Hissar	1	110	5	150	0.1	110	5	150	0.1
88	Bhiwadi-Hissar	2	111	6	150	0.1	111	6	150	0.1
89	Bhiwadi-Hissar	3	112	7	150	0.1	112	7	150	0.1
90	Bhiwadi-Neemrana(PG)	1	110	5	150	0.1	110	5	150	0.1
91	Bhiwadi-Neemrana(PG)	2	112	6	150	0.1	112	6	150	0.1
92	Bhiwani(PG)-Bhiwani(BB)	1	110	5	150	0.1	110	5	150	0.1
93	Bhiwani(BB)-Hissar(PG)	1	112	7	150	0.1	112	7	150	0.1
94	Bhiwani(PG)-Jind	1	110	5	150	0.1	110	5	150	0.1
95	Bhiwani(PG)-Jind	2	112	7	150	0.1	112	7	150	0.1
96	Bhiwani(PG)-Kabulpur(HV)	1	111	6	150	0.1	111	6	150	0.1
97	Bhiwani(PG)-Hissar-Moga(PG)	1	110	5	150	0.1	110	5	150	0.1
98	Bikaner_2-Bikaner(PG)	1	110	5	150	0.1	110	5	150	0.1
99	Bikaner_2-Bikaner(PG)	2	112	6	150	0.1	112	6	150	0.1
100	Bikaner_2(PG)-Khetri(PG)	1	110	5	150	0.1	110	5	150	0.1

101	Bikaner_2(PG)-Khetri(PG)	2	111	6	150	0.1	111	6	150	0.1
102	Bikaner_2(PG)-Khetri(PG)	3	112	6	150	0.1	112	6	150	0.1
103	Bikaner_2(PG)-Khetri(PG)	4	112	7	150	0.1	112	7	150	0.1
104	Chamera-II - Chamba(GIS)	1	110	5	150	0.1	110	5	150	0.1
105	Chamera-II-Chamera-I	1	111	6	150	0.1	111	6	150	0.1
106	Chamera-II-Kishenpur	1	112	7	150	0.1	112	7	150	0.1
107	Chamera-I-Jalandhar	1	110	5	150	0.1	110	5	150	0.1
108	Chamera-I-Jalandhar	2	112	6	150	0.1	112	6	150	0.1
109	Chittorgarh(RS)-Kankroli	2	110	6	150	0.1	110	6	150	0.1
110	Chittorgarh(PG)-Chittorgarh(RS)	1	110	5	150	0.1	110	5	150	0.1
111	Chittorgarh(PG)-Chittorgarh(RS)	2	112	6	150	0.1	112	6	150	0.1
112	Dadri NCTPP-G. Noida	1	110	5	140	0.1	110	5	150	0.1
113	Dadri(NT)-Maharanibagh(PG)-Ballabhgahr(PG)	1	111	6	140	0.1	111	6	150	0.1
114	Dadri(NT)-Mandola	1	110	5	140	0.1	110	5	150	0.1
115	Dadri(NT)-Mandola	2	112	6	140	0.1	112	6	150	0.1
116	Dadri(NT)-Muradnagar_2(UP)	1	110	5	140	0.1	110	5	140	0.1
117	Dadri(NT)-Panipat(BB)	1	110	5	140	0.1	110	5	150	0.1
118	Dadri(NT)-Panipat(BB)	2	112	7	140	0.1	112	7	150	0.1
119	Dadri(NT)-Kaithal	1	111	6	140	0.1	111	6	150	0.1
120	Deepalpur(JHKT)-Bawana(DV)	1	112	6	150	0.1	112	6	150	0.1
121	Dehradun(PG)-Abdullapur	1	110	5	150	0.1	110	5	150	0.1
122	Dehradun(PG)-Abdullapur	2	112	6	150	0.1	112	6	150	0.1
123	Dehradun-Baghpat	1	110	5	150	0.1	110	5	150	0.1
124	Dehradun(PG)-Roorkee(PG)	1	110	6	150	0.1	110	5	150	0.1
125	Dulhasti-Kishenpur	1	110	5	150	0.1	110	5	150	0.1

126	Dulhasti-Kishenpur	2	111	6	150	0.1	111	6	150	0.1
127	Dwarka-Jhatikra	1	110	5	150	0.1	110	5	150	0.1
128	Fatehabad-Hissar-Bhiwani	1	110	5	150	0.1	110	5	150	0.1
129	Fatehgarh_II(PG)-Fatehgarh_III(PG)	1	110	5	150	0.1	110	5	150	0.1
130	Fatehgarh_II(PG)-Fatehgarh_III(PG)	2	112	6	150	0.1	112	6	150	0.1
131	Fatehpur-Kanpur-Panki	1	112	6	150	0.1	112	6	150	0.1
132	Fatehpur-Kanpur-Panki	2	110	5	150	0.1	110	5	150	0.1
133	Fatehpur-Mainpuri (PG)	1	110	5	150	0.1	110	5	150	0.1
134	Fatehpur-Mainpuri (PG)	2	112	6	150	0.1	112	6	150	0.1
135	Fatehpur - Unchahar	1	110	5	150	0.1	110	5	140	0.1
136	Fatehpur - Unchahar	2	112	6	150	0.1	112	6	140	0.1
137	G.Noida-Nawada	1	110	5	140	0.1	110	5	140	0.1
138	Gorakhpur(PG)-Gorakhpur(UP)	1	110	5	150	0.1	110	5	150	0.1
139	Gorakhpur(PG)-Gorakhpur(UP)	2	112	6	150	0.1	112	6	150	0.1
140	Gorakhpur PG-Lucknow(PG)	1	110	5	150	0.1	110	5	150	0.1
141	Gorakhpur PG-Lucknow(PG)	2	112	6	150	0.1	112	6	150	0.1
142	Gorakhpur PG-LUCKNOW7 PG	1	110	5	150	0.1	110	5	150	0.1
143	Gorakhpur PG-LUCKNOW7 PG	2	112	6	150	0.1	112	6	150	0.1
144	Gorakhpur-Motihari IR	1	110	5	150	0.1	ER			
145	Gorakhpur-Motihari IR	2	112	6	150	0.1	ER			
146	Gorakhpur-Muzaffarpur IR	1	110	5	150	0.1	ER			
147	Gorakhpur-Muzaffarpur IR	2	112	6	150	0.1	ER			
148	Gorakhpur(PG)-Basti(UP)	1	110	5	150	0.1	110	5	150	0.1
149	Gorakhpur(PG)-Basti(UP)	2	112	6	150	0.1	112	6	150	0.1
150	Gumma(HP)-Panchkula(PG)	1	110	5	150	0.1	110	5	150	0.1

