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

AGENDA FOR THE 9th PROTECTION SUB-COMMITTEE MEETING TO BE HELD AT ERPC, KOLKATA ON 19.04.2011 (TUESDAY) AT 11:00 HOURS

PART – A

ITEM NO. 0 **PRESENTATION ON "LOCAL BREAKER BACK UP (LBB)" AND "BUS BAR DIFFERENTIAL" PROTECTION PHILOSOPHY OF 400KV SUB-STATIONS OF POWERGRID - BY SHRI S.J. LAHIRI ,CHIEF MANAGER (OS), POWERGRID ER-II**

ITEM NO.:1 **CONFIRMATION OF THE MINUTES OF THE 8th PROTECTION SUB-COMMITTEE MEETING OF ERPC HELD AT ERPC, KOLKATA ON 02.12.2010**

The minutes of the above meeting were circulated vide letter no. ERPC/SE (PS)/ PROTECTION/ 2010/ 7239-72 dated 22.12.2010

No comments have been received from any constituent. If there is no comment, the minutes of the meeting may be confirmed.

PART - B **FOLLOW UP OF DECISIONS OF THE PREVIOUS (8th) PROTECTION SUB-COMMITTEE MEETING**

The status on follow up actions is to be furnished by respective constituents.

ITEM NO. 1 **SIKKIM**
(Item No. 2 of MoM of the 8th Protection sub-committee)

The circuit breaker and proper protection and metering arrangement is to be provided at both Sagbari sub-station (by LILO of 132 kV Rangit-Melli line) and Rohtak sub-station (66 kV Rangit-Melli line) respectively.
132kV Sagbari sub-station would be connected to the grid by LILO of 132 kV Rangit-Melli line in September, 2010 when metering and protection of Sagbari will be ready.

Also the progress of Rohtak 66kV sub-station may be intimated.

Sikkim may please intimate the present status.

ITEM NO. 2 **ANALYSIS ON THE FAILURE OF 315 MVA, 400/ 220KV ICT-II AT BIHARSHARIFF SUB-STATION OF POWERGRID ON 05.10.2010 AT 22:22 HRS (POWERGRID ER-I TO SUBMIT RELEVANT DATA / TEST RESULTS ETC)**

Due to frequent through faults, 315 MVA, 400KV ICT-II failed on 05.10.2010 at 22:22 Hrs at the time of fault in 220kV Biharshariff-Bodhgaya Ckt-II in R-

Phase. The matter was referred to 8th Protection sub-Committee for further discussion and analysis.

It was decided that POWERGRID should make all out efforts to restore ICT-II at Biharshariff S/Stn. and implement the bus bar protection schemes with the help of M/s AREVA in order to avoid frequent trippings of ICTs in future. In the 17th ERPC meeting held on 17.03.2011 BSEB & Powergrid were requested to expedite the above works.

The ICT-II at Biharshariff was restored at on 18.03.2011.

The status of implementation of differential bus bar protection scheme with the help of M/s AREVA may please be intimated – BSEB & POWERGRID

ITEM NO. 3 STATUS OF AUTO-RECLOSER FACILITIES ON IMPORTANT 400KV TRANSMISSION LINES (BOTH CTU & STU).

Constituents agreed to provide the information regarding status of 'non-operation' of auto-recloser facility available at all major transmission lines (both CTU & STU) in the next protection committee meeting.

ERLDC, POSOCO may please intimate the present status.

ITEM NO. 4 FREQUENT TRIPPINGS OF 132KV KAHALGAON-LALMATIA AND KAHALGAON-SABOUR LINES – PROPOSED BY KHSTPP, NTPC

It was decided that following was recommended for early compliance:

i) The healthiness of Protection system at Lalmatia & Sabour S/stn. is to be ensured by the concerned utilities i.e. BSEB & JSEB.
ii) 132kV link between Lalmatia & Sabour may be kept normally open.
iii) Routine line patrolling may be done by the utilities.

The joint testing of distance protection relay (QUADRO MHO) installed in 132kV Kahalgaon to Lalmatia was carried out by KhSTPP, NTPC & JSEB on 01.02.2011 and the observations are:

a) The setting of the phase and neutral angle of the relay was found at 80 degree which should have been 70 degree – **The phase angle was changed to 70 degree.**
b) The over reach and under reach testing was done but the result was found not satisfactory.
c) The breaker was tripped through relay itself.
d) The trip contact of the distance relay was not hooked up with master trip relay.

On the above observation the setting of the timer relay was done as below:

i) T1 -0 m.sec
ii) T2- 240 m.sec in place of 400 m. sec
iii) T3- 800 m. sec in place of 1040 m.sec

It was concluded that for better performance and reliable protection the existing relay should be replaced by latest numerical relay.

Members may please discuss.

ITEM NO. 5 SPECIAL PROTECTION SCHEMES (SPS) FOR ER GRID

a) <u>SPS for IPPs Generation</u>

i) SPS for Sterlite Energy Ltd

Please refer Annexure-I

b) <u>SPS for 2x1250 MW, HVDC Balia - Bhiwadi line</u> (780 Km)

Member Secretary, NRPC vide its letter dated 23.03.2011 addressed to Member Secretary,ERPC informed that pole-I of + / - 500Kv, 2x 1250 HVDC Balia – Bhiwadi bi-pole has already been commissioned on 01.09.2010. The pole-II of the link is expected to be commissioned by March, 2011. Since the link is of very high capacity and in the absence of immediate automatic correction under outage of the link , a SPS was proposed by NRLDC which was approved by 16th NRPC meeting held on 16.04.2010.

The SPS requires an automatic backing down of generation by 750MW in ER at Kahalgaon / Barh / Farakka for taking care of tripping of both poles.

The detailed scheme was forwarded to ERLDC & NTPC for comments.

Members may please discuss.

