CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Petition No. 146/MP/2013
with I.A. 36/2013

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

Date of Hearing: 19.12.2013
Date of Order : 20.02.2014

In the matter of

Providing protection systems having reliability, selectivity, speed and sensitivity and keeping them functional in terms of Regulation 5.2 (I) of the CERC (Indian Electricity Grid Code) (First Amendment), Regulations, 2012 read along with Regulation 3 (e) of Central Electricity Authority (Grid Standards) Regulations, 2010 and following best practices of O&M of transmission elements for ensuing security of the Southern Regional grid as well as the interconnected Indian grid**.**

And in the matter of

Southern Regional Load Despatch Centre
29, Race Course Cross Road,
Bangalore-110 016. **...Petitioner**

Vs

1. Director (Grid operation)
Transmission Corporation of Andhra Pradesh Limited
Vidyut Soudha,
Hyderabad

2. Director (Thermal)
Andhra Pradesh Generation Corporation Limited
Vidyut Soudha,
Hyderabad- 500082 (AP)

3. SLDC, APTRANSCO

Vidyut Soudha,
Hyderabad- 500082 (AP)

4. Karnataka Power Corp. Limited
Shakti Bhawan,82, Race Course Road,
Bangalore-560001

5. Karnataka Power Transmission Corporation Limited
Cauvery Bhavan,
Bangalore-560009

6. SLDC, Karnataka Power Transmission Corporation Limited
Race Course cross road,
Bangalore

7. Kerala State Electricity Board
Vaidyuthi Bhavanam Pattom,
Trivandrum- 695004

8. SLDC, Kerala State Electricity Board
Kalamassery,
Ernakulam Dist.

9. TANGEDCO
Anna Salai,
Chennai, 600002

10. SLDC, TANTRANSCO
Chennai

11. Superintendent Engineer- I
Electricity Dept,
Puducherry

12. Executive Director
Power Grid Corporation of India Limited
SRTS-I,
Hyderabad

13. Executive Director
Power Grid Corporation of India Limited,
SRTS-II,
Bangalore

14. Executive Director

NTPC, SR HQ,
Hyderabad.

15. General Manager
NTPC Talcher Stage-II,
Talcher **…..Respondents**

Following were present:

Shri P.R. Raghuram, SRLDC
Ms Jyoti Prasad, NLDC
Shri A. Sensarma, PGCIL
Shri B. Sridhar, PGCIL
Shri Rangarao, PGCIL
Shri G. Srimannarayana, PGCIL
Shri A. Dua, NTPC
Ms. Usha Nandini. V, Advocate, KESB
Shri Biji P.Raman, Advocate, KSEB
Ms.Swapna Seshadri, Advocate, KPTCL
Shri Guru Prasad, KPTCL
Shri M. Hemantharaju, KPTCL
Shri TS Annapaa, KPTCL

ORDER

This petition has been filed by the petitioner, Southern Regional Load Despatch Centre with the following prayers, namely:

"(a) Ensure Adequacy and healthiness of protection system in compliance with regulation 3 (e) of the CEA (Grid Standards) in terms of IEGC regulation 5.2 (e);

(b) Form their own expert group in protection audit for periodic protection audit of the entire substation of 220 kV and above on continuous basis and discuss such protection audit reports in the Protection Co-ordination sub-committee of SR;

(c) Ensure different type (Principle of operation) and make of relays for Main-I and Main-II protection as well as different input for different protection schemes in a time bound manner on priority;

(d) Ensure proper and periodical preventive maintenance of transmission lines including RoW clearance, bush/jungle cutting etc., particularly in forest area adopting best O&M Practices;

(e) Ensure dual source of supply for all the auxiliaries in substation;

(f) Ensure availability of bus sectionaliser scheme in all the 200kV/230kV substation that may lead to Grid disturbance of category GD-I and above;

(g) Ensure strict compliance of IEGC provision under clause 5.2 (r) in furnishing the detailed tripping report along with DR & EL printouts within 24 hrs of the occurrence of the event; and

(h) Pass such further Order as this Hon'ble Commission may deem just and proper in the circumstances of the case."

2. The petitioner has submitted that from January, 2013, at least 16 times Grid disturbance of Category GD-I were occurred in Southern Region (SR) due to delayed operation or failure to operate of concerned protection relays/scheme, i.e. improper functioning of Protection Schemes.

3. As per the recommendations of Enquiry Committee report, a third party protection audit in SR was carried out and all constituents were agreed in principle for implementation of the recommendations. However, the status review reveals that many recommended items are yet to be implemented. In addition, there were Grid Disturbance (GD-I) instances due to not complying with the best O and M practices by the concerned utilities. The petitioner has filed this petition seeking directions to respondents to ensure timely implementation of recommendations of Protection Audit.

4. The petitioner has enumerated details of events causing Grid disturbances as under

Event	Time	Description	Reason
Multiple tripping of 220 kV transmission lines at Madakathara sub-stations of KSEB	02.01.2013 at 13:58 hrs	Resulted in complete outage of 220 kV this sub-stations and thereby loss of supply to parts of North Kerala.	Default Fault Clearance in Madakatathara-Areacode 220 kV line breaker on (Y-B phase fault). Also there was no provision like bus sectionaliser in Madakathara sub-station
Multiple tripping of 400 kV transmission lines at Hassan sub-station due to failure of CT of POWERGRID	10.03.2013 at 15:04:23hrs	Led to outage of multiple elements connected to 400/220 kV Hassan sub-station.	There were two faults and during both instances, there was delayed clearance of fault i.e., in 240 ms and 320 ms against 100 milli seconds
Simultaneous forced outage of multiple transmission lines, interconnecting transformers and generating units in SR.	29.03.2013 at 13:48 hrs	Outage took place at Vijayawada TPS (APGENCO) and Koyhagudam TPS (APGENCO) in SR. Resulted in threat to integrated operation of SR Power System due to depleted transmission system resulted from wide spread tripping.	There was slow developing fault in B-phase which took nearly 21 seconds to get cleared against the 100 milli second mandate of CEA
Loss of about 700 MW wind generation in Tamil-Nadu due to outage of 230/110 kV Kayathar substation of TANTRANSCO	07.06.2013 at 10:47 hrs	Resulted in sudden dip in frequency from 50.05 to 48.83 Hz.	Occurred due to fault in 110 kV bus at 230/110 kV Kayathar sub-station. There was delayed clearance of fault. Time taken for clearance of fault was in seconds against mandate to 160 ms. Also there is no bus sectionaliser scheme at 230 kV as well as bus protection scheme at 110 kV bus of 230 kV Kayathar sub-station, though the sub-station is very critical pooling station of wind generation in Tamil-Nadu.
GD-I category fault. Loss of generation 690 MW, in Karnataka system	08.01.2013 at 8:35 hrs	Total outage of Sharavati 220 kV sub-station.	Due to delayed fault clearance
GD-I category fault.	28.01.2013	Total outage of	Due to delayed fault clearance

Loss of generation 850 MW, in Karnataka system	at 23:21 hrs	Sharavati 220 kV sub-stations	
GD-I category fault. Loss of generation 600 MW, in Karnataka system	13.06.2013 at 14:00 hrs	Total outage of Sharavati 220 kV sub-station. All running units at Sharavati hydro station also tripped.	Due to delayed fault clearance. Report received from KPTCL and KPCL indicates fault had occurred in 220 kV Sharavati-Sirsi line 1 and 2. If protection system was in order, the fault would have been cleared at Sharavati end due to failure of both Main-I and Main-II protections. It can be inferred from PMU data that fault was cleared in 2.2 seconds against mandate of 160 ms by CEA.

5. The petitioner has submitted that the following measures have been taken by SRPC and SRLDC :

(a) Third party protection audit has been carried out at Sharavati Hydro station on 19.11.2012 and recommendations were submitted. Following critical observations were made by the audit team:

1. Only 1 CVT for all feeder protection
2. Same CT core is used for both Main-I and Main-II
3. Carrier protection not available for many feeders
4. Very old breakers (1964 make) in poor condition that served its life
5. DC earth leakage condition etc.

(b) On 6.3.2013, SRPC had constituted a task force committee to visit 220 kV Sharavati Hydro station to analyze the tripping on 8/28.1.2013 and to suggest remedial measures to prevent reoccurrence of the event. The committee reviewed the progress of protection audit recommendation and identified various other things to attend by Karnataka Power Corporation Limited / Karnataka

Power Transmission Corporation Limited as under:

1. Dual battery source with dual rectifier
2. Replacement of old electro-mechanical relays with numerical relays
3. Replacement of Westinghouse make OCB bus sectionaliser breaker
4. Different energisation source for breaker trip coil and etc.

