

EASTERN REGIONAL POWER COMMITTEE
14, GOLF CLUB ROAD, TOLLYGUNGE
KOLKATA-700033

**MINUTES OF THE 16th PROTECTION SUB-COMMITTEE MEETING HELD AT ERPC,
KOLKATA ON 24.07.2013 (WEDNESDAY) AT 11:00 HOURS**

List of participants is enclosed at **Annexure-A**

Member Secretary I/C welcomed the participants. Thereafter, he requested SE (PS), ERPC to take up the agenda points in seriatim.

PART - A

ITEM NO.:1 CONFIRMATION OF THE MINUTES OF:

- i. (15th) Protection Sub-Committee meeting held on 09.04.2013.
- ii. Special Protection Sub-Committee meeting held on 07.05.2013
- iii. Special Protection Sub-Committee meeting held on 05.06.2013
- iv. Special Protection Sub-Committee meeting held on 14.06.2013

The minutes of the above meetings were circulated vide letter no.

- i. ERPC/SE (PS)/ PROTECTION/ 2013/635-668 dated 30.04.2013
- ii. ERPC/SE (PS)/ PROTECTION/ 2013/ .. dated 15.05.2013
- iii. ERPC/SE (PS)/ PROTECTION/ 2013/ .. dated 12.06.2013
- iv. ERPC/SE (PS)/ PROTECTION/ 2013/ .. dated 20.06.2013

No comments have been received from any constituent.

The minutes of the above meetings may be confirmed.

Deliberation in the meeting

NTPC asked for some corrections in the minutes of Special Protection Sub-Committee meeting held on 05.06.2013 on the issue of bus splitting scheme of Khahalgau STPS, NTPC. It was clarified that since these corrections were already taken care of in the subsequent minutes of Special Protection Sub-Committee meeting held on 14.06.2013, so on this issue minutes of Special Protection Sub-Committee meeting held on 14.06.2013 will henceforth be considered as final.

Minutes of 15th Protection Sub-Committee meeting held on 09.04.2013 and minutes of Special Protection Sub-Committee meeting held on 07.05.2013 confirmed without any changes.

PART- B

FOLLOW-UP OF DECISIONS OF THE PREVIOUS PROTECTION SUB-COMMITTEE MEETING(S)

(The status on the follow up actions is to be furnished by respective constituents)

ITEM NO.B1.1 TRIPPING INCIDENCES ON 03.06.2013 AT 21:24HRS, 04.06.2013 AT 02:28 HRS, 05:20 HRS & 06:33 HRS INVOLVING RAMMAM, RANGIT, CHUZACHEN & SIKKIM SYSTEM

- The issue was discussed in the Special Protection Committee meeting on 14.06.2013
- In order to prevent repeated tripping of lines on overload, a short term measure was proposed to Powergrid to increase the existing plug setting of the over current relays (PSM) of all 132kV lines in Rangit-Chuzachen complex from 1.25 to 1.5. The setting would be reviewed once the SPS is commissioned.
(Action: Powergrid may confirm)
- ERLDC presented a SPS scheme for Chuzachen, which will actuate in case of tripping of one unit, when any of the (i) 132 kV lines Rangit-Rammam (ii) Rangit-Kurseong (iii) NJP- Kurseong and (iv) NJP-Melli gets tripped.
- Chuzachen being the Nodal agency was requested for immediate implementation of this SPS in consultation with PGCIL & ERLDC.
- Since then a review committee of ERPC was constituted to oversee the implementation.
- Recommendations of the review committee and the compliance report received from concerned agency is furnished:

Sl.No.	SPS REVIEW COMMITTEE RECOMMENDATIONS	COMPLIANCE REPORT
1.	Trip signals to be taken from dedicated contacts of the line breakers of Rangit end instead of semaphore	Complied as recommended.
2.	Breaker operation & maintenance to be carried out meticulously	Maintenance of the Circuit Breakers at Rangit end to be taken care of by Rangit HEP during their routine maintenance programme.
3.	Dedicated use of Electro mechanical relay for delivering SPS signal to Chuzachen	Work Pending, since the relay equipment is in service and instructions needed from GRID Authority (ERLDC/ERPC) to NHPC Rangit for releasing the same for dedicated use of SPS signals for Chuzachen.
4.	Change of settings of CDD type Over Current relay to ensure minimum delivery time of SPS signals to Chuzachen	Work Pending, since the relay equipment is in service and instructions needed from GRID Authority (ERLDC/ERPC) to NHPC Rangit for releasing the same for dedicated use of SPS signaling to Chuzachen.
5.	Restriction of power flow in Chuzachen Melli & Chuzachen Gangtok to 75MW each to ensure grid security & safety margin	Complied as recommended.

Chuzachen/ERLDC representative may please elaborate with all the latest developments.

Deliberation in the meeting

PSM of Over-Current Relays of all 132kV lines from Rangit HPS, NHPC are now set at 1.5 at Rangit end - Rangit HPS informed.

The CT ratio of all 132 kV lines from Rammam HPS is 600/1 and PSM of Over-Current Relays of these lines are set at 1.0 - WBSETCL informed.

PSM of Over-Current Relays of CTU control area in Rangit-Chuzachen complex including Gangtok S/s increased to 1.5 as per PCC direction on 07.06.2013 - POWERGRID informed.

M/s. Gati Infrastructure Ltd. appraised the house that in line with 87th OCC decision testing of the SPS of Chuzachen was successfully carried out on 23.07.2013 in the presence of representative from POWERGRID, ERTS - II and Rangit, NHPC. Further functioning of the SPS implemented was explained before the house with a detail presentation. Presentation is enclosed at Annexure-B1.1.

On the request from Chuzachen to maintain higher generation level from the existing level of 50 MW, PCC considered allowing generation at 75MW i.e - an increase of 25MW. PCC desired that performance of the implemented SPS at Chuzachen would be reviewed at 75 MW generation level for a week and thereafter if there is no constraint, then the station will be allowed to generate maximum at 99 MW.

ITEM NO. B 1.2 Tripping of 220 kV Biharsharif-Fatua line from Biharshariff S/s on 21.04.13

- Issue was discussed on 14.06.2013.
- It was reported that snapping of the Bottom conductor in between tower location No-103 & 104 of the 220KV Biharsharif - Fatuha Ckt.-II, resulted in total power failure at Biharsharif (BSPHCL) GSS. The line fault of 220KV Biharsharif - Fatuha Ckt.-II, operated the protection relays of all the 220KV incomer breaker of 315 MVA ICT-I, II & III at Biharsharif (BSPHC) end and that of the 220KV Biharsharif -Tenughat line at TenughatTPS end without tripping and isolating the faulty 220KV Biharsharif - Fatuha Ckt.-II itself at Biharsharif (BSPHCL) end.
- It was recommended that relay coordination of Fatuha, Biharsharif (BSPHCL), TenughatTPS and Biharsharif (PG) required to be carried out by BSPHCL in consultation with PGCIL and TenughatTPS and report.

BSPHCL may please submit the compliance report.

Deliberation in the meeting

Representative of BSPHCL was not present in the meeting.

Protection at 220 kV Biharsharif substation had been checked and necessary rectification in wiring of relay control circuit has been carried out at Biharsharif S/s. The relay setting had also been checked - BSPTCL informed vide a fax message dated 24.07.2013 placed in the meeting.

No information on compliance of previous recommendations by BSPHCL in respect of Fatuah S/s.

PCC decided that a committee comprising representatives from ERPC and POWERGRID would visit the substations -Fatuah (BSPHCL), Biharsharif (BSPHCL), Biharsharif (PG) and Tenughat TPS (JSEB) to assess the present status of the protection system and improvements required, if any.

ITEM NO. B 1.3 SYSTEM DISTURBANCES IN WEST BENGAL

i) BIDHANNAGAR 220 KV SUB-STATION ON 12.05.13 AT 15:55 HRS

- In the meeting on 14.06.2013 WBSETCL informed that the bus splitting scheme is now underway at 220 /132 kV Bidhannagar S/s and expected to be completed by October, 2013.

WBSETCL may please intimate the present status.

Deliberation in the meeting

WBSETCL informed that it would take some more time to complete necessary rectification work at this sub-station so as to make both the 220 kV buses operational with arrangement for sectionalisation. The work is now expected to be completed by the end of December, 2013.

ii) JEERAT 400KV SUB-STATION OF WBSETCL AND SUBSEQUENT POWER FAILURE AT 220 KV KASBA & OTHER SUBSTATIONS ON 21.05.13 AT 14:28 HRS.

- In order to prevent massive cascading effects of tripping it was proposed that WBSETCL should provide implementation of Special Protection Scheme to reduce the overloading of lines from Kasba sub-station, on which WBSETCL informed that it is in the process of considering and would be implemented very soon.
- On 10.06.2013 WBSETCL informed the following load rejection schemes were implemented at Subhasgram & Kasba 220kV sub-station:

Subhasgram Sub-station	Kasba Sub-station
Direction of power flow from PGCIL to WBSETCL Pick up : 992 Amp, Drop out:936 Amp; Time: 3 sec	Direction of power flow from Jeerat to Kasba Pick up : 672 Amp, Drop out:632 Amp; Time: 3 sec
Feeders to trip: i) 220kV Lakhikantapur-Subhasgram I & II ii. 3 nos. 33kV feeders at Subhasgram S/s	Feeders to trip: i) 132kV Sonnarapur I & II ii) 132kV Salt Lake I & II

In addition to the above , carrier signal sent with reverse blocking Zone-IV and blocking of Zone-I for 100 msec with carrier receipt from other end is to be made through for 220kV Subhasgram - Subhasgram (PGCIL) line I & II. WBSETCL was

requested to implement the above Load Rejection Scheme (SPS) in consultation with Powergrid and report in the next OCC meeting. The meeting between WBSETCL and Powergrid was proposed on 03.07.2013. The outcome is awaited.

The time frame for implementation of the SPS may please be intimated.

Deliberation in the meeting

A separate meeting between WBSETCL and Powergrid, ER-II was held on 06.07.2013 to discuss the blocking scheme for 220 kV Subhasgram (PG) - Subhasgram (WB) D/C line. Outcome of the meeting is as follows:

- i) Only one PLCC link is available for both the circuits;*
- ii) In order to prevent overreaching of the Zone - 1 distance protection at POWERGRID end, four (4) nos. of permissive signals are required for blocking the Zone - 1 protection;*
- iii) Therefore, for faults in Zone - 2, no direct trip signal would be available to ensure instantaneous tripping from POWERGRID end;*
- iv) ERTS - II is already in process of revising the settings of distance protection for this line;*
- v) Necessary approval from Corporate Engineering, POWERGRID is expected;*
- vi) Implementation of the revised scheme can be taken up by 15.08.2013.*

The line being only 800 Mtr. long, WBSETCL will implement current differential protection at a later date with OPGW as communication media between the ends-WBSETCL informed.

ITEM NO. B 1.4 FLAT UNDERFREQUENCY RELAY'S BASED AUTOMATIC LOAD SHEDDING SCHEME

Existing UFRs installed for Load Relief as agreed by the ER constituents

Control Area	Stage -I (48.8Hz) (MW)	Stage -II (48.6Hz) (MW)	Stage-III (48.2Hz) (MW)	Total Relief by Control Area
BSEB	80	80	115	275
JSEB	50	50	70	170
DVC	110	110	155	375
Odisha	150	150	208	508
WB & CESC	285	285	397	967
Total	675	675	945	2295

In view of improved operational grid frequency the stages of the UFR need to be raised with first stage at 49.2 Hz (against existing 48.8Hz in NEW GRID) and subsequent gap of 0.2 Hz between two consecutive stages for **four stages** as decided in the **1st NPC meeting** held on 15.04.2013. It was also decided that the quantum of load to be said at each level would be discussed by the RPCs with their constituents and revert back.

Accordingly, in 86th OCC meeting held on 21.06.2013 it was decided to implement the total load relief through operation of UFR in four stages without any changes in total quantum of load relief. The projected time schedule is one month.