ITEM NO. 6 ANALYSIS & DISCUSSION ON VARIOUS GRID INCIDENCES WHICH OCCURRED IN CTU / STU SYSTEMS DURING THE PERIOD BETWEEN NOVEMBER, 2010 TO MARCH, 2011

Agenda submitted by ERLDC- (Annexure-II)

ITEM NO. 7 DATE AND VENUE OF THE NEXT (10th) PROTECTION COMMITTE MEETING

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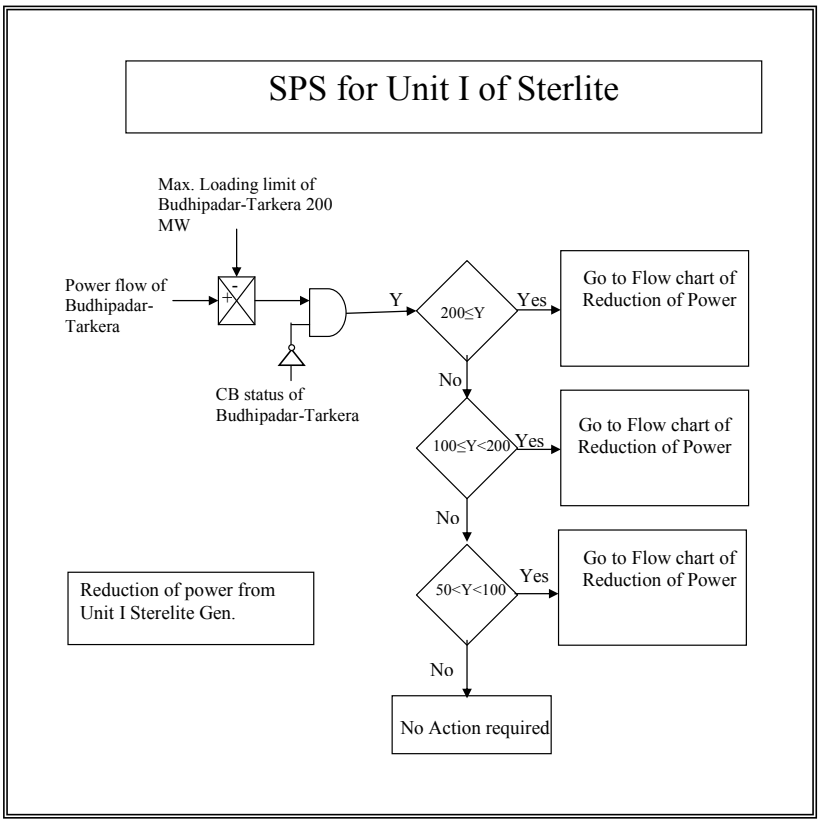
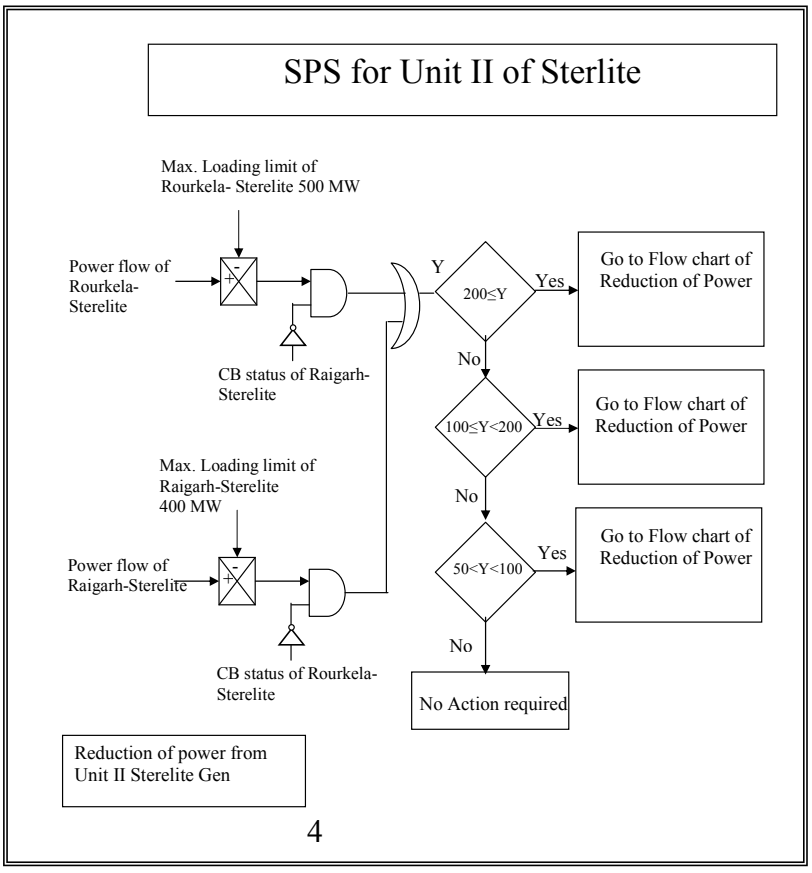
Annexure-I

