CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Petition No. 6/SM/2014

Coram:
Shri Gireesh B.Pradhan, Chairperson
Shri A.K.Singhal, Member

Date of order: 9.10.2015

In the matter of

Non-compliance of Regulation 5.2 (n) of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 for ensuring security of the Northern regional grid as well as the interconnected Indian grid.

And
In the matter of:

1. Shri Anurag Agarwal
   Chairman-cum-Managing Director
   Punjab State Transmission Corporation Ltd.
   PSEB Head office, the Mall ,
   Patiala- 147001

2. Shri Tarun Bajaj
   Manging Director
   Haryana Vidyut Prasaran Nigam Limited,
   Shakti Bhavan, sector 6,
   Panchkula-134109

3. Shri Alok Kumar
   Chairman-cum-Managing Director
   Rajasthan Rajya Vidyut Prasaran Nigam Ltd,
   Vidyut Bhavan ,Jaipur- 302005

4. Shri Arun Goel
   Chairman-cum-Managing Director
   Delhi Transco Limited,
   Shakti Sadan, Kotla Marg,
   New Delhi-110002

5. Shri S.K.B.S.Negi
   Chairman
   Himachal Pradesh State Electricity Board,
   Vidyut Bhavan , Kumar House,
   Complex building II,
   Shimla-171002

6. Shri Arun Mehta
   Principal Secretary
   Power development Department,
   Grid Substation complex,
   Jammu and Kashmir

7. Shri Rajender Singh (Sudpt. Engg.)
   Electricity Department,
   Sector-9D,
   Union Territory of Chandigarh,
   Chandigarh-160019

8. Shri Sudhir Bhatnagar,
   Chief Engineer
   State Load Despatch Centre
   Power Transmission Corporation of Uttarakhand Ltd.,
   Virbhadra, Rishikeksh,
   Uttarakhand- 249202

9. Shri Kamraj Rizei
   Chairman-cum-Managing Director
   Uttar Pradesh Power Transmission Corporation Limited,
   Shakti Bhawan, 14, Ashok Marg,
   Lucknow- 226007.

The following were present:

Shri S.K. Soonee, POSOCO
Shri V.K. Aggarwal, NLDC
Ms. Jyoti Prasad, POSOCO
Ms. Supriya Singh, NRLDC
Shri Rajiv Porwal, NRLDC
Shri Rahul Srivastava, Advocate, UPSLDC
Shri Zahir Ahmad, UPSLDC
Shri M.K. Gupta, SLDC UP
Shri Amit Kumar Singh, SLDC Uttarakhand

Shri A.K. Baid, RVPNL
Shri A.K. Arya, RVPNL
Shri Sunil Sharma, UT of Chandigarh
Shri Prem Prakash, DTL
Shri B.L. Gujar, DTL
Shri S.P. Singh, DTL
Shri Hem Joshi, HVPNL
Shri Rajesh Kumar Goel, HVPNL
Shri Ravi Sher Singh, HVPNL

ORDER

Regulation 5.2 (n) of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 (Grid Code) as amended from time to time provides as under:

> *"All SEBS, distribution licensees / STUs 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 the plan separately finalized by the concerned RPC and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency. All SEBs, distribution icensees, CTU STUs and SLDCs shall ensure that the above under-frequency and df/dt load shedding/islanding schemes are always functional. RLDC shall inform RPC Secretariat about instances when the desired load relief is not obtained through these relays in real time operation. The provisions regarding under frequency and df/dt relays of relevant CEA Regulations shall be complied with. SLDC shall furnish monthly report of UFR and df/dt relay operation in their respective system to the respective RPC.*
>
> *RPC Secretariat shall carry out periodic inspection of the under frequency relays and maintain proper records of the inspection. RPC shall decide and intimate the action required by SEB, distribution licensee and STUs to get required load relief from Under Frequency and df/dt relays. All SEB, distribution licensee and STUs shall abide by these decisions. RLDC shall keep a comparative record of expected load relief and actual load relief obtained in Real time system operation. A monthly report on expected load relief vis-a-vis actual load relief shall be sent to the RPC and the CERC."*