Apportionment of UFR actuated load shedding into four stages as agreed by the constituents

Control Area	Stage -I (49.2 Hz) (MW)	Stage -II (49.0 Hz) (MW)	Stage-III (48.8Hz) (MW)	Stage-IV(48.6Hz) (MW)	Total Relief by Control Area
BSEB	55	55	82.5	82.5	275
JSEB	34	34	51	51	170
DVC	75	75	112.5	112.5	375
Odisha	101.6	101.6	152.4	152.4	508
WB & CESC	193.4	193.4	290.1	290.1	967
Total	459	459	688.5	688.5	2295

The constituents are requested to submit the details of stage wise frequency setting, sub-station wise, feeder wise, quantum of load relief [both Peak (MW) & Average (MW) loads] for all the above stages upon its implementation.

In the 2nd NPC meeting held on 16.07.2013 there is a proposal for pro - rata distribution revised AUFLs scheme for NEW GRID as under:

Power No. (MW /Hz)	Frequency (HZ)	WR (MW)	NR (MW)	ER (MW)	NER (MW)	Required Load Relief (MW)
3000	49.2	2000	2100	800	100	5000
3000	49.0	2000	2100	800	100	5000
3000	48.8	2000	2100	800	100	5000
3000	48.6	2000	2100	800	100	5000

So, ER constituents are required to enhance the quantum of Load Relief from existing level of 2295MW to **3200MW** within three months time frame.

Members may please deliberate.

Deliberation in the meeting

ERPC Secretariat informed the house that as per decision taken in the 2nd NPC meeting held on 16.07.2013 communicated subsequently by CEA on 23.07.2013, the total quantum of Under Frequency load shedding to be implemented in all four stages would be 3320 MW for Eastern Region. Accordingly, the total load quantum is divided among the constituents as per present proportionate as given below:

Control Area	Stage -I (49.2 Hz) (MW)	Stage -II (49.0 Hz) (MW)	Stage-III (48.8Hz) (MW)	Stage-IV(48.6Hz) (MW)	Total Relief by Control Area
Bihar	98	99	99	101	397
Jharkhand	61	62	61	62	246
DVC	134	135.5	136	137	542.5
Odisha	181.5	183.5	184	186	735
WB & CESC	345.5	350	350	354	1399.5
Total	820	830	830	840	3320

This was also discussed in the 87th OCC meeting on 23.07.2013 and agreed upon. PCC members were requested to implement the revised quantum of Under Frequency load shedding in their respective systems as per the scheme finalised by NPC, within a month timeframe and inform the substation/feeder-wise load relief obtainable through Under Frequency load shedding, for both peak and other than peak conditions.

ITEM NO. B 1.5 INSPECTION OF UFRs IN THE CONSTITUENT SYSTEM FOR ENSURING PROPER FUNCTIONING

ERPC has constituted a group comprising of all the constituent members for inspection of UFRs installed in the constituent systems. The group carried out physical inspection including testing of UFRs installed in various sub-stations to ensure proper functioning / healthiness status. The group has completed testing of healthiness for 19 sub-stations so far (CESC - 2 nos., DVC- 6nos., Orissa- 5nos.,WB- 6nos.).

The group has also planned to inspect 2 nos. S/s of CESC on 25.07.2013 and 5 nos. S/s of OPTCL in Orissa by 10th of August, 2013.

For carrying out physical inspection / healthiness status of UFRs, protection coordination in affected areas and also for surprise checking of healthiness of protection systems by the ERPC team (consisting of 7/8 members) at remote / far end locations of the constituent systems, the team needs logistical support from outside agencies. That creates extraneous problems and puts roadblocks before time bound inspection works etc. Hence, it is proposed if Protection sub-Committee accepts, then ERPC secretariat could explore the possibility of developing its own logistics for carrying out such type of audits/inspections. Talks are already initiated at highest level and for these constituents are not required to burden any additional costs.

Members may deliberate.

Deliberation in the meeting

PCC noted the plan for UFR inspection for the month of August, 2013.

Further, PCC members accepted the proposal of ERPC Secretariat for building up its own logistics with inspection vehicle, test kits and other resources for carrying out inspection of U/F relays, Protection audits, and relay coordination wherever necessary.

ITEM NO. B 1.6 REVIEW OF ZONE-3 PHILOSOPHY

- **Zone-3 settings of Distance Protection Relays of Transmission Lines - The Views / Comments on Existing practices / Philosophy for CTU & STU systems** were obtained from the constituents and discussed in the special meeting held on 07.05.2013.
- In the 1st NPC meeting Powergrid informed that they had already reviewed and implemented revised Zone-3 settings for inter-state lines wherever required in the country in coordination with STUs and generators. However,

for the intra-state transmission lines, various data including existing Zone-3 settings had not been received by them. All RPCs were requested to advise STUs to furnish all such data to Director (O), Powergrid within three weeks. In the 2nd NPC meeting Powergrid informed that except for OPTCL system the requisite data from most of the ER constituents has been received.

OPTCL is requested to furnish the above to Powergrid at the earliest.

Deliberation in the meeting

Members desired to know the final philosophy adopted for Zone - 3 Distance Protection settings, for Inter State Transmission lines.

Representative of POWERGRID clarified that it is same as submitted by them earlier in the PCC meeting. However, the time delay for Zone - 3 protection may vary between 1 to 1.5 seconds and that for Zone - 2 protection, vary between 0.3 to 0.5 seconds depending upon case to case. As no representative from OPTCL was present in the meeting, it was decided that OPTCL would be requested for forwarding the setting of Zone-3 distance protection of OPTCL lines to Powergrid HQ with immediate effect.

PART - C

ITEM NO.:1 REMEDIAL MEASURES TAKEN BY JSEB FOR TESTING OF EXISTING RELAYS AT HATIA, RAMCHANDRAPUR & CHANDIL SUB-STATIONS AND INSTALLATION OF NEW RELAYS AT CHANDIL 220 KV SUB-STATIONS

JSEB in a communication dated 12.07.2013 intimated that the following remedial actions have been taken recently with the help of PGCIL:

- i. On dt. 24.06.2013 and 25.06.2013 each and every relays of both 220/ 132kV and 132/33kV G/S/S of Hatia were checked and reset wherever required with time co-ordination.
- ii. On dt. 26.06.2013 and 27.06.2013 each and every relays of 220/132kV Chandil and Ramchandrapur G/S/S were checked and reset wherever required with time co-ordination.
- iii. Defective relays of 220kV Ramchandrapur-Chandil T/L at Chandil end were replaced and tested by Micom P430C relays.
- iv. On dt. 02.07.13 SEL-311C distance protection relays of 220kV STPS and 220kV PGCIL(Ranchi) bays at Chandil end has been tested and co-ordinated by application engineer of M/s Easun Re-rolley Ltd. Hosur (Bangalore) and found okay.
- v. In the first week of July, 2013 Micom P442 distance protection relays has been retrofitted in the 132kV Lalmatia-Dumka-I. Lalmatia-Kahalgon(NTPC) Lalmatia - Sabour (BSEB) line and tested, result found satisfactory.

After carrying out the above work, JSEB informed that the cases of un-coordinated trippings of lines as well as units are not repeating. However, the status is being observed for further course of action.

JSEB may please elaborate and submit the detailed testing results.

Deliberation in the meeting

JSEB representative informed that with the assistance from POWERGRID, the time delay for Zone - 2 distance protection of all 220 KV and 132 KV lines emanating from Chandil, Hatia and Ramchandrapur have been reduced to 150 ms from 400 ms. Since then, indiscriminate tripping of lines on faults has reduced. Further, as single phase auto reclose facility is not present in their 220 kV lines, 3-phase tripping on single phase fault has been ensured with the help of manufacturer.

JSEB also informed that In the first week of July, 2013 Micom P442 distance protection relays has been retrofitted in the 132kV Lalmatia-Dumka-I. Lalmatia-Kahalgan(NTPC), Lalmatia -Sabour (BSEB) lines, which was pending since long. The relays were tested and result found satisfactory

ITEM NO.:2 ANALYSIS & DISCUSSION ON GRID INCIDENCES WHICH OCCURRED IN CTU / STU SYSTEMS DURING JUNE & JULY, 2013

Jharkhand System

- i. Total power failure at Patratu & Tenughat TPS of JSEB on 10.06.13 at 18:08hrs
- ii. Total power failure at Chandil s/s of JSEB on 18.6.13 at 13:10 hrs
- iii. Total power failure at Hatia, Tenughat & Patratu s/s of JSEB on 20.6.13 at 03:25 hrs
- iv. Tripping of all running units of Tenughat & Patratu TPS on 22.06.13 at 14:22hrs
- v. Bursting of CT at 33kV side of station transformer of Patratu TPS on 01.07.13 at 06:20hrs

The detailed report prepared by ERLDC upon collection of information from concerned utilities and reported to CEA, NLDC (ERLDC may please present the report).

JSEB may please elaborate and remedial measures taken.

Deliberation in the meeting

JSEB representative informed that, they are taking necessary corrective actions for rectifying the protection system at Chandil, Ramchandrapur, Hatia, Patratu and Tenugaht and will feed back regularly.

North Bengal System

- (i) Repeated trippings of 220kV Purnea-Dalkhola (PG) lines on 18.06.13 at 10:21hrs & 19.06.13 at 08:02 hrs leading to load loss in North Bengal system.

Reports of ERLDC

At 10:21hrs of 18.06.13, 220kV Purnea-Dalkhola (PG)-I tripped on B-N fault, Z-1, 30.64km from Purnea. At that time heavy rainfall & sporadic lighting was observed at

this area. 220kV Dalkhola (PG)-Dalkhola (WB)-D/C also tripped at the same time causing around 115MW radial load loss at Dalkhola (WB) area. Incident of similar nature occurred on 19.06.13 again at 08:02hrs when 220kV Purnea-Dalkhola (PG)-I & II tripped on R-Y fault, at distance 590.5m from Purnea end, wherein again 220kV Dalkhola(PG)-Dalkhola(WB) D/C tripped simultaneously. On inspection, it was found that insulators at loc-117 from Purnea end had got de-capped as a result of lightening & thunderstorm.

The detailed report may please be highlighted (ERLDC may please present the report).

The following points are required for deliberation and analysis :

- a. Repeated tripping of 220kV Dalkhola(PG)-Dalkhola(WB) D/C due to fault in any one line in 220kV Dalkhola-Purnea section is clearly a case of relay mal-operation. The relay indications from Dalkhola(PG) end need to be furnished for complete analysis. Dalkhola(WB) has indicated 3-phase tripping without stating the zone. Also SOTF has been mentioned to have been operated which is not in order. In the absence of full relay indications, the incident could not be logically analyzed. WBSETCL/Powergrid may furnish the complete relay indications including supporting DR printouts for both the sections for ensuring further clarity and corroborate the same with the trippings.
- b. SOTF operation at Dalkhola(WB) needs to be explained.
- c. 3-phase tripping from Dalkhola(WB) end needs to be explained. Relay indications need to be furnished properly stating the Zone.
- d. Considering that length of the line is 41KM reasons for tripping of 220kV Purnea-Dalkhola-II on 19/06/13 on Zone -III (F/L-156.3KM) from Purnea(PG) end is not clear.
- e. 220kV Dalkhola(PG)-Dalkhola(WB) being a short line, WBSETCL/Powergrid may comment on introduction of differential protection for the section.

Deliberation in the meeting

It was understood that RED 670 Relay for differential protection is installed in this short line at both ends. Mal-tripping occurred on 18th and 19th June, 2013 due to erroneous setting / erroneous configuration of tripping logic at WBSETCL end. The discrepancy has since been rectified with the help of the supplier. Thus, necessary action has been taken to prevent recurrence of such mal-tripping.