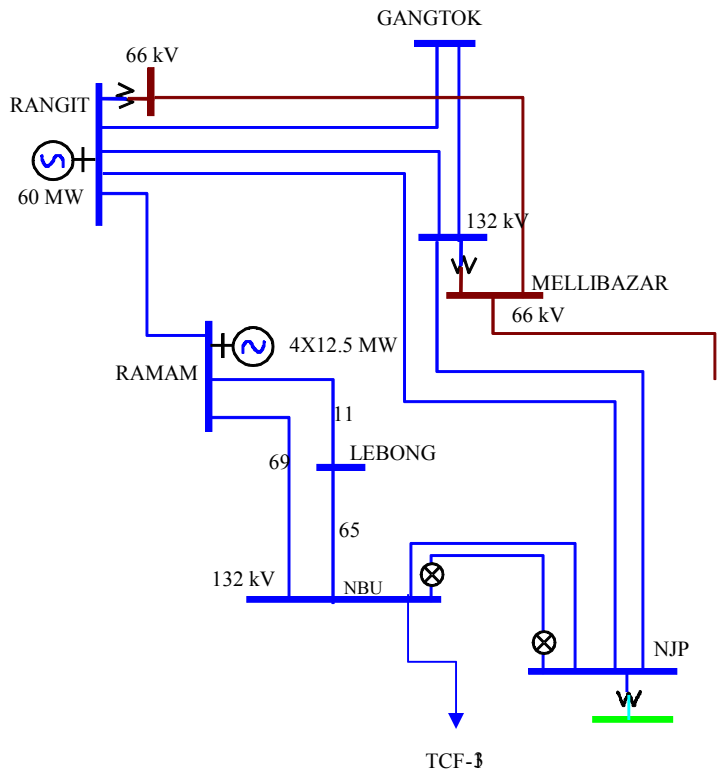

SPS for Unit I of Sterlite
Max. Loading limit of Budhipadar-Tarkera 200 MW
Power flow of Budhipadar-Tarkera
CB status of Budhipadar-Tarkera
Y
200≤Y
Yes
Go to Flow chart of Reduction of Power
No
100≤Y<200
Yes
Go to Flow chart of Reduction of Power
No
50<Y<100
Yes
Go to Flow chart of Reduction of Power
No
No Action required
Reduction of power from Unit I Sterelite Gen.


SPS for Unit II of Sterlite
Max. Loading limit of Rourkela- Sterelite 500 MW
Power flow of Rourkela-Sterelite
CB status of Raigarh-Sterelite
Y
200≤Y
Yes
Go to Flow chart of Reduction of Power
No
100≤Y<200
Yes
Go to Flow chart of Reduction of Power
No
50<Y<100
Yes
Go to Flow chart of Reduction of Power
No
No Action required
Max. Loading limit of Raigarh-Sterelite 400 MW
Power flow of Raigarh-Sterelite
CB status of Rourkela-Sterelite
Reduction of power from Unit II Sterelite Gen

Annexure-II

Agenda items for Protection Coordination Committee Meeting to be held on 19-04-11

a)**Date & Time of occurrence: 10/12/10 at 13:52 hrs**.
Generation loss in Rammam P/stn : 14.7 MW
Generation loss in Rangit P/stn : 20MW
System condition prior to the incident
132KV NBU-TCF-I was under shutdown.for replacement of Y & B phase CT at NBU.
132KV NBU-SLG (pg)-I & II, 132KV NBU-Rammam & 132KV NBU-Lebong ckts were in service.
220/132KV, 100MVA ICT at SLG (PG) was under shutdown.
Rammam P/stn was generating 14.7MW with Unit #1 & #3 on bar.
Unit #1 of Rangit was on bar with a load of 20MW.
Unit # 3 was under shutdown condition.
66KV Rangit-Melli was already opened for a long period.
Incidence-1:
At 13:52Hrs of 10/12/10 total power failed at NBU,Lebang 132KV S/S & Rammam S/S of WBSETCL system due to tripping of the following lines.
i) 132KV NJP-NBU tripped at both end due to B-phase LA bursting at NJP end.
ii) 132KV NBU-Rammam ckt tripped at Rammam end & both the running units tripped in D/P, Z-1, and B-phase.
At that time NBU was connected through 132KV NBU-NJP only & with the tripping of same ckt there was a total power failure. All outgoing ckts were kept open from NBU & Rammam after total power failure. The following lines emanating from Rangit power station also opened for the same incident.



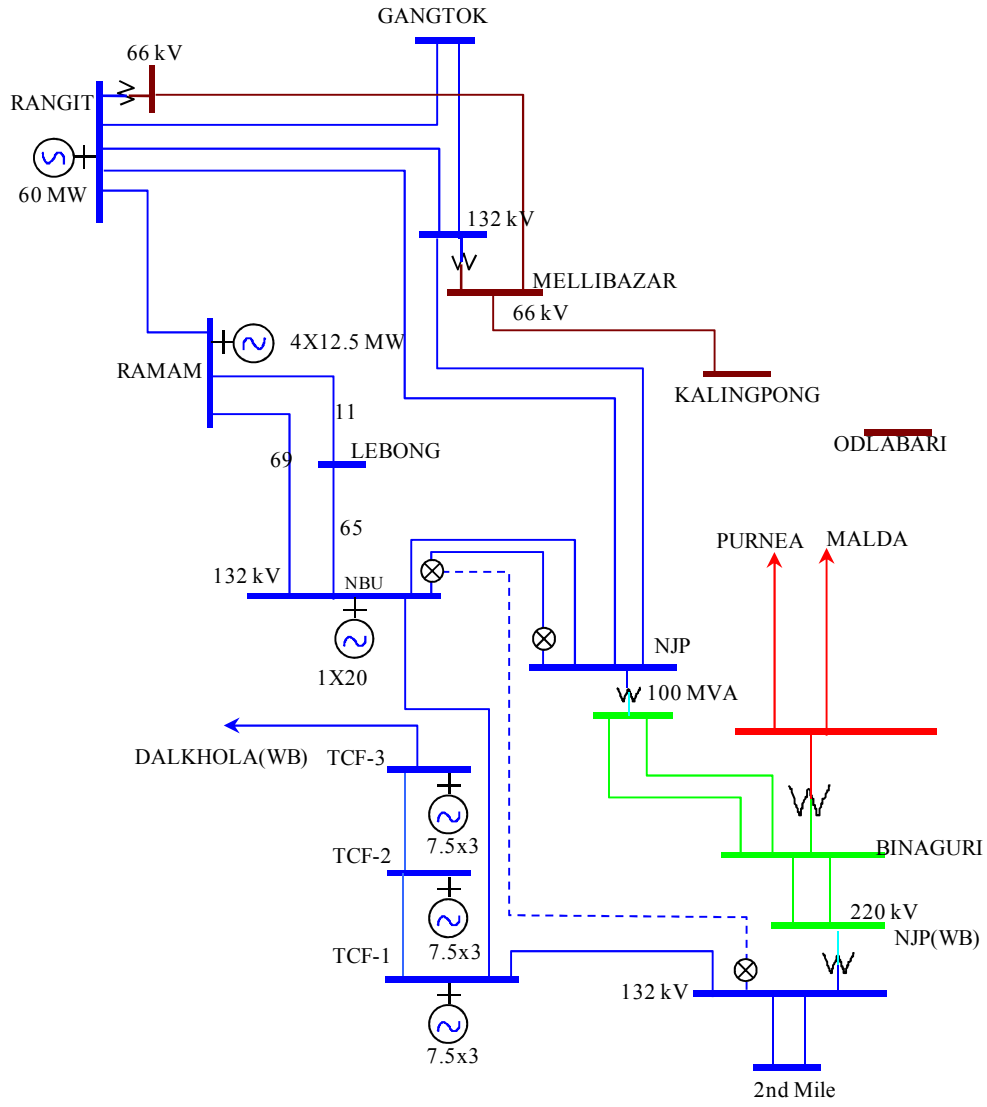
Sl no	Transmission line	Opening time	Restoration time	Relay details
1	132KV Rangit-Slg	13:52	16:27	Mannualy opened due to grid failure
2	132KV Rangit-Rammam		18:09	
3	132KV Rangit-Melli		16:45	
4	132KV Rangit-Gangtok		16:42	