2. Northern Regional Load Despatch Centre had filed Petition No. 221/MP/2013 seeking directions to State Utilities to comply with the Regulation

5.2 (n) of the Grid Code. After hearing the parties, the Commission came to the conclusion that some of the State utilities have not complied with the provisions of Regulation 5.2 (n) of the Grid Code and vide order dated 23.12.2013 directed to issue notices under Section 142 of the Act to the heads of SLDCs and MD/CMD of the STUs of Punjab, Haryana, Rajasthan, Delhi, Uttar Pradesh, Uttarakhand, Himachal Pradesh, Jammu and Kashmir and head of Electricity Department, UT of Chandigarh for non-compliance of the Grid Code which is extracted as under:

> "29. We are constrained to remark that we are thoroughly dissatisfied with the defense mechanism in terms of UFR and df/dt. Hard reality which stares us on the face is that these have not been provided and maintained as per Regulation 5.2 (n) and 5.4.2 (e) of the Grid Code by NR constituents. Accordingly, we hereby direct as follows:
>
> (a) Issue notices to the heads of SLDCs and MD/CMD of the STU of Punjab, Haryana, Rajasthan, Delhi, Uttar Pradesh, Uttarakhand, Himachal Pradesh, Jammu and Kashmir and head of Electricity Department, UT of Chandigarh and to explain why action should not be initiated under Section 142 of the Electricity Act, 2003 for non-compliance of the Grid Code.
> ……"

3. In view of the above, the Commission vide order dated 25.4.2014 issued show cause notice under Section 142 of the Act to the Respondent Nos. 1 to 9 on the charge for non-compliance with the provisions of the Act and the Grid Code.

4. During the course of hearing on 22.5.2014, the representative of Northern Regional Load Despatch Centre submitted that the issue regarding mapping of UFR and df/dt relays on SCADA was discussed in OCC meetings of

NRPC. However, the working of mapping relays on SCADA in NR is still pending. He further submitted that during the OCC meeting, some of the constituents informed that UFRs have already been provided for Stage-I and II. However, the frequency in Northern Region (NR) has not gone below 49.2 Hz (1st stage). It is not possible for RLDC to explain that these relays would work in real time or not when frequency reaches 49.2 Hz. The representative of NRLDC submitted that NRPC had inspected some of the relays in NR 5-6 months ago and it was found that some of the relays were not working which needs to be set right and regular inspection should be ensured. The representative of NRLDC further submitted that on 12.3.2014, there was large tripping in Western Region (WR) when the entire CGPL station of 4000 MW (at that time running around 3500 MW) tripped. At that time, the rate of change of frequency was much higher (0.3 Hz per sec in WR), most of the df/dt relays had not operated in, and very little support was observed from these relays in WR. In NR, as per data from Phasor Measurement Units (PMUs), rate of change of frequency was above 0.1 Hz/sec for around 500 to 600 ms. Certain relays in NR should, therefore, have operated in Stage-I (0.1 Hz/sec.). However, during discussion in OCC meeting, none of the States discussed about relay operated in their systems. Therefore, no operation of df/dt relays has taken place in WR and NR on 12.3.2014.

5. Reply to the show cause notice has been filed by Punjab State Transmission Corporation Ltd. (PSTCL), Rajasthan Rajya Vidyut Prasaran

Nigam Ltd (RRVPNL), Delhi Transco Limited (DTL), Uttar Pradesh-SLDC, Haryana Vidyut Prasaran Nigam Ltd (HVPNL), Power Transmission Corporation of Uttarakhand Limited (PTCUL), Electricity Department, UT of Chandigarh. Power Development Department, Jammu and Kashmir has not filed reply to the show cause notice.

