भारत सरकार
विद्युत मंत्रालय
केंद्रीय विद्युत प्राधिकरण
राष्ट्रीय विद्युत समिति
कटवारिया सराय, नई दिल्ली – 110016 **[ISO 9001:2008]**
वैबसाइट / Website: www.cea.nic.in

No. 4/MTGS/NPC/CEA/2015/132 -151 Date : 01-1-2016

विषय: एन. पी. सी. की चतुर्थ बैठक के कार्यवृत के सम्बन्ध मे |

महोदय,

उपरोक्त विषय से सम्बन्धित दस्तावेज आपकी जानकारी एवम आवश्यक कार्यवाही हेतु संलग्न है |

भवदीय

बि.मल्लिक
(बी.सी.मल्लिक)
मुख्य अभियंता एवं सदस्य सचिव, रा. वि. स.

संलग्नक : यथोपरि

To,

1. Shri Rakibul Hussain, Chairperson, NERPC & Hon'ble Power Minister of Government of Assam, Assam secretariat, Dispur, Guwahati-781006. **Email:** rockybulhussain@rediffmail.com
2. Shri P.C.Negi, Chairperson, NRPC & Managing Director, Himachal Pradesh State Electricity Board Limited, Vidyut Bhawan, Kumar House, Shimla-171004.
3. Shri M.Sivasankar, Chairperson, SRPC & CMD, KSEBL, Vydyuthi Bhavan, Pattom, Thiruvanthapuram-695 004. **Email:** cmkseb@ksebnet.com
4. Shri Shivraj Singh, IAS(Retd.), Chairman, WRPC & Chairman, Chattisgarh State Power Companies Limited, Vidyut Sewa Bhawan, 2nd Floor, P.O. Sundar Nagar, Raipur-492013. **Email:** shivraj@nic.in
5. Shri N.S.Nigam, Chairperson, ERPC & CMD, WBSEDCL, Vidyut Bhavan, 7th Floor, Bidhannagar, Sector-II, Kolkotta-700091. **Email**: cmdwbsedcl@gmail.com
6. Shri R.L.Baruah, Chairperson, TCC (NERPC) & Managing Director, APDCL, Bijuli Bhawan, Guwahati-781001. **Email**: md-apdcl@apdcl.gov.in
7. Shri R.K.Sharma,Chairman, TCC (NRPC) & Director (Tech), HPSEB, Vidyut Bhawan, Kumar House, Shimla-171004.
8. Smt. P.Vijayakumari, Chairperson, TCC (SRPC) & Director (Tr. & System Opn.), KSEBL, Vydyuthi Bhavan, Pattom, Thiruvanthapuram-695 004. **Email:** mtkseb@ksebnet.com
9. Shri Shashi Bhushan Agrawal, Chairman, TCC (WRPC) & Managing Director, CSPGCL, Vidyut Sewa Bhawan, 2nd. Floor, P.O. Sundar Nagar, Raipur-492013. **Email:** mdgenco@cseb.gov.in
10. Chairperson, TCC (ERPC) & Director (Operation), WBSEDCL, Vidyut Bhavan, 7th Floor, Bidhannagar, Sector-II, Kolkotta-700091.
11. Shri P.S.Mhaske, Member Secretary, NRPC, 18-A, S.J.S.S. Marg, Katwaria Sarai, New Delhi-110066. **Email:** msnrpc1@yahoo.com
12. Shri S. D. Taksande, Member Secretary, WRPC, Plot No. F-3, MIDC Area Marol, Andheri (East), Mumbai-400093. **Email:** ms-wrpc@nic.in
13. Shri A.K. Bandyopadhyay, Member Secretary, ERPC, 14, Golf Club Road, ERPC Building, Tolly Gunge,Kolkata-33. **Email:** mserpc-power@nic.in
14. Shri S. R. Bhat, Member Secretary, SRPC, No.29, Race Course Cross Road, Bengaluru-560 009 **Email:** mssrpc@yahoo.com
15. Shri P.K.Mishra, Member Secretary, NERPC, Meghalaya State Housing Finance Co-Operative Society Ltd., Nongrim Hills, Shillong-793003. **Email:** msnerpc@dataone.in

Special Invitees:

16. Chief Engineer, GM, CEA, New Delhi
17. CEO, POSOCO, B-9, Qutab Institutional area, Katwaria Sarai, New Delhi -110016.
18. Director (Operation), PGCIL, Saudamini, Plot No.2, Sector-29,Guragon-122001.

प्रति सूचनार्थ: 1. अध्यक्ष, के. वि. प्रा., रा.वि.स., 2. सदस्य, (ग्रिड प्रचालन एवं वितरण), के.वि.प्रा.

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विषय: एन. पी. सी. की चतुर्थ बैठक के कार्यवुत के सम्बन्ध मे |
Subject: Minutes of the 4th Meeting of NPC-Reg.

Sir,

The Minutes of the 4th Meeting of NPC held on 10th December, 2015 at New Delhi is attached herewith for kind information and necessary action please. The same is also available on CEA website.

Encl.: as above

भवदीय / Yours faithfully
Bmallik
(बी.सी.मल्लिक/ B.C.Mallick)
मुख्य अभियंता एवं सदस्य सचिव, रा. वि. स./ Chief Engineer & Member Secretary, NPC

To,

1. Shri Rakibul Hussain, Chairperson, NERPC & Hon'ble Power Minister of Government of Assam, Assam secretariat, Dispur, Guwahati-781006. **Email:** rockybulhussain@rediffmail.com
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18. Director (Operation), PGCIL, Saudamini, Plot No.2, Sector-29,Guragon-122001

Copy for Kind information to:

1. Chairperson, CEA, New Delhi
2. Member (G&OD), CEA, New Delhi

CENTRAL ELECTRICITY AUTHORITY
NATIONAL POWER COMMITTEE

MINUTES OF THE FOURTH MEETING OF NATIONAL POWER COMMITTEE

The 4th Meeting of the National Power Committee was held on 10th December, 2015 in NRPC Conference Hall, Katwaria Sarai, New Delhi. The list of the participants is at **Annexure-I.**

Shri Major Singh, Chairperson, CEA & NPC, welcomed the members and other participants to the meeting. He stated that subsequent to the last meeting held on 14th February, 2014, some modifications had been made by CEA in its divisional setup. One of the modifications was creation of the 'National Power Committee' or 'NPC' division from the 'Grid Management (GM)' division to look after the work of NPC, apart from other important tasks relating to grid security such as Grid Study Committee, PSDF related works, National Reliability Council for Electricity (NRCE), etc.. Accordingly, Chief Engineer (NPC) would henceforth be the Member Secretary, NPC in place of Chief Engineer (GM). He stated that NPC in its previous meetings had taken some important decisions like increased quantum of load shedding through Under-Frequency Relays, raised & uniform setting of these relays across the country, initiation of Renovation & Upgradation of protection system at grid sub-stations of states' network through funding from PSDF, etc. Implementation of these decisions has strengthened / would strengthen the grid security. Mentioning that the tasks entrusted to the NPC were of vital importance, he emphasised the need for holding at least two meetings of NPC every year. With these remarks, he requested Member Secretary, NPC to take up the agenda for discussion.