Points requiring clarification:

For which circuit of 132kV NJP-NBU line, the LA got burst
Reason for tripping of the other parallel circuit
Tripping of 132kV NBU-Rammam from Rammam end on Zone-I protection and Rammam units do not appear to be in order
The reach and time settings of distance protections for NJP-NBU and NBU-Rammam lines need checking and coordination

Incidence-2:
At 14:35Hrs 132KV NJP-TCF ckt tripped due to R-phase LA burst at NJP end. As TCF,Dalkhola & Raiganj was radially fed from NJP using the same ckt ,total power failed at those S/S also. At 17:17hrs WBSETCL switched off 132KV NJP-NBU Ckt due to overloading (100MW).Rangit unit #1 & #3 were tripped due to over voltage, over speed & under frequency the following lines were again opened.

Sl no	Transmission line	Opening time	Restoration time	Relay details
1	132KV Rangit-Slg	17:17	16:27	Mannualy opened due to grid failure
2	132KV Rangit-Rammam	Alredy opened	18:09	
3	132KV Rangit-Melli	17:17	18:02	
4	132KV Rangit-Gangtok	17:17	17:52	



Points requiring clarification:

Whether only one ckt of NJP-NBU 132kV line was in service
It appears that the 220/132kV ICT at Siliguri was in service before the incident

Generation at Rangit prior to the incident

Even after opening of 132kV NJP-NBU line, connectivity of Rangit , Rammam with the grid was maintained through 132kV NJP-Rangit and 132kV NJP-Melli lines. Hence Rangit units should not have tripped on overspeed or underspeed. It is therefore to be ascertained whether these lines tripped, and if so, reason for tripping.

c) Disturbance in OPTCL SYSTEM
(1) Date & Time of Occurrence:

05.01.2011, 13:55 Hrs

Sequence of events:

Before the incidence the single Tarkera-Rourkella line was carrying more than 200 MW and a caution message was issued by ERLDC (TOO: 11:45 AM) to OPTCL, SLDC to reduce its underdrawal and in turn, Orissa asked Vedant to reduce its injection (over 400 MW) at Budipatar. With approaching off-peak hours, Orissa demand was reducing leading to further overloading of the only available ckt of 220kV Tarkera-Rourkela.

Details of Occurrence: B-Phase jumper between CT to isolator of 220 kV Tarkera-Bisra Ckt-II snapped at Tarkera S/S pulling out all the 220 kV and 132 kV feeders emanating from Tarkera S/Y at other end resulting no power at 220 kV Tarkera bus.

Feeder disposition at 220kV Budhipadar at the time of occurrence

Bus I (220 kV)	Bus II (220 kV)
IB-II& IV	Auto-I & II
Raigarh	IB-I & III
Korba-II & III	
Tarkera-I & II	
Katapalli-I & II	
Bhushan-I & II	
SPS	
VAL-I & II	
Basundhara (idle charged)	

220 kV BUS COUPLER BREAKER STATUS (WHETHER “ON”/ “OFF”):-ON at Budhipadar S/S.

Sequence of Trippings with relay indication:

Time Hrs	Details of tripping	Relay indication
13:55	220 kV Tarkera- Bisra Ckt-II 'B' ph CT to isolator jumper snapped at Tarkera S/S. (220 kV Tarkera-Bisra Ckt-I was under S/D since 09:00 hrs)	No tripping at Tarkera S/S
	220 kV Tarkera-Budhipadar Ckt-I & II tripped at Budhipadar end but did not trip at tarkera end. (Prior to tripping 220 kV Tarkera-Rengali SY Ckt-I opened at Tarkera end. 220 kV Tarkera-Rengali SY Ckt-II opened at Renagli SY end.) So Tarkera S/S bus become dead.	D/P, 'Y' ph, 'B' ph, E/F
	220 kV Budhipadar-Katapalli Ckt-II tripped at Budhipadar end without any relay indication.	
14:01	220 kV Budhipadar -Korba Ckt-II & III tripped at Budhipadar end. (220 kV Budhipadar-Raigarh Ckt was under S/D)	3 phase Master trip relay.
	Sterlite unit tripped.	Due to variation in frequency
14:08	# 1 at IbTPS tripped	Under frequency
14:09	# 2 at IbTPS tripped	Under frequency
14:09	7 Nos Units at VAL tripped.	Under frequency

Following tripping of 220kV Tarkera-Rourkella-II, 220kV Tarkera-Budhipadar I & II and 220kV Budhipadar – Katapalli-II, the power flow through 220kV Budhipadar – Korba 2 & 3 shot up to more than 250 MW through each ckt. These circuits tripped on overcurrent protection from Budhipadar end.