151	Gumma(HP)-Panchkula(PG)	2	112	6	150	0.1	112	6	150	0.1
152	Gurgaon-Sohna Road	1	110	5	150	0.1	110	5	140	0.1
153	Gurgaon-Sohna Road	2	112	6	150	0.1	112	6	140	0.1
154	Hamirpur-Parbati Pool Banala	1	112	6	150	0.1	112	6	150	0.1
155	Hamirpur-Jalandhar	1	112	6	150	0.1	112	6	150	0.1
156	Jaipur South-Bassi	1	110	5	150	0.1	110	5	150	0.1
157	Jaipur South-Bassi	2	112	6	150	0.1	112	6	150	0.1
158	Jaipur South(PG)-RAPP D(NP)	1	110	5	150	0.1	110	5	150	0.1
159	Jalandhar-Chamba(GIS)	1	110	5	150	0.1	110	5	150	0.1
160	Jalandhar-Chamba(GIS)	2	112	6	150	0.1	112	6	150	0.1
161	Jalandhar-Dhanansu(PS)	1	110	5	150	0.1	110	5	150	0.1
162	Jalandhar-Nakodar	1	112	6	150	0.1	112	6	150	0.1
163	Kaithal-Hissar	1	110	5	150	0.1	110	5	150	0.1
164	Kaithal-Hissar	2	112	6	150	0.1	112	6	150	0.1
165	Kankroli-Jodhpur	1	110	5	150	0.1	110	5	140	0.1
166	Kankroli-Zerda IR	1	110	5	150	0.1	WR			
166	Kankroli-Zerda IR	2	112	6	150	0.1	WR			
167	Kanpur - Kanpur GIS(765/400)	1	110	5	150	0.1	110	5	150	0.1
168	Kanpur - Kanpur GIS(765/400)	2	112	7	150	0.1	112	6	150	0.1
169	Kanpur-Agra	1	111	6	150	0.1	110	5	150	0.1
170	Kanpur-Auraiya(NT)	1	110	5	150	0.1	110	5	140	0.1
171	Kanpur-Auraiya(NT)	2	112	6	150	0.1	112	6	140	0.1
172	Kanpur-Ballabgarh	1	110	5	150	0.1	110	5	150	0.1
173	Kanpur-Ballabgarh	2	111	6	150	0.1	111	6	150	0.1
174	Kanpur-Ballabgarh	3	112	7	150	0.1	112	7	150	0.1
175	Karcham Wangtoo-Nathpa Jhaki	1	110	5	140	0.1	110	5	150	0.1
176	Karcham Wangtoo-Nathpa Jhaki	2	112	6	140	0.1	112	6	150	0.1
177	Karcham Wangtoo-Wangtoo(HP)	1	110	5	140	0.1	110	5	140	0.1

178	Karcham Wangtoo-Wangtoo(HP)	2	112	6	150	0.1	112	6	140	0.1
179	Khetri- Bhiwadi	1	110	5	150	0.1	110	5	150	0.1
180	Khetri- Bhiwadi	2	112	6	150	0.1	112	6	150	0.1
181	Kishenpur-New Wanpoh	1	110	5	150	0.1	110	5	150	0.1
182	Kishenpur-New Wanpoh	3	110	5	150	0.1	110	5	150	0.1
183	Kishenpur-New Wanpoh	4	111	6	150	0.1	111	6	150	0.1
184	Kishenpur-Samba	1	110	5	150	0.1	110	5	150	0.1
185	Kishenpur-Samba	2	111	6	150	0.1	111	6	150	0.1
186	Koldam-Nallagarh	1	112	6	150	0.1	112	6	150	0.1
187	Kota-Jaipur South	1	111	6	150	0.1	111	6	150	0.1
188	Kota-Merta(RS)	1	110	5	150	0.1	110	5	150	0.1
189	Koteshwar(PG)-Koteswar(TH)	1	110	5	150	0.1	110	5	140	0.1
190	Koteshwar(PG)-Koteswar(TH)	2	112	6	150	0.1	112	6	140	0.1
191	Kotputli-Bhiwadi	1	110	5	150	0.1	110	5	150	0.1
192	Kurukshetra-Dhanansu(PS)	1	110	5	150	0.1	110	5	140	0.1
193	Kurukshetra-Jind	1	110	5	150	0.1	110	5	150	0.1
194	Kurukshetra-Jind	2	112	6	150	0.1	112	6	150	0.1
195	Kurukshetra-Nakodar(PS)	1	110	6	150	0.1	110	6	140	0.1
196	Kurukshetra-Sonipat	1	110	5	150	0.1	110	5	150	0.1
197	Kurukshetra-Sonipat	2	112	6	150	0.1	112	6	150	0.1
198	Lucknow(PG)-Lucknow UP	1	111	6	150	0.1	111	6	150	0.1
199	Lucknow(PG)-Jehta	1	110	5	150	0.1	110	5	140	0.1
200	Lucknow(PG)-Jehta	2	112	6	150	0.1	112	6	140	0.1
201	Jehta-Unnao	1	110	5	140	0.1	110	5	150	0.1
202	Jehta-Unnao	2	112	6	140	0.1	112	6	150	0.1
203	Lucknow_2(765/400)(PG) - Lucknow(PG)	1	110	5	150	0.1	110	5	150	0.1
204	Lucknow_2(765/400)(PG) - Lucknow(PG)	2	112	6	150	0.1	112	6	150	0.1
205	Lucknow_2(765/400) - Kanpur GIS(765/400)	1	110	5	150	0.1	110	5	150	0.1