- (ii) Tripping of Birpara –Binaguri 220kV lines followed by CHPS units on 09.07.2013 at 09:16 Hrs onwards**

Reports of ERLDC

At 09:16hrs, 220kV Birpara-Binaguri-D/C tripped on phase to phase (R-B-Ø) fault, Z-1 from Binaguri end. At the same time bus coupler at Malbase s/s tripped on earth fault as reported by Malbase. As a result power flow in 220kV Birpara-Salakati-D/C increased to 170MW (each).

Subsequently, at 09:29hrs, 220kV Birpara-Salakati-I tripped on B-Ø earth fault, Z-1, 91.6km from Birpara end. Later it was found that the insulator of the said line at loc-292 had got de-capped and the line was declared under breakdown. Due to heavy power flow thorough the only remaining circuit of 220kV Birpara-Salakati-II, power swing was detected in the said line at Birpara end, and the line tripped on 3-Ø fault at 09:32hrs.

All the running units of Chukha HEP tripped simultaneously due to load generation imbalance.

The detailed report may please be highlighted (ERLDC may please present the report).

The following points are required for deliberation and analysis :

- a. Confirmation regarding tripping of Bus coupler at Malbase on E/F and the detailed relay indications/report from Malbase to cross-check for any mal-operations.
- b. The PSB settings at Birpara end for 220kV Birpara-salakati D/C need to be furnished for cross-checking whether PSB had operated correctly and the 3-phase, Zone-I tripping of 220kV Birpara-Salakati-II is in order.
- c. A Special protection Scheme (SPS) for generation reduction/tripping of unit at CHPC needs to be put in place in case of outage of 220kV Birpara-Binaguri D/C or 220kV Birpara-Salakati D/C which would need to be kept activated during the peak monsoon season.

Deliberation in the meeting

Representative from POWERGRID, ERTS - II explained with the help of a presentation (Presentation is enclosed Annexure-2.A) the events that had led to tripping of Birpara - Binaguri as well as Birpara - Salakati D/C lines on 9/7/13. From DR output, it could be inferred that after tripping of 220 kV Birpara - Salakati Circuit I, the impedance measured by the Distance Protection of Circuit 2 at Birpara was less than the Zone - 1 value due to which Circuit 2 also tripped.

In this connection, ERLDC proposed that an SPS for reducing Chukha generation may be implemented at Birpara S/s, which would take care of cascaded outage of 220 kV lines connecting Birpara S/s with the rest of the NEW grid in the event of sudden outage of one or two lines on fault. Such SPS would be required only during monsoon when generation of Chukha would be in full. The proposal was illustrated with the help of a presentation. Powergrid agreed to implement such type of SPS scheme at Birpara S/s once it is approved. Presentation is enclosed at Annexure-2.B.

After threadbare deliberation, Members decided to re-examine the proposed scheme prepared by ERLDC and revert back with their final views in the next PCC meeting.

Orissa System

Repeated trippings of lines on over voltage from Meramundali 400kV S/S

Reports of ERLDC

Repeated trippings of 400kV Meramundali-Anugul section and other lines from Meramundali have been observed due to over-voltage Stage-I initiation from Meramundali. At Meramundali the Bus voltage generally remains around 420kV to 425kV. Initially problem in B-ph CVT of Meramundali-Anugul line at Meramundali end was reported and the same was reportedly rectified. However, even after rectification of the same, the trippings have not reduced.

The detailed report may please be highlighted (ERLDC may please present the report).

The following points are required for deliberation and analysis:

Considering the voltage level at Meramundali S/S remains well below 430kV, OPTCL may clarify regarding repeated initiation of over-voltage from Meramundali and actions taken in this regard.

Deliberation in the meeting

ERLDC informed that repeated overvoltage tripping of 400 kV Meramundali - Angul line had occurred in the last month. However, Such tripping incidents have not been experienced after OPTCL attended the B-phase CVT of the line at Meramundali end. The other details of corrective actions taken by OPTCL could not be ascertained as representative from OPTCL was not present in the meeting.

Bihar System

- (i) Tripping of 100MVA ICTs at Purnea & Purnea-Purnea(PG) lines on 06.07.2013 at 20:49 Hrs

Reports of ERLDC

At 20:49hrs of 06/07/13, due to fault in downstream system of BSPHCL, 132kV Purnea (PG)-Purnea(BSPHCL)-II & III tripped on earth fault & O/C relay operation at Purnea(PG) end. However no tripping was reported at Purnea (BSPHCL) end. 132kV Purnea(PG)-Purnea(BSPHCL)-I did not trip and it was later detected that Y-Ø CVT fuse of 132kV Purnea (PG)-Purnea (BSPHCL)-I at Purnea (PG) was blown. Due to Y-Ph CVT fuse failure, 132kV Purnea(PG)-Purnea(BSPHCL)-I did not trip and consequently all three 100MVA ICTs at Purnea (PG) end tripped on Directional O/C & E/F operation and cleared the fault. 132kV Purnea (PG) - Kishanganj and 132kV Purnea (PG)-Purnea (BSPHCL)-I were later hand tripped from both the sides as per normal practice. Report from BSEB in this regard is yet to be obtained.

The detailed report may please be highlighted (ERLDC may please present the report).

The following points are required for deliberation and analysis :

- a. The reasons for relays at Purnea(BSPHCL) end failing to clear the fault need to be clarified.
- b. The reasons for CVT fuse fail occurring coincident to the incident and the reasons for the same not being detected previously need clarification.
- c. The over-current trip settings for 220/132kV, 3 x 100MVA ICTs at Purnea(PG) need to be audited and coordinated w.r.t the settings for the relays at Purnea(PG)/Purnea(BSPHCL) end. Powergrid may furnish the over-current settings for 220/132kV ICTs at Purnea, demonstrating that the over-current relay operation is in order considering the delay in fault clearance.
- d. As 132kV Purnea(PG)-Purnea(BSPHCL) section is very short , Powergrid/BSPHCL may comment regarding introduction of differential protection for the above section.

Deliberation in the meeting

POWERGRID ERTS - I representative, informed that Purnea(PG) - Purnea(BSPTCL) 132 kV D/C line is protected only by directional Over-Current Relay from POWERGRID end. On 06.07.2013, there was a fault in 132 kV Purnea - Khagaria line which could not be cleared from BSPTCL end as MICOM relay installed at BSPTCL sub-station did not operate. Further, due to failure of PT fuse at POWERGRID end of 132 kV Purnea(PG) - Purnea(BSPTCL) ckt-1, the Directional Over-Current relay at POWERGRID end also failed to pick up. As a result the fault was cleared by operation of back up Over-Current and Earth Fault relay of the 220 / 132 kV ATRs at Purnea (PG) end. Members felt that since static Directional Over-Current Relay is the primary protection available at POWERGRID end, provision should be made for PT fuse supervision immediately.

Members further suggested that Purnea(PG) - Purnea(BSPTCL) line being a short line (around 1 Km.), the line should be protected using numerical relay with differential protection as the main and distance protection as back up protection.

PCC recommended immediate interaction between BSPTCL & Powergrid for relay coordination at the site.

- (ii) Tripping of 220kV Fatuha-Patna(PG) ckt at 12:13hrs on 25.06.13 followed by tripping of ICTs at Biharshariff S/S.

The detailed report from Bihar is awaited.

Deliberation in the meeting

The incident could not be deliberated in the absence of representative from BSPTCL / BSPHCL

MPL

Tripping of MPL U#-I due to R-Phase GT bushing failure on 06.07.2013.

The detailed report from MPL is awaited.

Deliberation in the meeting

Representative from MPL explained the incident with the help of a presentation. Presentation is enclosed at Annexure-2.C.

Representative from DVC shared that similar incident had also been experienced by them for their Mezia unit No. 8. The presentation is enclosed at Annexure-2.D. He further requested the House that these types of problem may be addressed and suitable remedial action may be suggested for overcoming the problem. PCC desired to collect such observations from the constituents for further deliberation and consultation with the manufacturer.

ITEM NO.3 Oscillation triggered at Jamshedpur by APNRL unit

Deliberation in the meeting

ERLDC informed that severe power oscillation had been recorded by the PMU at Jamshedpur 400 kV sub-station on 07.07.2013, when Turbine Control valve of APNRL Unit 1 reportedly started hunting due to mal-functioning of the Unit Output Transducers. APNRL subsequently assured that the problem has been rectified by them, but similar incident again occurred on 23.07.2013. Members unanimously agreed that Oscillation in 400 kV power system networks is detrimental to the security of the grid as a whole and requested APNRL to take immediate steps for preventing its recurrence.

ERPC: KOLKATA

Attendance Sheet

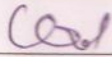
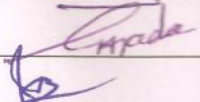
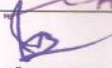
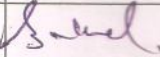
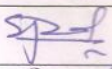
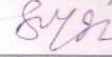
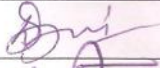
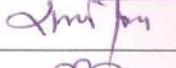
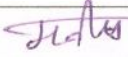
16th PROTECTION SUB-COMMITTEE MEETING

Venue: ERPC Conference Hall

Date: 24.07.2013(Wednesday)

Time: 11:00Hrs

Sl.No.	Organisation	Name & Designation	Mobile / Fax No./ E.mail	Signature
1	ERPC	AK Bandyopadhyay MSI/e	9433068533 msrerp-power@nie.in	Ak Bandyopadhyay
2	ERLDC	U.K. Verma, GM	08902496220 ujwal.kumar.verma@gmail.com	U.K. Verma
3	ईआरएलसीए	डी के श्रीवास्तव, डी-एन-ए.	9433041802 dkshrivastava@erpc.co.in	डी.के. श्रीवास्तव
4	PS-ERLDC	P.S. Das, Chief MgV	9433041837 psdas_psd@yahoo.co.in	P.S. Das
5	ERLDC	S. Banerjee, C.M.	9433041823	S. Banerjee
6	POWERGRID	Jiten Das, CM	9431815708	Jiten Das
7	DVC	JAYANTA DUTTA S.E.	9431515717	J. Dutta
8	MTPL	S. Nalaya Sinha	9432041581	S. Nalaya Sinha
9	NHPC	PURUSHOTTAM CHAUDHARY	9800936867	P. Chaudhary
10	NHPC	Md. Arif, TCDP-IT	9932025993	Md. Arif
11	Gati	W. Mandal	8016082299 niladri.mandal@gatiinfra.com	W. Mandal
12	VEL	S. Chowdhury, Asst. MgV	9937294336	S. Chowdhury
13	MPL	Anash Bapen	9204757804	Anash Bapen
14	ERLDC	M.K. Thakur	9432351832	M.K. Thakur
15	ERLDC	Sauvav Kumar Sahay	9432013173	S. Sahay
16	DPL	BISWANATH MUKHERJEE	9434703172	B. Mukherjee
17	CESC Ltd.	SANTANU SEN	9903010750 santanu.sen@np-19.in	S. Sen
18	CESC Ltd	Ashish Ghoshal	9831054664	A. Ghoshal
19	WBSETCL	AMITAVA BISWAS	9434910030	A. Biswas
20	WBSEDCL	T. K. DE, A.CE/ALDC	9433870748	T. K. De
21	NBS&YCL	P. Roy	9432316427	P. Roy
22	WBSETCL	A. Raichaudhary	9434910075	A. Raichaudhary
23	WBSEDCL	Gopnata Majhi, Sr. MgV	9432021132	G. Majhi
24	WBPDCL	P. HALDER, DGM (OS)	9432019803	P. Halder
25	TSEB	Vidya Sagar Singh, EEE/CRITL	9934169984 sagarjseb@gmail.com	V. S. Singh
26	TVNL	Sanatan Singh ESE	9431510020 sanatan.tvnl@gmail.com	S. Singh

S.No.	Organisation	Name & Designation	Mobile / Fax No./ E.mail	Signature
27	ERPC	V. Kalyanaram	2423 3015	
28	ERPC	Ganeswara Rao		
29	"	J. BANJOYOPADHYAY, SE		
30	ERPC	B. SARKHEL, SE(PS)	9433065724	
31	ERPC	S.P. Datta, AGM(NTPC)	9433067022	
32	NERPC	Shri Mohan Jha		
33	ERPC	D. K. Bansi, EE	5883617236	
34	NTPC	R. P. Singh, DGM(PS)	9431011366	
35	NTPC, FSTPS	B. MUKHERJEE, Supdt. (B&M/EM)	09434751481	
36	NHPC, Teesta-II P.S.	MANISH RAJ, Dy. Mgr(CE)	9800003548	
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				

DECISIONS OF 86TH OCC & PCC

Item no.B31- OCC : Schedule/generation restriction to 50 MW for Chuzachen HEP in view of repeated disturbances.

