

**CENTRAL ELECTRICITY REGULATORY COMMISSION  
NEW DELHI**

**Petition No.8/SM/2015**

**Coram:**

**Shri Gireesh B. Pradhan, Chairperson**

**Shri A.K.Singhal, Member**

**Shri A.S.Bakshi, Member**

**Dr. M.K.Iyer, Member**

**Date of Hearing: 23.2.2016**

**Date of Order : 31.5.2016**

**In the matter of**

Non-compliance of Regulation 5.2(o) of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010.

**And**

**In the matter of**

1. Chairman-cum-Managing Director  
Haryana Vidyut Prasaran Nigam Limited,  
Shakti Bhawan, Sector-6,  
Dist- Ambala, Panchkula, Haryana- 134109.
2. Chairman-cum-Managing Director  
Punjab State Transmission Corporation Ltd.  
PSEB Head office, the Mall , Patiala- 147001
3. Chairman-cum-Managing Director  
Rajasthan Rajya Vidyut Prasaran Nigam Ltd,  
Vidyut Bhavan ,Jaipur- 302005
4. Chairman-cum-Managing Director  
Uttar Pradesh Power Transmission Corporation Limited,  
Shakti Bhawan, 14 Ashok Marg,  
Lucknow- 226007
5. Chairman  
Bhakra Beas Management Board  
Sector 19 B, Madhya Marg,  
Chandigarh-160 019

**..Respondents**

1. Chairman-cum-Managing Director  
Power Grid Corporation of India Limited  
Saudamini, Plot No.- 2,  
Sector-29, Gurgaon- 1221001, Harynana
2. The Member Secretary,  
Northern Regional Power Committee,  
18-A, Shaheed Jeet Singh Sansawal Marg,  
Katwaria Sarai, New Delhi-110016
3. The General Manager,  
Northern Regional Load Despatch Centre,  
18-A, Shaheed Jeet Singh Sansawal Marg,  
Katwaria Sarai, New Delhi-110016.
4. National Load Despatch Centre (NLDC)  
B-9, Qutab Institutional Area,  
Katwaria Sarai,  
New Delhi -110016

**Proforma Respondents**

**ORDER**

Based on the report of Member Secretary, Northern Regional Power Committee (NRPC) dated 24.6.2015, the Commission vide order dated 31.7.2015 issued show cause notice to the respondents under Section 142 of the Electricity Act, 2003 for non-compliance of the provisions of the Regulation 5.2(o) of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 (Grid Code) as amended from time to time. Relevant portion the said order is extracted as under:

“3. Member Secretary, Northern Regional Power Committee (NRPC), vide his letter dated 24.6.2015, has reported that as per the above provisions of Grid Code various SPS schemes have been finalized and have been implemented in Northern Region. Member Secretary, NRPC has submitted that SPS is also important to take care of contingency of 765 kV Gwalior-Agra D/C transmission line implemented by Power Grid Corporation of India Ltd. NRPC has submitted that from the experience of the twin grid disturbances took place in the month of July 2012, it is evident that correct operation of SPS for 765 kV Gwalior-Agra D/C transmission line is critical for safety and security of the grid. In order to ascertain

the functionality of the SPS, mock testings of the scheme were conducted on 18.6.2013, 3.4.2014 and 24.12.2014 and the deficiencies observed during mock testing were communicated to concerned utilities. NRPC has submitted that issue of mock testing of the SPS for 765 kV Gwalior-Agra D/C transmission line was discussed in 30<sup>th</sup> meeting TCC and 34<sup>th</sup> NRPC meeting held on 19.3.2015 and 20.3.2015 respectively. In the said meetings it was agreed that after rectification of defects, mock testing of 765 kV Gwalior-Agra D/C transmission line would be again conducted in the month of April 2015. Accordingly, on 30.4.2015 mock testing was conducted with prior intimation to the concerned utilities and the following major deficiencies were observed:

- (a) Feeders identified for the scheme were not radial in the States of Haryana, Punjab and Uttar Pradesh;
- (b) The actual load relief was very less as compared to load relief envisaged in the scheme in the States of Haryana, Punjab, Uttar Pradesh, Rajasthan and Bhakra Beas Management Board; and
- (c) Abrupt increment in the counter during simulation of condition five (in case of Power Grid Corporation of India Ltd.).