206	Lucknow_2(765/400) - Kanpur GIS(765/400)	2	112	6	150	0.1	112	6	150	0.1
207	Ludhiana-Jalandhar	1	110	5	150	0.1	110	5	150	0.1
208	Ludhiana-Malerkotla	1	112	6	150	0.1	112	6	150	0.1
209	Ludhiana-Patiala	1	110	5	150	0.1	110	5	150	0.1
210	Ludhiana-Patiala	2	112	6	150	0.1	112	6	150	0.1
211	Mahendergarh-Bhiwani(PG)-Hissar	3	111	5	150	0.1	111	5	150	0.1
212	Mahendergarh-Bhiwani(PG)-Hissar	4	112	6	150	0.1	112	6	150	0.1
213	Mainpuri-Ballabgarh	1	110	5	150	0.1	110	5	150	0.1
214	Mainpuri-Ballabgarh	2	112	6	150	0.1	112	6	150	0.1
215	Malerkotla-Kaithal	1	110	5	150	0.1	110	5	150	0.1
216	Malerkotla-Patiala	1	112	6	150	0.1	112	6	150	0.1
217	Manesar-Sohna Road	1	110	5	150	0.1	110	5	140	0.1
218	Manesar-Sohna Road	2	112	6	150	0.1	112	7	140	0.1
219	Meerut-Baghpat	1	110	5	150	0.1	110	5	150	0.1
220	Meerut-Baghpat	2	112	6	150	0.1	112	6	150	0.1
221	Meerut-Mandola	1	112	5	150	0.1	112	5	150	0.1
222	Meerut-Mandola	2	112	6	150	0.1	112	6	150	0.1
223	Meerut-Mandola	3	110	5	150	0.1	110	5	150	0.1
224	Meerut-Mandola	4	111	6	150	0.1	111	6	150	0.1
225	Meerut(PG)-Muzzafarnagar(UP)	1	110	5	150	0.1	110	5	150	0.1
226	Moga-Fatehabad	1	110	5	150	0.1	110	5	150	0.1
227	Moga-Hissar	2	110	5	150	0.1	110	5	150	0.1
228	Moga-Hissar	3	112	6	150	0.1	112	6	150	0.1
229	Moga-Jalandhar	1	110	5	150	0.1	110	5	150	0.1
230	Moga-Jalandhar	2	112	6	150	0.1	112	6	150	0.1
231	Moradabad(UP)-Hapur(UP)	1	110	5	150	0.1	110	5	140	0.1
232	Muradnagar(UP)-Hapur(UP)	1	110	5	150	0.1	112	6	150	0.1
233	Nallagarh-Patiala	1	110	5	150	0.1	110	5	150	0.1
234	Nallagarh-Patiala	2	112	6	150	0.1	112	6	150	0.1
235	Nathpa Jhakri(SJ)-Rampur(SJ)	1	110	5	150	0.1	110	5	140	0.1
236	Nathpa Jhakri(SJ)-Rampur(SJ)	2	112	6	150	0.1	112	6	140	0.1

237	Nathpa Jhakri(SJ)-Gumma(HP)	1	110	5	140	0.1	110	5	140	0.1
238	Nathpa Jhakri(SJ)-Gumma(HP)	2	112	6	140	0.1	112	6	140	0.1
239	Neemrana(PG)-Manesar	1	110	5	150	0.1	110	5	150	0.1
240	Neemrana(PG)-Manesar	2	112	6	150	0.1	112	6	150	0.1
241	Neemrana(PG)-Dhanonda(HV)-Mohindergarh(APL)	1	110	5	150	0.1	110	5	150	0.1
242	Neemrana(PG)-Dhanonda(HV)-Mohindergarh(APL)	2	112	6	150	0.1	112	6	150	0.1
243	Neemrana(PG)-Sikar	2	111	6	150	0.1	111	6	150	0.1
244	New Wanpoh-Wagoora	1	110	5	150	0.1	110	5	150	0.1
245	New Wanpoh-Wagoora	2	111	6	150	0.1	111	6	150	0.1
246	Orai(PG)-Orai (UP)	1	110	5	150	0.1	110	5	150	0.1
247	Orai(PG)-Orai (UP)	2	112	7	150	0.1	112	7	150	0.1
248	Panchkula - Abdullapur	1	110	5	150	0.1	110	5	150	0.1
249	Panchkula - Abdullapur	2	112	6	150	0.1	112	6	150	0.1
250	Patiala-Panchkula	1	110	5	150	0.1	110	5	150	0.1
251	Patiala-Panchkula	2	112	6	150	0.1	112	6	150	0.1
252	Patiala-Patran	1	110	5	150	0.1	110	5	150	0.1
253	Patiala-Patran	2	112	6	150	0.1	112	6	150	0.1
254	Patran-Kaithal	1	110	5	150	0.1	110	5	150	0.1
255	Patran-Kaithal	2	112	6	150	0.1	112	6	150	0.1
256	Rampur(SJ)-Nallagarh(PG)	1	110	5	150	0.1	110	5	150	0.1
257	Rampur(SJ)-Nallagarh(PG)	2	112	6	150	0.1	112	6	150	0.1
258	Rampur_PRSTL-Moradabad(UP)	1	111	6	150	0.1	111	6	150	0.1
259	RAPP-D(NP)-Kota(PG)	1	110	5	150	0.1	110	5	150	0.1
260	RAPS-C(NP)-Chittorgarh(RS)	2	110	5	150	0.1	110	5	150	0.1
261	RAPS-C(NP)-Kankroli(PG)	1	111	6	150	0.1	111	6	150	0.1
262	RAPS-C(NP)-Kota(PG)	1	110	6	150	0.1	110	6	150	0.1

263	Rihand(NT)-Allahabad(PG)	1	110	5	140	0.1	110	5	150	0.1
264	Rihand(NT)-Allahabad(PG)	2	112	6	140	0.1	112	6	150	0.1
265	Rihand3-Vindhyachal IR	1	110	5	150	0.1	WR			
266	Rihand3-Vindhyachal IR	2	112	6	150	0.1	WR			
267	Roorkee(PG)-Kashipur(UK)	1	110	5	150	0.1	110	5	150	0.1
268	Roorkee(PG)-Kashipur(UK)	2	112	6	150	0.1	112	6	150	0.1
269	Roorkee-Saharanpur	1	111	6	150	0.1	111	6	150	0.1
270	Sambhal(UP)-Rampur(PRSTL)	1	110	5	150	0.1	110	5	140	0.1
271	Sambhal(UP)-Rampur(PRSTL)	2	112	6	150	0.1	112	7	140	0.1
272	Sarnath(UP)-Varanasi(PG)	1	110	5	150	0.1	110	5	150	0.1
273	Sarnath(UP)-Varanasi(PG)	2	112	6	150	0.1	112	6	150	0.1
274	Shahjahanpur(PG)-Bareilly(PG)	1	110	5	150	0.1	110	5	150	0.1
275	Shahjahanpur(PG)-Bareilly(PG)	2	112	6	150	0.1	112	6	150	0.1
276	Shahjahanpur(PG)-Lucknow(PG)	1	110	5	150	0.1	110	5	150	0.1
277	Shahjahanpur(PG)-Lucknow(PG)	2	112	6	150	0.1	112	6	150	0.1
278	Shahjahanpur PG-Rosa	1	110	5	150	0.1	110	5	140	0.1
279	Shahjahanpur PG-Rosa	2	112	6	150	0.1	112	6	140	0.1
280	Shree Cement(SCL)-Kota(PG)	1	110	5	150	0.1	110	5	150	0.1
281	Shree Cement-Merta	2	111	6	150	0.1	111	6	150	0.1
282	Sikar-Khetri	1	110	5	150	0.1	110	5	150	0.1
283	Sikar-Khetri	2	112	6	150	0.1	112	6	150	0.1
284	Sikar(PG)-Ratangarh(RS)	1	110	5	150	0.1	110	5	150	0.1
285	Sikar(PG)-Ratangarh(RS)	2	112	6	150	0.1	112	6	150	0.1
286	Sikar_2(PSTL)-Neemrana(PG)	1	110	5	150	0.1	110	5	150	0.1