After tripping of these lines, Budhipadar bus got isolated forming an island , with Bhushan IBTPS, Vedanta generators and load of Budhipadar-Burla complex, with a surplus generation of more than 500MW. The frequency of the island rose beyond 51.7 Hz . The Sterlite 600MW unit tripped around 14:02 Hrs on overfrequency, due to which the island frequency came down to around 50.95 Hz. Injection from Bhushan Steel stopped and the plant started drawing around 20-30MW (probably due to tripping of unit). However, IB units continued to generate and the island frequency touched 52 Hz at around 14:05 Hrs.due to increase in generation by Vedanta units. Subsequently, the power flow through 220/132kV ICTs (towards 132kV) was increasing. At 14:08 Hrs, 220kV Budhipadar – Katapali –II was taken into service and 50MW power flow observed towards Katapali / Bolangir, Due to low stiffness of the island, increase of 90MW load at Budhipadar and Katapali led to steep decline in frequency to 47.5 Hz and below. Finally, at around 14:08 Hrs, with tripping of Vedanta and IB units on underfrequency protection, the island collapsed.
Total generation loss was around 800 MW.

Points requiring deliberation:

It is understood that bus-bar differential protection does not exist at 220kV Tarkera

Connection arrangement of the 220kV lines to the 220kV buses at Tarkera prior to the fault

Whether 220kV bus-coupler CB operated to isolate the 220kV buses at Tarkera and its time setting

Reason for tripping of 220kV Budhipadar-Katapalli D/C is not clear, as the fault was at Tarkera.

The tripping of 220kV Budhipadar – Korba(E) lines on overcurrent is not justified and the relays at Budhipadar should be set to trip only on fault.

Whether 220kV Budhipadar-VAL I & II also tripped

Status / effect on 132kV Budhipadar-Tarkera circuit

d) Tripping of 400 KV Farakka – Kahalgaon D/C

Date & Time of occurrence: 07/01/11 at 05:59 hrs / 07:50 hrs
System condition prior to the incident
FSTPP Generation 1256 MW
400 KV Farakka – Kahalgaon – I 630 MW
400 KV Farakka – Kahalgaon – II 630 MW
NR Drawl 1824 MW (against Schedule 1024 MW)
WR was under-drawing by 800 MW
KhSTPP Unit No-6(500MW) was under shutdown due to coal shortage
Incidence of events:
At 06:02 hrs 400 KV Farakka – Kahalgaon –II tripped on R-phase to ground fault, Zone-1,18km from Kahalgaon end (Micom relay).Breaker was also opened at Farakka end(MAIN I -RANZA 99%,MAIN II - LZ 96; D; R & S). After tripping of ckt-II, flow in 400 KV Farakka – Kahalgaon –I shot up to 950 MW. FSTPP generation was backed down up to technical minimum 1077MW.Export to SR was increased by around 200 MW. Export from WR was also reduced by around 400 MW. NRLDC also took action to reduce NR drawal by around 200 –250 MW initially and reduced by 600 MW thereafter by carrying out load-shedding in the
states of Punjab, Rajasthan and picked up hydro generation. 400 KV Farakka – Kahalgaon –I load reduced to 650MW

At 07:52hrs 400KV Farakka – Kahalgaon –II was charged from Kahalgaon end and attempted to synchronize at Farakka end but breaker closed and tripped on pole discrepancy at Farakka. At Kahalgaon end current recordings (at MICOM relay of 400 KV Farakka – Kahalgaon – II line) -while synchronizing the 400 KV Farakka – Kahalgaon – II was 1062 / 90 / 1087.400KV
Farakka – Kahalgaon –I also got tripped at Kahalgaon on earth fault protection (MICOM relay recording at Kahalgaon end is 684 / 1028 / 694). Both 400 KV Farakka – Kahalgaon – I & 400 KV Farakka – Kahalgaon – II were in hanging condition with 400 KV Farakka – Kahalgaon –I charged from Farakka end & 400 KV Farakka – Kahalgaon – II charged from Kahalgaon end.

Backing down at Mejia Thermal Power Station (50MW) was done to reduce over-loading of 220 kV Mejia-Kalyaneswari S/C of DVC.
At 07:56hrs 400 KV Farakka – Kahalgaon – II was charged from Kahalgaon end synchronized at Farakka but it got tripped on E/F (Micom relay: IR/IY/IB:1171.9/90.119/1202A & IN-826A)) at Kahalgaon. The breaker at Farakka got closed and tripped on pole discrepancy & CVT fuse fail annunciation was also appeared.
At 08:06hrs 400 KV Farakka – Kahalgaon –I was tried to charge from Farakka end synchronize at Kahalgaon but got tripped from Farakka end and it remained charged at Kahalgaon. Relay indications at Farakka end are MAIN-I RANZA 00%;RAZFE RN,U,2Ø,3Ø,Z1 & Z2.MAIN-II LZ 96;R & S. Due to high bus voltage at Kahalgaon 400 KV Farakka – Kahalgaon –I was opened manually from Kahalgaon.

Points requiring clarification:

At KhSTPS end, LZ – 96 relays gave multi-phase indication while MICOM gave phase to ground indication for Circuit II. LZ – 96 relays also gave either inadequate information or operated with multi-phase indication at FSTPS. These anomalies need to be resolved.

The MICOM relays at KhSTPS also operated through back up earth fault elements while distance element did not operate in case of Circuit I and Circuit II when charged again.