4. In view of the above, the respondents are directed to show cause, latest by 7.8.2015, as to why action under Section 142 of the Electricity Act, 2003 should not be initiated against them for non-compliance with the provisions of the Regulation 5.2 (o) of the Grid Code.

5. National Load Despatch Centre and Northern Regional Load Despatch Centre are directed to file their responses by 20.8.2015. We direct National Load Despatch Centre to submit status of generation back down in Western Region while conducting mock exercise.”

2. As per the Commission`s directions, Power Grid Corporation of India Ltd., National Load Despatch Centre and Northern Regional Load Despatch Centre have submitted their responses.

3. Power Grid Corporation of India Ltd. (PGCIL), vide its letter dated 7.8.2015, has submitted as under:

- (a) Condition-5 of Agra-Gwalior SPS specifies as “Sudden reduction of import from WR to NR by more than 1500MW”. Condition-5 is achieved by Programmable

Logic controller (PLC) installed at Agra sub-station. On the basis of actual MW in Agra-Gwalior corridor, PLC is programmed to produce the desired outputs.

(b) Presently, there is no specific test set up to simulate the condition-5. Limitations of the currently available relay test jig restrict the precise simulation of the condition of abrupt reduction of 1500 MW Load flow. Therefore, during mock exercise, manual initiation of PLC output contacts was provided to initiate the tripping sequence for condition-5. While in the process of manual initiation of PLC output contacts, multiple counter increments took place.

(c) However, this unintended counter increment do not undermine the objective tests carried out satisfying the targeted command transmission leading to tripping to specified feeder to shed load in Northern Grid and run back of specified generators in Western Grid. On transmission of the first command and immediate disconnection of the load feeders thereof, the subsequent commands have no effect as far as load relief is concerned till manual re-connection of the tripped feeder. The re-connection is a manual exercise carried out by the utilities in coordination with respective SLDCs which involves natural time delay.

(d) In actual scenario, PLC shall function on the basis of actual MW present in the system and shall produce the desired output. PLC is programmed so that on fulfillment of the condition only **single** "command shall be transmitted to targeted location.

4. National Load Despatch Centre (NLDC) and Northern Regional Load Despatch Centre (NRLDC), vide their joint affidavit dated 19.8.2015, have submitted as under:

(a) On 30.4.2015, mock test of System Protection Scheme (SPS) of 765 kV Gwalior-Agra transmission line was jointly undertaken by NRPC, WRPC and the respective constituents to check the logic and communication system for the SPS.

(b) As agreed at NRPC level, NRLDC coordinated with PGCIL and various States to test the healthiness of the communication and logic. The testing was done at Agra (PG) end in the presence of representatives of NLDC and during testing, actual tripping was blocked. The major findings from Northern Region (NR) side were as under:

- There was regular counter increment at the remote end in case of SPS signal being transmitted from Agra.
- Some of the identified feeders were not radial so the load relief will be less than envisaged.
- There was abrupt increment in counter reading during testing of condition 5.

(c) As agreed at WRPC level, WRLDC coordinated with NTPC, PGCIL and CGPL and informed KSTPS, VSTPS and CGPL to block automatic backing down of the generation during the mock drill to test the signal. The test signal for 'loss of injection of 1500 MW and above from WR to NR' was generated from Agra end on 30.4.2015 at 16:45 hrs. CGPL, Korba STPS and Vindhyachal STPS confirmed that SPS signal was received several times and the testing was successfully completed at 17:40 hrs.

(d) The above test was especially a dry test to verify the logic at Agra as well as the communication channels up to the desired location where SPS action either in the form of load shedding or generation reduction is envisaged as per the SPS design. Such dry tests offer no guarantee of last mile problem at the sub-station or generating station level. In actual operation, it was observed that SPS for condition 3 (total steady state flow on 765 kV Gwalior-Agra D/C line more than 2800 MW for a period of 10 sec with both ckt. in service) operates frequently. The relief should be of the order of 520 MW as per implemented scheme. However, it was observed that actual relief is in the range of 200-300 MW only.

(e) SPS design is a continuous process as the transmission system is upgraded. 765 kV Gwalior-Agra SPS logic is also being re-examined with commissioning of 765 kV Gwalior-Jaipur D/C transmission line and 765 kV Jaipur-Bhiwani transmission line. However, the problems associated with SPS have been brought to the notice of the Central Advisory Committee (CAC) sub-Committee on Congestion headed by Shri R V Shahi, ex-Secretary (Power), Government of India. A copy of report in this regard is available on the Commission's website in which the problem associated with SPS has been highlighted at Annexure-XXX.

