CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Review Petition No. 7/RP/2014
in
Petition No. 263/MP/2012

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

Date of Hearing: 27.05.2014
Date of order: 24.12.2014

In the matter of

Review of order dated 19.12.2013 in Petition No. 263/MP/2012 pertaining to maintaining and ensuring Integrated Secured Grid Operation in Southern Region in terms of Regulation 5.2 of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010.

And
In the matter of

State Load Despatch Centre
APTRANSCO, Vidyut Soudh,
Hyderabad-500 082 **Review Petitioner**

Vs.

1. Southern Regional Load Despatch Centre
29 Race Course Cross Road,
Bangalore-560 009

2. Karnataka Power Transmission Corporation Ltd
Cauvery Bhawan, Bangalore-560 009,
Karnataka

3. Kerala State Electricity Board
Vaiduthi Bhavanam, Pattom,
Trivandrum-695 005, Kerala

4. TANTRANSCO,
114, Anna Salai-Chennai-600 002,
Tamil Nadu

5. Secretary, Power
Electricity Department of Puducherry,
Beach Road, Puducherry-605 001

6. Southern Regional Power Committee
29 Race Course Cross Road,
Bangalore-560 009 **Respondents**

The following were present:

Shri S. Vallinayagam, Advocate, APTRANSCO
Shri Y. Balasubramanyam, APTRANSCO
Shri S. Sai Ram, APTRANSCO
Shri V. Suresh, SRLDC
Shri Meka Ramakrishna, SRPC
Ms. Jyoti Prasad, POSOCO

ORDER

The Review Petitioner, State Load Despatch Centre, APTRANSCO has filed this Review Petition seeking review of the Commission`s order dated 19.12.2013 in Petition No. 263/MP/2012 wherein the Commission inter *alia* had directed the constituents of Southern Region including the Review Petitioner to identify more feeders for installation of UFR and df/dt relays to ensure relief as decided by SRPC from time to time and submit the details to Southern Regional Power Committee. The constituents were also directed to submit compliance report duly certified by Southern Regional Load Despatch Centre (SRLDC) and Southern Regional Power Committee (SRPC) indicating implementation of quantum of relief by AUFR and proper functioning of df/dt relays within one month from the issue of the order.

2. The Review Petitioner has submitted that determination of targeted quantum on the basis of average values will make implementation of the direction of the Commission impossible. However, if the targeted quantum is determined on the basis of the maximum demand conditions, implementation of direction of the Commission is feasible.

3. The Review Petitioner has submitted that in compliance with the Commission`s direction dated 19.12.2013, compliance report indicating implementation of quantum of relief by AUFR in the format prescribed by SRLDC for certification by SRLDC and SRPC has been submitted on 12.1.2014. The petitioner has submitted that the following pro-active steps were taken by it as per Regulations 5.2.(n) and 5.4.2 (e) of the Grid Code.

(a) The recommendation of SRPC dated 1.10.2012 for revision of the existing settings of UFRs in stage-I, II and III was implemented on 1.11.2012, based on the recommendation of the enquiry Committee on grid failure in NEW grid.

(b) Immediate action has been taken for increasing the quantum of load relief by providing 18 Nos. of additional feeders for Stage-I, Stage-II and Stage-III of UFR scheme.

(c) SRPC, vide its letter No. CE/SRPC/SE-I/2013/9169-81, dated 21.8.2013 communicated the revised Automatic Under Frequency Relay settings and quantum of relief as per National Power Committee decision. The existing and the recommended settings for Under Frequency Relays are indicated as under:

Stage	Existing		Revised settings recommended by SRPC	
	Frequency	Load Relief MW	Frequency	Load Relief MW
Stage-I	49.0 Hz	887	49.2Hz	809
Stage-II	48.8 Hz.	1256	49.0 Hz	812
Stage-III	48.6 Hz.	1424	48.8 Hz.	822
Stage-IV	---	--	48.6 Hz.	825

The first two stages of revised frequency settings are to be adopted by 7.9.2013 and the balance stages have to be implemented by 15.10.2013. However APTRANSCO has adopted the revised settings of all the four stages by 7.9.2013.

(d) In terms of the Commission's order dated 19.12.2013, additional feeders have been identified and proposed for enhancing the quantum of load relief of UFRs of four stages.

(e) The periodical testing of the UFRs is also conducted once in six months by the field MRT Wing for ensuring the healthiness of the relays which was also regularly intimated to SRPC and SRLDC. The same was also inspected by SRPC for ensuring its effective functioning. All information relating to number of feeders and related information is with SRLDC and is updated periodically.

(f) The quantum of load relief targeted needs review, considering the ground realities of compliance and realization**.** Till date the targeted quantum of load relief was carried out based on the maximum demand conditions and any additional quantum needed was reviewed and accordingly, additional feeders were provided to the maximum extent possible.