(c) Both reports have highlighted several inadequacies in respect of protection system at Sharavati Hydro station. Number of lapses have been observed in the reports and some even lead to non-conformity of CEA Grid Standards.

(d) As per Regulations 5.2(r) of Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 (Grid Code), all the regional entities are required to furnish tripping report in specific format along with Disturbance Recorder (DR) and Event Logger (EL) printouts within 24 hours of the event. However, there is significant delay in receiving detailed tripping report along with DR and EL print outs from SRLDC and SRPC. Till the completion of analysis and implementation of recommendations of SRLDC/SRPC, the system operator is exposed with the risk of operating the system without knowing the danger associated with those elements that caused the Grid disturbance. The delay in reporting also adds delay in implementation of required corrective/preventive measures.

(e) There were instances of Grid disturbance due to non-clearance of

bushing/jungle clearance or non-trimming of tree branches within the RoW to transmission lines periodically. The instance of 13.6.2013 is a typical case of such nature. It is evident that there was no periodic patrolling of lines by KPTCL in certain portions that lead to unwarranted tripping of critical transmission elements.

(f) In all control area of SR Regional Entities, following instances were reported which are affecting the security, economy and efficiency of the entire power system in Southern Region and needs to addressed quickly:

(i) Inadequacies/failures in the protective system at sub-stations.

(ii) Lack of proper patrolling and jungle clearance

(iii) Improper time setting/relay coordination/ delay in fault clearance

(iv) Malfunctioning of protection system, etc.

6. The petitioner has also filed Interlocutory Application No. 36/2013 seeking directions to respondents to comply with the Grid Code. The petitioner has submitted as under:

(a) All the Regional entities agreed in principle for implementation of the recommendations of the Protection Audit. However, the status Review reveals that many recommended items are yet to be implemented.

(b) On 15.7.2013 at 21:47:11 hrs, complete outrage of 400 kV Nellore Pooling Station of Power Grid along with generation loss of 260 MW had occurred at

Simhapuri Energy Limited (SEL) and 139 MW at Meenakshi Energy Private Limited (MEPL).

(c) On 3.8.2013 at 05:26 hrs, all connected lines and ICT's tripped at 400/220kV Mamedapalli (Hyderabad) sub-station of APTRANSCO. The triggering incident was failure of R-phase current transformer in 400kV Khammam line-1 Main bay and failure of B-phase bus post insulator in Srisailam-2 Main bay at Mamidapalli sub-station.

(d) On 2.9.013 at 11:41 hrs, all connected 220 kV lines, 400kV Kaiga-II and ICT-I and II tripped at Guttur sub-station. The synchrophasor data indicates that there was a fault in B-phase and there was a delayed clearance of fault.

(e) On 10.9.2013 at 3:04 hrs, multiple tripping had occurred at 400/220kV Nellore sub-station of Powergrid. The following lines had tripped on operation of over-voltage stage-1 protection and there was generation loss of 260 MW occurred at Simhapuri power station and 220 MW at Meenakshi power station due to loss of evacuating lines:

Name of line / equipment	**Date of tripping**	**Time of tripping**
400kV Nellore pooling-Nellore line-1	10-09-2013	2:46
400kV Nellore pooling-Nellore line- 2	10-09-2013	3:04
400 kV Vijayawada – Nellore line - 1	10-09-2013	3:04
400 kV Vijayawada – Nellore line - 2	10-09-2013	3:04
400kV Nellore – Sriperambadur line	10-09-2013	3:04
400kV Nellore- Almathi line	10-09-2013	3:04
400 kV Krishnapatham – Nellore (A.P) line – 1	10-09-2013	3:04

As reported, 400 kV lines connected to Nellore had tripped on operation of over voltage stage-1 protection. The 400 kV bus voltage (figure-1) from synchrophasor at Gooty indicates a high voltage. It can also be inferred that there was no fault in the system prior to the multiple tripping.

(f) SRPC and SRLDC have taken all possible efforts to identify the slackness in SR protection system through protection audit and circulated audit observation to all the regional entities for immediate action. Also, the events occurred during the month were analyzed in details and discussed in the following Protection Co-ordination Committee (PCC) meetings of SRPC for suitable corrective action.

(g) It may be evident from the details of all the above incidents, that there is substantial delay in implementation of recommendations of the protection audit and task force committee reports of various incidents by all the regional entities. There is lack of pro-active action by the Regional Entities due to the reasons like inadequate man power, additional financial implication, delay in procurement process etc. Despite SRLDC repeatedly follows-up and takes-up in forums like PCC and OCC for getting the DR, EL, and other details of tripping instances, there is significant delay in receiving such essential data for doing timely analysis.

7. Replies to the petition as well as IA have been filed by the Karnataka Power Corporation Ltd. (KPCL), SLDC Karnataka, TANTRANSCO, NTPC, Kerala State

Electricity Board and APTRANSCO.

8. Karnataka Power Corporation Ltd. (KPCL) in its reply dated 28.9.2013 has submitted as under:

(a) According to the petitioner, Sharavati units 1,2,3,4,5,6,7,8,9 and 10 tripped due to which generation loss of 690 MW and frequency came down from 50.05 Hz to 49.49 Hz. KPCL has submitted that it was reported on 8.1.2013 at 8:37 hrs, generator voltage reduced from 11 kV to zero causing station blackout. The reason for this might be failure of control supply of Governor and AVR, which in turn indicates that the root cause as 250V station battery bank, which is unusual to its nature. However, immediately after the station blackout, DG was started and the station was normalized and units brought on bar after 45mins.

(b) In SGS, there are two battery banks of 1000 AH and 500 AH. Standard O&M practices are being carried out in the corporation for regular maintenance of batteries as under:

(i) Pilot cell readings of the battery banks are noted down daily;

(ii) Weekly/fortnightly cleaning of the battery banks and application of petroleum jelly;

(iii) Monthly topping up of distilled water for maintaining the electrolyte level and boost charging of the battery bank if required.

(c) Action had taken by replacing the new battery bank (1000AH) commissioned and taken into service on 16.1.2013.

(d) With regard to tripping of Sharavati Units:1,2,3,4,5,6,7,8,9 and 10 on Earth Fault protection at 28.1.2013 at 23.21 hrs, Chief Engineer, Sharavati, KPC on 29.1.2013 have furnished the detailed report pertaining to system disturbance on 28.1.2013 to SRLDC which was discussed and recorded in minutes of 17th meeting of Protection Coordination Sub Committee held on 26.2.2013 at SRPC, Bangalore. On 28.1.2013, it was reported that, Sharavati-Talaguppa (St-1) line was taken on bus coupler breaker to review the settings of Main-I and Main-II relays of ST-1 line.

(e) At 23:20 hrs, ST-1 and ST-2 lines tripped at Talaguppa end only. ST-2 line tripped on backup zone-3 fault at Talaguppa and ST-1 tripped on back-up earth fault at Talaguppa end and ST-1 tripped on backup earth fault at Talaguppa end only. Rest of line breakers hand tripped after the station bus became dead.

(f) At 00:25 hrs on 29.1.2013, it was informed by Talaguppa AEE that ST-1 and ST-2 tripped at their end only on earth fault during the event. At 1:42 hrs, ST-2 line taken into service and at 02:00 hrs, ST-1 line, which was on bus coupler breaker was changed over to regular breaker. At 02:07 hrs, St-1 again

tripped on distance fault (Zone-1) when tried to take into service. After line patrolling TLM staff of KPTCL informed that de-capping/flashover of R-phase line insulator at location no. 8 has occurred and caused the disturbance for which distance relays may not detect on zonal fault, whereas backup relays should operate to these type of faults. However, the bus coupler breaker (taken on St-1) at SGS end did not trip on Back-up E/F.

(g) To analyze and investigate the events, on 30.1.2013, team from RT, KPTCL, Shimoga tested the bus coupler relays and informed that the relay is operating for distance zonal settings whereas the configured output relay for backup E/F settings is not operating for Main-I and II relays. The output relay was reconfigured, tested and normalized.