The fault locator indications at FSTPS and KhSTPS also gave conflicting information, which needs to be sorted out.

e) Trippings at 400/220/132 KV Malda (POWERGRID) S/s.
Date & Time of occurrence: 08/01/11 at 15:35 hrs
Pre disturbance condition Conditions:
System Frequency – 49.75 MW
Farakka STPP Generation 1525 MW
Kahalgaon STPS - I & II Generation 1190 MW
400 KV Farakka – Kahalgaon – I & II : 690 MW each Ckt
NR Drawl 1930 MW (against Schedule 1738 MW)
WR Injection 620 MW (against Drawl Schedule of 273 MW).
220 KV Malda – Dalkhola – I & II : 175 MW each Ckt from Malda towards Dalkhola
400 KV Farakka – Malda –D/c – 220 MW per ckt.
400/220 KV ICT- III & V, 220/132 KV ICT-I, II & IV were in service.
Incidence of events:
At 15:35 hrs, jumper snapping at 220 KV side of 315MVA ICT-III at Malda (PG) caused 220 KV bus fault leading to outage of 220 KV Malda Dalkhola D/C and all the ICTs{400/220 2Nos ICT & 220/132 3Nos ICT) at Malda S/s. For 315MVA ICT-III & V relay indications are Main-I, 67R & 67N (400KV side). Load affected at Malda, Gangarampur, Balurghat & Samsi in West Bengal. 400 KV Farakka – Kahalgaon D/c loading increased to 800 MW per circuit making system more vulnerable.
Corrective Actions Taken:
Farakka STPP was asked for immediate backing down of 180 MW and SR was requested to draw UI of 200 MW.

Points requiring deliberation:
Whether bus-coupler CB at 220kV operated
Need for bus-bar differential protection at 220kV

f) FREQUENT TRIPPING OF 132 KV KAHALGAON-LALMATIA AND 132 KV KAHALGAON-SABOUR LINES-NTPC

JSEB & NTPC have confirmed that joint testing has since been carried out by them at Lalmatia s/s on 01.02.11. Accordingly, JSEB initiated remedial actions, which are showing satisfactory preliminary results.
The results of testing obtained at both ends of 132kV Kahalgaon-Lalmatia and 132kV Kahalgaon-Sabour lines may be shared.

g) Total loss of power at Muzaffarpur 400kV S/Stn

Date & Time of occurrence: 01/01/11at 02:55 hrs.

Pre disturbance condition

400KV Muzaffarpur-NewPurnea-ckt-II, 400KV Muzaffarpur-Gorakhpur-ckt-I, 400KV Muzaffarpur-Biharsariff-ckt-I were already open on over volatge

Incidence of events:

At 00:37Hrs 400KV Muzaffarpur-NewPurnea-I, 400KV Muzaffarpur-Gorakhpur-II, 400KV Muzaffarpur-Biharsariff-II tripped on over voltage & direct trip sent to remote end. 220KV Muzaffarpur-Kanti-ckt-II did not trip. However, as the 220kV Kanti S/stn of BSEB was operated in split bus mode, with no generation at Kanti TPS, complete blackout occurred at Muzaffarpur 400kV/220kV Stn.

Points for deliberation
The time settings of Stage-I over-voltage relays at Muzaffarpur 400kV need proper coordination and checking.

h) Trippings at 400/220KV Patna (POWERGRID) S/s.

Date & Time of occurrence: 02/03/11 at 17:05 hrs

Load loss in BSEB system: 130MW

Pre disturbance condition Conditions:

400 KV Patna Bus-II was under Shutdown.

Incidence of events:

At 17:05 hrs 400KV Patna-Balia-D/C tripped on over voltage along with 400KV Patna-Kahalgaon & 400KV Patna-Barh-Kahalgaon.Due to S/D of 400KV Bus-II at Patna, 400KV Patna-Balia-II & 400KV Patna-Kahalgaon (direct) was on same dia & & 400KV Patna-Kahalgaon (direct) was connected through tie breaker only. So with the tripping of 400KV Patna-Balia-II(direct trip signal received from Balia S/S), 400KV Patna-Kahalgaon (direct) was also tripped from Patna end but remained charged from Kahalgaon end.400KV Patna-Balia-I & 400KV Patna-Barh tripped as over voltage stage-I relay operated at Patna S/S.There was a load through of 130MW in BSEB system.

i) FREQUENT TRIPPING OF LINES ON OVERVOLTAGE --

It is observed that number of 400 KV lines are tripping on overvoltage apart-
from number of 400 KV lines are being kept opened due to overvoltage. Such uncontrolled tripping of important lines is causing depletion of network and increases the probability of grid disturbance. GM (ERLDC) vide letter dated 03.02.2011 has already apprised OCC members on this issue.

Further, number of new generating station namely Barh STPP of NTPC,Mejia-B,DSTPP etc are being connected to the ER grid by LILOing existing line thereby
increasing the line length of those line which are being LILOed without being suitably compensated. The same are causing severe high voltage in above said generating station and commissioning activities may get hampered due to frequent tripping of line thereby losing supply. Also such interruption in the midst of commissioning activities may cause accident and loss of human life.

In view of above, in order to set right the overvoltage problem, following actions need to be taken at the earliest

i. Relook at existing overvoltage relays with an effort to increase drop off to pick up ratio to 99% to avoid simultaneous tripping of no of line in same station. (Concerned party: PGCIL, NTPC)

ii. To expedite commissioning of reactors already planned and planning of additional reactors in high voltage prone areas to get approval in standing committee. (Concerned party: DVC, PGCIL)

iii. Optimization of power order in HVDC, Gazuwaka and Talcher-Kolar HVDC line so that no MVAR from any of the HVDC station is injected to the grid. (Concern Party: PGCIL)

iv. Testing and declaration of Reactive capability of ISGS at different power level so that generators of the ISGS can be fully exploited to control voltages. (Concerned party: NTPC)

In this regard, NTPC has pointed out that due to continuous high voltage at Barh end (around 440 kV), Barh is unable to charge the station auxiliary transformer.