287	Sikar_2(PSTL)-Neemrana(PG)	2	112	6	150	0.1	112	6	150	0.1
288	Singrauli(NT)-Allahabad(PG)	1	110	5	140	0.1	110	5	150	0.1
289	Singrauli(NT)-Allahabad(PG)	2	111	6	140	0.1	111	6	150	0.1
290	Singrauli(NT)-Allahabad(PG)	3	112	7	150	0.1	112	7	150	0.1
291	Singrauli(NT)-Anpara(UP)	1	110	6	140	0.1	110	6	140	0.1
292	Singrauli(NT)-Fatehpur(PG)	1	110	5	140	0.1	110	5	150	0.1
293	Singrauli(NT)-Lucknow(UP)	1	111	6	140	0.1	111	6	150	0.1
294	Singrauli(NT)-Rihand(NT)	1	110	5	140	0.1	110	5	140	0.1
295	Singrauli(NT)-Rihand(NT)	2	112	6	140	0.1	112	6	140	0.1
296	Singrauli(NT)-Vindhyachal(PG)	1	110	5	140	0.1	110	5	150	0.1
297	Singrauli(NT)-Vindhyachal(PG)	2	112	6	140	0.1	112	6	150	0.1
298	Sohawal-Lucknow(PG)	1	110	5	150	0.1	110	5	150	0.1
299	Sohawal-Lucknow(PG)	2	112	6	150	0.1	112	6	150	0.1
300	Sorang(Greenko)-Kala Amb	1	112	6	150	0.1	112	6	150	0.1
301	Tehri(THDC)-Koteshwar(PG)	3	112	7	150	0.1	112	7	150	0.1
302	Uri-II(NH) - Uri-I(NH)	1	111	6	140	0.1	111	6	140	0.1
303	Uri-II(NH) - Wagoora(PG)	1	110	5	150	0.1	110	5	150	0.1
304	Uri-I(NH) - Amargarh(INDIGRID)	1	110	5	150	0.1	110	5	150	0.1
305	Uri-I(NH) - Amargarh(INDIGRID)	2	111	6	150	0.1	111	6	150	0.1
306	Varanasi(PG)-Sahupuri(UP)	1	110	5	150	0.1	110	5	140	0.1
307	Varanasi(PG)-Sahupuri(UP)	2	112	6	150	0.1	112	6	150	0.1
308	varanasi-Sasaram IR	1	111	6	150	0.1	ER			
309	varanasi-Biharshariff IR	1	110	5	150	0.1	ER			

310	varanasi-Biharshariff IR	2	112	6	150	0.1	ER			
311	Wagoora-Amargarh	1	110	5	150	0.1	110	5	150	0.1
312	Wagoora-Amargarh	2	111	6	150	0.1	111	6	150	0.1
313	Wangtoo(HP)-Kala Amb	1	110	5	150	0.1	110	5	150	0.1
314	Wangtoo(HP)-Sorang(Greenko)	1	112	6	150	0.1	112	6	150	0.1
B. Adani Transmission India Ltd. (ATIL) (FBTL)										
1	Alwar(ATIL)-Hindaun(RS)	1	110	5	150	0.1	110	5	150	0.1
2	Bhiwani(PG) - Mohindergarh(APL)	1	110	5	150	0.1	110	5	150	0.1
3	Bhiwani(PG) - Mohindergarh(APL)	2	112	6	150	0.1	112	6	150	0.1
4	Bhadla(PG)-Bhadla_II	1	110	5	150	0.1	110	5	150	0.1
5	Bhadla(PG)-Bhadla_II	2	112	6	150	0.1	112	6	150	0.1
C. UPPTCL (Uttar Pradesh)										
1	Agra UP-Fatehabad (765kV Agra UP)	1	110	5	140	0.1	110	5	140	0.1
2	Agra UP-Fatehabad (765kV Agra UP)	2	112	6	150	0.1	112	6	150	0.1
3	Agra Fatehabad(UP)-Firozabad	1	110	6	150	0.1	110	6	140	0.1
4	Agra UP-Unnao	1	110	5	140	0.1	110	5	140	0.1
5	Alakhnanda-Vishnuprayag	1	110	5	140	0.1	110	5	140	0.1
6	Aligarh-Mainpuri765 (UP)	1	110	5	150	0.1	110	5	140	0.1
7	Aligarh-Mainpuri765 (UP)	2	112	6	150	0.1	112	6	140	0.1
8	Aligarh-Muradnagar	1	110	6	150	0.1	110	6	150	0.1
9	Aligarh-Panki	1	110	6	140	0.1	110	6	140	0.1
10	Aligarh(UP)-Shamli(UP)	1	110	5	150	0.1	110	5	140	0.1
11	Aligarh(UP)-Shamli(UP)	2	112	6	150	0.1	112	6	140	0.1

12	Aligarh-Sikandrabad	1	111	6	140	0.1	111	6	140	0.1
13	Aligarh-Harduaganj	1	111	6	150	0.1	111	6	150	0.1
14	AnparaB-AnparaC	1	Only a Extension of Bus therefore overvoltage protection is not enable							
15	AnparaB-AnparaC	2								
16	AnparaB-AnparaD	1	110	5	140	0.1	110	5	140	0.1
17	AnparaB-AnparaD	2	112	6	140	0.1	112	6	140	0.1
18	AnparaB-Mau	1	110	6	140	0.1	110	6	140	0.1
19	AnparaB-Obra	1	111	6	140	0.1	111	6	140	0.1
20	AnparaB-Sarnath	1	110	5	140	0.1	110	5	140	0.1
21	AnparaB-Sarnath	2	112	6	140	0.1	112	6	140	0.1
22	Ataur-Indirapuram	1	112	6	140	0.1	112	6	140	0.1
23	Ataur-Noida sec123	1	110	5	140	0.1	110	5	140	0.1
24	Azamgarh-Mau	1	110	5	150	0.1	110	5	140	0.1
25	Azamgarh-Tanda Stage-II	1	112	6	140	0.1	112	6	140	0.1
26	Badaun-Sambhal	1	110	6	140	0.1	110	5	150	0.1
27	Badaun-Sambhal	2	112	6	140	0.1	112	6	150	0.1
28	Banda-Orai	1	110	5	150	0.1	110	5	150	0.1
29	Banda-Orai	2	112	6	150	0.1	112	6	150	0.1
30	Banda-Rewa Road	1	110	5	140	0.1	110	5	140	0.1
31	Banda-Rewa Road	2	112	6	140	0.1	112	6	140	0.1
32	Bareilly(UP)-Unnao	1	112	6	145	0.1	112	6	140	0.1
33	Bareilly(UP)-Unnao	2	110	5	145	0.1	110	5	140	0.1
34	Fatehabad(UP)-Agra(South)-I	1	110	5	140	0.1	110	5	140	0.1
35	Fatehabad(UP)-Mathura	1	110	5	150	0.1	110	5	150	0.1
36	Fatehabad(UP)-Mathura	2	112	6	150	0.1	112	6	150	0.1
37	Firozabad-Agra(South)	1	111	6	140	0.1	112	6	150	0.1
38	Firozabad-Jawaharpur	1	110	5	150	0.1	110	5	150	0.1
39	Firozabad-Jawaharpur	2	112	6	150	0.1	112	6	150	0.1
40	Gorakhpur UP-Azamgarh	1	111	6	140	0.1	111	6	140	0.1
41	Gr.Noida4-Gr.Noida7	1	110	5	150	0.1	110	5	140	0.1
42	Gr.Noida4-Gr.Noida7	2	112	6	150	0.1	112	6	140	0.1
43	Gr.Noida7-Sikandrabad	1	110	5	140	0.1	110	5	140	0.1