- Plug Setting Multipliers (PSMs) for 3-phase over-current has been raised suitably to allow transfer capacity of at least 102MVA through the lines, before operation of 3-phase over-current relays.
- ERLDC proposed a Special Protection Scheme to tackle overloading of this network.
- Gati was appointed the nodal agency for execution of the same.

ITEM NO.12 PCC - TRIPPING INCIDENTS ON 03.06.2013 AT 21:24HRS, 04.06.2013 AT 02:28 HRS, 05:20 HRS & 06:33 HRS INVOLVING RAMMAM, RANGIT, CHUZACHEN & SIKKIM SYSTEM

“Tripping of one unit in case of tripping of any the following 132 kV lines Rangit- Rammam ,Rangit-Kurseong ,or power flow of any of the above lines exceeding 70 MW” .

7/30/2013

3

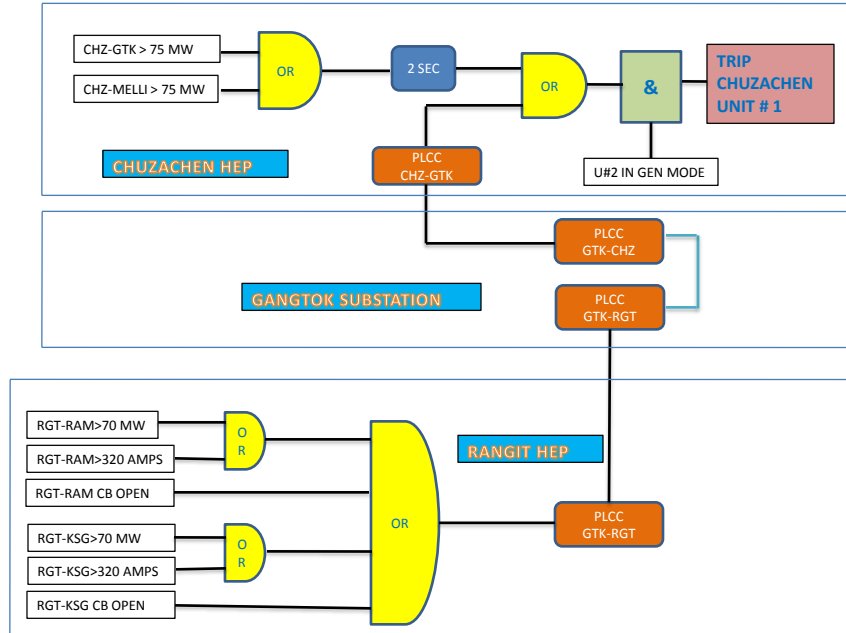
SPECIAL PROTECTION SCHEME

IN ALL BELOW CASES, CHUZACHEN UNIT I WILL TRIP SUBJECT TO UNIT II IN OPERATION

- **TRIPPING OF RANGIT – RAMMAM LINE CB**
- **TRIPPING OF RANGIT – KURSEONG LINE CB**
- **POWER FLOW > 70 MW OR LINE CURRENT > 320 AMPS IN RANGIT-RAMMAM FEEDER**
- **POWER FLOW > 70 MW OR LINE CURRENT > 320 AMPS IN RANGIT-KURSEONG FEEDER**
- **POWER FLOW > 75 MW IN CHUZACHEN – MELLI IN FEEDER**
- **POWER FLOW > 75 MW IN CHUZACHEN-GANGTOK FEEDER**

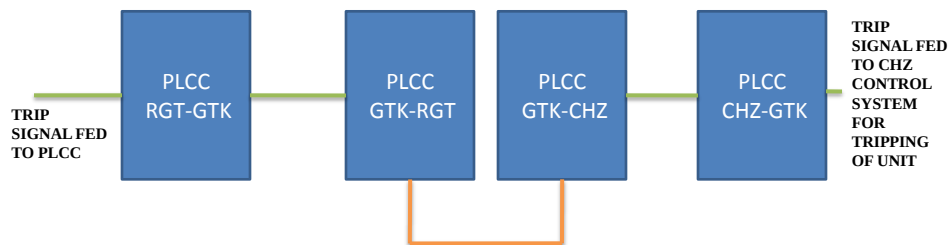
7/30/2013

4



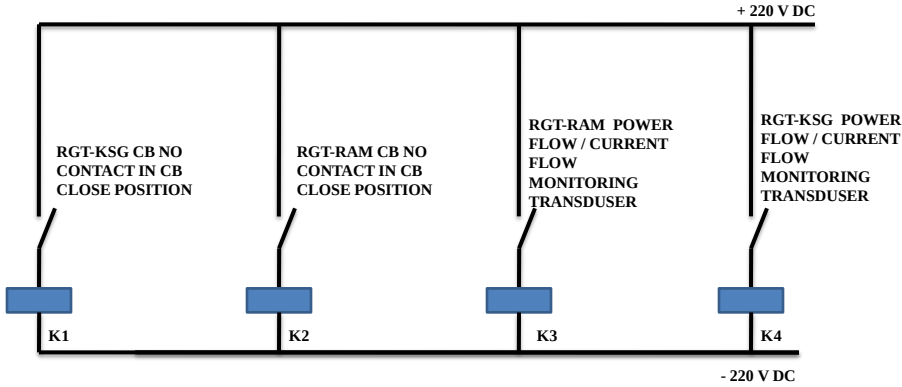
COMMUNICATING TRIP SIGNAL FROM RANGIT HEP TO CHUZACHEN HEP VIA GANGTOK

PLCC SYSTEM USED FOR COMMUNICATING TRIP SIGNAL FROM RANGIT TO CHUZACHEN.



2. PREPARING CIRCUIT TO GET TRIP SIGNAL, IN THE RANGIT HEP

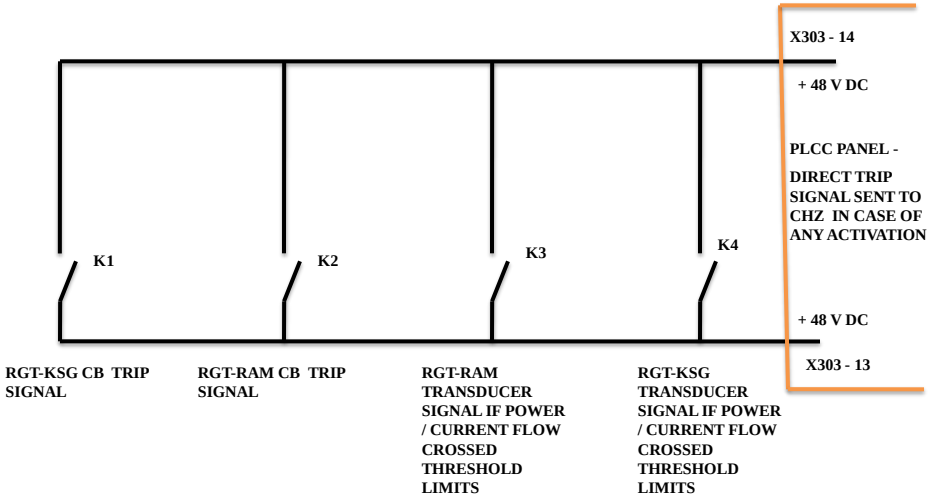
CIRCUIT IMPLEMENTED



7/30/2013

7

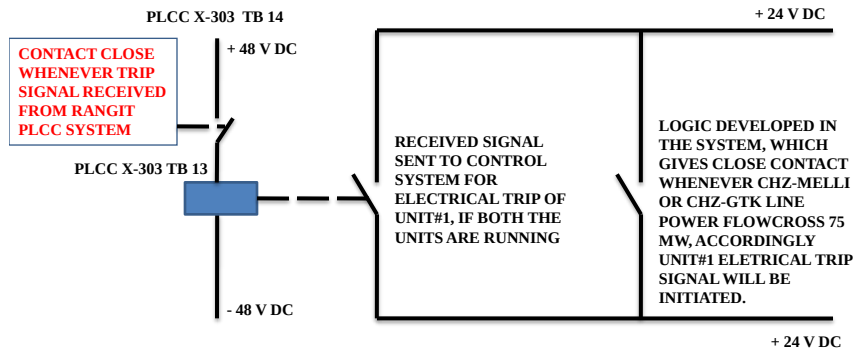
CIRCUIT IMPLEMENTED



7/30/2013

8

3. RECEIVING SIGNAL AND IMPLEMENTING IN THE CHUZACHEN SYSTEM FOR UNIT#1 TRIPPING



7/30/2013

9

SPS REVIEW COMMITTEE RECOMMENDATIONS

Preliminary Recommendation by ERPC team

1. Trip signal may be taken from dedicated contacts of Line breakers at Rangit HEP instead of contacts of Semaphore.
2. Since the breaker status at Rangit is the main input for SPS operation, the breaker maintenance and operation should be carried out meticulously.
3. Overcurrent Electromechanical relay installed at Rangit end on Rangit-Kurseong may be used dedicatedly for CHEP SPS as this is an additional protection available there which is in addition to Micromerical relay. For Rangit-Ramnang Line the O/C setting on the electromechanical Relay can be set to operate at 1.0 PSM as lesser PSM enables the operation of SPS quite earlier thus giving a greater safety margin.
4. CD type Over Current relay time input to SPS at Rangit end should be made available to the SPS logic with minimum time delay as far as possible.
5. The power flow on Chuzachen-Melli or Chuzachen-Gangtok line may be restricted to 75MW on each of the line separately in the interest of Grid security and to allow safety margin.

V. Kalyanraman
10/2/13
V. Kalyanraman ERPC

T. Baruah
10/2/13
T. Baruah (PGCIL)

S. Sahay
10/2/13
S. Sahay (ERLDC)

TRANSDUSER SETTING PARAMETERS PRINT SCREEN

Configuration Software
File Mode Setting Help Exit

Primary Value Secondary Value

Input

- * System Configuration: ThreePhase2Element
- * Rated Voltage V_{l-p} = 132kV/115.00V
- * Rated Current I_L = 300A/1.00A
- * Nominal Frequency = 50 Hz

Analog O/P 1

Analog O/P 2

Analog O/P 3

Analog O/P 4

Digital O/P 1

* Alarm ON #
System Active Power >= 70.000MW
OR
Average Current(I₁+I₂+I₃)/3 Current >= 320.000A
N/A