(h) On the issue of Sharavati-Sirsi line:-

(i) On 13.6.2013, it was reported that SS-1 line tripped on distance protection at both the ends. Subsequently, units on bar 1,2,3,6,7 and 8 tripped resulting in station shutdown. Rest of the lines were hand tripped. Auxiliary supply resumed through DG set and subsequently, units started from 14:40 hrs.

(ii) It was informed by KPTCL TLM staff that a bamboo branch had fallen on SharavatiSirsi line-1, SharavatiSirsi line-2 causing phase to

ground faults and R-Y phase fault, which was cleared. Thereafter, and lines were restored at 16:20 hrs.

(iii) SS-1 line tripped on fault at both ends. SS-2 line tripped at Sirsi end on distance protection. However, relays of SS-2 line at SS end (ABB make REL511) found not operated. Since SS-2 line did not trip on fault, all the running generators tripped on back-up earth fault and remaining lines tripped at other end occurred on 13.6.2013 to SLDC and SRPC.

(iv) Remedial Solution: M/s ABB's representative, OEM of the relay was called to visit the site to check the functions of relays. on 17.6.2013, the representative of ABB visited SGS for checking of relays and it was found that the terminal configuration of the relays was not properly downloaded earlier and suspected some files were missing. Original files were downloaded and all the functions were tested and found working satisfactorily.

(i) On the issue of Kodasalli Hydro Power station tripping, shutdown was taken for 220 kV Kodasalli-Nagjhari line-2 on 16.6.2013 at 12:05 hrs, during the testing, the local breaker back-up relay of 220 kV Kodasalli-Nagjhari line-2 mal-operated unexpectedly which in turn led to tripping of 220 kV bus at Kodasalli

Hydro Station.

Remedial Solution: The relay was serviced and tested and found satisfactorily.

(j) Since SS-1 line tripped and cleared the fault in 40ms, the operation of the SS-1 distance relay is consistent as per requirement and CEA norms and fault on SS-2 line persisted.

(k) On the reasons of both the Main-I and Main-II protection of 220 kV Sharavati-Sirsi line-2 failed operation, it is clarified that the relays were calibrated by KPTCL staff on 4.3.2013. However, the relays did not respond. On thorough checking of the relays by firm's, it was found that the terminal configuration of the relays was not properly downloaded earlier and suspected files were missing. The problem was rectified and relays were tested and found to be in order.

(l) With regard to only 1 CVT is there for all the feeder protection, KPCL has submitted that as per normal practice, one or two CVT's output was usually used for feeder protection. However, as desired by SRPC, the matter of providing CVT's for all the 3 phases of lines has been deliberated at higher levels and included in DPR for "Renovation and Up gradation of Control and Protection system for 220/400 kV Switchyards of KPCL Generating Stations", which has been furnished to SRPC.

(m) With respect to same CT core being used for both Main-I and Main-II,

KPCL has submitted that as per earlier practice there was only Main-1 distance protection for 220 kV lines. Due to interaction, pursuance for implementing Main-2 protection by SRPC to 220 kV feeders also, Main-2 protection was provided at the same core. This has not caused any grid events from past decades. As per guidelines of CEA, Main-1 and Main-2 are required for 400 kV lines and Main-1 is required for 220 kV lines and Main-2 is optional i.e. "yes/no" (shown in CEA`s gazette Page No. 121 schedule-V). However, as desired by SRPC, the issue of replacement of CT's by 5 core Ct's has been deliberated at high levels and finally approval sought for including in the DPR furnished to SRPC.

(n) With regards to carrier protection not available for many feeders, it has been submitted that **c**arrier protection is provided for all the feeders. (SS-1 and SS-2 feeder wave trap was not available during audit. The same was normalized by KPTCL later).

(o) With regard to very old breakers (1964 make) in poor condition, KPCL has submitted that this in context to Sectionaliser Breaker referred by the Audit team. As sectionaliser breakers are of BOCB type with built in CT's and also due to space constraint in the switchyard, BOCB's of sectionaliser breaker could not be replaced by SF6 breakers (as CT's and breakers are to be mounted separately). Now it is proposed to replace Sectionaliser breaker of BOCB type by modern hybrid breakers with built-in CT's and isolators already included in the

DPR furnished to SRPC.

(p) With regard to DC earth leakage**,** it has been submitted that occurrence of DC earth leakage is not regular phenomenon. The problem is being rectified when it occurs. This is the duty of routine maintenance staff and the problem may appear rarely, especially during rainy season.

(q) Regarding dual battery source with dual rectifier KPCL has submitted that dual battery source is already commissioned (1000AH-16.1.2013 and 500Ah-24.6.2013)

(r) Regarding replacement of old electro-mechanical relays with numerical relays**,** KPCL has stated that this is in context with bus bar protection system. The work was already awarded to M/s GE India Ind. Pvt. Ltd. Bangalore on 22.3.2007. Supply of the new numerical bus-bar protection panels with relays completed. While supplying the cables, the contractor had delivered cable short length which was not suitable to works. The problem has been rectified and work is in progress.

(s) Replacement of Westinghouse make OCB Bus sectionaliser Breaker is included in DPR.

(t) Regarding different energisation source for breaker trip coil and tec.,

KPCL has submitted that dual battery source is already commissioned (1000AH-16.1.2013 and 500AH-24.6.2013)

9. Karnataka Power Transmission Corporation Limited and State Load Despatch Centre, Karnataka vide their joint reply dated 20.11.2013 have submitted as under:

(a) On the issue of ensuring adequacy and healthiness of protection system the protection system adopted for 220 kV and 400 kV networks and the setting adopted for these protection relays are based on CBIP guidelines and the directions of SRPC.

(b) On the issue of formation of own expert protection audit group, SRPC has formulated a third party protection audit group which audited KPTCL from 11.10.2012 to 22.12.2012. The observations of the audit team were discussed in SRPC meeting and minor observations were attended. However, regarding major observations, DPR is already prepared which is under execution.

(c) KPTCL has formed 4 RT circles with Superintending Engineers as head of the circle and 14 RT divisions for effective periodical testing and up keeping of protection system. Further, based on the fault level and system conditions, relay coordination is carried out during pre-commissioning only.

(d) On the issue of ensuring different type and make of relays for Main-I and Main-II protection, it has provided 2 main numerical distance protection for all 400 kV lines. 220 kV lines were provided with one distance protection and OCRs and EFR for the backup protection as per the prevailing practice.

(e) The issues raised in I.A. have been discussed in Protection Committee meeting of SRPC and the recommendations of SRPC/SRLDC are implemented. Necessary remedial measures are taken, if required.

10. TANTRANSCO in its reply dated 6.11.2013 has submitted that adequacy and health of Standard Protection System is up to date. Monthly report on the healthiness of the protection and availability is sent to SRPC regularly. Further, the fault clearance time for all equipments is well within 100 msecond and the breaker fail protection is also set to operate 200 ms as per Regulation. TANTRANSCO has stated that a DPR specifying the requirement of materials and connected works to comply with the recommendations of Task Force including recommendations of Protection audit through SRPC in all 230 KV and above level sub-station is under process of implementation. TANTRANSCO has requested SRPC to provide financial assistance from PSDF. According to TANTRANSCO, protection audit of 33 sub-stations have been completed and minor issues recommended by audit team have been resolved. All efforts are being

taken to comply with the directions and recommendations of SRPC.

11. NTPC vide its reply dated 14.11.2013 has submitted that it is complying with all directions of the petitioner and SRPC. NTPC has further submitted that directions in respect of Ramagundam STPS and Simhadri STPS have been complied with.

12. Kerala State Electricity Board (KSEB) in its reply dated 6.11.2013 has submitted that all necessary steps are being taken for implementation of the recommendations of the enquiry committee report. Protection audit has already been completed in all 23 Nos 220 kV and one No. 400 kV sub-station and on 15.6.2013 DPR prepared based on the protection audit was submitted to SRPC . KSEB has submitted that since the work associated with protection audit has to be executed through various departmental procedures, four months time is not sufficient to implement recommendation of protection audit. KSEB has submitted that on 2.1.2013 at 13.59 hrs, MDAR tipped on distance protection zone I, B and C phase, LBB, reclosed and A/R lock out 315 MVA transformer Bank I (220 kV side) 200 MVA transformer bank II (220 side) SHMD, MDPK and LMPD II 200 kV feeders tripped on LBB, which is a mal-operation. Tripping of MDAR feeder on distance protection (zone I, B and C phases) was normal. Available records or data did not reveal for LBB tripping. However, circuit breaker and relays were tested and proper functioning has been ensured .KSEB has submitted that DR and EL in major sub-stations and generating station. However, routine tests are being done to confirm proper functionality of various protection schemes and non-occurrence of mal-

operation.