44	Gr.Noida7-Sikandrabad	2	112	6	140	0.1	112	6	140	0.1
45	Gr.Noida(765kV)-Noida Sec 148	1	110	5	140	0.1	110	5	140	0.1
46	Gr.Noida(765kV)-Noida Sec 148	2	112	6	140	0.1	112	6	140	0.1
47	Hapur-Ataur	1	110	5	140	0.1	110	5	140	0.1
48	Hapur-Ataur	2	112	6	140	0.1	112	6	140	0.1
49	Hapur-Dasna	1	110	5	140	0.1	110	5	140	0.1
50	Hapur-Dasna	2	112	6	140	0.1	112	6	140	0.1
51	Harduaganj-Sikandrabad	1	110	5	150	0.1	110	5	150	0.1
52	Jaunpur- Obra C	1	110	5	140	0.1	110	5	140	0.1
53	Kanpur765-Ghatampur	1	110	5	150	0.1	110	5	150	0.1
54	Kanpur765-Ghatampur	2	112	6	150	0.1	112	6	150	0.1
55	Lucknow(PG)-Mohanlalganj(PGYTL)	1	110	5	150	0.1	110	5	150	0.1
56	Lucknow(UP)-Mohanlalganj(PGYTL)	1	110	5	150	0.1	112	6	150	0.1
57	Mainpuri(UP)-Mainpuri(PG)	1	110	5	140	0.1	110	5	150	0.1
58	Mainpuri(UP)-Mainpuri(PG)	2	112	6	140	0.1	112	6	150	0.1
59	Mainpuri(UP)-Orai-I	1	110	5	140	0.1	110	5	140	0.1
60	Mainpuri(UP)-Orai-2	2	112	6	140	0.1	112	6	140	0.1
61	Meja(NTPC)-Bara	1	110	5	140	0.1	110	5	140	0.1
62	Meja(NTPC)-Bara	2	112	6	140	0.1	112	6	140	0.1
63	Meja-Masauli	1	110	5	140	0.1	110	5	140	0.1
64	Meja(NTPC)-Rewa Road	1	111	6	140	0.1	111	6	140	0.1
65	Muradnagar-Ataur	1	110	5	150	0.1	110	5	140	0.1
66	Muradnagar New-Mathura	1	110	5	150	0.1	110	5	140	0.1
67	Muzaffarnagar-Ataur	1	111	6	150	0.1	111	6	140	0.1
68	Muzaffarnagar-Vishnuprayag	1	110	5	150	0.1	110	5	140	0.1
69	Muzaffarnagar-Alakhnanda	1	112	6	150	0.1	112	6	140	0.1
70	Noida sec123-Indirapuram	1	110	5	140	0.1	110	5	140	0.1

71	Noida Sec 148-Noida Sec 123	1	110	5	140	0.1	110	5	140	0.1
72	Noida Sec 148-Noida Sec 123	2	112	6	140	0.1	112	6	140	0.1
73	Obra-B-Sultanpur	1	110	5	140	0.1	110	5	140	0.1
74	Obra-B - Jaunpur	1	112	6	140	0.1	112	6	140	0.1
75	Orai-Paricha	1	110	5	140	0.1	110	5	140	0.1
76	Orai-Paricha	2	112	6	140	0.1	112	6	140	0.1
77	Panki- Panki TPS	1	110	5	140	0.1	110	5	140	0.1
78	Panki- Panki TPS	2	112	6	140	0.1	112	6	140	0.1
79	Rasra-Mau	1	112	6	150	0.1	112	6	150	0.1
80	Rewa Road-Masauli	1	110	5	140	0.1	110	5	140	0.1
81	Rewa road-Obra	1	110	6	140	0.1	110	6	140	0.1
82	Rewa road-Panki	1	111	6	140	0.1	111	6	140	0.1
83	Roorkee-Muzaffarnagar	1	111	6	150	0.1	111	6	150	0.1
84	Rosa-Badaun	1	110	5	140	0.1	110	5	140	0.1
85	Rosa-Badaun	2	112	6	140	0.1	112	6	140	0.1
86	Sarnath-Azamgarh	1	110	5	140	0.1	110	5	140	0.1
87	Simbholi-Muradnagar II	1	110	5	150	0.1	110	5	150	0.1
88	Simbholi-Muradnagar II	2	112	6	150	0.1	112	6	150	0.1
89	Simbholi-Meerut	1	110	5	150	0.1	110	5	150	0.1
90	Simbholi-Meerut	2	112	6	150	0.1	112	6	150	0.1
91	Sultanpur(UP)-Mohanlalganj(PGY TL)	1	110	5	140	0.1	110	5	150	0.1
92	Sultanpur-Tanda Stage II	1	111	6	150	0.1	111	6	150	0.1
93	Tanda-Basti	1	110	5	140	0.1	110	5	150	0.1
94	Tanda-Basti	2	112	6	140	0.1	112	6	150	0.1
95	Unnao(UP)-Mohanlalganj(PGY TL)	1	110	5	140	0.1	110	5	150	0.1
96	Unnao-Panki	1	111	6	140	0.1	111	6	140	0.1
97	Varanasi(PG)-Jaunpur	1	110	5	140	0.1	110	5	140	0.1
98	Varanasi(PG)-Jaunpur	2	112	6	140	0.1	112	6	141.8	0.1
D. THDCIL										
1	Aligarh(PG)-Khurja STPP(TH)	1	110	5	150	0.1	110	5	140	0.1
2	Aligarh(PG)-Khurja STPP(TH)	2	112	6	150	0.1	112	6	140	0.1
E. Rajasthan										