Digital O/P 2

MODBUS

Mod Bus ID 881
Baud Rate 9600

Write To PMTS

Read From PMTS

ESOT

TRANSDUSER ON LINE MEASUREMENT PRINT SCREEN

Configuration Software
File Mode Setting Help Exit

Normal Run Mode

Measured	Input	Value	Unit
O/P1	A		mA
O/P2	A		mA
O/P3	A		mA
O/P4	A		mA

Digital O/P1

Limit 1 Ptol 50.568 >= 154.444 OFF

OR

Limit 2 Iavg 0.274 >= 1.067 OFF

NA

Limit 3

Digital O/P2

Limit 1

0

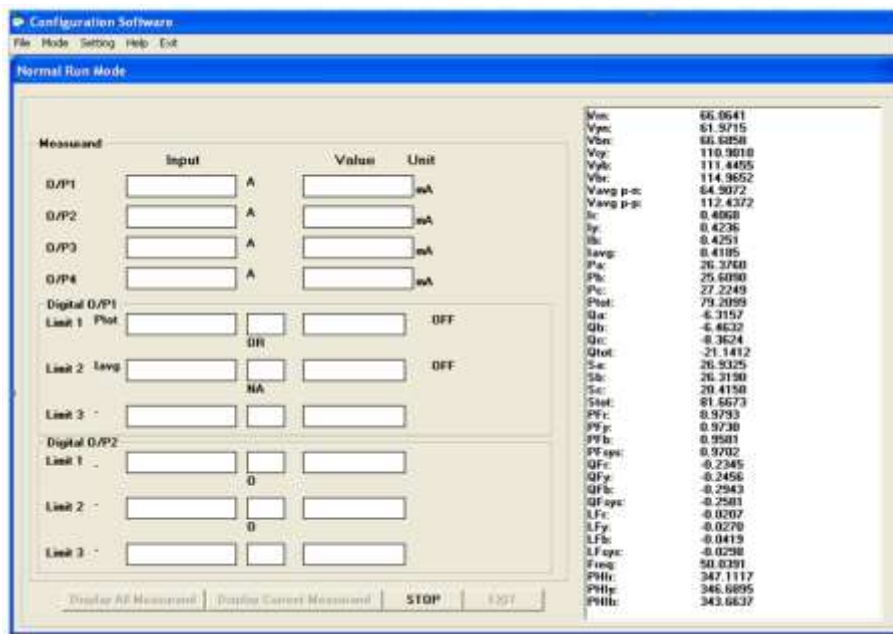
Limit 2

0

Limit 3

Display All Measurand Display Current Measurand STOP ESOT

TRANSDUSER ON LINE MEASUREMENT PRINT SCREEN



PHOTOGRAHS OF INSTALLED SPS EQUIPMENT



[illegible]

WITNESSING OF SPS DEMONSTRATION – 23/07/13

Sub: - Report on effectiveness of operation of SPS at Chuzachen HEP

As per instruction of the competent authority undersigned visited at Rangit HEP along with Engineer from M/a Gail, to check the effectiveness of SPS at Chuzachen HEP and following observation has been made

In line with committee recommendation on dated 10-07-2013, (Copy enclosed) the following modification / addition for SPS has been done by M/a Gailinfacture Pvt Ltd. at Rangit, HEP.

01. Breakers input for SPS at Rangit HEP have been taken from Auxiliary contract of CBs of Rangit - Rammam & Rangit -Kurseong Feeder.
02. A separate watt Transducer has been installed at Rangit HEP, for each feeder, ie Rangit -Rammam & Rangit -Kurseong and the Transducer will generate the trip signal, if the power flow or average current for each feeder reach 70 MW or 320A respectively
03. To check the effectiveness the SPS, false trip signal generated at Rangit HEP and it has been observed that signal fed to the logic in such occasion and chuzachen PH received the tripping signal for Unit 01.
Submitted for kind perusal please

Encls - As above


(T. Baruah)
Dy Manager (O&M)
POWERGRID, Gangtok Substation.

THANK YOU



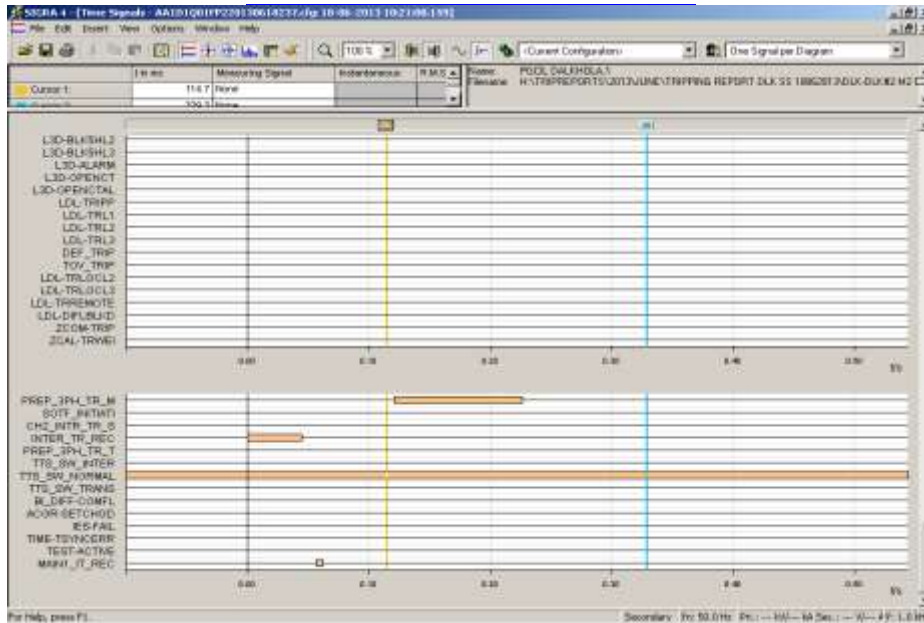
Annexure-2.A

Tripping Analysis Report

POWERGRID ER-II

- [Dalkhola Trip 18/06/13](#)
- [Dalkhola Trip 19/06/13](#)
- [Binaguri- Birpara, Birpara - Salakati](#)

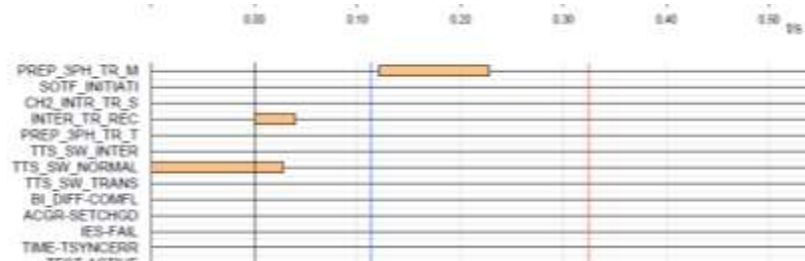
DR DLK-DLK feeder



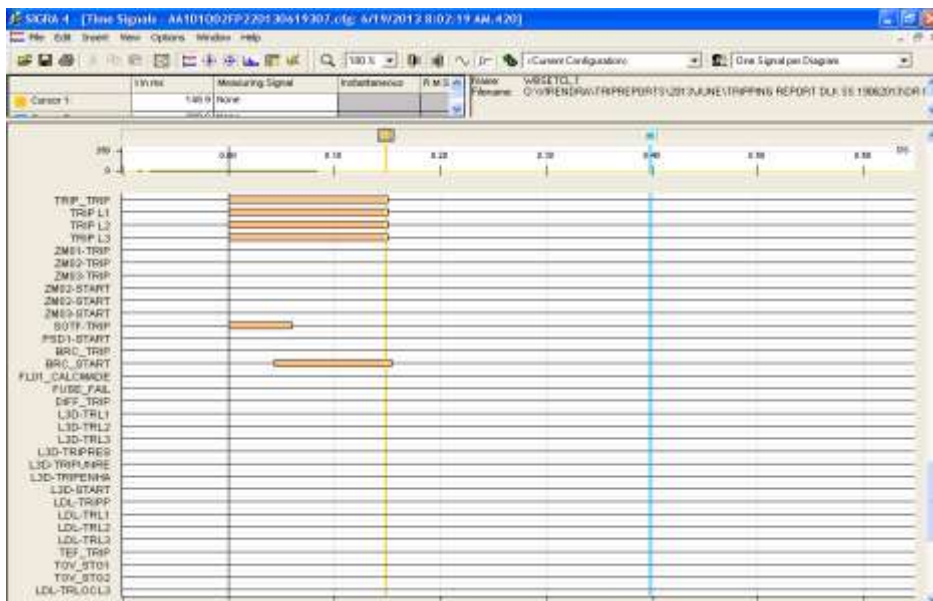
Dalkhola – Purnea 19/06/13

- On this day line tripped on Ph-Ph (R-Y).
Lightening and thunderstorm was reported from the area. Insulator decapping was found.
- On this occasion also Dalkhola (PG)- Dalkhola (WBSETCL) tripped.
– Intertrip received from WBSETCL end.

DLK-DLK DR : PG End



DLK-DLK DR: WBSETCL End



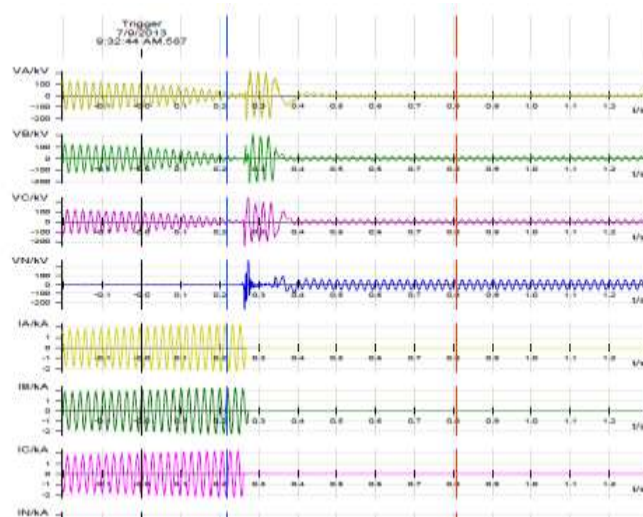
Resolution

- On both the trippings, intertrip was received from WBSETCL.
- Issue was diagnosed and it was found that WBSETCL end relay is issuing trip command on tripping of any of the feeder from Dalkhola due to configuration issue.
- As per configuration inter-trip is being sent to other end, as a result feeder tripped on both occasion.
- Issue has been rectified and no occurrence since then has been observed.

Birpara – Binaguri

- Birpara – Binaguri line tripped on ph-ph fault. Insulator decapping in R&Y phase at same tower was observed.
- Birpara – Salakati ckt-I also tripped on B-N fault. Insulator decapping in this line is also found.
- After about 3 min. of tripping of Birpara-salakati ckt-I, ckt-II also tripped on 3-ph fault.

BRP- Salakati – II DR



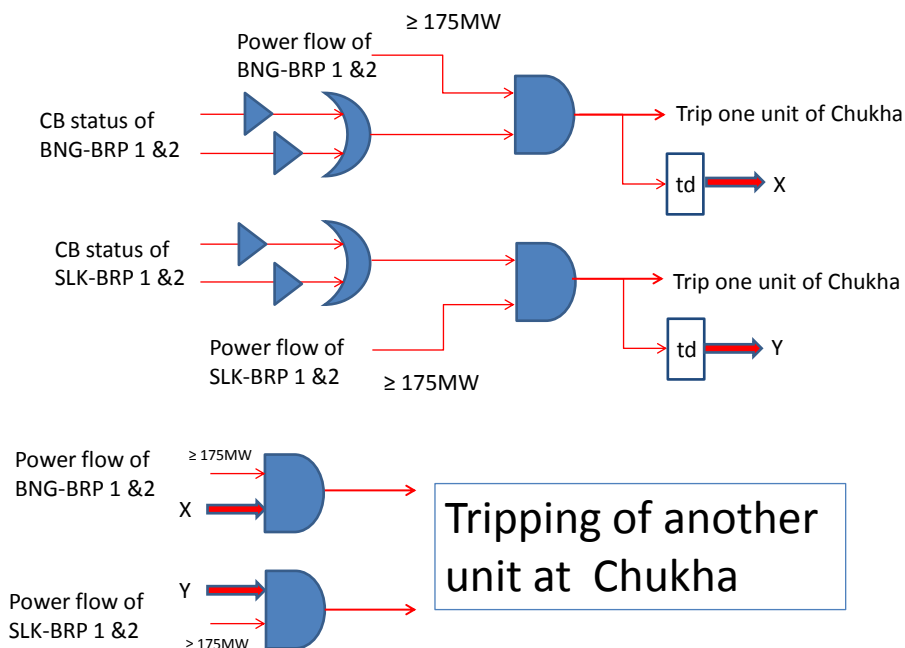
Birpara – Salakati - II

- From the DR Power Swing is observed.
- As per DR fault impedance seen by relay: 17 ohm.
- Line impedance: 64 ohm.
- Fault seen by the relay is well within Zone-I.
- Power swing setting: all zone blocked with unblocking time of 2 sec.
- This line has tripped after considerable time of tripping of other ckt. Hence power swing has been blocked by the relay however even after that relay see zone-I fault hence initiated trip.