13. APTRANSCO and SLDC, APTRANSCO in their joint reply 22.10.2013 to IA has submitted as under:

(a) On 3.8.2013 at 5.26 hrs, all concerned lines and ICTS tripped at 400/220 kV Mamidapally (Hyderabad) sub-station of APTRANSCO due to the failure of R-phase current transformer of 400 kV Khammam line-I Main bay and failure of B-phase bus post insulator in Srisailam-II Main bay at Mamidapally sub-station. The fault was rectified in 120 msec.

(b) In 23rd Protection Coordination Sub-Committee meeting held on 27.8.2013, a decision was taken to adopt the delay operation of CT supervision relay as 3 to 5 seconds against the existing default setting. Accordingly, on 24.9.2013 setting was revised from the existing 1.09 seconds operation to 5 seconds.

(c) The protection audit in APTRANSCO was carried out at 11 Nos. and 18 Nos 400 kV and 220 kV sub-stations respectively and certain recommendations were made involving the activities both immediate rectifications, Renovation and Modernization.

(d) Certain critical and innovation measures, such as planning of islanding scheme and implementation of SPS etc. were taken.

(e) APTRANSCO is adopting the defensive mechanism for achieving the frequency stability by providing the load relief through under frequency relays and F+df/dt relays methods and their periodical testing are being carried out and same is communicated to SRPC.

(f) FIRs and details reports of all sub-stations are regularly submitted to SRPC and SRLDC subject to availability of Disturbance Recorders and Event Loggers.

(g) APTRANSCO has requested to provide financial support from PSDF fund for the renovation and modernization activities.

14. TANTRANSCO vide its affidavit dated 1.2.2014 has submitted that all the Special Protection Schemes recommended by SRPC are implemented and compliance report sent to SRPC and SRLDC. The process of procurement of critical items and supply by the vendor require 4 months time and the commissioning would require another 2 months time. The implementation of Phase-I activities would be completed within six months.

15. The petitioner has vide its affidavit dated 8.1.2.014 has filed rejoinders to replies of KPCL, KPTCL, TANTRANSCO, NTPC and APTRANSCO. In response to KPCL reply, the petitioner has submitted as under :

(a) It is to be noted that:

(i) GD-I dated 8.8.2013 was due to failure of Aux Supply / defective

battery bank;

(ii) GD-I dated 28.8.2013 was due to non-operation of breaker at Sharavati end;

(iii) GD-I dated 13.6.2013 was due to delayed fault clearance of fault on 220kV Sharavati-Sirsi line at Sharavati end;

(iv) GD-I dated 17.6.2013 was due to miss-operation of LBB relay of 220 kV Kodasalli – Nagjhari line- 2.

Though all the above GD- 1 type grid disturbances are due to either failure /miss-operation of sub-station equipment, protection relays and switching elements, the respondent's claim that the maintenance activities / testing / calibration was done as per the industry standard is not justifiable.

(b) KPCL has also linked number items with funding modality through DPR such as replacement of CT core for Main-I and Main-II, replacement of Westinghouse make OCV Bus sectionaliser breaker, replacement of sectionaliser breaker of BOCB type with modern Hybrid breakers etc. have been linked to the DPR or the funding modality. It is pertinent to mention that respondent is aware of the replacement required in its system even before the protection audit. Instead of attending the same on priority, the respondent links with funding modality thereby deliberately exposing the system to security threat

for longer duration.

(c) While admitting the pitfalls indicated in protection system at KPCL stations, the action plan indicated by KPCL for rectification / replacement does not match the urgency as it is required. From the time schedule mentioned by KPCL, it appears that the procurement action is being taken as applicable for a routine item without any due urgency on the criticality of protection system. For some of the items, even time schedule for implementation is not mentioned. Accordingly, the grid is exposed to security threat for longer duration / till the implementation of identified rectification / replacement. For example in reply to the Petition, for the replacement of old electro-mechanical relays with numerical relays, the work is said to be in progress. In the reply to the Interim Application, for installation of DC earth fault relay, 4 months, commissioning of numerical bus bar protection system 6 months, is sought and for procurement of unique Disturbance Recorder for the whole facility, procurement of GPS facility, no timeline is provided. From the above, it is evident that KPCL adopts normal procurement procedure even for highly critical protection items. This nature adopting routine approach, poses severe threat to grid security for the integrated operation of SR with NEW grid. The impact of the problems in Karantaka system on the inter regional inter connector is very high as at present SR grid is connected through only one 765 kV ISTS line emanating from Karnataka system.

16. The petitioner, in response to KPTCL reply, has submitted as under:

(a) KPTCL has submitted that it has provided two different protections for Main and back-up. However, the concern of the petitioner is that in many locations the relays are of same make though they are configured on different logic / principle. Under this situation, in case of any defect in configuration/ software of the relays of same make, the effect will be the same on both Main as well as backup protection. The right approach to mitigate such a failure is to have relays of different make for Main-I and Main-II protection respectively. This aspect was deliberated in PCC meetings and special meetings in which the constituents including KPTCL endorsed the requirement. Accordingly, necessary action needs to be ensured by KPTCL.

(b) The transmission line maintenance procedure is fairly followed in most of the area. The maintenance activities in hardship terrain and forest area are the matter of concern which makes such locations as fault prone.

(c) If the healthiness of the protection system would have been ensured properly, number of the instances enumerated in the petition could have been averted. Probably deployment of expert team with adequate number of members for rigorous and periodic checking by the respective constituents is essential for this activity.

17. The petitioner, in response to TANTRANSCO reply, has submitted as under:

(a) TANTRANSCO has stated that the fault clearance time by the main protection for all equipments is well within 100 m sec. However, the experience of incident at Kayathar on 7.6.2013 confirms that the time taken for fault clearance was about 1.5 seconds while the Central Electricity Authority (Grid Standards) Regulations, 2010 prescribes 160 milliseconds as maximum fault clearance time for 230 kV system.

(b) It is reiterated that the loss of wind generation led to heavy drawl from grid by Tamil Nadu which in turn resulted in sudden dip in Southern regional grid frequency from 50.05 to 48.83 Hz. The Commission in its order dated 21.8.2009 in Petition No. 106/2009 had directed TANTRANSCO to implement suitable contingency plan on demand side management to offset the impact of sudden loss of wind generation. However, TANTRANSCO has not complied with the Commission`s direction despite regular monitoring by SRLDC and SPRC.

(c) TANTRANSCO has alleged that adequacy and health of the standard protection system of TANTRANSCO feeders, Auto Transformers and Bus Bar protection scheme for 230 kV and above level are up to date in TANTRANSCO network. It is pointed out that outage of 230/110 kV Kayathar sub-station of

TANTRANSCO had occurred due to fault in 110 kV bus at 230/110 kV Kayathar sub-station. There was delayed clearance of fault as inferred from data of phasor measurement unit. Further, no visible measures have been taken by TANTRANSCO to install bus sectionaliser scheme at 230kV as well as bus bar protection scheme at 110 kV bus of 230 kV Kayathar sub-station.

(d) It has been pointed out in the Protection Audit that for Phase I, at 230 kV Kayathar sub-station, earth resistance had to be measured and recorded, and for Phase II renovation of control room needs to be done and proper fire fighting and oil drain pit to be provided for transformers. However, no response has been received on this front of the steps taken.

18. The petitioner, in response to NTPC reply, has submitted that as per the Protection Audit, while in Simadhri sub-station existing MICROMHO relays of Stage-I lines have been replaced with numerical relays.

19. The petitioner, in response to APTRANSCO submissions, has submitted that in the present petition, it has raised concerned on a grid disturbance of type GD-I occurred on 3.8.2013 with regard to lapses in protection system. However, such instances could have been averted provided APTRANSCO regularly analyzed the past incidents and revised the protection settings time to time in line with the changes in the transmission network configuration. With regard to rectifications, the petitioner

has submitted that APTRANSCO attended items that generally does not involve financial implications. However, number of other critical items were kept pending linking funding modality. The petitioner has further submitted that the purpose of Islanding, SPS and AUFR are different from system protection and no one type can substitute the function of other. Accordingly, the requirement of effective and efficient system protection cannot be deferred with complacent that other mechanisms are in service. According the petitioner, since APTRANSCO confirms that some of the major stations are not equipped with Disturbance Recorders and Event Loggers, it will not possible for SRLDC and APTRANSCO to analyze the grid incidents/grid disturbances and make good the defects noticed. Therefore, situation amounts to non-compliance of Regulation 4.6.3 of the Grid Code.