6. Punjab State Transmission Corporation Ltd. (PSTCL) in its reply dated 12.5.2014 has submitted that there are 37 nos. locations/sub-stations where Under Frequency Relays (UFRs) have been installed. Apart from these, at 34 Nos. locations/sub-stations df/dt relays have been installed. Out of these 71 locations, 4 sub-stations are common where df/dt and UFRs both have been installed. PSTCL has submitted that the issue regarding monitoring/ mapping of UFR and df/dt relays was discussed in 5th State`s OCC meeting held on 9.4.2014. Punjab SLDC is in the process of monitoring/ mapping of UFR and df/dt relays in SCADA system. PSTCL has submitted the status of 67 Nos. independent sub-station/locations as under:

(a) At 18 Nos. locations, Dongfang make Remote Terminal Units (RTUs) have been commissioned and action for mapping the relays with the SCADA has already been initiated by installing additional transducers and digital inputs.

(b) For 17 Nos. locations, more RTUs have been ordered to Dongfang and work is in progress, and emergency load shedding relays

existing at these substations would also be monitored in SCADA along with the other feeders in the sub-stations.

(c) At 5 Nos. sub-stations, RTUs are under replacement with Siemens make Remote Terminal Units under ULDC phase-II and these relays would also be mapped along with feeders in the sub-stations.

(d) At 18 nos. sub-stations, Alstom/Areva make RTUs were installed during the years 2002 to 2005. New I/Os would be required to be configured for monitoring of df/dt and UFR relays at these sub-stations and accordingly, this activity has been taken up with the concerned AMC vendor separately.

7. Rajasthan Rajya Vidyut Prasaran Nigam Ltd (RRVPNL) in its reply dated 14.5.2014 has submitted that all relays are healthy and functional and all the feeders are radial in nature. In compliance of decision of NRPC regarding the revised scheme for automatic load shedding through under frequency relays (UFRs), UFRs have already been provided for Stage-I and Stage-II (428 MW at 49.20 Hz having 41 nos. of UFRs and 402 MW reliefs at 49.00 Hz having 40 nos. UFRs) and the same have been intimated to NRPC. With regard to Stage-III and Stage-IV under 'Revised schemes for automatic load shading through UFR', RRVPNL has submitted that the proposals for these stages have been submitted to the DISCOMs for approval. RRVPNL has submitted that it has already carried out testing of all existing system on emergent basis to ensure

their healthiness and functionality at all times to achieve adequate relief as recommended by NRPC.

8. Haryana Vidyut Prasaran Nigam Limited (HVPNL) in its reply dated 12.5.2014 has submitted that as per Commission`s direction dated 23.12.2013 in Petition No. 221/MP/2012 mapping of UFR df/dt in the system has also been implemented. HVNPL has further stated that in compliance with the provisions of Grid Code, Haryana has already installed UFR and df/dt relays in its transmission system. As per the directions given in the report of Enquiry Committee constituted after the Grid Disturbance of 30.7.2012 and 31.7.2012, Haryana has conducted thorough checks of UFR and df/dt relays installed in its system. 4 nos. relays which were not functioning properly have been rectified /repaired and 8 nos. relays which were not repairable have been replaced after procurement of 12 nos. new UFR's. HVPNL has further submitted that as per direction of NRPC regarding implementation of UFR and df/dt scheme in four stages, the scheme has been implemented with the help of operational UFR's load relief desired in all four stages by NRPC as under:

State/UT	**HARYANA**			
	49.2 Hz	**49.0 Hz**	**48.8 Hz**	**48.6 Hz**
Load shedding target for four stages (MW) based on maximum load on the feeders	308	309	312	314
Expected Average Load relief for four stages as given by Haryana	317	440	355	190

9. SLDC Uttar Pradesh in its affidavit dated 17.5.2014 has submitted that it has already installed UFR and df/dt relays in its transmission system. SLDC Uttar Pradesh has submitted that as per status submitted by STU, UP, against the targeted load relief of 2225 MW, total load relief for 4548 MW under frequency relays has been installed and STU has implemented the scheme in all the frequency stages. SLDC UP has further submitted that it has complied with the Commission's directions which was communicated in 98th OCC meeting held on 22.4.2014. SLDC UP has further submitted that for function of df/dt relays installed by STU till 7.2.2014, total relief on different rate of fall of frequency Hz/sec is as under:

S.No	Rate of fall of frequency of the grid (Hz/sec)	Total relief provided through df/dt relays (MW)
1.	0.1	678.02
2.	0.2	615.04
3.	0.3	550.725

SLDC, UP has submitted that since last one year most of the time frequency of the grid is stable at ideal level and did not fall therefore, UFR and df/dt relays could not be operated. On 12.3.2014, due to sudden fall of the frequency, df/dt relays has been operated and provided adequate relief up to different bands of frequency.