Annexure-2B

SPS for Chukha

- Summated flow of Birpara-Salakati and Birpara-Binaguri is taken as input. After occurrence of (n-1) contingency, flow in the remaining parallel ckt may be allowed upto 175 MW (keeping a safety margin of around 20MW w.r.t the thermal limit of 192 MW)
- Load shedding done only if power flow continues to violate the allowable limit even after tripping first unit at CHPS





To,
The Member Secretary In charge
Eastern Region Power Committee
14, Golf Club Road, Tollygunj,
Kolkata-700033

MPL/400KV SY/ERPC/04

Date: 22/07/2013

Sub: Fire incident happened in Unit-1 Generating Transformer (R-Phase) dated 06/07/2013 at 09:49 hrs.

Dear Sir,

This is with reference to the fire incident happened in GT-1(R-Phase) on dated 06/07/2013 at 09:43 hrs.

The details of fire incident and protection operated for Unit-1 isolation is attached herewith.

This is for your kind information and record.

Kindly acknowledge.

Thanking You
Yours Truly
For Maithon Power Ltd.

Ananjan Mukherji
22/7/13
Ananjan Mukherji
amukherji@tatapower.com
Mob No: 9234001689

Enclosed: Annexure: page-2 to 6
Cc: General Manager, ERLDC

MAITHON POWER LIMITED

(A Joint Venture Company of Tata Power & DVC)

Maithon Office: MA-5, Gogna Colony, PO-Maithon Dam,
District-Dhanbad, Jharkhand -828207
Tel: +91 6540 276604/06
Fax: +91 8860004758 & +91 6540 270023

Corporate Office: C-43, Sector-62, Noida-201307 (UP)
Tel: +91 120 6663000 Fax: +91 120 6663039
Registered Office: Jeevan Bharti, 10th Floor Tower-I,
124, Connaught Circus, New Delhi-110001

Fire Incident Report

Unit#1 was running on 430 MW before tripping . Unit#1 tripped on Class A protection & GT-1 (R-Phase) caught fire at 09:49 hrs.

Sprinkle system started in auto but was not adequate to control the fire. MPL fire team took the control of situation & extinguishes fire completely in 30 Minute.

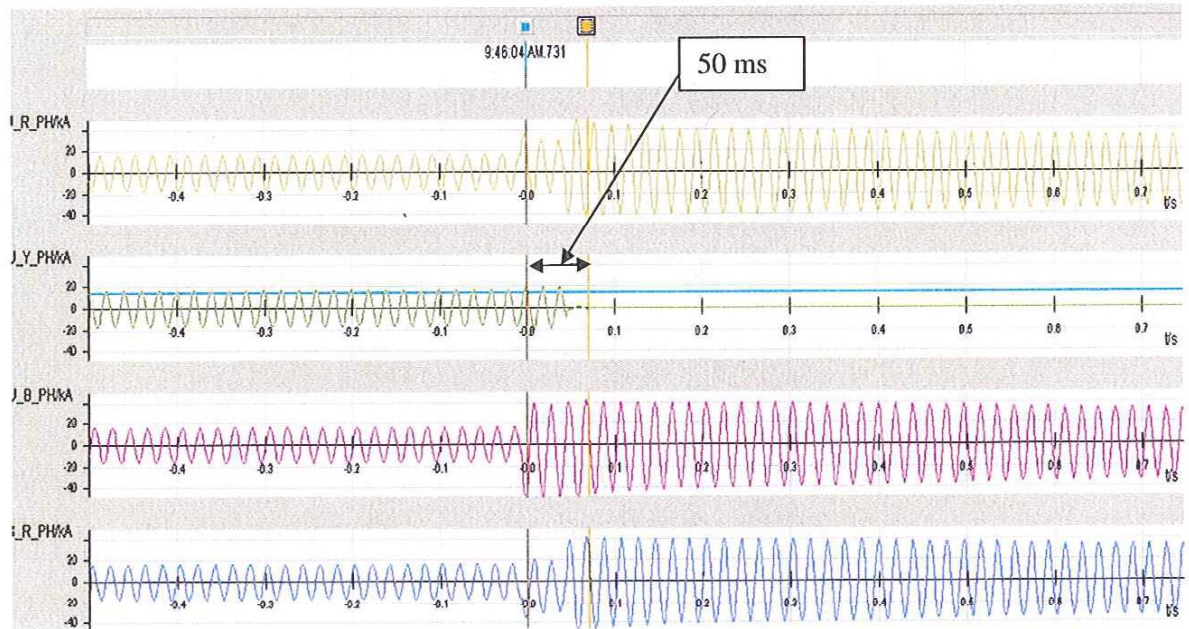
All Generator transformer protection like own differential/Overall differential/HV REF/Buchhloz/PRV/SPRR/OTI/WTI has operated.

As per Numerical relay record, fault was isolated from 400 kV system within 50 ms.AVR field breaker has also tripped.

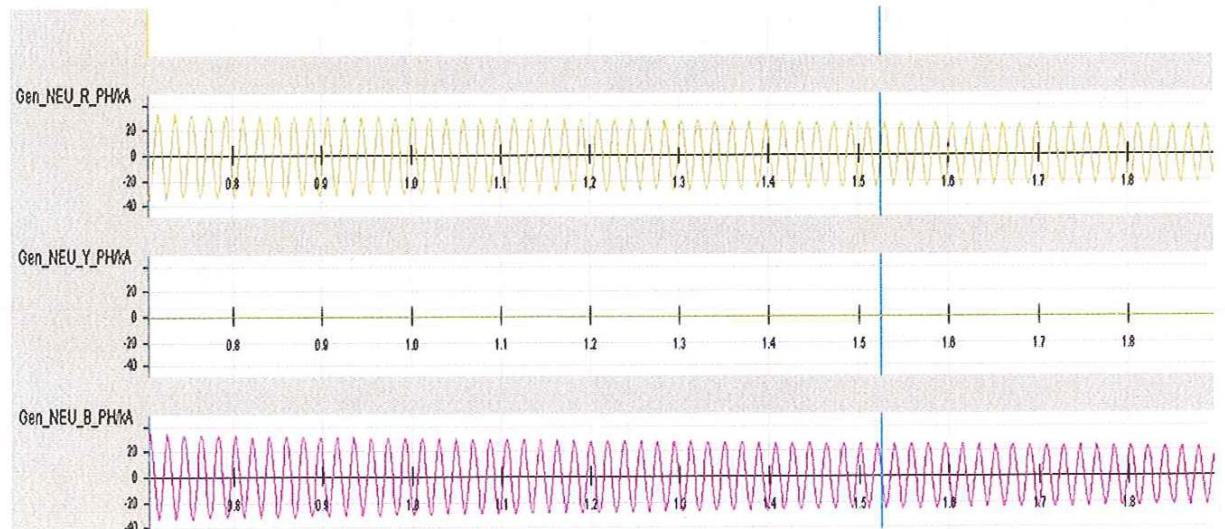
All electrical parameter before the fault was absolutely normal.

Protection	Status
GT Differential	Operated
Overall Differential	Operated
HV REF	Operated
Earth Fault & over current	Operated
Backup Protection	Operated
Buchhloz	Operated
PRV	Operated
SPRR	Operated
OTI & WTI	Operated

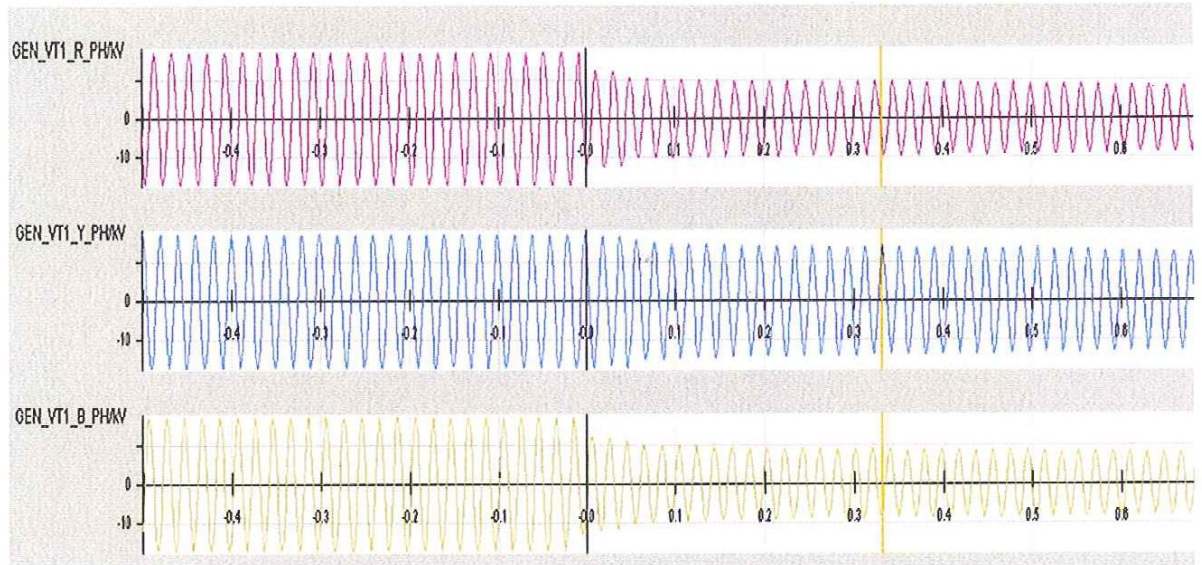
GR Relay Record at the start of Over current in Generator:-



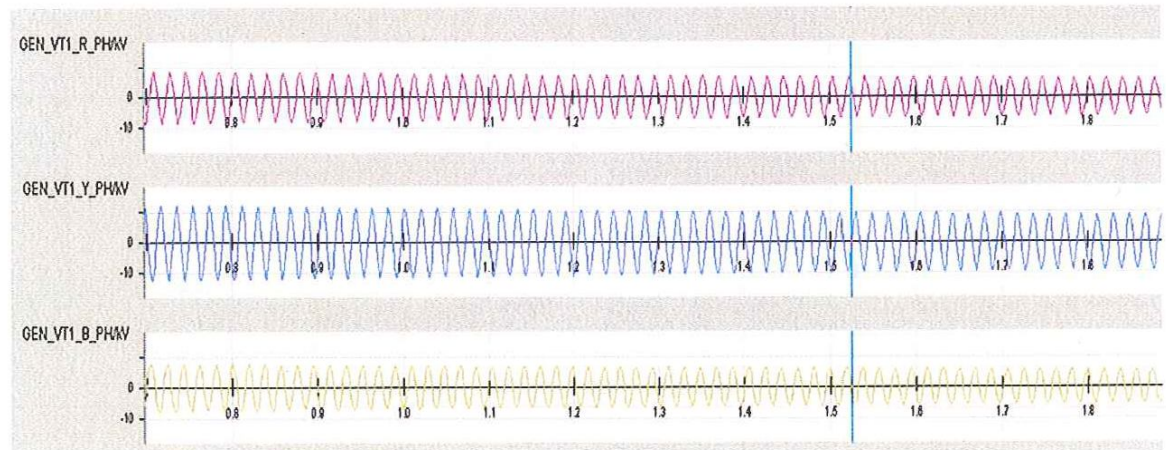
Pattern of Generator Current Continued:-