5. In response to show cause notice, Punjab State Transmission Corporation Ltd., Rajasthan Rajya Vidyut Prasaran Nigam Ltd., Haryana Vidyut Prasaran Nigam Ltd. and Bhakra Beas Management Board have filed their replies.

6. Punjab State Transmission Corporation Ltd. (PSPCL), vide its affidavit dated 19.8.2015 has submitted as under:

(a) PSTCL/SLDC has made all efforts for identification, installation and commissioning of System Protection Scheme (SPS) including inter-tripping and run back in the power system of Punjab to operate the transmission system closure to its limits in a secured manner.

(b) The contention of Member-Secretary, NRPC that "Feeders identified for the scheme were not radial in State of Punjab" is not maintainable due to the following reasons:

- The details have already been conveyed to NRPC vide letter dated 28.5.2015.
- Due to existence of 66 kV ring main system in Ludhiana city, second source of supply is available. However, the second source has not enough capacity to meet the demand/load requirement of these sub-stations and can only be used for emergent back-feeding/battery charging, etc.
- 66 kV feeders Nakodar 1 and 2 formulate a double ckt. line and since both are operated simultaneously through SPS operation, the total load is cut and the operation is radial.
- The supply from second source has never been used in case of SPS tripping in Punjab Control Area.

(c) The reasons of less load relief as compared to load relief are as under:

- The relief on the date of mock testing was on lower side on account of rainy weather conditions in concerned area covered under the SPS

scheme and temporary shifting of some load from concerned area due to forced outages.

- In the month of June and July, adequate relief has been acquired during the operation of SPS Agra-Gwalior line as per the requirement of SPS.

(d) Since during the month of June and July excessive tripping have been observed in the area covered by SPS Agra-Gwalior line, the matter was taken up with NRPC to exercise requisite operational control over the over-loading of Agra-Gwalior line. Accordingly, NRPC issued suitable corrective guidelines (in the shape of advisory to all utilities of NR to maximize the generation and minimize the import of WR-NR) to reduce the excessive SPS tripping and curb the inequality conditions prevailing in the areas covered by SPS Schemes.

(e) During the excessive tripping in the months of June and July, SLDC, Punjab was in under-drawl for most of the time. Despite under-drawal, SLDC, Punjab is complying with all directions of NRLDC for maintaining the grid security.

7. Rajya Vidyut Prasaran Nigam Ltd. (RRVPL), vide its affidavit dated 19.8.2015, has submitted as under:

(a) The System Protection Scheme as approved by RPC has been implemented in Rajasthan on various feeders connected for load shedding. During the mock testing on 30.4.2015, scheme was operated properly. However, the load



relief observed was less as compared to the envisaged due to the following reason:

(I) Following Feeders were feeding load through Bus coupler instead of main breaker:

(i) 33 kV Alwar-Vijay Mandir: since, the main breaker of 33 kV Vijay Mandir was defective on 30.4.2015, at the time of mock testing, load relief could not been obtained. However, the breaker is now in healthy condition.

(ii) 132 kV Merta-Kuchera and 132 kV Merta-Lamba Gotan: Due to certain local problem, both the feeders were charged through Bus-coupler and the load relief could not obtain. However, now both the feeders shifted to the original breakers.

(iii) 132 kV Merta-Roon: The reason for less quantum of load relief was due to thunderstorm/cyclone in area which resulted in less load relief.

(II) Load Shifted to the other GSS: (i) 132 kV Alwar-Bansur: Load of this feeder shifted to 220 kV GSS Kotputli due to failure of one of the transformer of capacity 160 MVA at 220 kV GSS Alwar, (ii) 132 kV Bhilwara-Gangapur, (iii) 132 kV Bhilwara-Karera and (iv) 132 kV Bhilwara-Danta. During the mock testing, the tripping was by-passed and was wrongly interpreted, and the actual load relief informed as 'zero'. While, if the actual tripping occurred, then the actual load relief would have been expected as 48 MW.