A. CONFIRMATION OF SUMMARY RECORDS OF 2nd & 3rd MEETINGS OF NPC

Summary record of discussions of the 2nd meeting of NPC held on 16th July 2013 and that of 3rd meeting held on 14th February, 2014 at CEA, New Delhi were circulated vide CEA letter No. 8/X/MMS/GM-13 dated 01-08-2013 and 05-03-2014 respectively.

Comments of WRPC had been received on the summary record of 2nd meeting (copy of WRPC letter is enclosed at **Annexure-II**). The Committee discussed these comments and agreed to make the following amendments to the summary record notes of the 2nd Meeting of NPC:

i. The 6th Para of the item B1.2.(Reactive Power Planning) of the record notes would be replaced with "MS, WRPC intimated that there was no further requirement of installation of shunt capacitors in the Western Region. However, 27 reactors were proposed to be installed in the region as per the requirement carried out by the Protection sub-committee and the same was approved by Standing Committee in the 34th and 35th meetings. The priorities of the reactors have been identified".

ii. The 2nd Para of item B.1.3 (Ensuring proper functioning of UFRs and df/dt relays) of the record notes would be replaced with " Member Secretary I/c, WRPC suggested that in view of the limited manpower, WRPC would carryout random checks and inspection of the relays. Also, monthly self certification from the utilities may be collected and considered valid to ensure the healthiness of UFR and df/dt relays as the prime responsibility of providing load relief lies with the utilites."

iii. The following para would be inserted between first and second sentence in the second para of item B.3 (Review of Zone 3 philosophy),

"Member Secretary I/c, WRPC stated that during the 117th Protection Committee meeting, constituents have confirmed that the Zone-III settings adopted by them are generally higher than the loadability limits given in para 20 of the manual on transmission planning criteria issued by SP&PA division of CEA".

iv. In the list of participants, the name of Shri Satyanarayan S., SE, WRPC, would be added.

NPC confirmed the summary record of discussions of 2nd meeting with above modifications and that of the 3rd meeting without any change.

B. FOLLOW-UP ACTION ON DECISIONS TAKEN IN EARLIER MEETINGS

B1.1 Reactive Power Planning

Member Secretary, NPC, stated that as per the decision taken at the earlier meetings, all States would carry out reactive power planning not only at transmission level but also at distribution level and prepare schemes to maintain voltage profile as per relevant Regulations / Standards. These schemes would be forwarded by the States to the Power System wing of CEA under intimation to the NPC secretariat at the earliest. However, no such information had been received in the NPC secretariat.

ERPC informed that WBSETCL had carried out the reactive power planning studies and the same were in final stage. OPTCL had also initiated such studes. However, ERPC had no information regarding such studies by other constituents of the Eastern Region.

NRPC stated that they too had not received any information from the constituent states of their region regarding reactive power planning by them. They informed that the matter was proposed to be discussed at the next NRPC meeting.

WRPC stated that they had done the study of 765 kV and 400 kV CTU network with the SP&PA division of CEA. However, no reactive power planning studies had been done in respect of the distribution network.

NERPC informed that all states in the region had done reactive power planning studies. NERPC was requested to forward the results of the studies to the Power System wing of CEA and NPC Division.

The details furnished by SRPC regarding reactive power planning studies by SR states are attached at **Annexure-III**.

NPC agreed that states should adopt a proactive approach in the matter of reactive power planning, and that the provisions regarding reactive power planning similar to those mandated in the IEGC for the CTU should be included in the respective State Grid codes. It was decided that RPCs would follow up the matter further with the states.

B1.2. Ensuring proper functioning of Under Frequency Relays (UFRs) and df/dt relays

Chief Engineer (NPC) stated that as per the decision taken in the last meeting, all SLDCs & RLDCs would upload the details of feeders to be tripped through the UFRs and the expected load relief at different frequency levels in their respective States / Regions on operation of UFRs. It was also decided that RPCs would send inspection report for healthiness of UFRs and df/dt realys regularly on quarterly basis to NPC secretariat. He requested the RPCs to intimate the progress of implementation of the decision.

General view of the RPCs was that due to limited manpower in RPC secretariat, physical inspection of UFRs on monthly basis was very difficult and should be done away with. Instead, STUs/SLDCs could be directed to carry out the mock testing of these relays and submit the quarterly/monthly self-certification report regarding their healthiness. RPCs could carry out random inspection of UFRs to check correctness of self-certification submitted by the STUs, for which a uniform procedure could be adopted by all the RPCs. In this connection, a procedure and checklist to be followed by the STUs for mock testing of relays was proposed by NRPC, is attached at **Annexure-IV** for reference by other RPCs.

NRPC opined that this procedure and checklist would help in ensuring proper compliance by states regarding procedure, essence, and accuracy of the mock testing of UFRs.

It was brought to the notice of Chairperson, NPC that the Committee at its first meeting had decided that RPCs would carry out regular inspections in a year of about one-third number of total UFRs & df/dt relays installed in their respective region to ensure their healthiness. Further, RPCs had also to furnish the status of healthiness of UFRs and df/dt relays installed in the region to CEA on quarterly basis. Healthiness of UFRs being vital from grid security angle, a careful thought needed to be given by the Committee to the above proposal to do away with the process of regular inspection of about one-third number of total relays in a year.

Chairperson, NPC opined that under-frequency relays based automatic load-shedding scheme was meant to ensure grid security, and therefore, it would not be appropriate to do away with the requirement of inspection of a targetted number of relays by the RPCs in a year. Keeping in view the manpower constraints in RPC secretariats, he suggested that instead of inspection of one-third number of total relays in a region, at least 20% of the under frequency relays installed in the respective regions should be physically inspected by respective RPCs in each year besides self-certification by the STUs. Regarding self-certification by the STUs regarding healthiness of the UFRs as per the procedure / checklist proposed by NRPC, he requested other RPCs to forward their comments / suggestions to NPC for evolving a uniform procedure across the states at the next meeting.

This was agreed to by the Committee.

B.2: Automatic Under Frequency Load Shedding (AUFLS) scheme:

In the 2nd meeting of NPC, it was decided to implement the following AUFLS scheme with 4 stages of frequency viz. 49.2, 49.0, 48.8 & 48.6 Hz :

Frequency (Hz)	Load relief in each region (in MW)				
	NR	WR	SR	ER	NER
49.2	2160	2060	2350	820	100
49.0	2170	2070	2360	830	100
48.8	2190	2080	2390	830	100
48.6	2200	2100	2400	840	100
Total	**8720**	**8310**	**9500**	**3320**	**400**

Member Secretary (NPC) requested the RPCs to intimate the status of implementation of the above scheme.

NRPC intimated that all the states except Chandigarh and J&K had implemented the above load-relief scheme. Chandigarh had implemented AUFLS scheme at 49.2 and 49.0 Hz only and J&K was yet to implement the same.