10. Delhi Transco Limited (DTL) in its reply dated 21.5.2014 has submitted that as per the guidelines of the NRPC and recommendations of Protection Audit Committee, the settings for under frequency load shedding and df/dt were

fixed under peak load demand conditions at 3736 MW (2006-07 peak conditions). DTL has submitted that it has already installed UFRs at all 24 stations which had both the features of UFR and df/dt settings to achieve the recommended load shedding. These have been implemented station-wise as Group-X, Y, Z combining some feeders to achieve the desired quantum of relief at each frequency stages. The total designed load shedding as implemented by Delhi system is 150 MW for 48.8Hz, 150 MW for 48.6Hz, 315 MW for 48.2Hz. (total =615 MW as against 400 MW stipulated by NRPC in its under frequency load shedding scheme). DTL has submitted that in order to provide load relieve envisaged at 0.1Hz/sec slope and 0.2Hz/sec slope, the total load relieve at 0.2Hz/sec slope was envisaged 590 MW against the recommended load of 530 MW (250 MW for stage-I i.e 0.1Hz/sec slope and 280 MW for stage-II i.e 0.2Hz/sec slope). The stage 3 i.e 0.3 Hz/sec slope load of 280 MW was implemented as per the guidelines of NRPC. DTL has submitted that to map all the UFRs and df/dt relays in the SCADA system, as per revised schemes approved by NRPC, the account of operation is available in SLDC which can be integrated to main SCADA along with the completion of ULDC scheme phase-II.

11. Transmission Corporation of Uttarakhand Limited (PTCUL) in its reply dated 13.5.2014 has submitted that as per the target decided by NRPC, Uttarakhand has implemented required UFRs and df/dt relays. PTCUL has further submitted that SLDC Uttarakhand vide letters dated 5.2.2015 and 13.2.2015 requested STU to intimate the status of UFRs, df/dt settings and

healthiness of relays to SLDC and to map all the UFRs and df/dt relays in the SCADA system. However, presently UFRs and df/dt relays are not mapped on SCADA system.

12. UT, Chandigarh in its reply dated 21.5.2014 has submitted that it has already installed 2 nos. of UFR at 66 kV Industrial Area phase-I and II sub-stations. Industrial area phase-II is providing relief of around 8 MW each through its 11 kV feeders in its transmission system at frequency of 49.3 Hz. UT Chandigarh has further submitted that it has initiated the process of procurement of df/dt relays which would provide relief of 50 MW each at 49.9 Hz with slope of 0.2 Hz/sec (Stage-II) and 49.9 Hz with slope of 0.3 Hz/sec (Stage-III). UT Chandigarh has proposed to install 4 nos. of df/dt relays and submitted that the estimate for procurement of the same is under approval.

13. NRLDC vide affidavit dated 14.7.2014 has submitted as under:

(a) The matter was discussed regularly in NRPC forum i.e, Operation Coordination Committee (OCC) and Protection Coordination Committee (PCC). National Power Committee (NPC) had decided four (4) stages of Under Frequency Relay (UFR) scheme at 49.2 Hz, 49.0Hz, 48.8 Hz and 48.6 Hz respectively. In the 2nd meeting of NPC held on 16.7.2013, it was decided that the scheme would be implemented within a period of three months and the following quantum of load relief was decided:

Frequency (Hz)	**Required Load Relief (MW)**				
	NR	WR	ER	NER	Total
49.2	2160	2060	820	100	5140

49	2170	2070	830	100	5170
48.8	2190	2080	830	100	5200
48.6	2200	2100	840	100	5240
Total	8720	8310	3320	400	20750