1	Ajmer-Bhilwara-I	1	110	5	140	0.1	110	5	140	0.1
2	Ajmer-Bhilwara-II	2	112	6	140	0.1	112	6	140	0.1
3	Ajmer-Deedwana	1	110	5	140	0.1	110	5	150	0.1
4	Akal-Barmer	1	110	5	150	0.1	110	5	150	0.1
5	Akal-Bhensra (Jaisalmer2)	1	111	6	150	0.1	111	6	150	0.1
6	Akal-Jodhpur	1	111	6	150	0.1	110	6	150	0.1
7	Akal-Kankani (Jodhpur New)	1	112	6	150	0.1	112	6	150	0.1
8	Akal-Ramgarh	1	110	5	148	0.1	110	5	148	0.1
9	Akal-Ramgarh	2	112	6	150	0.1	112	6	150	0.1
10	Anta-Chhabra SCTPS	1	110	5	140	0.1	110	5	140	0.1
11	Anta-Chhabra SCTPS	2	112	6	140	0.1	112	6	140	0.1
12	Anta-Kalisindh	1	110	5	140	0.1	110	5	140	0.1
13	Anta-Kalisindh	2	112	6	140	0.1	112	6	140	0.1
14	Anta-Kawai SCTPS	1	110	5	140	0.1	110	5	140	0.1
15	Anta-Kawai SCTPS	2	112	6	140	0.1	112	6	140	0.1
16	Babai - Suratgarh SCTPS	1	106	3	150	0.1	Both lines i.e. 400 KV Babai-SCTPS CKT-I &II CHARGED UP-TO 77 KM ON ANTI-THEFT BASIS FROM 400 KV GSS BABAI END ,SINCE DT. 06.01.2024.			
17	Babai - Suratgarh SCTPS	2	106	4	150	0.1				
18	Barmer-Bhinmal (PG)	1	110	5	150	0.1	110	5	150	0.1
19	Barmer-Bhinmal (PG)	2	112	6	150	0.1	112	6	150	0.1
20	Barmer-Rajwest	1	111	6	150	0.1	111	6	150	0.1
21	Barmer-Bhensra (Jaisalmer2)	1	110	5	150	0.1	110	5	150	0.1
22	Barmer-Bhensra (Jaisalmer2)	2	112	6	150	0.1	112	6	150	0.1
23	Bhadla(RS)-Jodhpur	1	110	5	140	0.1	110	5	140	0.1
25	Bikaner(RS)-Bhadla(RS)	1	110	5	150	0.1	110	5	140	0.1
26	Bikaner(RS)-Bhadla(RS)	2	112	6	150	0.1	112	6	140	0.1
27	Bikaner(RS)-Sikar(PG)	1	110	5	150	0.1	110	5	150	0.1
24	Bikaner(RS)-Deedwana	1	111	6	150	0.1	111	6	140	0.1
28	Bikaner(RS)-Sikar(PG)	2	112	6	150	0.1	112	6	150	0.1

29	Bikaner(RS)-Suratgarh SCTPP	1	110	5	150	0.1	110	5	150	0.1
30	Bikaner(RS)-Suratgarh SCTPP	2	112	6	150	0.1	112	6	150	0.1
31	Bhilwara-Chhabra	1	111	6	150	0.1	111	6	150	0.1
32	Bhilwara-Chittorgarh(RS)	1	110	5	150	0.1	110	5	150	0.1
33	Bhilwara-Chittorgarh(RS)	2	112	6	150	0.1	112	6	150	0.1
34	Chhabra-Chhabra SCTPS	1	Only an Extension of Bus therefore overvoltage protection is not enabled							
35	Chhabra-Chhabra SCTPS	2								
36	Chhabra-Kawai	1	110	5	140	0.1	110	5	140	0.1
37	Chhabra-Anta (RS) -Kota (PG)	1	112	6	140	0.1	112	6	150	0.1
38	Heerapura-Hindaun	1	110	5	150	0.1	110	5	150	0.1
39	Hindaun-Chabra TPS	1	112	7	150	0.1	112	7	150	0.1
40	Jaisalmer(RS)-Renew hans Urja Pvt Ltd	1	110	5	150	0.1	110	5	150	0.1
41	Jaisalmer(RS)-Corneight Parks Pvt. Ltd	1	111	6	150	0.1	111	6	150	0.1
42	Kankani (Jodhpur New)- Bhensra (Jaisalmer2)	1	111	5	148	0.1	111	5	148	0.1
43	Kankani (Jodhpur New)-Merta	1	110	5	150	0.1	110	5	150	0.1
44	Kankani (Jodhpur New)-Jodhpur	1	110	5	140	0.1	110	5	140	0.1
45	Kankani (Jodhpur New)-Jodhpur	2	112	6	140	0.1	110	5	140	0.1
46	Kankani (Jodhpur New)-Pachpadra	1	111	6	150	0.1	111	6	150	0.1
47	Rajwest-Pachpadra	1	111	5	150	0.1	110	5	150	0.1
48	Merta-Bikaner(RS)	1	110	5	150	0.1	110	5	150	0.1
49	Merta-Heerapura	1	111	6	150	0.1	111	6	150	0.1
50	Merta-Bhadla(RS)	1	112	5	150	0.1	112	6	150	0.1
51	Merta-Ratangarh	1	112	6	150	0.1	112	6	150	0.1
52	Phagi-Ajmer(RS)	1	110	5	140	0.1	110	5	140	0.1
53	Phagi-Ajmer(RS)	2	112	6	140	0.1	112	6	140	0.1
54	Phagi-Heerapura	1	110	5	140	0.1	110	5	150	0.1
55	Phagi-Heerapura	2	112	6	140	0.1	112	6	150	0.1
56	Rajwest-Jodhpur	1	110	5	150	0.1	110	5	140	0.1