(g) At present all the available 132 kV feeders including power transformers were taken into consideration for implementation of the various protective scheme under (i) UFRs (ii) df/dt (iii) Talcher-Kolar SPS (iv) Kudankulam SPS and Ramagundam Islanding Scheme. The Quantum of proposed loads under the various schemes are detailed below:

S.No.	**Name of the Schemes**	**Quantum of the Loads identified in MW**
1	UFRs (Under Stages-I,II,III,IV)	3567
2	df/dt (under Stage-A&B)	2349
3	Talcher-Kolar SPS (Stage-I,II&III)	515
4.	Kudankulam SPS	230
5	Ramagundam Islanding Scheme	2000
	Total	8661

(h) As the loads on the feeders are dynamic and are subjected to variations depending on the availability of generation and demand the assertion of targeted quantum always based on the average value on the feeder is practically not feasible. It is to be appreciated that the constituents are having the obligation of reliable supply to the consumers, apart from maintaining grid security. Further, from the above table, all the radial 132kV feeders and the power transformers feeding the rural and some of the urban areas are also included under various schemes. There are number of frequent interruptions experienced by the consumers, sequentially in the form of scheduled load relief, unscheduled load relief, UFRs, df/dt and SPS. Therefore, the load of 8661 MW was included in the form of defensive mechanisms.

4. Based on the above, the Review Petitioner has urged that the determination of targeted quantum on the basis of average values is not possible and the impugned order needs to be reviewed and modified. However, if the targeted quantum is determined on the basis of the maximum demand conditions, compliance of Commission`s direction is feasible. The Review Petitioner has submitted the demand variation for the year 2013 as under:

Month	Jan 2013	Feb 2013	March 2013	April 2013	May 2013	June 2013	July 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013
Max. Demand MW	11236	11148	11630	11410	11369	10723	10932	11717	11887	11914	10591	11365
Min. Demand MW	7445	7064	8706	7101	7239	6731	7064	7859	8291	5945	7420	7772

Therefore, under minimum demand conditions it is very much evident that the targeted quantum could not be maintained in spite of inclusion of the whole AP system.

5. In view of the above, the Review Petitioner has prayed to review and modify the order dated 19.12.2013 for modifying the targeted quantum of relief.

6. The Review Petition was heard on 18.3.2014 after notice to the respondents. During the course of hearing, learned counsel for the Review Petitioner submitted as under:

(a) The quantum of load relief targeted needs review, considering the ground realities of compliance and realization. Till date the targeted quantum of load relief was carried out based on the maximum demand conditions. Any additional

quantum needed was reviewed and accordingly, additional feeders were provided to the maximum extent possible.

(b) At present all the available 132 kV feeders were taken into consideration for implementation of various protective schemes and the total quantum of the loads identified under the various schemes is 8661 MW. On the other hand, as per the impugned order, the declared load relief considering the feeders which are available for monitoring at SRLDC SCADA is only 3796 MW. Therefore, the system will operate when the relief quantum has been fixed not on average but on maximum demand of the feeder.

(c) As the loads on the feeders are dynamic and are subjected to variations depending on the availability of generation and demand the assertion of targeted quantum based always on the average value on the feeder is practically not feasible.

(d) Under the minimum demand conditions in December 2013 at 7772 MW, the system will not operate under the load relief of 8661 MW. Therefore, the load relief has to be fixed on the maximum demand of the feeder.

7. In response, the representative of SRLDC submitted as under:

(a) The claim of the petitioner that the quantum identified for relief through protection system in the State of AP is about 8661 MW is not correct as the quantum identified for relief through AUFR is much less. The petitioner has conveniently mentioned the total quantum of all types of protection systems like

SPS, Islanding Scheme, AUFR and df/dt but highlights only AUFR and df/dt quantum as required quantum. However, the purposes of different types of protection schemes and triggering factors are different.

(b) The quantum considered for relief through AUFR and df/dt scheme is same as that of approved value decided by Protection Co-ordination Committee (PCC) of SRPC during the year 2012. Only changes suggested by National Power Committee) (NPC) at present is dividing the same quantum into four stages of operation instead of three stages earlier.

(c) Since year 2012, the petitioner declared that the PCC approved quantum has been connected for relief through AUFR and df/dt protection scheme. However, it is consistently observed that relief realized during operation of AUFR and df/dt operation was 10%- 30% of expected relief. Despite regular discussion and analysis in PCC/OCC, there was no improvement in the situation and thereby SRLDC was forced to insist on SLDCs to extend the feeder-wise SCADA details to SRLDC and monitor the load available in the identified feeders for relief. From the monitoring, it has been confirmed that the load available for relief at any point of time is of the order of 30% - 50% only.

(d) With regard to feeder-wise discrepancy or less load available, SLDC is responsible to monitor and ensure the availability of declared quantum through appropriate feeders. As it is not happening, SRLDC was forced to monitor and

point out the deficiency. SLDC should not transfer its responsibility to SRLDC. Further the petitioner is required to make necessary arrangement to get field data from all the identified feeders to SLDC SCADA and onward transmission to SRLDC SCADA.

(e) With regard to computation of quantum of relief, the present average demand for the month of February 2014 was about 90% of the maximum demand and even the ratio between minimum and maximum demand was about 85%. Accordingly, it is evident that the load available for relief shall not be less than 85% of approved value at any point of time. Meeting this criteria at least to nearest value will be possible only if the average value of feeder is considered for computation.

(f) With regard to the petitioner contention that all the radial feeders in the State of AP have been used for various types of protection schemes and thereby it is unable to identify additional feeders, it is clarified that AUFR and df/dt is the last line of defence, life saving protection scheme of the grid and thereby the petitioner shall not have any reservation in identifying city/urban feeders for such protection scheme. At least for stage-IV, operation of such feeders is to be considered as an instance which will be a rare occasion.