20. The petitioner vide its affidavit dated 8.1.2014 has further submitted that considering the present status of Southern Regional Grid, it is very much essential to have perfect protection system in place and pro-active and proper maintenance in place of planning to attend the defect as and when it surfaces. The petitioner has further submitted as under:

(a) In the Southern Region, the situation is worrying with repeated or re-occurrence of multiple tripping leading to total black-out of 400kV / 220kV sub-stations due to mal-operation of the protection system at many locations.

(b) The condition of switching equipments in old 220 kV and 132kV sub-stations is far below the standard.

(c) The protection requirements like auxiliary power supply, DC supply / batteries are under poor maintenance condition without complying reliability requirement.

(d) In new sub-stations or LILO sub-stations, the relay settings are not properly co-ordinated with the neighborhood sub-stations.

(e) At times features such as auto re-closure, relay reach etc., were not tested/ ensured properly. Such lapses also pose threat with multiple tripping

(f) Constituents are not furnishing the trip report within 24 hours in terms of Regulation 5.2 (r) of the Grid Code.

(g) Number of critical sub-stations such as Kayathar, Madakathara etc., continue to operate as single main and transfer bus configuration without any bus sectionaliser breaker posing threat of total outage of the sub-station in case of operation of bus-bar protection for any reason. The bus coupler breaker at Gummidipundi, Sharawathi, Madakathara, Guttur etc are non-functional.

(h) The situation is not limited to any one constituent though the degree of issue varies. Some of the sub-stations at following locations are identified with

critical lapses:

(i) Sharawathi, Nagjeri, Guttur etc., in Karnataka system

(ii) KTPS, Vijayawada, Srisailam etc., in AP system

(iii) Eadaman in Kerala System

(iv) Kayathar in Tamilnadu system

(i) O&M practices followed in transmission line maintenance (like Bush / Jungle clearance) in tough terrain / forest area are not planned properly by the constituents and thereby leading to persistent fault condition.

21. The petitioner has further submitted that all the above facts as well as number of lapses existing in the Southern Regional grid were brought out clearly in the Protection Audit Report with suitable action required to be done by the constituents. All the constituents endorsed the lapses and agreed in-principle for attending the same. However, the progress of implementation is insignificant. The matter has been regularly taken-up with Protection co-ordination Committee (PCC) meetings, OCC meetings, and Special meetings of SRPC. The seriousness of the issue has been brought to the senior management of the constituents through TCC and SRPC Board meetings. Since the constituents still rely upon the implementation with funding from PSDF, the implementation is getting delayed.

22. During the course of hearing on 19.12.2013, the Commission took serious note of the deficiencies pointed out by the petitioner and observed that the matter assumes added importance as NEW Grid is to be shortly synchronized with the Southern Grid. The Commission directed the petitioner to analyze as to whether Southern Grid can be connected synchronously with NEW Grid under such deficiencies. The petitioner was directed to file a list of detailed deficiencies in the systems of respondents and the respondents were directed to file an affidavit stating the deadline for attending to the deficiencies. The Commission also noted that the petitioner raised issue of non-compliance of the Regulation 5.2 (r) of the Grid Code which mandated all users to report the disturbance/fault to RLDCs within 24 hours of occurrence. The Commission directed the petitioner to submit the instances of non-compliance by SLDC/users.

23. In response, the petitioner vide its affidavit dated 8.1.2014 has submitted as under:

(a) Any grid disturbance of 'Type GD-1' or above in SR may lead to operation of SPS / tripping of 765 kV Raichur- Sholapur inter-connector with sudden in-rush on either direction. The threat of dis-integration of SR grid from N-E-W grid is very high in the present scenario as the integration has been done using the available single inter connecting line. On 2.1.2014, the load changeover of huge quantum lead to in-rush of power through inter-connecting Raichur- Sholapur 765 kV line and SPS did not operate resulting in dis-integration. Also, operation of

SPS with tripping of identified generating unit at WR and loads at SR happened twice within a couple of days of synchronization. If by any chance, these instances could have happened with simultaneous GD -1 incident, the result could have been catastrophic failure. Therefore, it is most important to have an effective protection system in service ensuring intended performance.

(b) With regards to protection deficiencies identified during protection audit of SR and other recommendations of PCC sub-committee of SRPC and prioritized the requirements in to two groups for implementation by the concerned Regional Entities as Phase-I and Phase -II activities in a time bound manner, the phase-I activities are such activities to be implemented without waiting for funding modality as well as following 'urgency clause' procedure for procurement items and the normal tendering process. In general, phase- I activities include revision of settings, replacement of numerical relays, implementation of bus-bar protection in critical 220kV sub-stations etc., while phase- II activities include replacement of defective / very old breakers, isolators, bus sectionliser, etc., at critical sub-stations. Phase-I items are to be attended in the shortest possible time, i.e. within three months while the phase - II items needs to be attended at the earliest possible. The detailed list on constituent-wise are enclosed as **Annexures – IA and IB** respectively with this order.

(c) There are many tripping instances for which the tripping report, DR and EL

print outs are yet to be received or received in a delayed manner. In the absence of timely receipt of such details/data, it may not be possible for the petitioner to analyse the incident immediately and come out with suggestions to avert such instances in future. Not maintaining DR and EL in proper working condition, non-availability of qualified / adequate personal etc., could have been some of the reasons for non-furnishing of tripping details/ report on time. The petitioner has filed the list of delayed receipt or non-receipt of tripping details / data as on date with its reply.

Analysis and Decision

24. We have considered the submissions of petitioner and respondents. It is clarified that grid security and operation within the prescribed parameters is of prime importance and no compromise will be allowed in this regard. The Commission considers it to be of paramount importance in view of the fact that two major grid disturbances occurred on 30/31.7.2012. Further, grid security assumes added importance as NEW Grid has been synchronously connected with SR Grid and there is one synchronous grid in the country with conventional generation of about 200 GW.

25. In the Central Electricity Authority (Grid Standards) Regulations, 2010 (CEA Grid Standards), 'GD-1 type grid disturbance' has been defined as under:

> "Category GD-1 - When less than ten per cent of the antecedent generation or load in a regional grid is lost;"

26. The petitioner, after analyzing the system conditions, has submitted that any grid disturbance of 'Type GD-1' or above in SR may lead to operation of SPS/tripping of 765 kV Raichur-Sholapur inter-connector with sudden in rush on either direction, which means that the threat of disintegration in present system conditions is very high.

27. We agree to the petitioner's contention that the linking implementation of protection audit/PCC recommendations with funding modality has resulted into implementing schedule becoming uncertain which is undesirable as the matter involves grid security. The petitioner has proposed to segregate the works of implementation in two Phases, namely Phase-I requiring immediate attention and Phase-II requiring timely implementation. Phase-I involves minor works such as revision of settings, replacement of numerical relays, implementation of bus-bar protection in critical 220 kV sub-stations etc. and Phase-II involves activities such as replacement of old breakers etc. which may require some time. Accordingly, we direct the respondents to implement the works as mentioned in Phase-I and Phase-II by 1.5.2014 and 1.9.2014 respectively. SRPC is directed to coordinate the protection setting issue and submit a report regarding implementation of Phase-I activities by 1.6.2014. SRPC is further directed to submit bi-monthly status report for works mentioned in Phase-II to the Commission.

28. In terms of Regulation 5.2 (r), all the users, STU/SLDC and CTU are required to send information/data to RLDC within 24 hours for analysis of grid disturbance.

Regulation 5.2(r) of the Grid Code extracts as under:

> "5.2 (r). All the Users, STU/SLDC and CTU shall send information/data including disturbance recorder/sequential event recorder output to RLDC within 24 hours for purpose of analysis of any grid disturbance/event. No User, SLDC/STU or CTU shall block any data/information required by the RLDC and RPC for maintaining reliability and security of the grid and for analysis of an event."

29. The petitioner has submitted that number of respondents are not complying with the provisions of Regulation 5.2 (r) of the Grid Code and the directions of the Commission. We administer a strong warning to the respondents to take all possible measures permissible under the Act and the Grid Code to provide data /information to RLDC and RPC for maintaining reliability and security of the grid. 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. We also direct the petitioner and SRPC to coordinate and monitor the progress and compliance of Commission's directions and ensure compliance of Regulations 5.2 (r) of the Grid Code and report instances of non-compliance to the Commission.