(b) The actual tripping of the Mundra-Mahindargarh transmission line was observed on 27.5.2015 and there was load relief of 342 MW against the load relief envisaged as 300 MW. RRVPNL ensured that the feeders connected for SPS are kept in radial mode.

8. Haryana Vidyut Prasaran Nigam Ltd. (HVPNL), vide affidavit dated 31.8.2015, has submitted as under:

(a) Feeders to provide load relief on operation of SPS at 765 kV Agra-Gwalior D/C line on all groups were identified with due deliberations with NRPC. During system up-gradation of transmission system, new sub-stations have been added in the system and part load of identified feeders/transformers has been shifted to new sub-stations. The feeders envisaged in group E, F and G for load relief during operation of SPS is being run in radial mode.

(b) At the time of mock testing on 30.4.2015, the wheat harvesting season was going on and in order to avoid fire hazards to ripen wheat fields, 11 kV feeders were kept switched off during day time. Therefore, the actual load relief was less than envisaged load relief. Moreover, in the month of April, overall load of Haryana was in the range of 4000-5700 MW during the day which rises to around 6500-8500 MW during peak summer season. Therefore, it is expected that envisaged load relief may not be available in the month of April.

(c) As per report of NRPC, 220 kV Samaypur-Palwal D/C transmission line (radial feeder) in group C is supplying power to district Palwal and part of Mewat

has operated on number of occasions and provided 152 MW (304%) load relief against envisaged load relief of 50 MW during actual operation. However, repeated load shedding on the 220 kV Samaypur-Palwal D/C transmission line completely disrupt the power supply of 220 kV sub-stations Palwal, Rangla-Rajpur and twelve 66 kV sub-stations being fed from said 220 kV sub-stations, namely Bhagola, Mandkola, Palwal, Chandhut, Hodal, Hathin, Aurangabad, Hassanpur, Nagina, Jharsetly and Punhana feeding Mewat and Palwal districts. The repetitive operation of SPS resulting complete disruption of power supply in district Palwal and Mewat created law and order problem.

(d) In order to resolve the matter, NRPC in its 35<sup>th</sup> NRPC meeting, 113<sup>th</sup> and 114<sup>th</sup> OCC meetings constituted a group comprising of members from HVPNL, UPPTCL, NRLDC to examine the location of loads to be shed and introducing rotational load shedding on operation of SPS to avoid repeated load shedding at same location, etc. HVPNL has already nominated Superintending Engineer/SLDC (OP) as member of the said group.

9. Bhakra Beas Management Board, vide affidavit dated 1.9.2015, has submitted as under:

(a) 765 kV Agra-Gwalior transmission lines are used for the power flow from West to North region and to avoid tripping of these lines due to over loading, System Protection Scheme (SPS) has been put in place for load shedding in Northern Region and automatic generation backing down of Western Region generating stations in case of overloading of this line.

(b) In the 30<sup>th</sup> meeting of TCC and 34<sup>th</sup> meeting of NRPC held on 19.3.2015 and 20.3.2015 respectively, it was discussed that adequate load relief is not being obtained for the respective States during operation of SPS for 765 kV Agra-Gwalior transmission lines. In the said meetings, it was agreed that after rectification of the defects, mock testing of 765 kV Agra-Gwalior D/C transmission line would be again conducted in the month of April 2015. Accordingly, the mock exercise was carried out on 30.4.2015 and the system at BBMB sub-station was found in order.

(c) BBMB is required to ensure the operation of power elements (for HVPNL feeders emanating from BBMB sub-stations) covered under SPS scheme of 765 kV Agra-Gwalior transmission line on receipt of tripping command as per the logic defined in the scheme and the same has been found to be ensured during operation of SPS from time to time. Any load relief under the scheme is to be provided by HVPNL. Accordingly, HVPNL has planned load relief during operation of aforesaid SPS scheme in Haryana area under Group B, C and D through their feeders emanating from BBMB sub-stations. Moreover, the tripping command was executed on 30.4.2015 during mock testing from the logic system.

(d) Mock testing of SPS was carried out on 30.4.2015 as per the logic defined in the scheme to comply with the Commission`s Regulations. The tripping command was executed during Mock testing from the logic system and operation of power element at BBMB Sub-stations was found in order. Therefore, no further action is required on the part of BBMB.