ERPC & NERPC informed that all the states in their respective region had implemented the scheme.

SRPC & WRPC intimated that the scheme had been implemented in their region and it was designed to provide even higher load-relief than that required under the scheme. SRPC

mentioned that the scheme in SR states had been implemented by selecting the feeders in such a fashion that average load-relief - not the peak load-relief - provided by those feeders through the UFRs was equivalent to the load-relief required to be provided under the AUFLS scheme. WRPC stated that in WR, except Goa (for about 30 MW load-relief), all states had implemented the scheme.

NPC expressed satisfaction that barring a few states, the revised AUFLS scheme had been implemented by the states in the country. It was decided that the RPCs would take up the matter of implementation of the scheme with the states which had not so far implemented the same and inform the progress at the next meeting.

B.3.: Membership of POSOCO in NPC:

A proposal was mooted in the 2nd meeting to include NLDC as the member of NPC, on which RPCs had assured to examine the proposal and revert back to NPC in the matter.

All the RPCs informed that the proposal of Membership of NLDC in the NPC is agreeable to them. Accordingly, The Committee requested Member Secretary (NPC) to take up with MoP the necessary amendment in the resolution of constitution of NPC.

C. NEW ITEMS DISCUSSED AT THE MEETING

C1. Treatment of Bilateral short term and collective transaction in case of grid disturbances

It is mentioned in the second amendment to the IEGC dated 17-02-2014 notifed by CERC that "For Bilateral short term and collective transactions, the methodology of settlement of accounts for the period of Grid Disturbance shall be formulated by National Power Committee (NPC) and same shall be put up to the Commission for approval. The methodology shall cover all possible scenarios with illustrative examples to cover the instances where the Grid disturbance is either partial or it affects only one region." Member Secretary (NPC) sought suggestions from the members of the Committee.

WRPC was of the view that any transaction during the grid disturbance (GD) period by an entity from healthy region to an entity in the GD region cannot be settled since the entities in GD region are unable to honour the transaction due to the grid constraints. Therefore, it would be appropriate to suspend all the collective schedules from or targeted to entities in the GD region. Alternatively, the deviation liability of the seller/buyer in a healthy region who would unnecessarily be suffering due to suspension of its schedule shall be shared by all the pool members of the disturbed region who have schedule from/to such seller/buyer in the ratio of their schedules in the block prior to the declaration of grid disturbance, for all the blocks it could not revise its schedule.

Some other options were also deliberated but no consensus could be arrived at. The Committee felt that the matter be first deliberated threadbare among the officers at the level of SE/EE of the RPCs, who deal with the work of regional energy accounting, and a report / recommendations thereon could be put up by them during next meeting for deliberations by the NPC.

Accordingly, the Committee constituted a Working Group with following composition:

(1) Director level representative from GM Division, CEA
(2) SE/EE (Commercial) level representative from each RPC
(3) AGM level representative from NLDC
(4) Director (NPC) ----- Member Secretary/Convenor

The Working Group would examine & discuss possible options for Treatment of Bilateral short term and collective transactions in case of grid disturbances and submit its recommendations within two months for consideration of NPC at its next meeting.

Member Secretary (NPC) requested CEA, RPCs and NLDC to nominate their representative for the above Working Group.

C2. Power swing blocking (PSB) setting in Distance relays:

Narrating background of the issue, Member Secretary (NPC) stated that NRPC had constituted a group to make recommendations on the Power Swing Blocking (PSB) feature in the distance relays. The group recommended that PSB should be applied in all zones of distance relay and Out of Step (OOS) relaying should be employed on all inter-regional lines at both ends. NRPC had requested that the matter be deliberated at NPC forum for uniform implementation of the recommendations of the expert group.

Director, NPC informed that two options have been proposed by Ramakrishna Task Force in regard to protection from Power Swing:

- Option 1: Block all Zones except Zone-I - Applies blocking signal to the higher impedance zones of distance relay and allow Zone-I to trip if the swing enters its operating characteristic.
- Option 2 : Block all Zones and Trip with Out of Step (OOS) Function - applies a blocking signal to all zones of distance relay and order tripping if the power swing is unstable using the OOS function.

SRPC was of the view that it would be prudent to await the recommendations of the Consultants appointed for implementation of the recommendations of the Task Force for Power System Analysis under contingencies. However, they informed that option 1 had been implemented in their region.

Based on the feedback from the other regions, it was noted that all RPCs except NRPC had adopted option 1 above. Explaining the ground for adopting option 2, NRPC stated that adopting Option 1 used to lead to frequent trippings of transmission lines. However, with Option 2, the trippings had been contained.

PGCIL informed that both the options were being used by them in their various transmission lines. OOS relay was installed at all inter-regional lines of Northern region. However, adoption of Option 2 requires proper system study to identify feeders where OOS relay could be deployed.

NPC while agreeing to NRPC's opinion to have a uniform PSB setting across all regions, decided to maintain status quo in different regions and wait for the report of the Consultant appointed for implementation of the recommendations of the 'Task Force for Power System Analysis under contingencies' before further deliberations in the matter.

C3. Review of df/dt relays and UFR based automatic load shedding schemes

C.3.1 **Review of df/dt relays**

Member Secretary (NPC) stated that df/dt relays were installed in the Northern, Western and Southern region grids and these were set to get activated at 49.9 Hz to shed load automatically if the rate of fall of frequency happened to be 0.1, 0.2 or 0.3 Hz/Sec depending upon the setting of the concerned relay. The df/dt relays help in arresting the rapid fall of frequency subsequent to severe grid disturbance. These relays in different regions were set keeping in view the power number of the concerned regional grid. The aforementioned settings may not be effective in the inter-connected national grid in view of enhanced inertia. Therefore, SRPC had expressed the need for a review of the settings of the df/dt relays and adoption of the reviewed settings uniformly across all regions.

SRPC informed that their Protection Sub-committee had recommended to determine an appropriate setting of df/dt relays by carrying out detailed system studies for uniform implementation across all the regions in the inter-connected grid. However, as an interim measure, the setting of df/dt relays located in SR had been recommended as under:

Stage-1 : 49.7 Hz & 0.2 Hz/sec
Stage-2 : 49.5 Hz & 0.3 Hz/sec

NPC discussed the issue and opined that in the event of a sudden loss of generation or any grid disturbance, the rate of fall of frequency would vary from one location to another, and it would also vary from one point of time to another at a particular location depending upon the distance from the location of the fault. Therefore, there could be no uniform setting of df/dt relays in different regions. In view of this, NPC decided that settings would be determined by each RPC separately after detailed study of load and generation balance in different areas of the region and communicate the same to the Committee for ratification.

NRPC was of the view that Consultant may be appointed to analyse the location of df/dt relays.