8. Southern Regional Power Committed (SRPC), vide Record of Proceedings for the hearing dated 18.3.2014 was directed to clarify how the targets relief quantum has

been fixed and the feasibility of provided relief is ascertain. SRPC vide its affidavit dated 24.4.2014 has submitted the information called for.

Submission of SRPC dated 24.4.2014

9. The petitioner has implemented 3373 MW quantum relief under AUFR and df/dt against requirement of 5747 MW. 146 MW additional load has been identified and were yet to be implemented. Further, 2229 MW of loads are yet to be identified and implemented. Thus there is deficit of 41.33% in relief to be provided.

10. Relief and settings to be provided by each of the SR constituent was worked out based on the average of the ratios of energy consumption for 2012-13 and maximum demand met during 2012-13.

11. Only 7208 MW (excluding 2000 MW for Ramgundam Islanding scheme) of loads have been identified for Andhra Pradesh under various protection schemes by OCC/PCC Sub-Committees of SRPC. Out of 5747 MW of UFR and df/dt recommended by SRPC, Andhra Pradesh has implemented 3372 MW. SCADA system of SRLDC monitors 2469 MW and the relief visible was around 2160 MW (11.2.2014 to 20.2.2014) and 2115 MW (21.2.2014 to 28.2.2014). The relief was of the order of 86-87%. The value was in range of only 34-75% and 51-74% for the period of 1.11.2013 to 30.11.2013 and 11.12.2013 to 20.12.2013 respectively. SR constituent generally meet their peak demand in months of February/March each year. Even during peak time, Andhra Pradesh was available to achieve only 86-87% of the declared relief.

12. Quantum of relief identified should be available at all times, whether peak or off peak periods. In case maximum feeder loading is considered, then visible relief would be much lesser than the desired relief. Maximum loading does not consider the pattern of the feeder throughout the day while the average feeder loading considers the loading pattern of the feeder throughout the day.

13. Grid disturbance could occur anytime. Therefore, the constituents should be in a position to provide necessary load relief irrespective of the time of occurrence (peak or otherwise). This could occur during off peak hours also when the feeder loadings would tend to be lower. All constituents should provide desired relief, especially since SR Grid has been integrated with NEW Grid. There are load variations in a day due to time zone effect. Considering this and all India view average feeder loading should only be considered.

14. It was informed by NLDC in SRPC meeting dated 15.3.2014 that there had been no operation of UFR since October 2013 throughout India. In SR except for first stage of 49.2 Hz other UFR stages have not operated for a long period.

15. During the year 2013-14, first stage of UFR had operated only in case of one incident i.e. 7.6.2013. SRPC has submitted the details of relief provided by SR Constituents as under:

States	**Expected relief in MW at 49 Hz**	**Relief obtained in MW**	**Relief Obtained in %**
Andhra Pradesh	882	202	23
Karnataka	589	281	48
Kerala	214	100	47
Tamil Nadu	772	393	51
Puducherry	22	18	82

In that particular incidence, frequency had remained between 49.0 Hz and 48.8 Hz (II stage of UFR) for more than 4 minutes. The above relief could not bring the frequency back to operating range. Any other grid incident during that period could have led to major grid disturbance. It is noted that the Andhra Pradesh had provided only about 23% of the expected relief.

16. UFR w.r.t other protection schemes is a time tested and reliable last line of defence. Other schemes are based on triggering of certain events while UFR protection is geographically spread and independent to each other.