10. During the course of hearing on 17.9.2015, the representative of NRLDC submitted that the relief provided by the constituents is not in accordance with the provisions of the Grid Code. Northern Regional Power Committee (NRPC), vide ROP for the hearing dated 17.9.2015, was directed to discuss all the issues related to SPS with the constituents and finalize the measures to be taken to provide desired response in the next OCC meeting and submit report in this regard after implementation of requisite measures and carrying out mock exercise.

11. NRPC, vide its affidavit dated 26.10.2015, has submitted as under:

(a) In compliance of the Commission`s direction dated 1.10.2015, the matter was taken up with the constituents of Northern Region in the 116<sup>th</sup> OCC meeting held on 16.10.2015. In this meeting, it was noted that certain changes suggested by constituents such as carrying out changing the feeders for load shedding covered in the scheme etc. may take time to implement and therefore, the following measures are required to be taken immediately to ensure automatic load shedding as envisaged in the scheme:

- Additional feeders emanating from same location where existing feeders are part of the scheme should be included in the scheme which can easily be done by the utility owning the sub-station.
- Strict implementation of Regulation 5.4.2 (e) of the Grid Code.

(b) In the said meeting dated 16.10.2015, it was decided that mock testing of SPS shall be carried out again on 29.10.2015 after implementation of above

mentioned steps and it was agreed that other measures which would enhance effectiveness of SPS shall be deliberated in the meeting of the group constituted in accordance with decision taken by NRPC in the 35<sup>th</sup> meeting held on 9.7.2015. Accordingly, meeting of group on SPS for 765 kV Agra-Gwalior transmission line was held on 21.10.2015 at NRPC. In the said meeting certain additional steps were identified for increasing reliability of the scheme. However, PGCIL indicated that implementation of these steps may require about 6 months time as tendering process would take minimum prescribed time.

(c) A meeting of group (members from all the constituents) on SPS for 765 kV Agra-Gwalior line was held on 21.10.2015. In the said meeting, the following was agreed:

(i) States of Haryana, Rajasthan, U.P. and Punjab would furnish within a week the details of minimum load on the feeders presently a part of the scheme so that extent of the shortfall from the envisaged load relief can be ascertained. The said States would identify additional loads to bridge the shortfall identified plus loads of 200 MW to implement revised scheme recommended by OCC in the 115<sup>th</sup> OCC meeting.

(ii) Delhi, which is not part of present SPS, would identify load of 200 MW and become part of the revised SPS.

(iii) The feeders emanating from only those sub-stations, which have connectivity with fiber optic based communication system should be identified for inclusion in the scheme.

(iv) The representative of PGCIL informed that it would take about 06 months to implement the revised scheme if it involves procurement process. SE (O), NRPC suggested that PGCIL can use the already available spare, namely DTPC (Digital Tele-Protection Couplers) for the scheme. PGCIL agreed to look into this aspect after all the relevant details are available from the utilities.

(v) On the issue of non-availability of Radial Feeders, it emerged that a transformer (such as 220 kV/66 kV) can be tripped directly instead of going to individual feeders of 220 kV or 132 kV as number of radial feeders of 220 kV and 132 kV are not available. This would resolve the issue of non-radial feeders to some extent as transformer would provide a bulk load and it is generally having radial feeders at LV side.

(vi) Same feeder can be included in two carefully selected SPS with minimum probability of simultaneous operation.

(vii) NRPC informed that there is a need to define the role and responsibility for the installation, commission, operation, maintenance and other such aspects of the SPS. Accordingly, NRLDC was requested to frame draft guidelines and put up the same in the next OCC meeting for approval.

(viii) On the issue of selecting the feeders for the scheme on rotational basis, it emerged that this would increase the complexity of the scheme which in turn may reduce the reliability of the scheme. It was observed

that in past also where feeders were tripped on rotational basis like in earlier UFR scheme, the scheme was not giving the desired result due to problem/malfunctioning of logic.

(viii) It was decided to keep a log of operation of the SPS at sub-station level. Details of counter reading/actual operation would be taken preferably in each shift or at least once in 24 hrs.

(ix) Some of the SPSs already implemented and operational may not be required. One of such scheme can be for contingency of 400 kV Muzaffarpur-Gorakhpur transmission line. There is ample parallel network available for this transmission line and scheme may not be required for the contingency. It was agreed that NRLDC would study the requirement of the scheme in changed scenario and if required, the scheme can be dismantled. The spare DTPC can be used in the revised SPS for 765 kV Agra-Gwalior transmission line.