Mentioning that an international consultant had been appointed by POWERGRID / POSOCO to review power transfer capability, operational planning, etc., CEA felt that study of emergency measures was also in the scope of the consultant. **CEA, therefore, requested POWERGRID / POSOCO to include the study regarding settings / location of df/dt relays under those emergency measures by the consultant. POSOCO assured to examine the same and revert back to NPC secretariat.**

C.3.2 **Review of Automatic Under-Frequency relay based Load-shedding Scheme (AUFLS)**

Member Secretary (NPC) stated that the settings of Under-Frequency Relay (UFR) based automatic load shedding scheme were revised by NPC in the year 2013 on the basis of the power number of the NEW grid and SR grid at that time. Subsequently, SR grid had also been synchronised with the NEW grid leading to increase in power number of the inter-connected NEWS grid. In view of this, he felt that the present quantum of load shedding through UFRs needed to be reviewed based on the inputs of the NLDC/RLDC. He also proposed for raising the settings of the UFRs by 0.2 Hz at each step in view of the fact that most of the time, grid frequency was hovering in the IEGC band (49.90 - 50.05 Hz). Thus, new stages under the automatic load shedding scheme could be set as 49.4 Hz, 49.2 Hz, 49.0 Hz and 48.8 Hz. He sought comments of the participants on the proposal.

WRPC and NRPC intimated that the states in their regions had connected higher load than prescribed one under the AUFLS scheme. They felt that existing quantum of load-shedding under AUFLS was adequate, provided that equivalent load-relief is actually obtained in the event of operation of the scheme. Therefore, according to them, first there was a need to ensure operation of the planned quantum of load shedding through existing UFRs before raising the quantum of load shedding or frequency setting under the AUFLS. They also expressed difficulty in identification of such additional load for this scheme which did not overlap with any other protection scheme.

SRPC endorsing the views of NRPC & WRPC informed that they had also achieved more than required load shedding from UFRs and had also done the mapping of feeders participating under AUFLS scheme to visualize the real time loading thereon and have a ready assessment of likely load-relief. ERPC and NERPC also agreed to the opinion of other RPCs and intimated that AUFLS scheme had also been implemented in their regions.

NLDC agreed to the views expressed by the RPCs but suggested that since NER generally imported about 800 MW power from ER, the load shedding in NER under AUFLS should be raised from 400 MW to 800 MW so that NER grid was able to survive the loss of ER-NER

inter-regional link. SE, NERPC stated that raising the quantum of load shedding to 800 MW in NER would be quite high in comparison to its peak demand of around 2000 MW, and hence, might be difficult to implement.

After detailed deliberations, NPC decided to maintain status quo in respect of AUFLS. It was also agreed by the RPCs to initiate the process of mapping of feeders covered under AUFLS scheme like SRPC with a view to ensuring proper implementation of the scheme and also have a real time assessment of load-relief likely to be available under the scheme if it operated.

C4. Transfer capability determination by the states

During the 4th meeting of the erstwhile NPC held on 21st August 2012 in CEA, it was appreciated that for safe operation of the grid, States should carry out power system studies periodically for the purpose of operational planning and power transfer capability through their respective transmission links with the rest of the grid. This would give a clear idea to the concerned SLDC about the maximum quantum of power it can draw from the grid without jeopardizing the grid security. RPCs had agreed to advise the States of their respective region to do it and, if rquired, assistance would be taken from the RLDCs in the beginning. However, no appreciable progress had been observed in implementation of this decision as only a few states like Punjab and UP were providing information about their ATC after regular system study at their websites and to NRLDC / NLDC.

RPCs stated that most of the SLDCs did not have requisite expertise in assessment of transfer capability. They suggested RLDCs to take a lead in this direction and train SLDC personnel to carry out this job on regular basis. NLDC stated that they were always willing to help the SLDCs in the matter through their RLDCs.

It was decided after detailed discussion that to begin with, power system study for assessment of operational limits / power transfer capability for each state will be done by the concerned RLDC in association with concerned SLDC. Monthly TTC/ATC will be uploaded by the SLDCs at their respective websites and also communicated to concerned RLDC & NLDC subsequently.

C.5 Reasons for demand - supply gap and its variation:

Chief Engineer (GM), CEA stated that monthly power supply position prepared & published by CEA based on the data furnished by the states reflected shortages in almost all the states. However, a number of those states intimated adequate availability of power. This meant that the deficit/shortage in such states was actually not the deficit in true sense but demand-supply gap due to reasons other than shortage of power. The reasons for the demand-supply gap could be inadequate availability of power, transmission constraint, distribution constraint, financial constraint, etc. The reason for demand-supply gap needed to be clearly mentioned to reflect true picture of power supply position in different states and also to invite attention of various agencies including policy makers to the specific problem areas in the power sector for suitable solution. He requested the RPCs to advise the states in their respective regions to intimate broad break-up of demand-supply gap due to various reasons, or at least, the main reason(s) for demand-supply gap in each month. He suggested that this matter could be discussed in the OCC forum of RPCs on regular basis and the reasons for demand-supply gap ascertained from the States therein and communicated to CEA.

RPCs agreed to take action accordingly and furnish the above information to CEA along with the power supply position related data every month.

C6: Coordinated outage planning of transmission elements:

NLDC stated that they were experiencing difficulty in coordinating planned shutdown of inter-regional lines with the concerned RPCs as some RPCs were approving shutdowns early in the month, while other RPCs were doing so somewhat later in the month. This led to difficulty in allowing shut down of the inter-regional transmission elements for maintenance purposes. NLDC requested to adopt a suitable approach to eliminate the said difficulty.

CE(GM), CEA suggested to explore the possibility of coordinating shutdowns of inter-regional links for the following month by publishing relevant information at NLDC website by a pre-decided date in the month and giving opportunity to the RPCs / SLDCs to communicate their consent or reservation through e-mail by a specific date. This process could obviate the need for NLDC to wait for the OCC meetings to permit planned shutdowns of inter-regional lines.

Keeping in view the specific issue raised by NLDC, **it was agreed that all RPCs would conduct OCC meetings in a distributed manner by 15th of every month for finalising the planned shutdown of different transmission lines including inter-regional ones for the following month, and 10 days time would be allowed to NLDC to finalise TTC/ATC etc. of various inter-regional corridors taking approved shutdowns into consideration.**

C7: Fund Requirement for NPC

MoP vide its order dated 25th March, 2013 had constituted NPC to (i) resolve issues among RPCs, and (ii) discuss & resolve issues referred to NPC requiring consultation among one or more RPCs, concerning inter-alia inter-regional implication or any other issue affecting more than one region or all regions. The Conduct of Business Rules of NPC stipulate that "Requirement of funds for hosting the meetings of NPC would be met through CEA's budgetary provisions. However, NPC may decide to create a fund for NPC in future for establishment expenses of its Secretariat".

Member Secretary (NPC) sought suggestions of members regarding creation of fund for meeting establishment expenses of NPC secretariat or sharing its expenses.