(b) Based on the discussion held in the OCC meeting of Northern Region held on 19.7.2013, NRPC vide letter dated 13.8.2013 revised the target of individual State Control Areas of NR. The matter was further discussed in the 26th TCC and 29th NRPC meetings held on 12.9.2013 and 13.9.2013 respectively and the following revised target for the State Control Areas of NR was decided:

S.No.	**State/UT**	**Peak Requirement during 2012-13(MW) (source: CEA)**	**Load Shedding Target for four stages (MW)**			
			49.2Hz	**49.0Hz**	**48.8Hz**	**48.6Hz**
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.	Uttar Pradesh	8515	390	392	395	397
8.	Uttrakhand	12048	551	554	559	561
9.	Total	1674	77	77	78	78
	Total	**47184**	**2160**	**2170**	**2190**	**2200**

(c) The scheme was to be implemented by 25.8.2013 for the first two stages by raising the setting of existing URF relays and for last two stages within a period of 3 months. In 27th TCC and 30th NRPC

meetings held on 27.2.2014 and 28.2.2014 respectively, NRPC was also advised that States should ensure the ability of the relays to communicate with the control centre.

(d) UT Chandigarh and PDD, Jammu and Kashmir have not complied with requirement regarding quarterly self certification with respect to Mock testing of UFR and df/dt relays.

(e) With regard to procurement of 10% spare UFR and df/dt relays RVPNL, UPPTCL, DTL, HVPNL, HPSEB and PTCUL have confirmed that they have 10% spare relays. However, UT Chandigarh and PDD, J & K have not complied with the same.

(f) In the 100th OCC meetings held on 20.6.2014 following was noticed:

(i) PDD, J&K and UT Chandigarh have still not complied by installing UFR in the system as mandated by NRPC.

(ii) Other States have Self Certified the functioning of UFRs in respective control areas.

(iii) Though as per minutes of 100th OCC meeting of Northern Region, the stage of 48.8 Hz and 48.6 Hz were to be implemented by end of June 2014, RVPNL vide letter dated 4.7.2014 informed

implementation of the above stages. This information was also included in the minutes of meeting while giving status on 7.7.2014.

(iv) UP has reported the relief based on average load on the feeders.

(v) Punjab, Delhi, Haryana, UP and Rajasthan have informed higher than the target load relief.

(vi) The inadequate load relief for defence mechanism of UFR and df/dt relays has been discussed in various meetings of NRPC and 20% extra UFR and commissioning based on average load has been decided earlier.

(g) System frequency has not touched its first stage of under frequency (viz 48.8 Hz till July 2013 and 49.2 Hz from August 2013) since August 2012 and therefore, actual relief in the system observed vis-à-vis planned one is unavailable. However, there have been repeated discussions in the NRPC meetings about the less load relief from some of the System Protection Schemes (SPS) which had operated.

(h) In regard to Commission's direction regarding mapping of UFR and df/dt relays to their respective SCADA, the issue was discussed with all concerned utilities. In 99th OCC meeting of Northern Region held on 19.5.2014, the representatives of Haryana and HP informed about

mapping of some of the UFR and df/dt relays to SLDC SCADA. SLDC Punjab vide its letter dated 4.7.2014 informed regarding mapping of the seven numbers of relays to the SLDC SCADA and work being in progress in remaining relays. NRLDC vide its letter dated 7.7.2014 had taken up the matter with all the concerned for information of the monitoring page on SLDC SCADA so as the same is also visible at the control center of NRLDC.

(i) NRPC has approved the following target for rate of change of frequency (dt/df) relays based on load shedding:

	Load relief in MW			
	Stage-I	**Stage-II**	**Stage-III**	
States	**49.9Hz & 0.1 Hz/sec**	**49.9Hz & 0.2 Hz/sec**	**49.9Hz & 0.3 Hz/sec**	**Total**
Punjab	430	490	490	1410
Haryana	280	310	310	900
Rajasthan	330	370	370	1070
Delhi	250	280	280	810
UP	500	280	280	1060
Uttrakhand	70	70	70	210
UP	50	70	70	190
J&K	90	90	90	270
Chandigarh	0	50	50	100
Total	**2000**	**2010**	**2010**	**6020**

e tripping of Mundra UMPP on 12.3.2014 was discussed in Western Region. As per WRPC, tripping happened due to inadequate governor action from the generating station. The details of inadequate load relief