In the 60th OCC meeting the following were decided:
Regarding setting of drop-off / pick-up ratio of O/V relays and coordination of their time gradings, concerned utilities are to interact with ERLDC for finalizing the setting

Regarding reactors, ERLDC informed that a comprehensive agenda would be put in the next Standing Committee meeting.

Regarding optimization of power order in HVDC station, PGCIL was requested to be in touch with ERLDC for requisite action.

All generators connected with 400 kV grid were requested to test and share their reactive capability curve with ERLDC.

Members may please deliberate.

j)Disturbance in JSEB/BSEB system on 12.02.11
Date & Time of occurrence: 12.02.11 at 22:08 hrs.
Generation loss : 432 MW
Load loss : 50 MW at BSEB & 132 MW at JSEB
Incidence of events:
At 22:08Hrs of 12.02.11,220KV Tenughat-Biharsariff line tripped at both the ends with heavy flashing & sound at 220KV Biharsariff along with the tripping of both the units of Tenughat(210MW each) & Patratu TPS unit #4(40MW).220KV Patratu-Tenughat & 150MVA ICT-III at Biharsariff also tripped simultaneously. Later it was found that the earth wire of 220KV Tenughat-Biharsariff line was swinging at Biharsariff (Pawapuri) about 12KMs from Biharsariff.
220KV Tenughat-Biharsariff line relay indication observed at Biharsariff is CNZ1, VAJ tripping relay
Relay indication observed at Tenughat is TN, TK2, and Z2V
Restoration
220KV Patratu-Tenughat synchronised at 22:24hrs 12.02.11
220KV Tenughat-Biharsariff synchronised at18:32hrs(13.02.11)
150MVA ICT-III at Biharsariff synchronised at 22:12hrs
Tenughat U#1 synchronised at 09:35hrs of 13.02.11
Tenughat U#2 synchronised at 20:45hrs of 14.02.11
Patratu U#4 synchronised at 23:25hrs of 12.02.11
This disturbance is categorised as GD-1
Relay indication for lines and Generator(Tenughat) yet to be received

Following points need clarification
1. Reason for tripping of Both 315 MVA ICT of Biharsharif(PG)
2. Reason for tripping of PTPS-Tenughat line and both units of TVNL

k) Disturbance in JSEB/BSEB system on 15.02.11
Date & Time of occurrence: 15.02.11 at 11:00 hrs.
Generation loss : N/A
Load loss : N/A
Incidence of events:
At 11:00 Hrs .while charging 220KV Begusari-Kanti for the first time the line tripped instantaneously (Dp, Z-1, B-Phase) along with tripping of 220KV Biharsariff-Begusarai at Biharsariff end (86A1 & A2.,B1 & B2,230CD & 30CD)Also 400/220KV 315MVA ICT-I & III at Biharsariff(PG) S/S tripped due to over current protection at 400KV side as reported by Biharsariff S/S. Tenughat unit #2 tripped at 11:04hrs & Unit #1 tripped at 11:05hrs on same day due to electrical jerk.. The entire load of 220KV Biharsariff BSEB system was fed

through 220 KV Tenughat-Biharshariff S/C line. Due to this low voltage (140KV) occurred at Tenughat S/S. After synchronization of 315MVA ICT-I & III
at Biharsariff (PG) S/S, 220 KV Tenughat-Biharshariff has been opened by Tenughat at 11:35hrs.
Restoration
315MVA ICT-I & III synchronized at 11:16hrs.
220 KV Tenughat-Biharsharif closed at 12:16 hrs
Tenughat U#1 synchronised at 00:53hrs of 16.02.11
Tenughat U#2 synchronised at 13:15hrs of 15.02.11
This disturbance is categorised as GD-1
Relay indication for lines and Generator(Tenughat) yet to be received

Following points need clarification
1. How O/C protection of transformer, which is a slower protection operates simultaneously with distance protection?
2. Reason for tripping of both units of TVNL.

I) Disturbance in JSEB system on 28/02/11
Date & Time of occurrence: 28.02.11 at 05:35 hrs.
Generation loss : 67 MW
Load loss : N/A
Incidence of events:
At 05:35Hrs following tripping occurred in Jharkhand system due bursting of 220KV Main bus-I PT of R & Y-phase at Patratu

Name of the Element	Tripping time	Relay indication
132 KV Hatia-Patratu-I	05:35	51 N,Nondirectional E/F,
132 KV Hatia-Patratu-II		DP,21,R-Y N
220 KV Hatia-Patratu-I		Z2,R,Y,B ,36.82KM, IA=1.759KA IB=1.765KA IC=0.4KA
220 KV Hatia-Patratu-II		Z2,R,Y,B ,37.09KM, IA=1.765KA IB=1.759KA IC=0.4KA
220 KV Tenughat-Patratu		Z1,R,Y,B
132KV Patratu-Ramgarh		
Patratu TPS U#4		Electrical Jerk
Patratu TPS U#6		Electrical Jerk

Relay indication for lines and Generator(PTPS) yet to be received.

Following details need deliberation

- In many lines, all phase indication appears, which appear to be erroneous.
- Busbar protection in PTPS and Tenughat need to be installed

m) Disturbance at 220/132 kV Budhipadar S/S in OPTCL system

Date & Time of occurrence: 20/03/11 at 13:23 hrs.

Generation loss : 900 MW
Load Loss : 400 MW

System condition prior to the incident

WR injection- 1100 MW
Vedanta Injection – 250 MW
220 KV Tarkera – Budhipadar was carrying 210 MW per ckt
IBTPS U#1 & 2 was on bar with total generation of 370MW.
Generation at Burla HPS was around 30MW.