After discussions, **it was agreed that for the time being, expenditure towards hosting the various meetings of NPC meetings would be met by RPCs on rotational basis.**

C.8: Common Commercial Input data formats for all RPCs (Agenda from WRPC):

Member Secretary (NPC) stated that RPCs were preparing UI pool A/c, Reactive Energy A/c, Regional Energy A/c, Regional Transmission A/c and various other reports based on the input data provided by RLDCs/NLDCs as per the provisions laid down in various regulations notified by CERC. However, in spite of the same basis for preparing the said accounts, the input data formats and output formats of these accounts were not uniform across the RPCs. Also, the methodology of data processing and preparing these A/cs was not uniform in all the regions. To bring uniformity in the preparation of these A/cs, WRPC had proposed that the data formats, procedures and methodologies of A/c preparation be standardized, so that software development for preparation of these A/cs would be common for all the RPCs.

SRPC was of the view that the commercial input data format was RPC independent and that there was no data handshake among the RPCs. The output of various Accounts was being made user friendly in Excel format by the RPCs separately. SRPC felt that there was no need of uniform data format etc. in this regard.

POSOCO pointed out that apart from different data formats, there was an issue in

accounting philosophy being followed by different RPCs. The accounting philosophy needed to be uniform among the regions.

After deliberations, it was decided that the committee formed for finalisation of methodology for treatment of collective transactions may also look into this issue and formulate a uniform accounting philosophy in Regional Energy Accounts being prepared by the RPCs.

C.9: Consensus on Conductor Specification (Agenda from ERPC)

ERPC stated that due to load growth and severe right of way problems encountered in the construction of new transmission lines, it had become necessary to update the existing infrastructure, especially at 132 kV & 220 kV voltage levels . Increasing the power transfer capability of existing installation involves the use of High Temperature Low Sag (HTLS) conductors which were not in widespread use and were supplied by limited number of vendors. As such, certain guidelines needed to be framed regarding the tendering procedure to be followed and conductor's specifications specified. The issue was discussed in 24th TCC/ERPC meeting held at Bhubaneshwar, wherein Members were of view that since the issue was a concern for all constituents in the sector, it should be discussed at national level at the National Power Committee meeting.

NPC advised that the issue be taken up by the ERPC with the Power System wing of CEA.

C.10: NRPC made the following suggestions (refer **Annexure-IV)** for improving grid security for deliberation by the NPC (**Agenda proposed by NRPC**):

(i) **Certification of healthiness of UFR and df/dt relays:** One of the recommendations of the Enquiry Committee, constituted by GOI to enquire into grid disturbances of July 2012, was to ensure healthiness of defense mechanism. Accordingly, NRPC submitted their approved procedure (Annexure-IV) to NPC for comments / adoption by other RPCs so that uniformity can be brought across all the regions.

This suggestion has already been discussed under Para B1.2 above.

(ii) **PSS tuning:** The Enquiry Committee constituted by GOI to enquire into grid disturbances of July 2012 had recommended proper tuning of electronic devices and PSS of generators. Accordingly, NRPC submitted their recommended procedure to NPC for comments / adoption by other RPCs so as to bring uniformity across all the regions.

It was agreed that other RPCs would examine the proposal of NRPC and will revert back in the next NPC meeting.

(iii) Target fixed for Load Relief from operation of Defense Mechanism:

This issue could not be discussed at the meeting due to paucity of time.

D. NPC REPRESENTATION IN SUB-COMMITTEES OF RPCs

Chairperson, CEA & NPC informed that NPC Division of CEA had been entrusted with functions of not only co-ordinating and resolving / deliberating inter-regional issues among the RPCs at the NPC meetings but also other issues like grid security, National Reliability Council of Electricity (NRCE), PSDF, etc. He opined that for discharging the above functions effectively, NPC needed to remain in touch with the RPCs through other forums also. Accordingly, he proposed that **Chief Engineer (NPC) could be nominated a member of TCC, and Director (NPC) would be nominated a**

member of Operation Coordination Sub-committee (OCC), Protection Coordination Sub-Committee (PCC) and Commercial Sub-Committee in all the RPCs.

RPCs agreed to the above suggestion.

E. FOR INFORMATION

New Location of Office of NPC Secretariat: The NPC was informed that subsequent to cadre restructuring in CEA, Chief Engineer (NPC) had been designated as Member Secretary, NPC in place of Chief Engineer (GM). The secretariat of NPC had been shifted from CEA's Sewa Bhawan, R.K. Puram-I, New Delhi office to 3rd floor of NRPC Building, Katwaria Sarai, New Delhi-110016 office w.e.f September, 2015.

Email : cenpccea@gmail.com

Ph. No: 011-26562202

The Meeting ended with vote of thanks to the Chair.

****

ANNEXURE - I

List of Participants in the 4th Meeting of NPC held on 10.12. 2015 at 11.00 AM at NRPC Conference Hall, Katwaria Sarai, New Delhi.

CEA

1. Shri Major Singh, Chairperson, CEA & NPC.
2. Shri Dinesh Chandra, Chief Engineer
3. Shri B.C. Mallick, Chief Engineer & MS, NPC
4. Shri Vijay Meghani, Director
5. Shr D.K. Srivastava, Director
6. Shri Praveen Mishra, Deputy Director
7. Shri K.P. Madhu, Deputy Director
8. Shri Saurabh Mishra, Asstt. Director

NRPC

1. Shri R.K. Sharma, Chairperson TCC.
2. Shri P.S. Mhaske, Member Secretary
3. Shri Ajay Talegaonkar, Superintending Engineer
4. Shri B.S. Bairwa, Executive Engineer (O)
5. Shri Naresh Kumar, Executive Engineer (O),

ERPC

1. Shri S.Kejriwal, EE(C)

WRPC

1. Shri S.B. Agrawal, Chairman TCC
2. Shri S.D. Taksande, Member Secretary
3. Shri P.D. Lone, Executive Engineer

SRPC

1. Smt. Vijayakumari P., Chairperson TCC
2. Shri Asit Singh, Superintending Engineer
3. Shri Anil Thomas, Executive Engineer

NERPC

1. Shri P. K. Mishra, Member Secretary
2. Shri B.Lyngkhoi, Superintending Engineer (O)

NRLDC

1. Shri S.R. Narasimhan, AGM (System Operations)
2. Shri Rajeev Porwal

RVPNL

1. Shri Mukesh Singhal, Superintending Engineer

PGCIL

1. Shri P.N. Dixit, ED

Annexure – II
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भारत सरकार
Government of India
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
पश्चिम क्षेत्रीय विद्युत समिति
Western Regional Power Committee
एफ -3, एमआयडीसी क्षेत्र, अंधेरी (पूर्व), मुंबई - 400093
F-3, MIDC Area, Andheri (East), Mumbai - 400093
दूरभाष Phone: 022- 28221636; 28200195; 28200194 ; फैक्स Fax : 022 -28370193
Website : www.wrpc.gov.in E-mail : ms-wrpc@nic.in

आई एस ओ 9001 2008
ISO : 9001-2008

NO.WRPC/NPC/2013- 1172 Date: 07.08.2013

To,

Member Secretary, NPC & Chief Engineer I/c(GM Division),
Central Electricity Authority,
Sewa Bhavan, R.K.Puram,
New Delhi – 110066.