(based on input from utilities) from rate of change of frequency (df/dt) scheme as per the report of WRPC is as under:

States	Observed df/dt in Hz/s	Applicable Stages	Envisaged quantum of load shedding in MW	Actual load shedding reported in MW	Inadequate by
Gujarat	-0.33	I&II	1911	636	1275 MW
Madhya Pradesh	-0.23	I&II	716	0	716 MW
Chhattisgarh	-.017	I	64	0	64 MW
Maharastra	-0.31	I&II	1167	334	1167 MW
TPC	-0.31	I&II	142	0	142 MW
			4000	960	3040 MW

(k) The status of df/dt relay operation in NR as on 12.3.2014 at 19:21 hrs is summarized as below:-

NR state control Area	df/dt, stage-1 (49.9 Hz, 0.1Hz/s) Required Relief (MW)	df/dt, stage-II (49.9 Hz, 0.3Hz/s) Required Relief (MW)	df/dt, stage-III (49.9 Hz, 0.4Hz/s) Required Relief (MW)	Tata Mundra tripping (loss of 3700MW on 12.3.2014 at 19:21 hrs)			
				Observed df/dt(Hz/s)	Applicable stages of df/dt	Envisaged quantum of load shedding under df/dt stage-I (MW)	Load df/dt as Reported by respective state control area
Punjab	430	490	490	Greater than (-) 0.1Hz/s for 800ms	I	430	$
Haryana	280	310	310		I	280	
Rajasthan	330	371	371		I	330	
Delhi	250	280	280		I	250	53
Uttar Pradesh	500	280	280		I	500	245.87*
Uttrakhand	70	70	70		I	70	
Chandigarh	50	70	70		I	50	
Himachal Pradesh	90	90	90		I	90	
Jammu & Kashmir	0	50	50		I	0	
Northern Region	2000	2010	2010		I	2000	

* Load relief on df/dt as reported by UP include 147MW for 0.1 Hz/sec and 99MW for 0.2Hz/sec. Also, reportedly 19MW load also tripped on UFR.
$: Relays at nine 132 kv sub-stations operated but quantum of relief not mentioned.

(l) Based on the above data, NRLDC requested all State Control Areas to keep the defence mechanism always in healthy condition so that full targeted relief may be always available and direct all the generating stations to keep generation units operational under governor action as mandated in the Grid Code.

14. NRPC vide its letters dated 5.4.2014 and 20.11.2014 in Petition No. 221/MP/2012 has submitted status of adequate load shedding through automatic under frequency and df/dt relays. NRPC has submitted that inspections were carried out and its updated summary has already been submitted to the Commission. NRPC has submitted that during the inspection carried out after 17.11.2012, certain deficiencies were observed and the concerned utilities were advised to take corrective action.

Analysis and Decision:

15. We have considered the submissions of NRLDC, NRPC and the respondents. It is noted that the discrepancies noticed in the information submitted by the respondents are similar in both the submissions of NRLDC and NRPC respectively. The issue was taken up with all concerned utilities. As per the status provided by NRLDC, UFR is not fully operational in the sub-stations of the respondents.

16. As per the report submitted by NRLDC and NRPC, the following steps were taken by NRLDC and NRPC:

(a) National Power Committee (NPC) had decided four (4) stages of Under Frequency Relay (UFR) scheme at 49.2 Hz, 49.0Hz, 48.8Hz and 48.6 Hz respectively. NPC in its 2nd meeting dated 16.7.2013 decided to implement the scheme within a period of three months. The quantum of load relief was decided for each region at four stages of UFR. Accordingly, revised UFR based automatic load shedding in each State/ UT at all the four stages (stage-wise) were worked out by NRPC vide letter dated 13.8.2015. The scheme was to be implemented by 25.8.2013 for the first two stages by raising the setting of existing UFR relays and for last two stages with in a period of 3 months. NRPC in the 27th TCC and 30th OCC meetings held on 27/28.2.2014 advised the States to ensure the ability of the relay to communicate with the control centers.