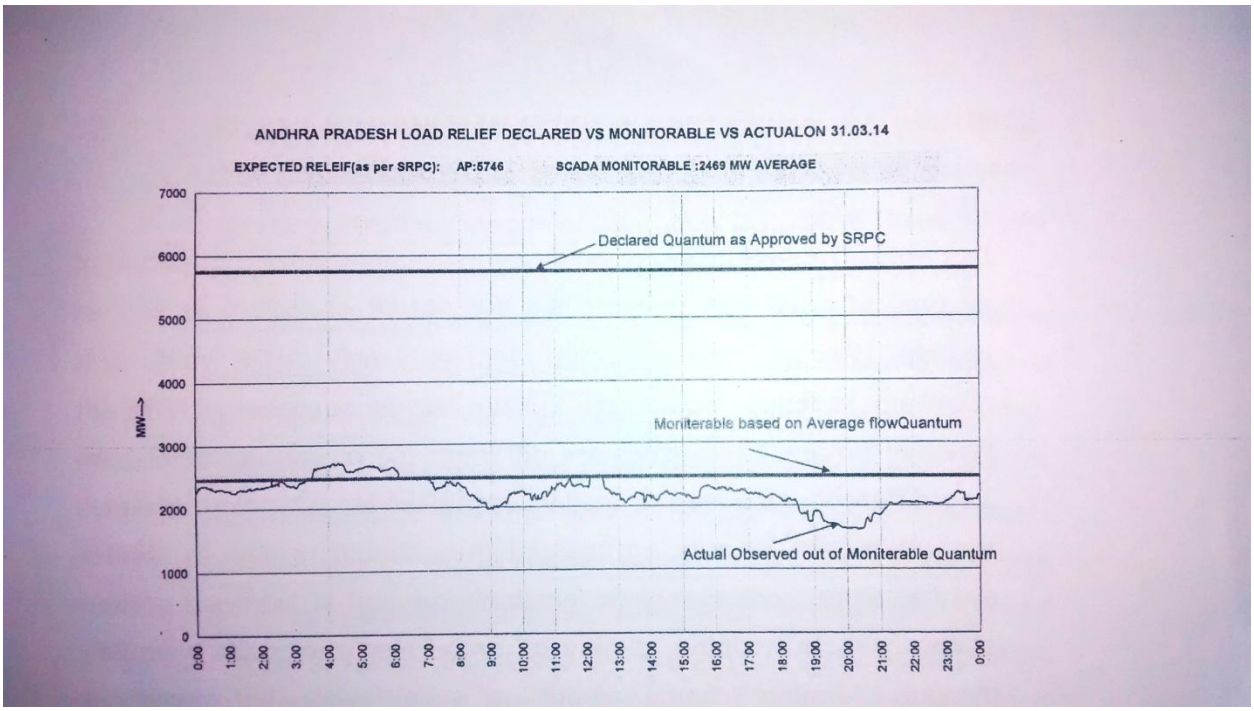
Reply by SRLDC

17. SRLDC has filed its reply vide affidavit dated 1.5.2014. SRLDC has submitted that quantum of load on individual feeder considered by the petitioner for computation was instantaneous maximum value and not the average flow of the feeder. Thus, the course of efforts indicated by the petitioner results only partial compliance of the Commission`s direction. SRLDC has further submitted as under:

(a) The quantum of load relief targeted needs review, considering the ground realities of compliance and realization and that till date the targeted quantum of load relief was carried out based on the maximum demand conditions. SRLDC has clarified that the present average demand, for the month of February 2014 was about 90% of the maximum demand and even the ratio between maximum and minimum demand was about 85%. Accordingly, it is evident that the load

available for relief shall not be less than 85% of approved value at any point of time. Meeting this criterion at least to nearest value will be possible only if the average value of feeder is considered for computation. From January to February 2014, maximum demand varies between 11000MW-12000 MW while the average demand varies between 10000 MW-10500 MW. The ratio between the maximum demand to average demand was about 0.9 while the ratio between the minimum demand to average demand was about 0.8 except on a holiday like Sankaranthi (13.1.2014) etc., which may be seen in the graph below. Thus, it is evident that the demand in the State fairly remains constant. Accordingly, the quantum of load available for relief shall always be equal to the total finalized quantum of SRPC, which is possible only if the average flow / load of the feeder is considered for arriving the load relief quantum.

(b) The maximum flow of different feeders occurs at different instances and taking maximum of all feeders indirectly will mean that the load available for relief will be far below the approved quantum. The value of total load available as a sum of instantaneous flow of all the feeders mapped for monitoring through SCADA for the AP system on a typical peak season (summer) day (say on 31.3.2014-Monday) based on minute wise data shown as under:



(c) SRLDC has submitted that considering the average value would be appropriate for ensuring the availability of declared load relief. It is also submitted that the ratio between maximum and minimum power flow in the identified feeders is very high, particularly in the States like Kerala. Accordingly, the Commission`s direction dated 19.12.2013 in Petition No. 263/MP/2012 is appropriate and does not require any review.

(d) According to the Review Petitioner all the available 132kV feeders including power transformers were taken into consideration for implementation of the various protective scheme under (i) UFRs (ii) df/dt (ii) df/dt (iii) Talcher –Kolar SPS (IV) Kudankulam SPS (iv) Kudankulam SPS and Ramagundam Islanding Scheme. The claim of the petitioner that the quantum identified for relief through protection system in the State of AP is about 8661 MW while the required quantum is far below is submission of partial fact only. The Review Petitioner

conveniently mentions the total quantum of all type of protection systems like SPS, AUFR and df/dt as well as include Islanding schemes but highlights only AUFR and df/dt quantum as required quantum. However, the purposes of different types of protection schemes are different and triggering factors are also different. Further, loads/feeders identified for Islanding schemes are not meant for tripping, instead they should remain in service even at worst contingency for ensuring survival of Islanded portion of the grid. In addition, it may be noted that the loads identified through Islanding Scheme are not just radial feeders but consists of few sub-stations and ICTs and feeders matching the generation level of the Island.

(e) With respect to argument pertaining to all the radial feeders in the State of AP having been used for various types of protection schemes and there by inability to identify additional feeders, SRLDC has clarified that AUFR and df/dt is the last line of defense, life saving protection scheme of the grid and thereby the petitioner shall not have any reservation in identifying city/urban feeders for such protection scheme. SRLDC has also suggested that at least for stage-IV of operation, such feeders are to be considered as such instances of operation would be a rare occasion.

18. SRLDC has further submitted as under:

(a) The quantum considered for relief through AUFR and df/dt scheme is same as that of approved value of Protection Coordination Committee (PCC) of SRPC during the year 2012. Only change suggested by NPC at present is

dividing the same quantum into four stages of operation instead of three stages earlier.