Subject:- Corrections/additions in the minutes of 2nd NPC meeting.

Sir,

This has reference to the minutes of the 2nd NPC meeting held on 16.07.2013 at New Delhi forwarded vide letter No.8/X/MMS/GM-13/958-976 dated 01.08.2013. Our comments on recording of some of the items are given below which may be considered and the minutes may be modified accordingly.

B.1.2. Reactive Power Planning.

In the 6th Para it is mentioned that 27 reactors were proposed to be installed in the region as per the requirement carried out by the Protection sub-committee and the same was under consideration of Standing Committee of CEA. It may be modified that "27 reactors were proposed to be installed in the region as per the requirement carried out by the Protection sub-committee and the same was approved by Standing Committee in its 34th and 35th meetings. The priorities of commissioning of the reactors have been identified".

G.M. Division Dy. No. 695 Date 21/8/13 C.E.A.

B.1.3. Ensuring proper functioning of Under Frequency Relays(UFRs) and df/dt relays.

In the 2nd Para it may be added that "Member Secretary, WRPC in view of the acute manpower shortage suggested that WRPC would carryout some random checks and inspection of the relays. Also monthly self certification from the utilities may also be collected and considered valid to ensure the healthiness of

UFR and df/dt relays as the prime responsibility of providing load relief lies with the utilities".

B.3 **Review of Zone-III Philosophy.**

It may be added that " Member Secretary, WRPC stated that during the 117th Protection Committee meeting Constituents have confirmed that the Zone-III settings adopted by them are generally higher than the loadability limits given in Para 20 of the manual on transmission planning criteria issued by SP & PA division of CEA".

C Also Shri Satyanarayan S. ,SE,WRPC,s name may be added in the list of participants.

Thanking you,

Yours faithfully,

(S.D.TAKSANDE)
Member Secretary I/c.

Sl. No	UFR and df/dt stages	AP		TELANGANA		KARNATAKA		KERALA		Tamil Nadu			Puducherry		SR	
		SRPC Recommended	Implemented Quantum	SRPC Recommended	Implemented Quantum	SRPC Recommended	Implemented Quantum	SRPC Recommended	Implemented Quantum	SRPC Recommended	Implemented Quantum	Addl feeders identified yet to be implemented	SRPC Recommended	Implemented Quantum	SRPC Recommended	Implemented Quantum
		Average MW		Average MW		Average MW		Average MW		Average MW			Average MW		Average MW	
1	AUFR Stage-I (49.2 Hz)	392	392	417	419	576	571	204	214	740	804	35	21	21	**2350**	**2421**
2	AUFR Stage-I (49.0 Hz)	393	393	419	420	578	578	205	217	744	808	5	21	22	**2360**	**2438**
3	AUFR Stage-I (48.8 Hz)	398	398	424	426	586	594	208	212	753	867	23	21	25	**2390**	**2522**
4	AUFR Stage-I (48.6 Hz)	399	399	426	431	588	593.5	209	211	756	867	65	22	24	**2400**	**2526**
	AUFR Total	**1582**	**1582**	**1686**	**1696**	**2328**	**2336.5**	**826**	**854**	**2993**	**3346**	**128**	**85**	**92**	**9500**	**9907**
1	df/dt stage-I (at 49.5 Hz & 0.2 Hz/sec fall of frequency)	345	345	367	368	474	483	172	178	624	617	0	18	12	**2000**	**2003**
2	df/dt stage-II (at 49.3 Hz & 0.3 Hz/sec fall of frequency)	855	855	912	914	737	735	175	175	559	561	0	0	6	**3238**	**3246**
	df/dt Total	**1200**	**1200**	**1279**	**1282**	**1211**	**1218**	**347**	**353**	**1183**	**1178**	**0**	**18**	**18**	**5238**	**5249**

Annexure-III
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UFR & df/dt relay inspection carried out in SR since Jan 2014

Substation inspected(UFR & df/dt)	Date of Inspection
132/33 kV Naidupet S/S(AP)	9/6/2015
220 /132/33 kV Renigunta S/S(AP)	9/5/2015
400/230/110 kV Sriperamabadur S/S (TN)	8/21/2015
400/230/110 Almathy S/S (TN)	8/20/2015
110 kV Punalur S/S (KER)	6/30/2015
110 kV Chavara S/S, KER)	6/30/2015
220 kV Kundara S/S(KER)	6/29/2015
230/110 kV Sembatty S/S, Dindigul (TN)	6/27/2015
230/110 kV Pasumalai S/S , Madurai (TN)	6/26/2015
110 kV Paripally S/S(KSEB)	6/26/2015
132 kV Turkayamjal S/S (TS)	5/13/2015
132 kV Ibrahimpatnam S/S (TS)	5/13/2015
220 kV Tubinekere S/S (KAR)	4/7/2015
220 kV Hootagally S/S (KAR)	4/6/2015
110 kV Kayathar S/S (TN)	3/27/2015
66 kV Neyyattinkara S/S (KER)	3/26/2015
220 kV Pothenkode S/S (KER)	3/25/2015
110 kV Kttakada S/S (KER)	3/25/2015
220 kV Talak S/S (KAR)	2/21/2015
220 kV Hiriyur S/S (KAR)	2/21/2015
400/220/132 kV Nellore S/S (AP)	8/27/2014
132 kV Atmakur S/S (AP)	8/27/2014

Sl.No	Reactor	Cap. In MVAR	Voltage level	Date
By PGCIL				
1	KURNOOL NEW BUS REACTOR - I	240	765kV	01.04.2014
2	NELLORE POOLING STN BUS REACTOR - I	240	765kV	01.03.2014
3	RAICHUR NEW BUS REACTOR - I	240	765kV	01.02.2014
4	THIRUVALAM BUS REACTOR - I	63	400kV	01.04.2014
5	TUTICORIN POOLING STN BUS REACTOR - I	80	400kV	04.01.2015
6	Sholapur-2 Line Reactor at Raichur New	240	765kV	01.02.2014
7	Mysore 1 Line Reactor at Kozhikode	50	400kV	16.10.2015
8	Mysore 2 Line Reactor at Kozhikode	50	400kV	16.10.2015
9	Line reactor at Nellore (AP) for VJA- NLR III line	63	400kV	14.03.2015
10	Line reactor at Nellore (AP) for VJA- NLR IV line	63	400kV	14.03.2015
By TANTRANSCO				
1	Kayathar line reactor	63	400	26.07.2014
2	Line reactor for Pugalur-KVPT line both ends	80	400	23.07.2014
By KPTCL				
1	Guttur line reactor	63	400	29.04.2015
2	Talaguppa	63	400	Charged 26.11.2015
BY KPCL				
1	Raichur	63	400	Ready for charging 01.12.2015
By APTRANSCO				
1	Bus Reactor at Kalpakka 400 kV SS	63	400	Charged on 15.10.2015