(b) The status of the implementation of the UFR relays is regularly monitored in the OCC meetings of the Northern Region. PDD, J&K and UT of Chandigarh did not comply with the direction of NRPC regarding installing UFR in their respective system. Other States have Self-Certified the functioning of UFRs in respective control areas.

(c) NRLDC had taken the issue regarding mapping of UFR and df/dt relays to their respective SCADA with all concerned utilities. In the 99th OCC meeting of Northern Region held on 19.5.2014, the representatives

of Haryana and Himachal Pradesh informed regarding mapping of some of the UFR and df/dt relays to the SLDC SCADA. SLDC Punjab vide its letter dated 4.7.2014 informed regarding mapping of the seven (7) numbers of relays to the SLDC SCADA.

17. NRLDC has submitted that due to inadequate load relief (based on input from utilities) from rate of change of frequency (df/dt) relays and inadequate governor action from the generating stations in the Western Region, large tripping occurred on 12.3.2014 in Western Region. Accordingly, NRLDC requested all the utilities of Northern Region to submit information regarding df/dt relief, FGMO/RGMO response in the generating stations, SPS operation, manual generation raise/load shedding details and other relevant information.

18. Perusal of reports of NRPC and NRLDC reveals that in various meetings of NRPC, all State Transmission Utilities (except J&K) have claimed proper functioning of the UFR and df/dt schemes in their systems. NRPC has also conducted periodic inspection as per the provisions of Regulation 5.2(n) of the Grid Code. It is noted that despite report of inspection, various discussion in the OCC and PCC meetings to rectify the deficiencies and claims by the State utilities that defence mechanism is adequate in their systems, required load relief from under frequency and df/dt relays is still not available, which is a matter of great concern. SLDC UP has submitted that df/dt relays has been operated and provided adequate relief up to different bands of frequency. It is noted that SLDC UP has not submitted the quantum of load relief.

19. Regulation 5.2 (n) and 5.4.2 (e) of the Grid Code provides as under:

> "5.2 (n) All SEBs, distribution licensees/STUs 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 the plan separately finalized by the concerned RPC and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency. All SEBs, distribution licensees, CTU STUs and SLDCs shall ensure that the above under-frequency and df/dt load shedding/islanding schemes are always functional. RLDC shall inform RPC Secretariat about instances when the desired load relief is not obtained through these relays in real time operation. The provisions regarding under frequency and df/dt relays of relevant CEA Regulations shall be complied with. SLDC shall furnish monthly report of UFR and df/dt relay operation in their respective system to the respective RPC.
>
> RPC Secretariat shall carry out periodic inspection of the under frequency relays and maintain proper records of the inspection. RPC shall decide and intimate the action required by SEB, distribution licensee and STUs to get required load relief from Under Frequency and Df/Dt relays. All SEB, distribution licensee and STUs shall abide by these decisions. RLDC shall keep a comparative record of expected load relief and actual load relief obtained in Real time system operation. A monthly report on expected load relief vis-a-vis actual load relief shall be sent to the RPC and the CERC."
>
> "5.4.2 (e) In order to maintain the frequency within the stipulated band and maintaining the network security, the interruptible loads shall be arranged in four groups of loads, for scheduled power cuts/load shedding, loads for unscheduled load shedding, loads to be shed through under frequency relays/ df/dt relays and loads to be shed under any System Protection Scheme identified at the RPC level. These loads shall be grouped in such a manner, that there is no overlapping between different Groups of loads. In case of certain contingencies and/or threat to system security, the RLDC may direct any SLDC/ SEB/distribution licensee or bulk consumer connected to the ISTS to decrease drawal of its control area by a certain quantum. Such directions shall immediately be acted upon. SLDC shall send compliance report immediately after compliance of these directions to RLDC."