30. The petitioner has submitted that the respondents have not fully implemented the recommendations made by the Protection Audit Committee and Committee constituted by SRPC. This issue will be dealt with in order in Petition No. 220/MP/2012.

31. The petitioner has further raised issue of non-compliance of Regulation 3 (1) (e)

of the CEA Grid Standards and Regulation 5.2(e) of the Grid Code. Regulation 3 (1) (e) of the CEA Grid Standards provides as under:

> "3. Standards for Operation and Maintenance of Transmission Lines.
>
> (1) All Entities, Appropriate Load Despatch Centres and Regional Power Committees, for the purpose of maintaining the Grid Standards for operation and maintenance of transmission lines, shall,-
> …
>
> (e) Provide standard protection systems having the reliability, selectivity, speed and sensitivity to isolate the faulty equipment and protect all components from any type of faults, within the specified fault clearance time and shall provide protection coordination as specified by the Regional Power Committee.
> Explanation: For the purpose of this regulation "fault clearance time" means the maximum fault clearance time are as specified in Table below-

S. No.	Nominal System Voltage (kV rms)	Maximum Time (in milliseconds)
1	765 and 400	100
2	220 and 132	160

> Provided that in the event of fault by a circuit breaker within the time limit specified in Table 4, the breaker fail protection shall initiate tripping of all the breakers in the concerned bus section to clear the fault in the next 200 milliseconds."

32. Further Regulation 5.2(e) of the Grid Code provides as under:

> "5.2 (e) Maintenance of their respective power system elements shall be carried out by users, STUs and CTU in accordance with the provisions in Central Electricity Authority (Grid Standards) Regulations, 2010. Any prolonged outage of power system elements of any User/CTU/STU, which is causing or likely to cause danger to the grid or sub-optimal operation of the grid shall regularly be monitored by RLDC. RLDC shall report such outages to RPC. RPC shall finalise action plan and give instructions to restore such elements in a specified time period."

33. The petitioner has submitted that there have been instances where fault clearance

time has been more than the prescribed limit due to old equipment in the sub-stations. In this regard, the petitioner should take immediate steps. We direct the respondents to strictly comply with the provisions of Regulation 5.2(e) of the Grid Code and CEA Grid Standards. The petitioner is directed to monitor the progress and compliance of the Commission's directions and ensure compliance of provision of regulations. In case of non-compliance for action plan finalized by RPC, the petitioner is at liberty to approach the Commission with specific instances of non-compliance against defaulting entities for necessary directions in accordance with law.

34. The respondents are also directed to ensure proper maintenance of transmission lines and adopt best O&M practices.

35. The petitioner has raised another issue of Jungle Clearance and non-monitoring of transmission lines by patrolling. Trimming of vegetation below transmission lines is an important maintenance activity. In the United States, a major grid disturbance was caused due to non-cutting/trimming of trees of vegetation below High Voltage transmission line in Ohio in August, 2003. On this issue, we direct all RPCs to formulate patrolling protocol/guidelines by 1.6.2014. The protocol must also take into account the terrain, forest cover and reach in that area and ensure regular monitoring as per requirement in that area to ensure efficient operation.

36. We observe that Protection Co-ordination Committee functions under RPC. The

petitioner is directed to discuss and try to resolve the issues in the Protection Co-ordination Committee and in case of non-resolution of the issues in RPC forum, the petitioner is at liberty to approach the Commission for direction/decision in accordance with law. The issues regarding non-compliance with the provisions of the Act and Regulations should be brought before the Commission and the implementation issues shall be handled at RPC level. Further, RPCs shall direct constituents to implement its recommendations in a time bound manner.

37. The petition No. 146/MP/2013 along with IA is disposed of with the above.

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

Annexure - IA

Phase-1

Sl. No.	Name of Substation	Details of work	Remarks (As per inputs received from constituents)
POWERGRID			
1	400 KV Arasur Substation	Distance protection Zone-2 & Zone-3 timing of **230 KV feeders** need review	
2	400 kV Bidadi Substation	Synchronisation check relay setting is to be reviewed.	complied
3	400 kV Ghanapur (Hyderabad) Substation	Enabling of stub protection in Ramagundam-3 & 4, Kurnool feeders	complied
4	400 kV Gooty Substation	Replacement of static relays by Numerical Relay provided for Distance, Differential Bus Bar and Reactor Protection	
		Numerical Bus bar protection to be provided	
		Static differential relays to be replaced with numerical relays on reactors and ICTs	
		Electromagnetic back up directional O/C and E/F relays to be replaced with numerical relays on ICT-1.	
5	400 kV Hassan	PId PLCC protection couplers to be replaced with new protection couplers	
6	400 kV Hiriyur Substation	Based on Setting of distance protection relays to be reviewed as per the revised line parameters received from KPTCL.	complied
		Static distance relays of 400 kV feeders to be replaced with numerical relays	complied
7	400 kV Kadapa Substation	Static bus bar protection relay to be replaced with numerical relays	Replacement of bus bar relays with numerical is not contemplated in the gazette notification
8	400 kV Kalivanthapattu S/S	Electromagnetic and static relays for ICTs, Reactor, Bus bar,over voltage, distance protection to be replaced with numerical relays.	
9	400 KV Khammam Substation	230 kV feeder distance protection Zone-2 and Zone-3 timings need review	complied
10	400 kV Madakkathara	Old Static line protection (Distance) relays to be replaced with numerical relays	
11	400 kV Mysore Substation	Time synchronising of protection system with GPS to be provided	complied
		Replacement of static relays (THR, CAG, RADHA etc.) with numerical relays to be looked into.	complied
		Co-ordination of protection settings for 220 kV Downstream lines to be done to avoid un wanted trippings at Mysore SS.	complied
12	400 KV Narendra Substation	Plug setting multiplier setting of back up over current relays of CTs to be reviewed.	complied
		Distance protection Zone-2 and Zone-3 timings of 220 KV lines need review	complied
13	400 kV Puducherry Substation	Bus sectionaliser direction to be reviewed (both sides operation).	complied
		Zone-2 & Zone-3 time settings of distance protection relays of 230kV feeders need review.	complied
14	400 kV Pugalur	LBB & Bus Bar protection are in-built in the same Siemens SIPROTEC 75552 Relay for both Main 1 & 2. Same needs review	In built busbar and LBB protection in station bus bar protection scheme is a general practice being followed in all SAS based substation and this is as per the latest practice in protection system
15	400 kV Salem Substation	Distance protection zone-2 and zone-3 time settings for 230 kV Lines needs review.	complied
16	400 kV Somanahalli Substation	Static distance protection relays of 400 kV feeders to be replaced with numerical relays	complied
		Nomenclature of Binary Inputs/Binary Outputs & function to be done in DR.	complied

17	400 kV Sriperumbudur	The high set setting of HV side DOCR & DEFR of each 500 MVA Transformer needs review.	complied
		Replacement of static distance, differential & busbar protection relays with numerical relays	complied
		Provision to be made for continuous monitoring of dc earth leakage measurements	complied
		Enabling "Direction Earth Fault" function in numerical type main-1 and main-2 distance relays	complied
		Time synchronising of protection system with GPS to be provided	
		Different make & type of distance relays to be used for Main-1 and Main-2 protection	
18	400 kV Trichy Substation	Carried aided protection to be provided for 230kV Sriperumbudur-Nokia, 230kV Sriperumbudur-Mambakkam (sipcot), 230kV Sriperumbudur-Oragandam	
19	400 KV Vijayawada (NUNNA) Substation	Old electromagnetic/static relays to be replaced with numerical relays.	complied
		Old Static line protection (Distance) relays to be replaced with numerical relays.	
		Evaluation unit is to be made available for Disturbance recorder of 400 KV Vemagiri-I & II feeders.	
20	400kV Kochi Substation	The DRs (Indactic65C) and Event Logger (SER7000) of 400KV VTPS-I & II Feeders are not healthy and need to rectified.	
		Monitoring source to be provided for DC earth leakage to be provided	
		Over voltage protection time setting to be reviewed	
21	400kV Munirabad Substation	Review of zone-3 setting for 220kV Kochi-Brahmapura and 220kV Kochi-Kalamashery	complied
22	400kV N'Sagar (Tallapalli) Substation	Numerical relay to be provided for differential protection of ICT-1&2	complied
		Old relays to be replaced with numerical relays for feeders, ICTs and Reactors.	
		Mutual compensation to be incorporated in distance protection settings of 400kV N'Sagar-Ramagundam ckt-1&2.	
NTPC			
1	220 kV Kayamkulam	Zone-2 and Zone-3 timings of distance protection relays need review.	
2	400 kV Ramagundam	Distrubance Recorders (ABB, INDACTIC) to be time synchronized with GPS.	complied
3	400kV Simhadri	Existing MICROMHO relays of Stage-I lines to be replaced with Numerical relays.	complied
			complied
NEYVELI LIGNITE CORPORATION			
1	400 kV NLC TPS-I Expn.	Protection system to be synchronized with available GPS	Action initiated for procurement of numerical relays for Main-2 protection. GPS synchronising will be completed along with commissiong of the new relays.
		Event logger to be rectified and made functional	Complied
		Disturbance Recorder to be rectified and made functional	New DR purchased. Will be commissioned by January-2014
2	400 kV NLC TPS-II Expn.	Existing micro mho distant protection (Main I) relays to be retrofitted with numerical relay.	Tender evaluation in progress on the tender for new relays
NPCIL		O/V protection for stage-II time setting to be revised for instantaneous trip	Complied