12. NRPC, vide ROP for the hearing dated 6.11.2015, was directed to carry out mock exercise on 26.11.2015 in presence of staff of the Commission and submit report in this regard.

13. In response, NRPC vide letter dated 11.12.2015 has submitted the report as under:

(a) On 26.11.2015, mock testing of the SPS for 765 kV Gwalior- Agra D/C transmission line was carried out with prior intimation to the concerned utilities and the following major deficiencies were observed during testing:



(i) Punjab: Expected load relief in Punjab is marginally less than target load relief for conditions 1 to 4 and by about 32% for condition 5. Since, one feeder from Mohali-I sub-station, which is part of the scheme was connected to Mohali-II sub-station, would not have contributed to load relief, if scheme had actually operated.

(ii) Haryana: Expected load relief in Haryana is less than target load relief by about 21% for conditions 1 to 4 and by about 13% for condition 5.

(iii) PGCIL: The counter reading had not increased at Phase-1 feeder of 220 kV Mohali-1 sub-station. However, PSTCL, vide its e-mail dated 9.12.2015 informed that the same was re-tested on 8.12.2015 and the reading of the counter increased as per the scheme.

(b) The details of envisaged load relief are as under:

Name of State/Utility	Envisaged load relief in condition 1 to 4(MW)	Actual load relief in condition 1 to 4 that would have been obtained, had the SPS actually operated at the time of mock testing(MW)	Envisaged load relief in condition 5(MW)	Actual load relief in condition 5 that would have been obtained, had the SPS actually operated(MW)
<b>Haryana</b>				
i) BBMB sub-stations	140	110	140	110
ii) HVPNL sub-stations	Nil	Nil	125	119.57
<b>Haryana(Total)</b>	140	110	265	229.57
<b>Punjab</b>	161	155.1	361	243.14
<b>Rajasthan</b>	119	157	319	395
<b>Uttar Pradesh</b>	100	168	200	268
<b>Total</b>	<b>520</b>	<b>590.10</b>	<b>1145</b>	<b>1135.71</b>

## Analysis and Decision:

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

*“5.2 (o) All users, STU/SLDC, CTU/RLDC and NLDC, shall also facilitate identification, installation and commissioning of System Protection Schemes (SPS) (including inter-tripping and run-back) in the power system to operate the transmission system closer to their limits and to protect against situations such as voltage collapse and cascade tripping, tripping of important corridors/flow-gates etc.. Such schemes would be finalized by the concerned RPC forum, and shall always be kept in service. If any SPS is to be taken out of service, permission of RLDC shall be obtained indicating reason and duration of anticipated outage from service.”*

*“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, all users, STU/SLDC, CTU/RLDC and NLDC are required to facilitate and ensure that System Protection Schemes (SPS) (including inter-tripping and run-back) shall be identified, installed and commissioned to protect transmission system against overloads, voltage collapse, cascade tripping and tripping of important corridors/flow gates. The action under SPS prescribed may require the opening of one or more lines, tripping of generators, ramping of HVDC power transfers, intentional shedding of load, or other measures which would alleviate the problem of concern.

15. SPS for the 765 kV Gwalior-Agra D/C transmission line is installed to take care contingencies as defined under five different conditions and different interruptible loads of the constituents of Northern Region (UP, Rajasthan, Haryana and Punjab) are

arranged in four group of loads for unscheduled load shedding under SPS. The mock test is carried out on SPS to verify the logic as well as the communication channels up to the desired location where SPS action either in the form of load shedding or generation reduction is envisaged as per the SPS design.

16. During the meeting of group on SPS for 765 kV Agra-Gwalior transmission line held on 21.10.2015 at NRPC, certain additional steps were identified for increasing reliability of the scheme. In this regard, the following is observed:

- (a) All the feeders which are identified for the SPS scheme should be in radial mode only.
- (b) The load relief identified under the SPS scheme should be the minimum load on the feeders considering all variations due to paddy seasons, rainy weather conditions etc.
- (c) The mock testing of the critical SPS schemes should be carried out by the RPCs periodically preferably within every six months.
- (d) Same feeder should be included at the most in two carefully selected SPS with minimum probability of simultaneous operation.
- (e) There is need to review settings and study the requirement of scheme in changed scenarios for all SPS periodically and the redundant SPS scheme should be de-commissioned.
- (f) The log of operation of the SPS at sub-station level should be maintained.