(b) It is pertinent to mention that since year 2012, the petitioner declared that the PCC approved quantum has been connected for relief through AUFR and df/dt protection scheme. But it is consistently observed that relief realized during operation of AUFR and df/dt operation was 10% - 30% of expected relief. Despite regular discussion & analysis in PCC / OCC, there was no improvement in the situation and thereby SRLDC was forced to insist the SLDCs to extend the feeder-wise SCADA details to SRLDC and monitor the load available in the identified feeders for relief. It has been confirmed from the monitoring that the load available for relief at any point of time is of the order of 30%-50% only. The matter of under protection with inadequate load for relief was regularly taken-up with SRPC. Only then, the petitioner like constituent came out with details of their discrepancy between declared quantum and actual quantum. With all these efforts, during this peak demand period of summer, it is observed that the load available for relief is about 75% of the declared quantum based on average flow.

(c) The Review Petitioner indicated that SRLDC did not indicate the feeder-wise discrepancy or less load available and compares only the total quantum, it is clarified that it is the responsibility of the SLDC to monitor and ensure the availability of declared quantum through appropriate feeders.

19. SRLDC has prayed as under:

(a) Uphold the directions issued vide order dated 19.12.2013 in Petition No. 263/MP/2013;

(b) Direct the petitioner to identify suitable number of feeders ensuring load relief matching declared quantum on average load basis of the individual feeders; and

(c) Direct the petitioner to ensure availability of data of the identified feeders in the SCADA system facilitating monitoring feeders/load available on regular basis.

20. During the course of hearing on 27.5.2014, learned counsel for the Review Petitioner submitted as under:

(a) The issue involved in the present review petition is that whether the quantum of load relief for AUFR and df/dt relays shall be calculated at maximum load or average load. The relief should be computed on the basis of average which is also reflected in the reply filed by SRPC wherein SRPC has submitted that average loading of the feeder is being compared with declared average loading of the feeder and the review petitioner was able to achieve 86-87% of the declared average relief.

(b) SRLDC in its reply has also admitted that during the peak demand period of summer, the load available for relief is about 75% of declared quantum.

(d) The quantum of load on feeder is dynamic depending upon the load and generation scenarios. The recording of SRLDC is at fault and it is not able to see the actual real-time relief provided. Therefore, inclusion of urban feeders in UFR, df/dt load relief should not be insisted upon as it affects the consumers.

21. In response, the representative of SRLDC submitted as under:

(a) Learned counsel for the petitioner is mixing facts by stating that maximum demand condition should be met for assessment of relief which in turn should be computed on the basis of maximum load flowing on the feeder. In this regard it is clarified that it is next to impossible that at any moment of time maximum flow on the line would coincide with maximum load conditions and there has never been a case in the past wherein the quantum of actual load relief has been equal to the declared quantum.

(b) Earlier, the flow declared by the petitioner was taken for granted. However, now SRLDC has started monitoring the same and found that the flow on the feeders is almost always less than the declared amount.

(c) The petitioner`s contention that SRLDC is at fault for not being able to monitor the accurate real time load relief, is wrong as SLDC is responsible to extend the facility of monitoring to RLDC.

(d) Demand conditions of the year 2012 were considered for calculating quantum of load relief to be made available but now the demand met has further increased. Thus, ideally the quantum of relief should even be more. Therefore, there is no case for petitioner to not to provide the relief decided on the basis of the year 2012 conditions.

(e) The petitioner has wrongly added the islanding schemes, while computing the load relief as islanding scheme feeders are the ones that ought to remain in service and not to be out during the contingency.

(f) In a scenario where there is no RGMO and FGMO available, overloading of critical lines and large change in load during changeover, any laxity in providing relief form UFR and df/dt relays could prove highly detrimental, as they are the last line of defense in system protection.

22. The representative of SRLDC informed that Kerala has implemented 100% load relief on the basis of average load and mapped around 50% on the SCADA system. Karnataka has implemented 74% of the relief on basis of average and around 950 MW of additional load has to be identified. Andhra Pradesh and Tamil Nadu have to identify around 2000 MW and 750 MW, respectively more to comply with Commission's direction.

23. The Review Petitioner and the respondents, vide Record of Proceedings for the hearing dated 27.5.2014, were directed to submit all the facts to SRPC and CEA and analyze all the facts and issues raised by the Review Petitioner and the respondents

and convene a meeting to discuss the same and finally recommend the basis on which declared quantum should be calculated. SRPC and CEA were directed to submit their reports/recommendations. NLDC was directed to submit the practices being followed by other RLDCs. SRPC, CEA and NLDC have furnished the information called for which are discussed in subsequent paras.

Submission of National Load Despatch Centre (NLDC)

24. NLDC vide its affidavit dated 18.7.2014 has submitted that contingencies in the system can take place at any point of time and adequate load relief must be there, irrespective of time of occurrence of contingency. Effect of UFR and df/dt actuated load-shedding has to be affirmative and minimum load of feeders should be considered to ensure that relief is adequate under all conditions Actual operation of UFR may take place only under very large contingencies. It may be relevant to mention here that even after tripping of all machines at Mundra UMPP generating 3800 MW on 12.3.2014, UFR did not operate as frequency came down only by 0.6 Hz. to 49.3 Hz. (1st stage UFR setting is 49.2 Hz.). Hence, the constituents may not have any apprehension regarding frequent operation of UFR**.**

25. NLDC has submitted the methodology followed in regions other than Southern Region as under:

(a) **Eastern Region:** At present maximum load in the feeders is being considered for computation of load relief. In the OCC meetings held at ERPC, the constituents of Eastern Region furnished the maximum relief obtainable by UFR operation in their respective identified feeders, at different stages. ERLDC

had insisted that the figures furnished by constituents should correspond to average expected load. However, ER constituents did not agree to provide such average relief through UFR operation. OCC has referred the issue to NPC for their views.