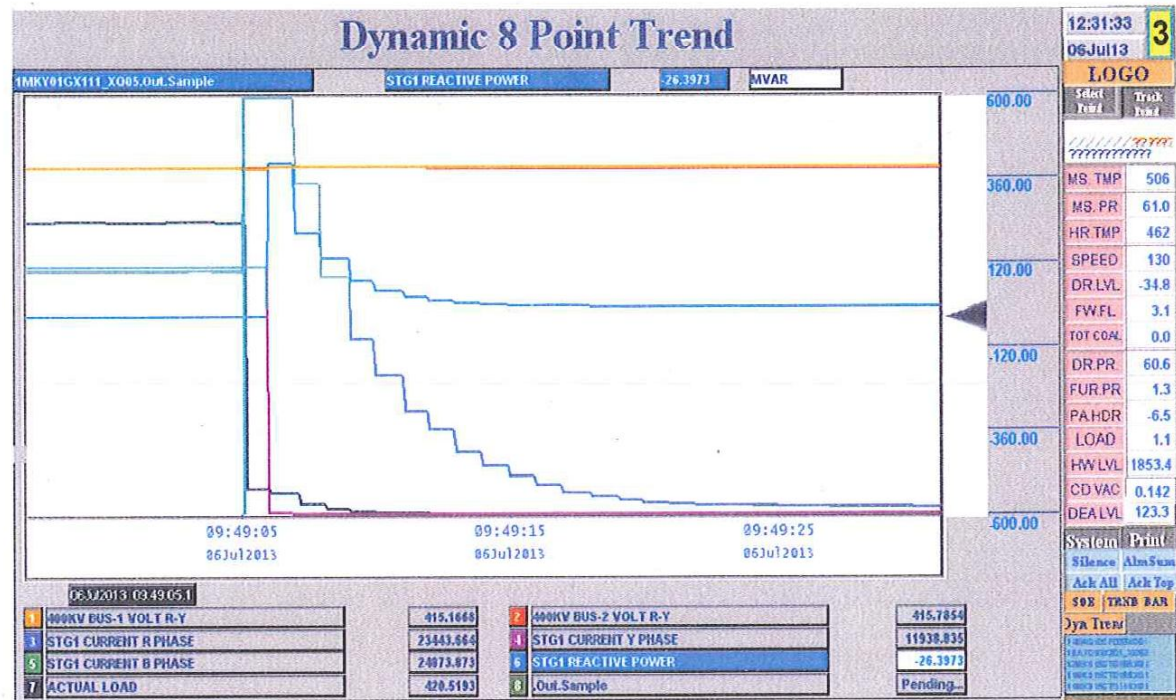
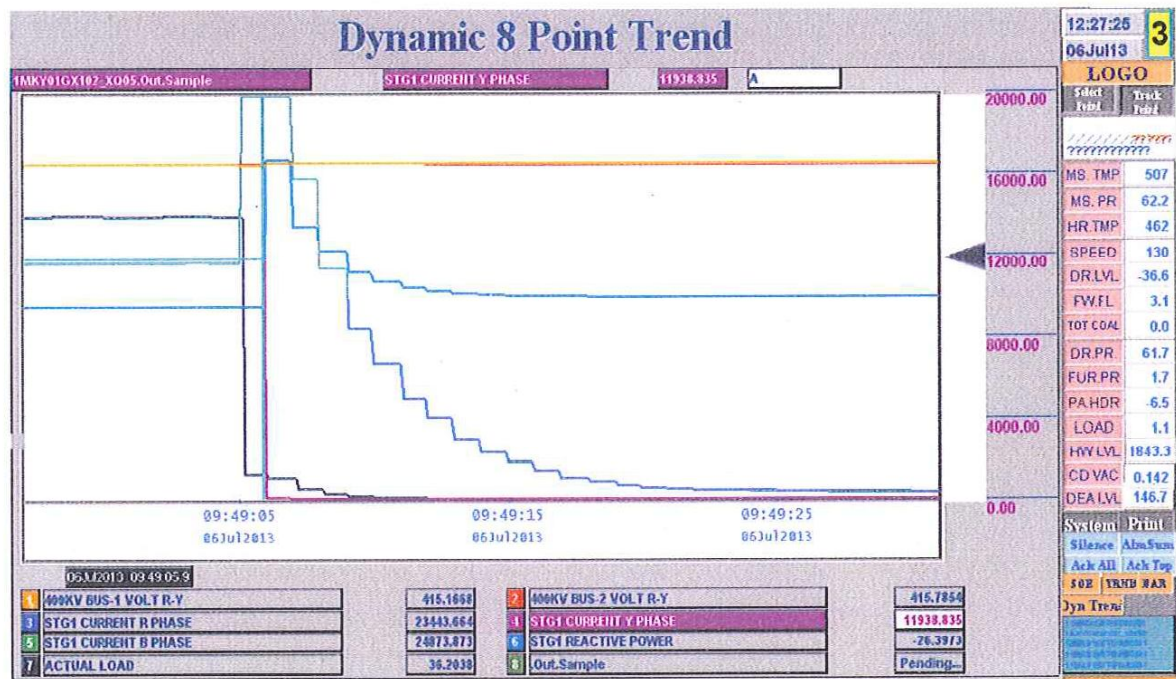
Pattern of Generator Voltage:-

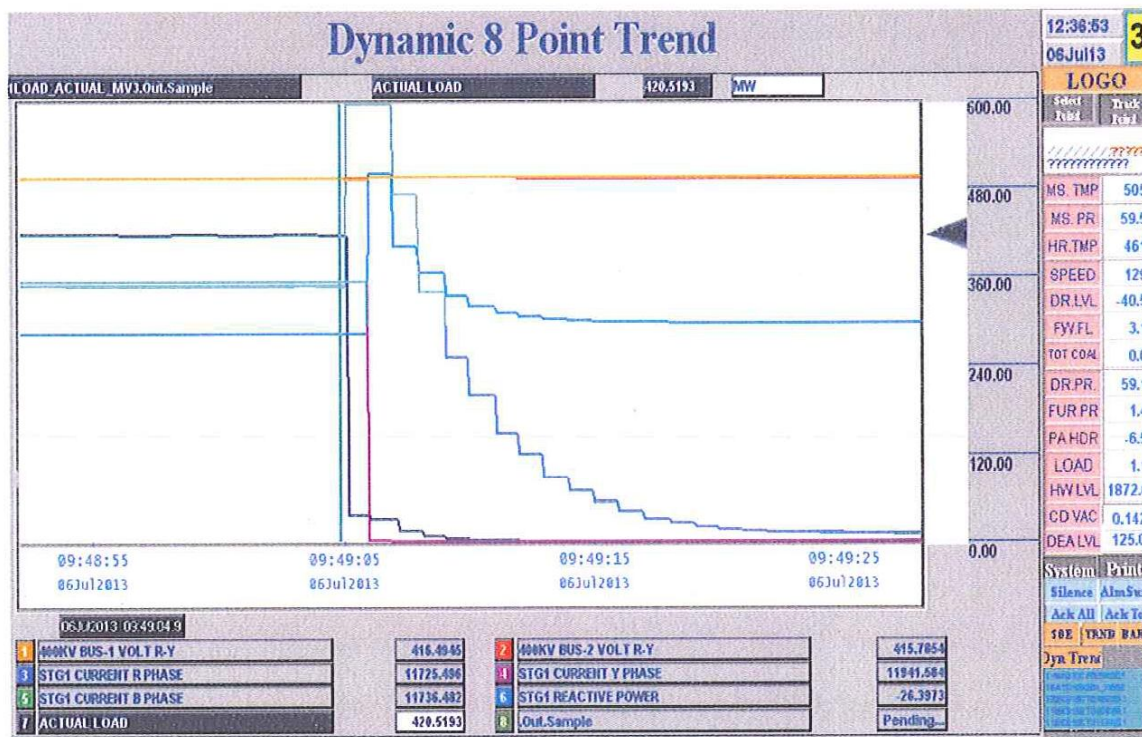
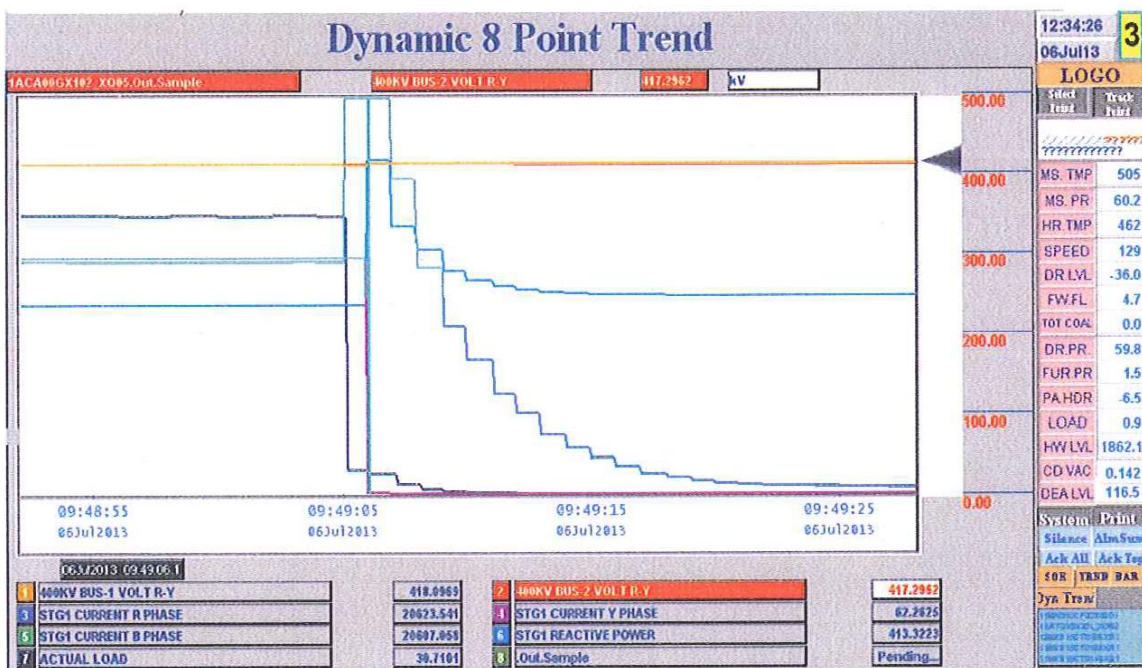


Pattern of Generator Voltage Continued:-



Current decaying trend during GT-1 fire.



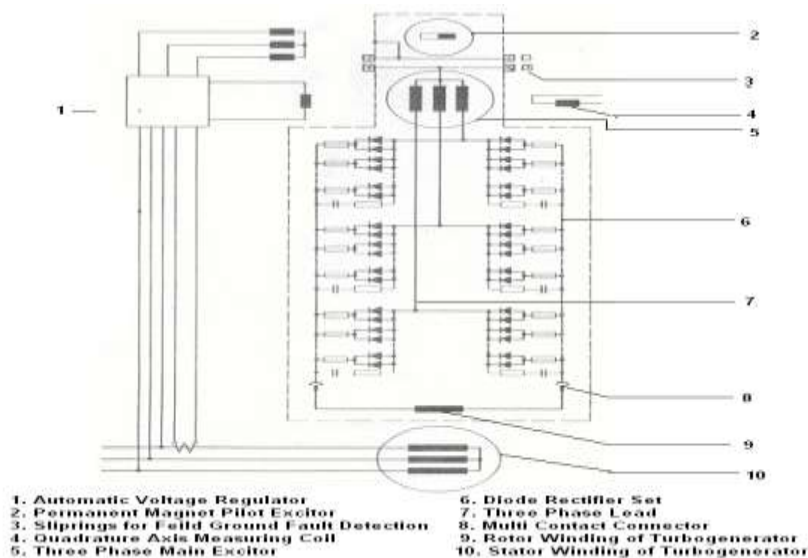


MAJOR FAILURES IN GENERATOR TRANSFORMERS OR ITS AUXILLIARY EQUIPMENTS OF DVC 500MW UNITS

***CENTRAL TESTING CIRCLE,
DAMODAR VALLEY CORPORATION***



Basic arrangement of Brushless Excitation system



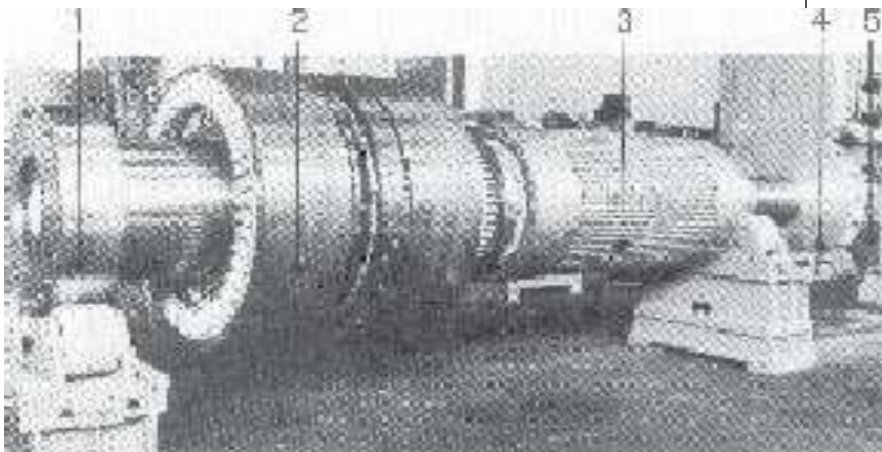
BRIEF EXPLANATION



Basic Arrangement of Brushless Excitation System With Rotating Diodes

The Above figure shows the basic arrangement of the exciter. The three-phase pilot exciter has a revolving field with permanent magnet poles. The three-phase AC generated by the permanent-magnet pilot exciter is rectified and controlled by the AVR to provide a variable DC current for exciting the main exciter. The three-phase AC is induced in the rotor of the main exciter. This three-phase AC induced in the rotor of the main exciter is rectified by the rotating rectifier bridge and fed to the field winding of the generator rotor through the DC leads in the rotor shaft.