57	Ramgarh-Bhadla(RS)	1	110	5	150	0.1	110	5	150	0.1
58	Ramgarh-Bhadla(RS)	2	112	6	150	0.1	112	6	150	0.1
59	Suratgarh-Bikaner(RS)	1	111	6	150	0.1	111	6	150	0.1
60	Suratgarh-Ratangarh	1	110	5	150	0.1	110	5	150	0.1
61	Suratgarh-Ratangarh	2	112	6	150	0.1	112	6	150	0.1
62	Suratgarh-Suratgarh SSCTPP	1	Only an Extension of Bus therefore overvoltage protection is not enabled							
63	Suratgarh-Suratgarh SSCTPP	2								
F. HVPNL (Haryana)										
1	CLP Jhajjar (MGSTPS) - Dhanonda	1	110	5	150	0.1	110	5	140	0.1
2	CLP Jhajjar (MGSTPS) - Dhanonda	2	112	6	150	0.1	112	6	140	0.1
3	CLP Jhajjar(MGSTPS)-Kabulpur	1	110	5	150	0.1	110	5	150	0.1
4	CLP Jhajjar(MGSTPS)-Kabulpur	2	112	6	150	0.1	112	6	150	0.1
5	Deepalpur-Kabulpur	1	110	5	150	0.1	110	5	150	0.1
6	Deepalpur-Kabulpur	2	112	6	150	0.1	112	6	150	0.1
7	Dhanonda-Daulatabad	1	110	5	140	0.1	110	5	150	0.1
8	Dhanonda-Daulatabad	2	112	6	140	0.1	112	6	150	0.1
9	Gurgaon-Daulatabad	1	110	5	150	0.1	110	5	150	0.1
10	Gurgaon-Daulatabad	2	112	6	150	0.1	112	6	150	0.1
11	Jhajjar(IGSTPS)-Daulatabad	1	110	5	150	0.1	110	5	150	0.1
12	Jhajjar(IGSTPS)-Daulatabad	2	112	6	150	0.1	112	6	150	0.1
13	Jind-Kirori	1	110	5	150	0.1	110	5	150	0.1
14	Jind-Kirori	2	112	6	150	0.1	112	6	150	0.1
15	Khedar-Fathehabad	1	111	6	150	0.1	111	6	150	0.1
16	Khedar-Kirori	1	110	5	150	0.1	110	5	150	0.1

17	Khedar-Kirori	2	112	6	150	0.1	112	6	150	0.1
18	Khedar-Nuhiyawali	1	111	6	150	0.1	111	6	150	0.1
19	Nuhiawali-Fathehabad	1	110	5	150	0.1	110	5	150	0.1
G.APCPL										
1	Jhajjar (IGSTPS)-Mundka	1	110	5	140	0.1	110	5	150	0.1
2	Jhajjar (IGSTPS)-Mundka	2	112	6	140	0.1	112	6	150	0.1
H. DTL (Delhi)										
1	Ballabgarh(PG)-Tughlakabad(PG)	1	110	5	150	0.1	110	5	150	0.1
2	Ballabgarh(PG)-Tughlakabad(PG)	2	112	6	150	0.1	112	6	150	0.1
3	Bamnoli-Jhatikra	2	111	6	150	0.1	111	6	150	0.1
4	Bamnauli(PG)-Tughlakabad(PG)	1	110	5	150	0.1	110	5	150	0.1
5	Bamnauli(PG)-Tughlakabad(PG)	2	112	6	150	0.1	112	6	150	0.1
6	Bawana(DV)-Maharanibagh(PG)	1	110	5	150	0.1	110	5	150	0.1
7	Bawana(DV)-Maharanibagh(PG)	2	112	6	150	0.1	112	6	150	0.1
8	Jhatikra(PG)-Mundka(DV)	1	110	5	150	0.1	110	5	150	0.1
9	Jhatikra(PG)-Mundka(DV)	2	112	6	150	0.1	112	6	150	0.1
10	Mandola(PG)-Maharanibagh(PG)	1	110	5	150	0.1	110	5	150	0.1
11	Mandola(PG)-Maharanibagh(PG)	2	112	6	150	0.1	112	6	150	0.1
12	Bawana-Mundka	1	110	5	150	0.1	110	5	150	0.1
13	Bawana-Mundka	2	112	6	150	0.1	112	6	150	0.1
I. PDD (J&K)										
1	Baglihar-Kishenpur	1	110	5	150	0.1	110	5	150	0.1
2	Baglihar-Kishenpur	2	111	6	150	0.1	111	6	150	0.1
3	Baglihar-Kishenpur	3	112	7	150	0.1	112	7	150	0.1
4	New Wanpoh-Baglihar(JK)	1	111	6	150	0.1	111	6	150	0.1
J. PSTCL (Punjab)										
1	Behman Jassa Singh-HMEL	1	110	5	150	0.1	110	5	150	0.1
2	Behman Jassa Singh-HMEL	2	112	6	150	0.1	112	6	150	0.1
3	Behman Jassa Singh-Moga	1	112	6	150	0.1	112	6	150	0.1
4	Makhu-Amritsar	1	110	5	150	0.1	110	5	150	0.1

5	Makhu-Amritsar	2	112	6	150	0.1	112	6	150	0.1
6	Makhu-Mukatsar	1	110	5	150	0.1	110	5	150	0.1
7	Makhu-Mukatsar	2	112	6	150	0.1	112	6	150	0.1
8	Nakodar-Makhu	1	110	5	150	0.1	110	5	150	0.1
9	Nakodar-Makhu	2	112	6	150	0.1	112	6	150	0.1
10	Nakodar-Moga	1	110	5	150	0.1	110	5	150	0.1
11	Rajpura-Rajpura TPS	1	110	5	150	0.1	110	5	150	0.1
12	Rajpura-Dhuri	1	110	5	150	0.1	110	5	150	0.1
13	Rajpura-Rajpura TPS	2	112	6	150	0.1	112	6	150	0.1
14	Rajpura-Dhuri	2	112	6	150	0.1	112	6	150	0.1
15	Rajpura TPS-Nakodar	1	110	5	140	0.1	110	5	150	0.1
16	Rajpura TPS-Nakodar	2	112	6	140	0.1	112	6	150	0.1
17	Talwandi Sabo-Dhuri	1	110	5	140	0.1	110	5	150	0.1
18	Talwandi Sabo-Dhuri	2	112	6	140	0.1	112	6	150	0.1
19	Talwandi Sabo-Behman-Jassa	1	111	6	140	0.1	111	6	150	0.1
21	Talwandi Sabo-Nakodar	1	112	6	140	0.1	112	6	150	0.1
22	Talwandi Sabo-Mukatsar	1	110	5	140	0.1	110	5	150	0.1
23	Talwandi Sabo-Mukatsar	2	112	6	140	0.1	112	6	150	0.1
K. PTCUL (Uttrakhand)										
1	Muradabad-Kashipur	1	110	5	150	0.1	110	5	150	0.1
2	Rishikesh-Nehtaur	1	110	5	140	0.1	110	5	140	0.1
3	Kashipur-Nehtaur	1	110	5	140	0.1	112	6	140	0.1
4	Roorkee-Muzaffarnagar	1	110	5	150	0.1	110	5	150	0.1
5	Roorkee-Rishikesh	1	112	6	150	0.1	112	6	140	0.1
6	Srinagar-Alakhnanda (GVK)	1	110	5	150	0.1	110	5	150	0.1
7	Srinagar-Alakhnanda (GVK)	2	112	6	150	0.1	112	6	150	0.1
L. HPPTCL										
1	Chamba(PG)-Lahal(HP)	1	110	5	150	0.1	110	5	150	0.1
2	Chamba(PG)-Lahal(HP)	2	112	6	150	0.1	112	6	150	0.1
M. BBMB										