1	220 KV Kaiga-Generating Station-1&2	The line relays 220 KV side are provided with 01 primary protection ie. Static Relay, and a back up relay is to electro mechanical relay with high set. Blocking of High set protection in the back up relay needs to be reviewed. NPCIL-Kaiga to review the same	
		Instead of Static Relays, Numerical Relays to be provided with different make for all lines as Main-I and Main-II. NPCIL-Kaiga to review the same	
Tamilnadu - TRANSCO/ GEDCO/ IPP			
1	230 kV Arni Substation	Static relays are to be replaced with numerical relays	
		V/F protection for transformers to be made available	
		REF protection to be implemented for Transformers (Capacity below 100 MVA)	
		DC leakages are to be complied for DC source I.	
2	230 kV Basin Bridge Substation	synchronizing facility to be made available.	complied
		Carrier scheme to be provided for 230kV Mylapore feeder	complied
		No protection during VT Fail condition. Same to be reviewed	
			Complied - Inbuilt protection is available during VT fuse fail
		No Earth fault protection on HV & LV side of transformer. Same to be provided	E/F settings for AUTOs not being adopted in Tantransco.
		O/L settings oauto transformers to be reviewed	complied
		Separate earthing for DC system (110 V DC) to be provided	
		Only Bus PT supply is available for Main I & II protection, no line VT supply is available for protection. Same needs review	Bus PT used for protection in all the stations.
		No Capacitor Tripping Devices are kept in service for Feeders and Transformers. Same needs review	Capacitor trip device is not in service,since nuisance trippings were observed.
		Relay settings for feeders and transformers need review	Being reviewed whenever needed.
		Time synchronising with GPS to be provided for 230kV protection system	
		Auto reclosure to be enabled for feeders.	complied
3	230 kV Ennore (ETPS)	Power swing block settings to be reviewed.	complied
		Earth fault relay to be provided on HV & LV sides of Auto t/p # 1, 2 and TO # 3 t/f. Over fluxing relayto be provided.	E/F settings for AUTOs not being adopted in Tantransco.
		OT1 and WT1 indicators suspected for not working. Same needs to be rectified.	complied
		PRV device to be made available on Auto T/f # 1 and 2.	complied
		Surge counters to be made available on lightening arrestor.	
		DC earthing in 220V DC system to be rectified	complied
4	230 kV Gobi Substation	Zone-2 timing of distance protection relay of 23kV kines need review	complied
		REF protection to be made available.	
		Time synchronising with GPS to be provided for protection relays.	
		Static distance relay to be replaced with numerical relays.	
		Diiferent type and Make of distance protection relays to be provided for Main-I & Main-II protection for 230kV Arasur feeder.	
5	230 kV Hi-Tech Carbon Co-Gen.	Earthing system to be improved.	
6	230 kV Ingur Substation	Dedicated hot line speech facility to SLDC to be established.	additional earth pits being provided.
		Time synchronising with GPS to be provided for protection relays.	
		Static distance relay to be replaced with numerical relays.	
		Diiferent type and Make of distance protection relays to be provided for Main-I & Main-II protection for 230kV Arasur and K.R.Thoppur feeders	
		In Busbar Protection same CT is used for Main & Check zone relay. Same needs review	

7	230 kV Kayathar Substation	Earth resistance to be measured and recorded.	complied
8	230 kV Korattur Substation	During VT fail condition no protection is available (Backup 1> disabled). Same needs review	complied
		No E/L relay protection on ATR 1, 2 & 3 HVs. Same to be provided	E/F settings for AUTOs not being adopted in Tantransco.
		V/F protection is not available on ATR-1, 2 & 3. Same to be provided	
		Different type and Make of distance protection relays to be provided for Main-I & Main-II protection for 230kV feeders	
		Only Bus PT supply is available for Main I & II protection. There is no line VT supply available for protection. Same to be reviewed and rectified	Bus PT used for protection in all the stations.
		No capacitor tripping devices are provided on 230 kV feeders & ATRs. Provision for the same to be done	Capacitor trip device is not in service,since nuisance trippings were observed.
9	230 kV Madurai Substation (Alandur)	Relay settings for feeders and transformers need review	Reviewed whenever needed
		Time synchronising with GPS to be provided for 230kV protection system	
		Time synchronising with GPS to be provided for protection relays.	
10	230 kV Manali Substation	Static distance protection relays to be replaced with numerical relays.	
		Station Event loggerto be provided	
		O/C and E/f relay setting on HV & LV sides of both auto transformers need review.	
		Diiferent type and Make of distance protection relays for Main-I & Main-II protection to be provided for 230kV feeders	complied
		DC earthing in 220V DC system to be rectified	
11	230 kV Mylapore Substation	Earth resistance meaured on 07.02.2009. It is observed to be violating in more number of earth pits. The same to be rectified	complied
		Carrier scheme to be provided for 230kV Basi bridge feeder	
		No protection during VT Fail condition. Same to be reviewed	
		Static Main-2 relay of 230kV Basin bridge feeder to be replaced with Numerical relay	Complied
		No Earth fault protection on HV & LV side. Same to be reviewed and provided	complied
		Earth leakage monitoring system to be provided	E/F settings for AUTOs not being adopted in Tantransco.
		Separate earthing for 220 V & 48V DC system to be provided	complied
		Only Bus PT supply is available for Main I & II protection, no line VT supply is available for protection. Same needs review	
		No Capacitor Tripping Devices are kept in service for Feeders and Transformers. Same needs review	Bus PT used for protection in all the stations.
12	230 kV North Chennai TPS	Time synchronising with GPS to be provided for 230kV protection system	Capacitor trip device is not in service,since nuisance trippings were observed.
		Provision for station event logger to be done	
		CTD protection to be provided in all 230KV feeders and Transformers.	
		Different type and Make of distance protection relays to be provided for Main-I & Main-II protection for 230kV feeders	Capacitor trip device is not in service,since nuisance trippings were observed.
13	230 kV Pugalur Substation	Remote temperature indicators to be provided for station transformers.	
		Time synchronising with GPS to be provided for protection relays.	
14	230 kV PUSHEP Switchyard (Pykara Ultimate S/S (GEN.)	Station Event Logger, Disturbance Recorder with dedicated computer systems, printers to be provided.	
15	230 kV Singaperumal Koil Substation	DC leakage in the station to be rectified	complied
16	230 kV Singaperumal Koil Substation	Trip circuit supervision relay to be provided for both trip coils for 230 kV Veerapuram, 230 kV Kalpakkam, 230 kV Kalivanthapattu, 230 kV Oragadam, 230/110 kV Auto 1 HV side	R&M work is proposed
		Provision for supervision of all the trip coils through the TSR relay to be examined.	