(b) **North Eastern Region:** In NER, **maximum load in feeders** is considered for computation of load relief.

(c) **Northern Region:** In the 83rd Operation Coordination Sub-committee meeting held on 18.1.2013, it was mentioned that the actual expected load relief from all installed UFR and df/dt may be on average basis. At present, computation of load relief is being done on the basis of maximum load. However, more load has been connected for UFR actuated load-shedding to ensure that at any point of time in the day, total relief is not less than the desired quantum. Chandigarh and J&K have not yet implemented UFR actuated load-shedding scheme.

(d) **Western Region:** Quantum of relief is calculated on average load basis. DD and DNH are yet to implement UFR actuated load-shedding scheme.

26. NLDC has requested the Commission to direct all constituents to (i) consider minimum load in the feeders for computation of target relief through UFR and df/dt on identified feeders and (ii) monitor of operation and relief by these UFR and df/dt relays, UFRs and df/dt relays also be mapped on the SCADA system of each state so that they can be monitored from SLDC/RLDC.

Submission of Central Electricity Authority (CEA)

27. Central Electricity Authority in its submission dated 8.9.2014 has submitted that principal issue raised in this petition as to whether the quantum of load relief to be provided by the States through automatic under-frequency relays and df/dt relays should be calculated on the basis of maximum load or average load on the electricity feeders. CEA has further submitted as under:

(a) Automatic Under-Frequency relays based Load Shedding (AUFLS) scheme is a defence mechanism against grid collapse. It is designed to operate and shed load connected to pre-identified radial feeders in four stages at very low grid frequencies of 49.2, 49.0, 48.8 and 48.6 Hz. Such a low frequency in the grid is a rare phenomenon and occurs only under severe contingencies, for example, during the current year 2014-15 (April - July), minimum frequency of the all India grid has always been above 49.2 Hz.

(b) As the grid security is of paramount importance. AUFLS Scheme is required to be implemented by all the States faithfully to avoid grid collapse in case of any severe contingency.

(c) National Power Committee (NPC) had determined the quantum of load shedding to be carried out in the grid in four stages of frequency taking into account, mainly the power number and dependence of load on grid frequency, voltage and season. For taking into account the impact of seasonal and daily variation, it was assumed that average load on a feeder would be about 70% of its peak declared load during an year. Accordingly, a factor of 1.43 (=1/0.7) apart from other factors was also used

to arrive at the quantum of load-shedding. It is, however, learnt that the actual load on the feeders where under-frequency relays have been installed by the States is generally much less than 70% of the declared load relief.

28. In view of the above, CEA has further submitted as under:

(a) The quantum of load to be shed under AUFLS Scheme has been worked out on the basis of mainly the power number, which itself varies substantially from time to time depending upon the load/generation configuration of the grid and thus, is an estimated parameter. Therefore, if a contingency occurs at an instant when the value of power number of the grid happens to be greater than the estimated value the quantum of load as determined to be shed through AUFLS scheme on the basis of the estimated value of power number, would fall short of requirement. In view of this, each State needs to ensure that the load relief to be provided by it under the AUFLS Scheme is mostly equivalent to or more than the quantum advised by the RPC. States should have no hesitation in implementation of AUFLS Scheme faithfully in view of the following:

(i) Excursion of frequency to be low as 49.2 Hz does not occur under normal system operation. Subsequent to synchronous connection of SR with the NEW grid on 31.12.2013, frequency stability has improved further due to increased inertia, and chances of its dipping to a very low level have further reduced. It will occur only in case of a severe contingency which is a rare phenomenon, and therefore, load shedding through AUFLS will also take place rarely.

(ii) It is in the interest of all power utilities to implement AUFLS Scheme to prevent any contingency which has the potential to lead to grid collapse as grid collapse causes colossal financial loss to all the utilities connected to the grid.

(iii) Implementation of AUFLS scheme is not going to create any difficulty to the consumers of the State as AUFLS Scheme will operate rarely.

(b) Keeping in view the above factors, it is considered prudent that all States provide load-relief under AUFLS scheme at least equivalent to the quantum (intimated by the respective RPC) on the basis of average load on the feeders (covered in the scheme) during the previous year.

(c) All feeders which are covered in the AUFLS scheme to provide load relief, should be mapped for visibility through SCADA system at SLDC/RLDC. This would facilitate monitoring of actual load relief at any instant and average load on the aforesaid feeders by the SLDC/RLDC, who can advise suitable action to the State in case of inadequate load relief.

Analysis and Decision

29. We have heard the learned counsel and representatives of the parties. We have perused the entire record leading to issue of the order dated 19.12.2013 as also submission of the parties in the present case.

30. The Review Petitioner has filed this Review Petition on the ground that the determination of targeted quantum on the basis of average value in the impugned order requires review by the Commission as it will make implementation of the Commission`s direction impossible. The Review Petitioner has submitted that if the targeted quantum is determined on the basis of the maximum demand conditions, implementation of the Commission`s directions is feasible.