As per the above provisions of the Grid Code, STUs and SLDCs are required to ensure that the above under-frequency and df/dt load shedding/islanding schemes are always functional. We are pained to remark that the defense

mechanism in terms of UFR and df/dt have not been provided and maintained by the constituents of Northern Region as per the provisions of the Grid Code:

20. NRLDC has submitted that the following status of df/dt relay operation in NR as on 12.3.2014:

NR state control Area	df/dt, stage-1 (49.9 Hz, 0.1Hz/s) Required Relief (MW)	df/dt, stage-II (49.9 Hz, 0.3Hz/s) Required Relief (MW)	df/dt, stage-III (49.9 Hz, 0.4Hz/s) Required Relief (MW)	Tata Mundra tripping (loss of 3700MW on 12.3.2014 at 19:21 hrs)			
				Observed df/dt(Hz/s)	Applicable stages of df/dt	Envisaged quantum of load shedding under df/dt stage-I (MW)	Load df/dt as Reported by respective state control area
Punjab	430	490	490	Greater than (-) 0.1Hz/s for 800ms	I	430	$
Haryana	280	310	310		I	280	
Rajasthan	330	371	371		I	330	
Delhi	250	280	280		I	250	53
Uttar Pradesh	500	280	280		I	500	245.87*
Uttrakhand	70	70	70		I	70	
Chandigarh	50	70	70		I	50	
Himachal Pradesh	90	90	90		I	90	
Jammu & Kashmir	0	50	50		I	0	
Northern Region	2000	2010	2010		I	2000	

* Load relief on df/dt as reported by UP include 147MW for 0.1 Hz/sec and 99MW for 0.2Hz/sec. Also, reportedly 19MW load also tripped on UFR.
$: Relays at nine 132 kv sub-stations operated but quantum of relief not mentioned.

Perusal of the above status of df/dt operation in NR as on 12.3.2014 reveals that the respondents have not properly provided dft/dt relays for load shedding in their respective systems in terms of Regulation 5.2 (n) of the Grid Code. Despite our repeated directions to set right and discrepancies in the defence mechanism and provide required load relief, the respondents have taken it very casually. All constituents except Jammu and Kashmir were

required to provide load relief at 0.1 Hz/sec fall of frequency. However, the load relief provided by the constituents was not sufficient. We express our displeasure at the conduct of the respondents to ignore our directions and provisions of the Grid Code, especially in such a matter where grid security is involved. In our view, there are no mitigating factors which exonerate the respondents from the charges initiated under section 142 of the Act. In our view, the charges against the respondents are proved and accordingly, we impose a penalty of ₹ one lakh on each of the heads of STUs and SLDCs of Uttar Pradesh, Rajasthan, Delhi, Haryana, Punjab, Himachal Pradesh, Uttarakhand and head of Electricity Department of UT, Chandigarh under Section 142 of the Act for non-compliance of provisions of Regulations 5.2 (n) and 5.4.2 (e) of the Grid Code. The penalties shall be deposited within one month from the date of issue of the order.

21. We further direct that all STUs, distribution licensees and SLDCs of Northern Region shall ensure that UFRs, df/dt and Islanding scheme are always functional and shall operate to provide adequate load relief as agreed in NRPC forum. NRLDC and NRPC are directed to submit report to the Commission regarding operation of UFRs and df/dt below the settings, if any and adequate relief to be made available by concerned States/utilities so that appropriate action may be taken against defaulting SLDCs and STUs in accordance with law. Further, we feel that the present UFR settings are quite low considering the normal range of operation of the grid between 49.9. Hz to 50.05 Hz. National

Power Committee may review the settings of UFR and df/dt, if required considering the above aspect and submit a report to the Commission in this regard.

22. It is further noted from the report of NRLDC that on 12.3.2013, required load relief was not provided by the constituents of Western Region during the tripping of Mundra UMPP. We direct the staff for initiation of proceedings against constituents of Western Region under Section 142 of the Electricity Act, 2003 for non-compliance of the provisions of Regulation 5.2 of the Grid Code.

23. The petition is disposed of with the above directions.

Sd/-
(A.K.Singhal)
Member

sd/-
(Gireesh B.Pradhan)
Chairperson