(g) The feeders should be selected on rotational basis when there are no additional complexities and further provided that the reliability of the scheme is not compromised.

17. We have considered the submissions of NRLDC, NLDC, NRPC, PGCIL and the respondents. It is noted that there were number of deficiencies while carrying out mock testing of SPS for 765 kV Gwalior-Agra D/C transmission line. The performance of each constituent during mock testing of SPS is discussed in the succeeding paragraphs.

18. During the mock testing carried out on 30.4.2015, abrupt increment in the counter during simulation of condition-5 was observed in the case of PGCIL. PGCIL has contended that presently, there is no specific test set up to simulate the condition-5 and during mock exercise, manual initiation of the PLC output contacts was provided to initiate the tripping sequence for condition-5. While in the process of manual initiation of the PLC output contacts, multiple counter increments took place. According to PGCIL, on transmission of the first command and immediate dis-connection of the load feeders thereof, the subsequent commands have no effect as far as load relief is concerned till manual re-connection of the tripped feeder. The re-connection is a manual exercise carried out by the utilities in coordination with respective SLDCs and this involves natural time delay. In actual scenario, PLC shall function on the basis of actual MW present in the system and shall produce the desired output. PLC is programmed so that on fulfilment of the condition only single "command may be transmitted to targeted location.

19. During the mock testing carried out on 29.10.2015, communication failure on the part of PGCIL was observed. PGCIL has submitted that it is looking into the issue of failure of communication link at 220 kV Naro sub-station of UP and non-increment of counters at 220 kV Mainpuri sub-station, Vindhyachal STPS and CGPL, Mundra which is being restored. During the mock testing on 26.11.2015, all five conditions were successfully simulated in the presence of staff of the Commission and no abrupt/repetitive counter increase was observed at Agra end and remote end as telephonically confirmed by other utilities. Taking note of the submission of PGCIL and no abrupt/repetitive counter increase was observed during the mock testing held on 26.11.2015, we are not initiating action against PGCIL under Section 142 of the Electricity Act, 2003. However, there was certain communication failures observed on part of PGCIL during the mock testing. We direct PGCIL to ensure that there is no communication failure during SPS operations and the signal reaches up to the desired location where SPS action either in the form of load shedding or generation reduction is envisaged as per the SPS design.

20. During the mock testing carried out on 30.04.2015, feeders identified for the scheme were not radial in the States of Haryana, Punjab and Uttar Pradesh, and the actual load relief was very less as compared to load relief envisaged in the scheme in the States of Haryana, Punjab, Uttar Pradesh, Rajasthan and Bhakra Beas Management Board.

21. RRVPNL has submitted that during the mock testing on 30.4.2015, number of feeders were feeding load through bus-coupler instead of main breaker. However, now

the breakers are in healthy condition and these feeders have been shifted to the main breakers. Other reasons were thunderstorm/cyclone, shifting of loads to the other GSS and by-passing of few loads. RRVPNL has further submitted that they have ensured that the feeders connected for SPS are kept in radial mode. During the mock testing on 26.11.2015, no deficiency was observed on the part of RRVPNL. Taking note of the submission made by RRVPNL and result of the mock testing held on 26.11.2015, where load relief made by RRVPNL was more than the envisaged load relied under all five condition, notice issued vide order dated 31.7.2015 is discharged against RRVPNL.

BBMB has submitted that purview of BBMB is to ensure the operation of power elements (for HVPNL feeders emanating from BBMB sub stations) covered under SPS scheme of 765 kV Agra-Gwalior transmission lines on receipt of tripping command as per the logic defined in the scheme and the same has been found to be ensured during operation of aforesaid SPS from time to time and during mock testing carried out on 30.04.2015. BBMB has submitted that any load relief under the aforesaid scheme is to be provided by HVPNL in the instant case. According to BBMB, tripping command was executed on 30.4.2015 during mock testing from the logic system and operation of power element at BBMB sub-stations was found in order. Therefore, no further action is required on the part of BBMB. We agree with the contention of BBMB that any load relief under SPS scheme is to be provided by HVPNL and purview of BBMB is to extend the tripping command to the feeders of HVPNL emanating from BBMB. It is noted that during mock testing, the tripping commands were **extended** successfully to the feeders of HVPNL, therefore, notice issued vide order dated 31.7.2015 is discharged against BBMB.