EXCITOR ROTOR VIEW



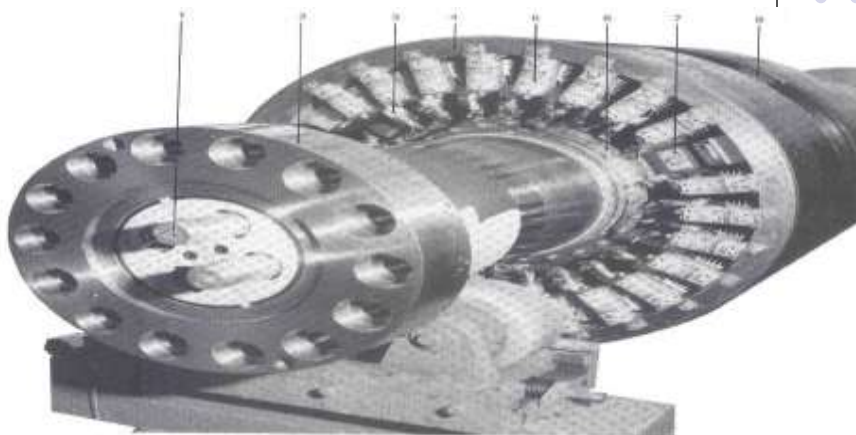
- 1 Coupling 2 Rectifier wheel 3 Rotor of main exciter
- 4 Fan 5 Permanent magnet rotor

BRIEF EXPLANATION



The exciter rotor shown corresponds to the basic arrangement described above. A common shaft carries the rectifier wheels, the rotor of the main exciter and the permanent-magnet rotor of the pilot exciter. The shaft is rigidly coupled to the generator rotor. The exciter shaft is supported on a bearing between the main and pilot exciter. The generator and exciter rotors are thus supported on total of three bearings. Mechanical coupling of the two shaft assemblies results in simultaneous coupling of the dc leads in the central shaft bore through the **Multi contact** electrical contact system consisting of plug-in bolts and sockets. This contact system is also designed to compensate for length variations of the leads due to thermal expansion

EXCITOR ROTOR



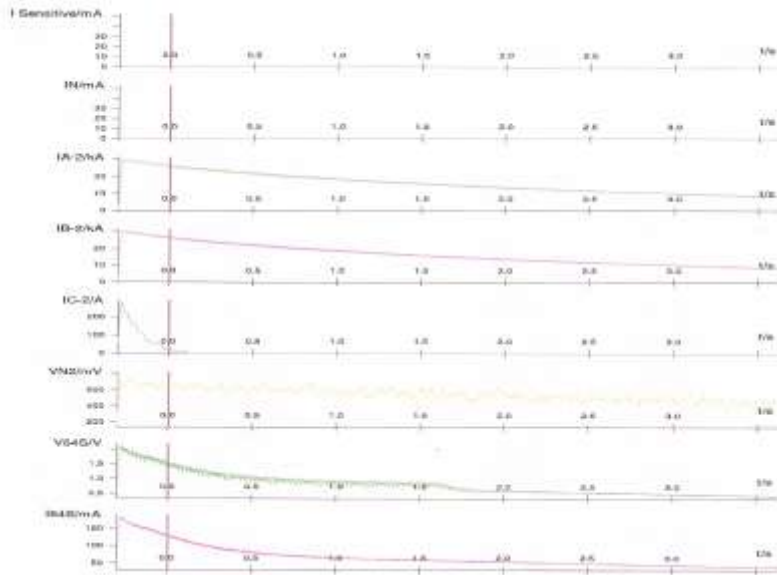
- | | | |
|--------------------------|---------------------|-----------|
| 1 Multikontakt connector | 2 Coupling | 3 Diode |
| 4 Rectifier wheel | 5 Fuse | 6 AC lead |
| 7 NC network | 8 Balancing weights | |

[illegible]

FAULT RECORD OF RELAY SHOWING SUSTAINANCE OF VOLTAGE AND CURRENT

SICRA 4.3

7/31/2013 AM 2:45



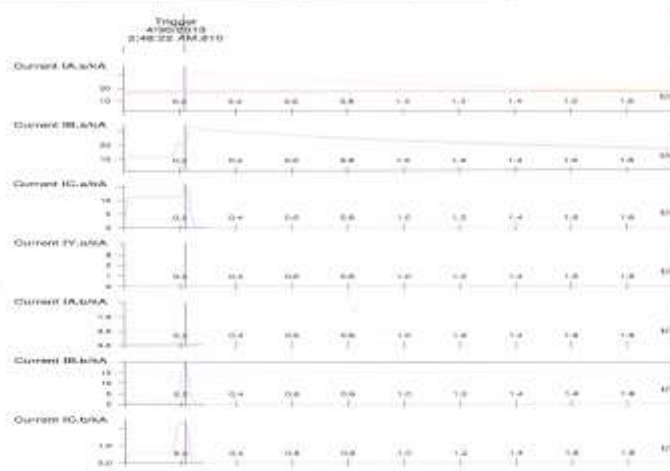
FAULT RECORD OF RELAY SHOWING SUSTAINANCE OF VOLTAGE AND CURRENT

SICRA 4.3

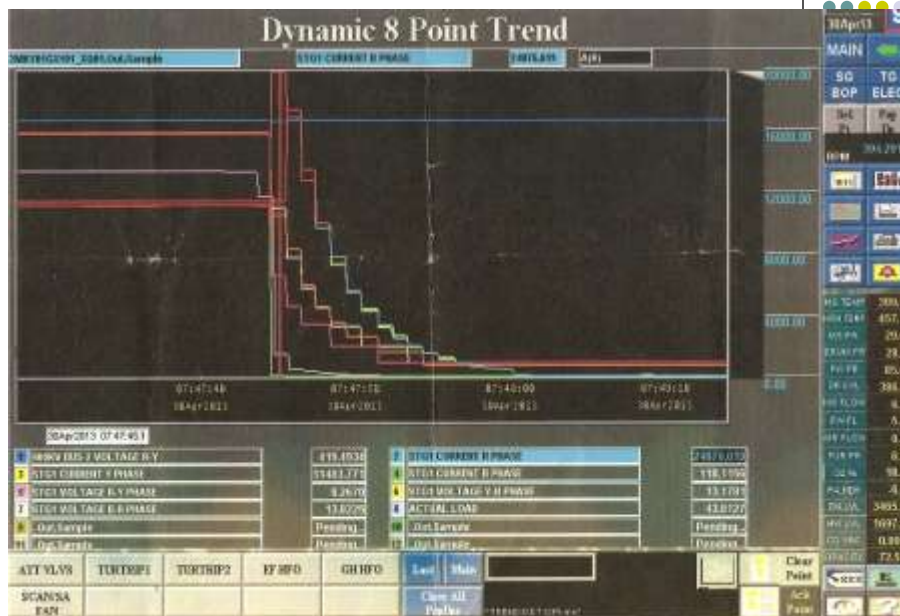
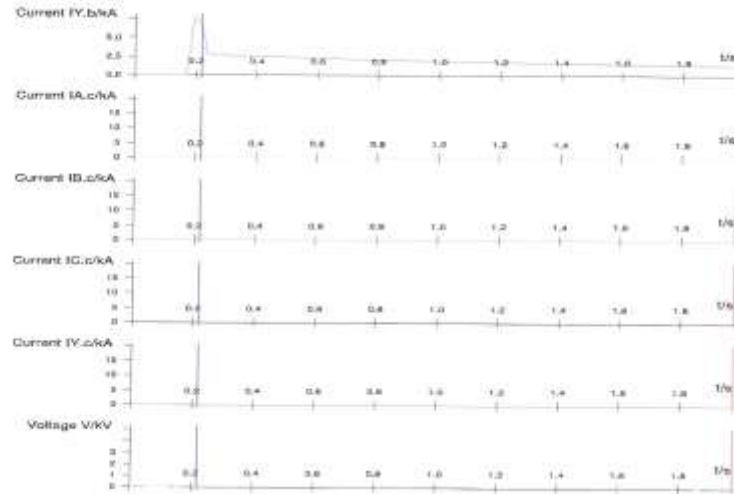
7/31/2013 AM 2:45



	Time	Measuring Signal	Instantaneous	R.M.S.
Current 1	0.00	Current 1A	10.00 kA	10.00 kA
Current 2	0.00	Current 2A	10.00 kA	10.00 kA
Current 3	0.00	Current 3A	10.00 kA	10.00 kA
Current 4	0.00	Current 4A	10.00 kA	10.00 kA
Current 5	0.00	Current 5A	10.00 kA	10.00 kA
Current 6	0.00	Current 6A	10.00 kA	10.00 kA
Current 7	0.00	Current 7A	10.00 kA	10.00 kA
Current 8	0.00	Current 8A	10.00 kA	10.00 kA
Current 9	0.00	Current 9A	10.00 kA	10.00 kA
Current 10	0.00	Current 10A	10.00 kA	10.00 kA



SIGRA 4.3



**Y-PHASE GT FAILURE OF UNIT 8 AT MTPS ON
30.04.13**



**Y-PHASE GT FAILURE OF UNIT 8 AT MTPS ON
30.04.13**



RATING OF BUSHING



- MAKE :- BHEL
- TYPE :- OIP CONDENSER
- VOLTAGE CLASS :- 420KV
- ONE MINUTE POWER FREQUENCY WITHSTAND :- 630KV
- IMPULSE WITHSTAND VOLTAGE :- 1425KVP

BUSHING FAILURE OF B'PHASE GT OF UNIT # 7 ON 9.10.2011



BUSHING FAILURE OF B'PHASE GT OF UNIT # 7 ON 9.10.2011



BUSHING FAILURE OF B'PHASE GT OF UNIT # 7 ON 9.10.2011



REMEDIAL STEPS RATING OF NEW BUSHING FOR 500MW GT AT DVC



- MAKE :- PASSONI VILLA, ITALY
- TYPE :- OIP CONDENSER
- VOLTAGE CLASS :- 550KV
- ONE MINUTE POWER FREQUENCY WITHSTAND :- 750KV
- IMPULSE WITHSTAND VOLTAGE :- 1675KVP

SINGLE LINE DIAGRAM ON GENERATOR AND ST.TRANSFORMER WITH GCB