31. The Grid Code provides for the load shedding in different contingencies in order to maintain frequency within the stipulated band and network security. In this Connection, Regulations 5.2 (n) and 5.4.2 (e) of the Grid Code are extracted 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, RPC in a region has been allowed to carry out periodic inspection of the Under Frequency relays and decide and intimate the action required to be taken by SEB, distribution licensee and STUs to get the required load relief for the Under Frequency relays and df/dt relays.

32. The Enquiry Committee constituted by Ministry of Power to analyze the causes of disturbances and to suggest measures to avoid recurrence of such disturbance in future had submitted its detailed report on 16.8.2012. The quantum of relief required through AUFR and df/dt operation from each constituent's control area, during contingencies was reviewed and discussed from time to time in the Protection Co-ordination Committee (PCC) meetings and Operation Co-ordination Committee (OCC) meetings of SRPC. All the constituents furnished the feeder-wise details of loads that are identified and connected with AUFR and df/dt relays in their control area in compliance of Regulation 5.4.2 (e) of the Grid Code matching the quantum agreed in the SRPC Board meeting held 1.6.2012. Though the SR constituents furnished the feeder-wise details, during the real time operation on the occasions of contingencies, the actual relief

realized was far below the declared quantum. During such instances, the SR system frequency excursion was at critical level. The matter was taken up in every Protection Co-ordination Committee (PCC) meetings and Operation Co-ordination Committee (OCC) meetings SRPC and all the constituents were asked to ensure availability of adequate relief as declared by them. In view of consistent under-performance of AUFR and df/df in the Southern Region, SRLDC began feeder-wise monitoring of the earmarked feeders through SCADA system on continuous basis with effect from 23.9.2012. It was observed that the flow on many such identified feeders was very much lower than the declared quantum of relief from the respective feeder. As a result, available load relief for safeguarding system security during contingencies through AUFR and df/df of each control area was about 20%-50% of the declared quantum. The same was reported by SRLDC to the secretariat of Southern Regional Power Committee (SRPC) periodically. The issue of non-availability of adequate loads in the identified feeders was regularly taken-up in the Operation Co-ordination Committee (OCC) meetings of SRPC as well as PCC and TCC meetings of SRPC. All the constituents were asked to identify further feeders giving realistic load available for relief through AUFR and df/dt for meeting the system contingencies

33. SRLDC filed Petition No. 263/MP/2012 for seeking *inter-alia* directions to all the STUs/SLDC in the Southern Region to ensure identifying and connecting the feeders with AUFR and df/dt relays that provide availability of declared quantum of relief at any point of time so as to take care of contingency, if any. The Commission after hearing

all the parties including the Review Petitioner issued the following direction vide order dated 19.12.2014:

"13. We have heard the parties and perused the pleadings. We are in agreement with the petitioner that there is a need to review and estimate the actual load on the feeders and the constituents should consider average load in the feeders for computation of target relief on identified feeders. As sufficient load relief has not been achieved, the respondents are directed to identify more feeders for installation of UFR and df/dt relays and submit the details to SRPC.

14. We would like to emphasize that no complacency shall be accepted for ensuring safety and security of the Grid. Also according to Enquiry Committee constituted by the Ministry of Power, the response from generators and operation of defense mechanism like Under Frequency and df/dt based load shedding and special protection schemes should be ensured in accordance with provisions of the Grid Code so that Grid can be saved in case of contingencies. Further, as the SR Grid is going to be integrated with NEW Grid, urgent action by the respondents is all the more essential.

* * * * * * * * * * * * *

16. The matter of increasing AUFR relief and implementation of df/dt settings have been discussed at various Forums of SRPC. In the special TCC meeting held on 21.8.2013 the State-wise quantum of relief was firmed-up as in table below and was decided to be implemented by all constituents by 15.10.2013:

Constituent	**Frequency Setting for Trip (in Hz)**			
	49.2	**49.0**	**48.8**	**48.6**
Andhra Pradesh	809 MW	812 MW	822 MW	825 MW
Karnataka	576 MW	578 MW	586 MW	588 MW
Kerala	204 MW	205 MW	208 MW	209 MW
Tamil-Nadu	740 MW	744 MW	753 MW	756 MW
Puducherry	21 MW	21 MW	21 MW	22 MW
Total	**2350 MW**	**2360 MW**	**2390 MW**	**2400**

17. All SR constituents are directed to identify the additional feeders and install UFR, df/dt relays to ensure the relief as decided by SRPC from time to time. We direct all constituents to submit compliance report duly certified by SRLDC and SRPC of implementation of quantum of relief by AUFR as per table above and proper functioning of df/dt relays within one month of issuing this order. We also make it clear that failure in this regard will amount to non-compliance of the directions of this Commission and render the constituent liable for proceedings under Section 142 of the Electricity Act, 2003 and other relevant provisions, against the Heads of defaulting entities."