Reactive Power Planning

The following details had been furnished by utilities:

Utility	Reactive power Planning	Voltage Level	Remarks
APTRANSCO	32 x 7.5 MVAR 4 x 14.4 MVAR	33kV level of 132/33 kV SS	
APEPDCL	Srikakulam : 5 x 2 MVAR Vizianagaram : 5 x 2 MVAR Visakhapatnam : 5 x 2 MVAR Rajahmundry : 10 x 2 MVAR Eluru : 4 x 2 MVAR	33/11 kV level	
APSPDCL	April 2015 : 11x2MVAR May 2015 : 16 x2 MVAR June 2015 : 16 x2 MVAR July 2015 : 1 x 2 MVAR August 2015 : 2 x 2 MVAR September 2015 : 2 X 2 MVAR October 2015 : 0	11 kV level	
TSNPDCL	Awaited		
TSSPDCL	249 x2 MVAR	11 kV level	LoA issued on 29.04.2015 for 221 x 2 MVAR capacitors at 11 kV level with supply schedule of 4 month.
	179 x5 MVAR	33 kV level	Tendering under way.
Karnataka	Bengaluru Tr. Zone:708.8 MVAR Bagalkot Tr. Zone :258.1 MVAR Hassan Tr. Zone :136.3 MVAR Mysore Tr. Zone :60.9 MVAR Gulbarga Tr. Zone :98.60 MVAR Tumkur Tr. Zone :281.3 MVAR		Total of 1544 MVAR which were planned to be implemented new PO is placed. 27th TCC Meeting held on 9th October 2015, it was informed that retendering was being done for Bangalore Transmission zone.
Kerala	15 MVAR	66kV level	PO under Progress
TANGEDCO	34 x 2.4 MVAR	11 kV level	Material would be received by December 2015. Work will be started from January 2016 and may be commissioned by March 2016.
	16 x 2.4 MVAR	22 kV level	
	7 x 24 MAVR	110 kV level	
	780 MVAR of capacitors at distribution level had been commissioned out of 1,005 MVAR capacitors planned. 2.4 MVAR capacitors at Somalapauram had been commissioned on 30.06.2015.		

Northern Regional Power Committee

Subject: Additional Agenda for 4th meeting of NPC.

Following agenda items may be included in the agenda for forthcoming meeting of NPC:

(i) Certification of healthiness of UFR and df/dt relays

One of the recommendations of the Enquiry Committee constituted by GOI to enquire into grid disturbances of July 2012 was to ensure healthiness of defense mechanism. In this context, in the 27th meeting of NRPC held on 30th November, 2012, it was decided that mock exercise for healthiness of UFRs would be carried out by utilities themselves on quarterly basis and report would be submitted to NRPC Secretariat and NRLDC. This exercise is being done at the end of March, June, September and December months.

The issue was again discussed in the 18th TCC/ 31st NRPC meetings held on 23rd and 24th July 2014, it was inter-alia decided that OCC would finalize a procedure for testing and self-certification of UFR by utilities. Accordingly, the procedure finalized by OCC was discussed and finalized in the 29th TCC/33rd NRPC held on 10/11 November 2014. It was decided by NRPC that the approved procedure should be submitted to NPC so that uniformity can be brought across all the regions. The procedure approved by NRPC is enclosed at **Annex-A**.

The procedure may be deliberated by members of NPC for consistency in all the regions.

(ii) PSS tuning

One of the recommendations of the Enquiry Committee constituted by GOI to enquire into grid disturbances of July 2012 was to ensure proper tuning of electronic devises and PSS of generators. In this regard, in the 27th TCC/30th NRPC meeting,it was decided to constitute a group to make suitable recommendations with regard to PSS tuning. The group consisted of one member each from NRPC secretariat, CTU, NRLDC, IPGCL, NTPC, BHEL and NHPC. The report of group was deliberated in the29th TCC/33rd NRPC held on 10/11 November 2014. The recommendations of the group approved by NRPC are as under:

1) All generating units with capacity over 50 MW, for which PSS have not been tuned or Step Response Test has not been carried out during last 12 months, should do so within next 12 months and submit to NRPC, NRLDC and CTU, the results of the Step Response Test.

2) If PSS has been tuned or Step Response Test has been carried out during last 12 months, the generating company should submit to NRPC, NRLDC and CTU, the results of the Step Response Test within one month.
3) If results of Step Response Test indicate sufficient damping, generating company would performed next Step Test after three year or at the time of major overhauling of the machine, whichever will be earlier.
4) Generating Companies would arrange for re-tuning of PSS, if Step Response Test indicates insufficient damping or oscillations.
5) All new units with capacity over 50 MW must carry out PSS tuning before declaration of Date of Commercial Operation (COD). A report along with model parameters shall be submitted to CTU, RLDC/SLDC and NRPC for taking the correct modeling in the system study software (s).
6) NRLDC will observe and analyze the changing grid conditions based on the output of PMUs and will inform the generating Company concerned if oscillations are observed. On receipt of the information, the generating company would arrange for re-tuning of PSS at the earliest.
7) In some of the generating units it may not be feasible to tune PSS. Generating Companies would furnish details of such units (Year of Commercial operation, capacity, OEM, reason as to why PSS cannot be tuned etc), which in their opinion are not amenable to PSS tuning. These would then be discussed in the OCC and TCC/NRPC. In cases where there is general agreement that it may not be feasible to carry out PSS tuning, the matter may be taken to CERC for seeking exemption.

Status of implementation of these recommendations is being monitored at NRPC forum.

The recommendations may be deliberated by the NPC for consistency in all the regions.

(iii) Target fixed for Load Relief from operation of Defense Mechanism

NPC, in its 2nd meeting held on 16.07.2013, had agreed for the four stage UFR based automatic load shedding scheme. A combined reading of agenda and minutes of the 2nd meeting of NPC reveals targets were fixed based on peak loads with the assumption that average load will be of the order of 60-70% of peak loads.

Further, the regional load shedding target for each stage was allocated to each state of Northern Region pro-rata to their peak demands.

In recently held OCC meeting of NRPC, Punjab has submitted following details of various automatic load shedding required to be carried out in Punjab:

Sr. No.	Type of Defense Mechanism	Target Load Relief (Available at NRPC website)	
1.	df/dt (Stage-1 49.9 Hz & 0.1 Hz/sec)	430	1410
2.	df/dt (Stage-2 49.9 Hz & 0.2 Hz/sec)	490	
3.	df/dt (Stage-3 49.9 Hz & 0.3 Hz/sec)	490	
4.	UFR (49.2 Hz)	400	1616
5.	UFR (49.0 Hz)	402	
6.	UFR (48.8 Hz)	406	
7.	UFR (48.6 Hz)	408	
8.	SPS (Group-A)	35	496
9.	SPS (Group-C)	71	
10.	SPS (Group-D)	90	
11.	SPS (Group-E)	100	
12.	SPS (Group-F)	100	
13.	SPS (Group-G)	100	
Total Load Relief		**3522**	

Punjab has further submitted details of maximum and minimum load recorded in Punjab during 2014-15. The maximum load was 10155 MW in June 2014 whereas minimum load was 1236 MW in March 2014. Average load for FY 2014-15 was 5444 MW. Also some of the loads such as defence establishments, Hospitals, courts and continuous process industries are uninterruptible. Further, IEGC also requires that there should be no overlapping of feeders between various load shedding schemes.