Incidence of events:

At 13:23 hrs, 220 kV Budhipadar-Tarkera Ckt-I & II tripped on overload followed by tripping of 220 kV Budhipadar-Korba Ckts. and IBTPS units & VAL units.

Sequence of Tripping with relay indication:

Time Hrs	Details of tripping	Relay indication
13:23	220 kV Tarkera- Budhipadar Ckt-I & II tripped at both ends	At Tarkera-O/C in 'B' phase At Budhipadar-D/P, 'Y' ph, 'B' ph, E/F
	220 kV Budhipadar-Raigargh Ckt tripped at Budhipadar	'R'ph, 'Y' ph, 'B' ph
	132 kV Budhipadar-Rajgangpur Ckt tripped at Budhipadar.	O/C in 'R' and 'Y' phase.
	132 kV Tarkera-Rourkela Ckt-I& II tripped at Tarkera.	E/F
	220/132 kV, 100 MVA Auto-IV at Tarkera tripped on both sides.	Master trip relay
	Feeder flow in 220 kV Budhipadar-Korba Ckt-II & III increased to 240 MW.	
13:30	220 kV Budhipadar –Korba Ckt-II tripped at Budhipadar end.	3 phase Master trip relay.

	220 kV Budhipadar –Korba Ckt- III tripped at Budhipadar end.	E/F, O/C, 'B' ph
13:35	U # 1& #2 at IBTPS and VAL units tripped and 220 kV Bus at Budhipadar become dead.	

n) Disturbance in DVC system on 16.03.11

Date & Time of occurrence: 16.03.11 at 04:05 hrs.

Total generation loss: 500MW

System Condition before the disturbance.

Chandrapura U #1, 2, 3 were on bar delivering load of 100MW, 105MW & 124MW respectively.
Bokaro 'B' U #1 & U #3 was on bar delivering load of 160MW.
Bokaro 'B' U #2 under lit up condition
Waria u #4 under overhauling
220KV Mejia-CTPS-D/C line was under shutdown.
One ATR each Kalyaneswari & CTPS was under shut down condition for annual maintenance work at Kalyaneswari and oil filtration at CTPS respectively.

Incidence -1:

1) At around 04:05 Hrs of 16/03/11,top conductor of 220KV Mithon(PG)-CTPS-II snapped and all outgoing lines from CTPS and Bokaro tripped leading to the outage of all running units of CTPS (U#1,2&3 Generation was260 MW) and Bokaro'B' (U#1 & 3 Generation was 280 MW).

2) Loss of generation was 540 MW. And approximate load loss of 600 MW hence frequency dip could not be observed.

Restoration

Power supply was restored though Joda tie at 04:40
CTPS u# 1, 2 and 3 synchronized at 06:42 hrs, 0710 hrs and 0720 hrs respectively.
BTPS-B u# 1 and 3 synchronized at 10:54 hrs, 0710 hrs and 12:25 hrs respectively.

Incidence -2: 17:29 Hrs

1) System frequency prior to the incident was 49.74Hz. 220 kV CTPS – Mejia D/C was under S/D and 220 kv CTPS-Maithon(PG) D/C was under forced outage

2) Incidence of events: Fault occurred in 220 Kv JODA-JINDAL line, leading to overloading of 132kV CTPS-Waria D/C and subsequently isolation of Bokaro 'B' - CTPS subsystem with major load-generation imbalance and tripping of all running units of CTPS (U#1,2&3 : Generation was270 MW) and Bokaro'B' (U#1 & 3, Generation was 230 MW).

3) Post disturbance position : CTPS and Bokaro availed start up power through 132 kV CTPS-WARIA at 17:50 hrs and 220 Kv Joda- -Jindal- Jamshedpur- Bokaro line at 18:28 hrs respectively. CTPS U#1 lit up at 18:50 hrs and Bokaro U#1 expected to be lit up by 19:30 hrs.

Disturbance in DVC system on 17.03.11; 03:35 Hrs

1) System frequency prior to the incident was 49.69Hz. 220 Kv CTPS – Mejia D/C was under S/D and 220 kv CTPS-Maithon(PG) D/C was under forced outage.

2) Incidence of events: 220 kV Joda-JINDAL line tripped on over current. Subsequently 132 kV CTPS-Waria D/C line tripped on overload leading to isolation of Bokaro'B'-CTPS sub-system with major load-generation imbalance and tripping of all running units of CTPS (U#1,2&3 : Generation was270 MW) and Bokaro (U#1 & 3, Generation was 241 MW).

3) Loss of generation was 511 MW. and approximate load loss was 600 MW..

4) Post disturbance position : CTPS and Bokaro'B' availed start up power through 132 kv CTPS-Waria at 03:50 hrs and 220 Kv Joda- -Jindal- Jamshedpur- Bokaro line at 03:55 hrs respectively. CTPS U#1&2 were lit up at around 04:00 hrs and Bokaro U#1& unit 2 are expected to lit up shortly.

Preliminary report on the incidents have been received from DVC.
DVC is requested to explain the incidents in detail.

o) Demonstration of response time of constituents under emergency conditions

In the event of any criticality arising in the grid, such as sudden overdrawal by any constituent due to loss of major generation, overloading of any important transformer or line, partial collapse following a disturbance etc., the SLDCs should be in a position to take corrective actions as per RLDC instructions, in the shortest possible time.

The SLDCs thus need to identify the feeders and loads that can be disconnected in their respective systems to produce the requisite load relief in the shortest possible time. Also, in the case of load reconnection during restoration, following a total / partial collapse, identification of feeders to be restored on priority basis and their corresponding loads to be connected in steps, estimated power factor of such loads, degree of unbalance if any etc. is essential.

It is therefore requested that reliability coordinators of each state of Eastern Region take necessary actions in this regard, following which mock exercise would be conducted through interaction between SLDCs and ERLDC

p) Additional agenda on SPS for generation backing down at Sterlite and Teesta-III will follow shortly.