1	Bhiwani-Rajpura	1	111	6	150	0.1	111	6	150	0.1
2	Dehar-Rajpura	1	112	6	150	0.1	112	6	140	0.1
3	Dehar-Panchkula	1	110	5	150	0.1	110	5	150	0.1
4	Panchkula-Panipat	1	111	6	150	0.1	111	6	150	0.1
N. INDIGRID										
1	Amargarh-Samba	1	110	5	150	0.1	110	5	150	0.1
2	Amargarh-Samba	2	111	6	150	0.1	111	6	150	0.1
3	Jalandhar-Samba	1	110	5	150	0.1	110	5	150	0.1
4	Jalandhar-Samba	2	112	6	150	0.1	112	6	150	0.1
5	Koldam-Parbati Pooling Banala	2	112	6	150	0.1	112	6	150	0.1
6	Ludhiana-Koldam	1	110	5	150	0.1	110	5	150	0.1
7	Koldam-Ropar	1	112	6	140	0.1	112	6	140	0.1
8	Parbati Pool Banala-Nallagarh	1	110	5	150	0.1	110	5	150	0.1
9	Parbati-II- Parbati Pooling Banala	2	112	5	150	0.1	112	6	150	0.1
10	Parbati-III- Parbati Pooling Banala	2	112	6	150	0.1	112	6	150	0.1
11	Prithala(GPTL)-Kadarpur	1	110	5	150	0.1	110	5	140	0.1
12	Prithala(GPTL)-Kadarpur	2	112	6	150	0.1	112	6	140	0.1
13	Prithala(GPTL)-Aligarh(PG)	1	110	5	150	0.1	110	5	150	0.1
14	Prithala(GPTL)-Aligarh(PG)	2	112	6	150	0.1	112	6	150	0.1
15	RAPPC-Shujalpur IR	1	110	5	150	0.1	110	5	140	0.1
16	RAPPC-Shujalpur IR	2	112	6	150	0.1	112	6	140	0.1
17	Ropar(PS)-Ludhiana(PG)	1	112	6	150	0.1	112	6	150	0.1
18	Sainj(HP)-Parbati II	1	110	5	140	0.1	110	5	140	0.1
19	Sainj(HP)-Parbati III	1	110	5	140	0.1	110	5	140	0.1
20	Sohna Road(GPTL)-Kadarpur	1	110	5	150	0.1	110	5	140	0.1
21	Sohna Road(GPTL)-Kadarpur	2	112	6	150	0.1	112	6	140	0.1
O. NTPC										
1	Dadri(NT)-Loni Road/ Harsh Vihar	1	110	5	140	0.1	110	5	140	0.1
2	Dadri(NT)-Loni Road/ Harsh Vihar	2	112	6	140	0.1	112	6	140	0.1
P. NRSS36										

1	Babai(RS)-Bhiwani(PG)	1	110	5	150	0.1	110	5	150	0.1
2	Babai(RS)-Bhiwani(PG)	2	112	6	150	0.1	112	6	150	0.1
3	Babai(RS)-Neemrana(PG)	1	110	5	150	0.1	110	5	150	0.1
4	Babai(RS)-Sikar(PG)	1	112	6	150	0.1	112	6	150	0.1
Q. NRSSXXXI(B) (Sekura Energy)										
1	Amritsar-Malerkotla	1	110	5	150	0.1	110	5	150	0.1
2	Amritsar-Malerkotla	2	112	6	150	0.1	112	6	150	0.1
3	Kurukshetra-Malerkotla	1	110	5	150	0.1	110	5	150	0.1
4	Kurukshetra-Malerkotla	2	112	6	150	0.1	112	6	150	0.1
R. RENEW Power Limited										
1	Bikaner(PG) - Bikaner (ReNew)	1	110	5	150	0.1	110	5	150	0.1
1	Renew SuryaRavi SL_BKN_PG-Bikaner RENEW Solar	1	110	5	150	0.1	110	5	150	0.1
S. Azure										
1	Bikaner(PG)-Azure43 PSS	1	110	5	150	0.1	110	5	150	0.1
2	Azure43 PSS-Azure43 RSS	1	110	5	150	0.1	110	5	150	0.1
T. AEPL										
1	Bikaner(PG)-Avada	1	110	5	150	0.1	110	5	150	0.1
U. AYANA										
1	Ayana-ARP3PL	1	110	5	150	0.1	110	5	150	0.1
2	Bikaner(PG)-Ayana	1	110	5	150	0.1	110	5	150	0.1
V. ADANI GREEN										
1	AGE25L-Bhadla2(PG)	1	110	5	150	0.1	110	5	150	0.1
2	AREPRL-Fatehgarh Pooling	1	110	5	150	0.1	110	5	150	0.1
3	AREPRL-Fatehgarh Pooling	2	112	6	150	0.1	112	6	150	0.1
W. NTPC GREEN										
1	Bhadla_2 (PG)-Kolayat Solar NTPC_1	1	110	5	150	0.1	110	5	150	0.1
2	Kolayat Solar NTPC_1 Kolayat Solar NTPC_2	1	110	5	150	0.1	110	5	150	0.1

X. ACME										
1	Fatehgarh Pooling(FBTL)-ACME Deoghar	1	110	5	150	0.1	110	5	150	0.1

Annexure-B.X

State Name	Defense Scheme	Planned Relief (MW)	Mapped Relief (MW)	No. of Main feeders Planned	No. of Main feeders Telemetered	No. of Alternate feeders Telemetered
UP	UFR	5958.843				
	df/dt	2561.92				
Rajasthan	UFR	4055.282				
	df/dt	776				
Punjab	UFR	3008.19				
	df/dt	1410				
Haryana	UFR	2631.661				
	df/dt	900				
Delhi	UFR	1496.69				
	df/dt	809.36				
HP	UFR	486.231				
	df/dt	190				

S.N.	Name of S/stn (including voltage level)	Name of feeder/transformer (including voltage level)	UFR Stage-wise Estimated Load relief (MW)			
			49.4 Hz	49.2 Hz	49.0 Hz	48.8 Hz

S.N.	Name of S/stn (including voltage level)	Name of feeder/transformer (including voltage level)	df/dt Stage-wise Estimated Load relief (MW)		
			49.9 Hz; 0.1Hz/s	49.9 Hz; 0.2Hz/s	49.9 Hz; 0.3Hz/s