34. The Review Petitioner has submitted that all the available 132 kV feeders including power transformer were taken into consideration for implementation of the various protective scheme under UFRs, df/dt, Talcher–Kolar SPS, Kundankulam SPS and Ramagundam Islanding Scheme and the quantum of proposed loads under the various schemes were identified as 8661 MW. The petitioner has submitted the load of 8661 MW was included in the form of defensive mechanism. The petitioner has given the demand variation for the year 2013 and has submitted that the under minimum demand conditions, the targeted quantum on the basis of average value could not be maintained inspite of inclusion on the whole AP system. Accordingly, the petitioner has submitted that the targeted quantum should be decided on maximum demand conditions.

35. The UFR and df/dt are defence mechanisms of the system. With narrowing of frequency range 49.9-50.05 Hz, under normal conditions these relays would not operate. However in case of contingency, sufficient load relief is required as decided at RPC level. Under the Grid Code, responsibility has been assigned to SRPC to decide the frequency setting for the purpose of load relief from UFR and df/dt relays. The matter was discussed in various forums of SPRC and in the Special TCC meeting held on 21.8.2013 and the State-wise quantum of relief was firmed up to be implemented by the constituents by 15.10.2013 which have been extracted in para 16 of the impugned order. The Commission vide para 17 of the impugned order directed all SR constituents to identify the additional feeders and install UFR and df/dt relays to ensure relief as

decided by SRPC from time to time. The Review Petitioner has sought review of the said frequency setting decided by SRPC.

36. The Commission has the power to review its order in one of the three grounds, namely, error apparent in the face of record, discovery of new and important matter or evidence which after due diligence was not within the knowledge or could not be produced by the Review Petitioner when the order was made, and due to any sufficient reasons. In our view, the case of the petitioner is not covered under either error apparent on the face of record or discovery of new and important matter or evidence. We have to consider whether there is sufficient reasons for review of the impugned order.

37. This is a technical issue and the Commission has the advantage of the view of POSOCO, SRPC and CEA on the issue. The gists of the views of these expert bodies have been discussed in the earlier part of the order. Their views are discussed in brief as under:

(a) SRPC has submitted that quantum of relief identified should be available at all times, whether peak or off peak periods. In case maximum feeder loading is considered, then visible relief could not be much lesser than the desired relief as it does not consider the pattern of the feeder throughout the day whereas the average feeder loading considers the loading pattern of the feeder throughout the day. SRPC has referred to the load relief on account of the operation of first stage of UFR in case of one incident on 7.6.2013 when AP could provide only 202 relief as against

the expected relief of 882 MW which is about 23% of the expected relief. SRPC has submitted that with this kind of relief realization in real time, the grid security would tend to get compromised.

(b) SRLDC has submitted that the average demand for the month of February 2014 was about 90% of the maximum demand and the ratio between maximum and minimum demand was about 85%. Accordingly, the load available for relief should not be less than 85% of the approved value at any point of time. Meeting this criterion at least to nearest value shall be possible only if the average value of feeder is considered for computation.

(c) NLDC has submitted that contingencies in the system can take place at any point of time and adequate load relief must be there, irrespective of the time of occurrence of contingencies. Effect of UFR and df/dt actuated load shedding has to be affirmative and maximum load of feeders should be considered to ensure that relief is adequate under all conditions. Actual operation of UFR may take place only under large contingencies and the constituents may not have any apprehension regarding frequent operation of UFR.NLDC has submitted that at present in Eastern, Northern and North Eastern Regions, maximum load in the feeders is being considered for computation of load relief. However, in Western Region load relief is being calculated on average value. NLDC has prayed to consider minimum load in the feeders for computation of target relief under UFR and df/dt on identified feeders.

(d) CEA has opined that as the grid security is of paramount importance, AUFLS Scheme is required to be implemented by all Stations faithfully to avoid grid collapse in case of any severe contingency. Since excursion of frequency to the level of 49.2 Hz does not occur under normal system operation and implementation of AUFLS is unlikely to create any difficulty to the consumers, it is desirable that all stations provide load relief under ULFLS scheme at least equivalent to the quantum as intimated by the respective RPC on the basis of the average load on the feeders covered in the scheme during the previous year.

38. The expert bodies have opined that the UFR setting should be either on average load or minimum load and have not subscribed to the contention of the Review Petitioner that the UFR setting should be on the basis of the maximum load. SRPC and SRLDC have also recommended the load relief on average basis. Even during the course of hearing on 9.4.2013 in the main petition, SRLDC had submitted that during PCC/OCC meeting of SRPC, the Review Petitioner had agreed for the average load in feeders for UFR operation. Therefore, we feel that UFR setting on average load is implementable and accordingly, we do not find any sufficient reason to review our order dated 19.12.2013.

39. UFR and df/dt relays are life saving protection scheme of the grid and last line of defence against any major grid disturbance and we observe that a conservative approach generally needs to be adopted in regard to last line of defence mechanism, more so in view of the fact that operation of these relays under the prevailing frequency regime are not likely to cause inconvenience to power utilities during normal operation

and the need for operation of these relays arises only during emergency conditions. We are of the view that a conservative approach should be generally adopted in regard to last line of defence mechanism to ensure that desired load relief is available in all contingencies.

40. In our view of the above, there is no ground to review to order dated 19.12.2013 and accordingly the review petition is dismissed.

Sd/-	sd/-	sd/-
(A. K. Singhal)	**(M. Deena Dayalan)**	**(Gireesh B. Pradhan)**
Member	**Member**	**Chairperson**