22. UPPTCL neither filed its reply to the show cause notice nor appeared before the Commission during the hearings. We express our displeasure at the conduct of the UPPTCL. During the mock testing on 29.10.2015 and 26.11.2015, no deficiencies were observed on the part of UPPTCL. It is noted that during the mock testing held on 26.11.2015, load relief made by UPPTCL was more than the envisaged load relief under all five conditions, therefore, notice issued vide order dated 31.7.2015 is discharged against UPPTCL.

23. HVPNL has submitted that the feeders envisaged for load relief during operation of SPS are being run in radial mode. At the time of mock testing on dated 30.4.2015, the wheat harvesting season was going on and in order to avoid fire hazards to ripen wheat fields the 11 kV feeders were kept switched off during day time. Therefore, due to the above reasons, the actual load relief was less than envisaged load relief. Moreover, in the month of April, overall load of Haryana was in the range of 4000-5700 MW during the day which rises to around 6500-8500 MW during peak summer season. On the other hand, the repetitive operation of SPS resulting complete disruption of power supply in district Palwal and Mewat created law and order problem. HVPNL has submitted that a group comprising of members from HVPNL, UPPTCL, NRLDC has been constituted to examine the location of loads to be shed and introducing rotational load shedding on operation of SPS to avoid repeated load shedding at same location, etc. NRPC has submitted that during the mock testing on 26.11.2015, the expected load relief in Haryana was less than target load relief by about 21% for conditions 1 to 4 and by about 13% for condition 5.

24. PSPTCL has contended that due to existence of 66 KV ring main system in Ludhiana city, second source of supply is available which was not enough capacity to meet the demand/load requirement of these sub-stations and can only be used for emergent back-feeding/battery charging, etc. PSPTCL has submitted that 66 KV feeders Nakodar 1 and 2 formulate a double ckt line. PSPTCL has submitted that since both are operated simultaneously through SPS operation, the total load is cut and the operation is radial. PSPTCL has certified that the supply from second source has never been used in case of SPS tripping in Punjab Control Area. According to PSPTCL, the relief on the date of mock testing was on lower side on account of rainy weather conditions in concerned area covered under the SPS scheme and temporary shifting of some load from concerned area due to forced outages. PSPTCL has contended that in the months of June and July, adequate relief was acquired during the operation of SPS Agra-Gwalior transmission line as per the requirement of SPS and excessive tripping has been observed. During the excessive tripping in the months of June and July, SLDC, Punjab was in under-drawl for most of the time. PSPTCL has submitted that despite under-drawal, SLDC, Punjab is complying with the directions of NRLDC and curtailing its load for maintaining the grid security. NRPC has submitted that during the mock testing on 26.11.2015, expected load relief in Punjab was marginally less than target load relief for conditions 1 to 4 and by about 32% for condition 5.

25. We express our displeasure at the conduct of HVPNL and PSTCL to ignore our directions and provisions of the Grid Code, especially in such a matter where grid security is involved. It is noted that correct operation of SPS for 765 kV Gwalior-Agra D/C transmission line is critical for safety and security of the grid from the experience of



the twin grid disturbances took place in the month of July 2012. The correct operation of SPS can be assured only by carrying out mock testing more frequently. In our view, there are no mitigating factors which exonerate the HVPNL and PSTCL 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 Rs. one lakh on each of the heads of PSTCL, Punjab and HVPNL, Haryana which shall be deposited within one month from the issue of the order.

26. We direct PSPTCL, HVPNL, RRVPNL, UPPTCL and BBMB to ensure that target load relief is provided each time for operation of SPS scheme of 765 kV Agra-Gwalior transmission line in actual as well as during mock testing. NRPC is directed to submit a report with details of target load relief achieved along with details of any deficiency observed during operation of SPS scheme of 765 kV Agra-Gwalior transmission line in actual as well as during mock testing after six month of issue of the order.

27. Petition No. 8/SM/2015 is disposed of in terms of the above.

Sd/-  
**(Dr. M.K.Iyer)**  
Member

sd/-  
**(A.S.Bakshi)**  
Member

sd/-  
**(A.K.Singhal)**  
Member

sd/-  
**(Gireesh B. Pradhan)**  
Chairperson