In view of this, Punjab had expressed difficulty that load relief from UFRs will be much less than target fixed for them. This difficulty may be faced by other states also which have high ratio of maximum to minimum load.

NPC may deliberate so as to decide on the criteria for fixing target for UFR based load shedding for individual states.

07.12.2015

(Ajay Talegaonkar)
SE(O)

Chief Engineer, NPC Division, CEA
No NRPC/119/01/2015/1154 Dated 07.12.2015
08

Annex-A

Procedure for carrying out quarterly certification of healthiness of UFRs and df/dt Relays

1.0 Background:

1.1 Section 9 of Grid Standard 2010 notified by CEA requires all Entities to set their Under Frequency Relays (UFR) and rate of change of frequency with respect to time (df/dt) Relays in their respective systems, in accordance with the plan made by the Regional Power Committee, to provide adequate load relief for grid security and ensure the operation of these relays at the pre-set value of frequencies.

1.2 Further, the Section 5.2 (n) of IEGC stipulates that all STUs/distribution licensees shall provide automatic under-frequency and df/dt relays for load shedding in their respective systems, to arrest frequency decline that could result in a collapse/disintegration of the grid, as per plan separately finalized by concerned RPC and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency.

1.3 In order to ensure healthiness of under-frequency and df/dt relays, It was decided in the 31st meeting of NRPC held on 24th July, 2014 that all STUs/SLDCs shall carry out mock testing of these relays and submit quarterly self-certification regarding healthiness of these relays. In 28th TCC/31st NRPC meeting held on 23rd/24th July, 2014 at New Delhi it was decided that OCC shall develop guidelines to be followed by STUs for testing and self-certification.

2.0 Definition:

2.1 **df/dt Relay:** It is a relay meant to trip pre-selected feeders/transformer (where it is connected) on a pre-set value of rate of change of frequency (with time) to obtain targeted load relief in order to enhance security to the grid. In accordance with decision taken by NRPC, df/dt relays are required to be of numerical type and the scheme is required to be of non-rotational type.

2.2 **Frequency Generator:** Frequency Generator is an equipment which can generate signal of desired frequencies and also capable of generating signal of varying frequency with desired rate of change of frequency with respect to time.

2.3 **Mock testing:** It is a test which applies on UFR or df/dt relay after disconnecting the relay (under test) from the circuit breaker of the feeder/transformer.

2.4 **Radial feeders:** Means the feeder in which, the source of injection of power is at one end only under normal operating conditions.

2.5 **Targeted Load Relief:** Sum of peak loads on each of the feeder/transformer which is required to be tripped when frequency or rate of change of frequency (as the case may be) reaches the pre-set value. The present Targeted Relief for UFR and df/dt relay based automatic load shedding scheme is enclosed at **Annex-I of procedure.**

2.6 **UFR Relay:** It is a relay meant to trip of pre-selected feeder on a pre-set value of frequency to obtain targeted load relief in order to enhance security to the grid. In accordance with decision taken by NRPC, UFRs are required to be of numerical type and the scheme is required to be of non-rotational/flat type.

3.0 Certification of healthiness of the UFRs and df/dt Relays and methodology of testing

3.1 The STU should carry out mock test of UFR &df/dt Relays once in six months.

3.2 The STU should carry out actual tripping of the feeder through df/dt or UFR at least once in a year.

3.3 Sub-station In-charge should inform the SLDC before carrying out the testing of UFRs and df/dt relays.

3.4 Just before testing, the UFR or df/dt relay should be decoupled from the grid frequency input and should couple it with output of Frequency Generator.

3.5 Results of the test should be recorded and conveyed to SLDC of the state. The SLDC after verification should submit quarterly report in respect of the entire state system to NRPC Secretariat within 15 days of the end of the quarter. The format for submission of the report is enclosed as **Annex-II.**

3.6 In case of tripping of feeders on UFR and df/dt based load shedding scheme, the STUs will submit the information in the format submitted as **Annex-III.**

Annex-I

S.No.	State/UT	Peak Met during 2012-13 (MW) (Source:CEA)	Load shedding Target for four stages (MW)- Based on maximum load on the feeders			
			49.2 Hz	49.0 Hz	48.8 Hz	48.6 Hz
1	Chandigarh	340	16	16	16	16
2	Delhi	5642	258	259	262	263
3	Haryana	6725	308	309	312	314
4	Himachal Pradesh	1672	77	77	78	78
5	Jammu & Kashmir	1817	83	84	84	85
6	Punjab	8751	400	402	406	408
7	Rajasthan	8515	390	392	395	397
8	Uttar Pradesh	12048	551	554	559	561
9	Uttarakhand	1674	77	77	78	78
	Total	**47184**	**2160**	**2170**	**2190**	**2200**

Annex-II

Format for submission of report of inspection & checking of UFR and/or df/dt rely by SLDC to NRPC Secretariat

Name of state Control Area:

S. No.	Name of Sub-stn (including Voltage level)	Name of Feeder/ Transformer (including Voltage level)	Area Affected by automatic load shedding	Targeted load relief (MW)	Whether feeder is radial	Whether this feeder/underlying feeders are a part of scheduled power cuts/load shedding	Whether this feeder/underlying feeders covered under UFR	Whether this feeder/underlying feeders covered under df/dt load shedding scheme	Whether the feeder/underlying feeders covered under any SPS?	UFR (Hz.) or df/dt (Hz./sec) setting	Whether power flow and breaker status of the feeder/ underlying feeder visible in SLDC through SCADA	Model, Make and Type (Numerical/static) of relay	Date & time when relay/ /load relief operation was checked last time	Load on the feeder at the time of testing (MW)	Name & Designation of the Checking Officer
				MW	Yes/ No	Yes/No	Yes/No	Yes/No	Yes/No		Yes/No				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1															
2															
3															
4															
5															
----															
n															

Format for submission of report of Tripping/operating of UFR and/or df/dt relay by SLDC to NRPC Secretariat

Annexure-III

Name of State Control Area:

S.No.	Name of Sub-stn (including Voltage level)	Name of Feeder/Transformer (including Voltage level)	Model and Make of relay	Frequency at the time of tripping	Exact Time of operation of relay (as per relay)	Approved load relief (MW) from the feeder	Actual Load relief (MW) obtained from the feeder	Affected Area whether power flow	Whether power flow was monitored in SLDC through SCADA	If yes, time of tripping in SCADA SOE	Total impact at state level in SCADA (MW) change in drawal of the state
1											
2											
3						MW	MW		Yes/No	Yes/No	MW
4											
5											
6											
----											
n											
Total relief from the state at same time											

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