		High water content in auto transformer oil test report needs review and suitable actions	complied.
		It is found that relays of the same C&R panels are placed in different locations of other C&R panels in many bays. It is very difficult for the SS operator to identify the relays during emergency condition. Hence relays shall be placed on the respective feeder panel to be examined.	R&M work is proposed
		TMS of auto transformers for over currrent relays (HV/LV) to be reviewed and corrected	Uniform setting adopted
		Replacement of all static relays (Differential, Busbar, Distance etc) to be done with numerical type relay	
		Since the length of 230 kV Veerapuram line is around 650 mts, sensitivity of performance of distance protection for that shortest line needs to be examined.	Numerical relay available and performance satisfactory
		Carrier aided protection scheme to be provided for 230 kV Oragadam feeder	
		Provsion for Direct trip transmission signal on operation of Bus bar/LBB relay for all the lines to remote end to be provided.	Already adopted
		DC earthing in DC system to be rectified leakage	complied
		Labelling to be done for all the relays in panels to be provided	complied.
17	230 kV Thiruvalam Substation	Cable Duct near Auto transformer 3 needs to br repaired	
		Over flux protection to be provided for Auto transformers .	
		Battery earth leakage meters provided for DC source I & II are not in working condition. Same needs to be rectified.	
		Non Directional Over Current relay with 150% on both sides of all Auto Transformers are provided. Earth fault relay on both side are not adopted. Same needs review.	Uniform setting adopted
18	230 kV Tondiarpet Substation	Transmission line earth wire not connected to SS earth mat at Tondiarpet. Same needs review and rectification	complied.
		100 MVA, 230/110 kV transformer # 1 &2, back up O/C relays setting need review. Earth fault relays to be provided on both HV & LV side of ICT's	Uniform setting adopted for O/C. E/F settings for AUTOs not being adopted in Tantransco
		REF for transformer # 1, overfluxing relays for both t/f # 1, 2 to be provided	Neutral CT to be provided -Phase 3
		DC earthing in 220V DC system to be rectified	Rectified on 30.01.13
		Separate treated earthpit for DG set to be provided. Body of DG Set to be earthed with suitable flat or conductor.	
19	230kV Mettur Thermal Power Station	Main-I and Main-II protection schemes to be fed from separate DC source. Provision for the same to be done.	
		PLCC protection coupler to be made available for MTPS-Stage-III and MTPH feeders.	
		Synchronisation cores of Line VT and Bus VT are of different voltage ratios and same needs review	complied
		Time synchronising with GPS to be provided for protection relays.	
		Both Main-1& Main-2 distance protection relays of 230 kV feeders to are be of numerical type. Static distance relays to be replaced with numerical relays.	
20	230kV Singarapettai Substation	Zone separation for Bus Bar Protection needs to be done. .	
		Staticrelays to be replaced with Numerical Relays.	R&M work is proposed
		V/F Protection to be enabled in autotransformers upto the level of 230 kV	
21	400 kV Alamathy Substation	Time synchronising with GPS to be provided for 400 & 230kV protection system	R&M work is proposed
		Different type and Make of distance protection relays to be provided for Main-I & Main-II protection for 230kV feeders	
		Earth leakage Relays to be made functional	
22	400 kV K.R.Thoppur Substation (Salem)	Possibility of providing time synchronising system (GPS Unit) for protection relays.	------
		The existing Static Distance Protection Relays to be replaced with Numerical Relays.	
		Dedicated event Logger to be provided for post tripping analysis.	
23	400 kV Sunguvarchathiram	Separate auxiliary relays for transformer mounted protection.	
		Control cable duct to be properly sealed to avoid entry of rain water.	complied
		Different type and Make of distance protection relays to be provided for Main-I & Main-II protection for 230kV feeders	complied.
			Phase 2

		Tap position indication of some of the 1 phase ICTs are not showing properly, which is to be rectified	Being complied by OEM
		Enabling of "directional earth fault protection in main-1 and main-2 distance relays	complied
		The differential protection relay in ICTs has inbuilt function of differential protection, ref protection, overflux protection, aux. protection for transformer mounted relays, breaker failure protection. So provision for additional differential protection relay with all the above in built function as a main-II to be reviewd for improving reliability	
		Providing of Trip-Neutral-Close (TNC) switch for all the bays in C&R panel for emergency operation	
		Providing of "Stub protection" for 400 kV lines	Provided for new lines. To be provided for Pondy and Sriperumpudur feeder
Andhra pradesh - TRANSCO/ GEDCO/ IPP			
1	220 kV APGPCL - Stage-I Vijjeswaram GS	Static distance protection relays to be retrofitted with numerical relays	
		GPS to be provided for time synchronization of protection system	
2	220 kV APGPCL - Stage-II Vijjeswaram GS	All distance static relays should be retrofitted with latest version Distance Relays for quick and accurate analysis for the tripping.	
		GPS to be provided for time synchronization of protection system	
3	220 kV Bommur Substation	Directional Earth Fault protection to be provided/ enabled	
		The Static distance protection relays available on 220 kV feeders are to be replaced with latest numerical relays with inbuilt DR	
		GPS to be provided for time synchronization of protection system	
4	220 kV C.K. Palli	REF is not used in APTRANSCO for 220 kV substations.	
		Static Distance Relays of Main I & II on 220 kV Rajampeta feeder to be replaced with numerical relays	
		Event logger for recording of sequence events is not available. Same shall be made available	
5	220 kV Chandrayanaghatta	Time synchronisation equipment not available. Same shall be made available.	
		Replacement of existing Static Relays provided for Distance Protection, diff protection with numerical relays	
		Replacement of 220 kV Dind-1 & 2 Mamidipally and Hial feeder control panels to be reviewed	
		220 kV Ghanapur-2 feeder annunciation module to be made functional	
		The Relay panels of different bays are scattered in different rooms and monitoring of the same is very difficult. Hence re-arrangement of relay panels in main control room to be examined for proper monitoring.	
		PTR 4 (100 MVA) LV side dir E/F relay to be made functional	
		100 MVA PTR-1 LV side non directional E/F relay provided due to non availability of directional feature, whereas recommended relay is directional E/F.	
		In PTR 1 (100 MVA) and PTR-2 (160 MVA) LV over flux relays not provided. Also transformer trouble trips were provided in differential relay as inbuilt function. Providing separate auxiliary relays for transformer troubles to be examined.	
6	220 kV Chittoor Substation	Auto reclosure function is to be enabled for all 220 KV feeders.	
		Surge monitors to be made availble for LAs on LV side of Auto Transformer 1&2.	
		Carrier aided trip to be be made available for 220kV Tiruvalam and Kalikiri feeders.	
		Necessary Surge Monitors on LA's to be provided where they are not available.	
7	220 kV Gachibowli (hyderabad) Substation	Insulation mats in front of the control panel to be provided	
		Over flux relay is to be provided on HV side of 220/132 kV, 100MVA PTR-1.	
		DC earth leakage to be rectified in the 220KV DC system-I&II	
8	220 kV Gajwel Substation	Replacement of existing Static distance protection relays for feeders, Differencial relay of transformers with numerical relays	
		Different Make and type of distance relays to be used for Main- & Main-2 protection for Lines. Same to be implemented	

		220 kV KAMAREDDY line distance relay settings to be reviewed.	
		100MVA PTR-I, O/L Relay settings of HV and LV side need to be reviewed	
		Replacement of Static type ABB make Differencial relays (RADSB) provided in, PTR-1&2 with numerical relays	
9	220 kV Gooty Substation	100MVA PTR-2 OLTC tap position indicator in RTCC panel to be made functional	
		All static distance relays of feeders shall be replaced with numerical distance relays.	
		Event logger for recording of sequence events is not available. Same shall be made available	
10	220 kV HIAL Substation	GPS time synchronisation equipment not available. Same shall be made available.	
11	220 kV Jurala Generating Station	Earth leakage to be provided	
		Provision of differential protection for Jurala line 1 & 2 (line length-1.45 KM) feeders to be examined.	
		Main 1 & 2 distance relays to be of different make and type for 220kV lines. Same to be implemented.	
		The inbuilt disturbance recorder available in numerical relays to be activated	
		In adopted distance relay setting for Main 1 & Main 2 for Jurala Line 1 & 2 one of the settings of piolet directional protection i.e. PIL - Dis.resist ROZ is 0.24 ohms whereas recommended setting is 18.05 hms which is the major deviation.	
		In bus bar protection settings recommended setting for charge exit differential is on, whereas adopted is Off. This is to be reviewed.	
		Instrument for earth resistance measurement to be made available	
		DC earth leakage in DC system to be rectified	
		PLCC panel is erected but not commissioned	
12	220 kV KTPS SS A,B,C Unit (1-8) - Kothagudem	GPS time synchronisation for 220 kV switch yard protective relays to be provided	
		All Electro Static Relays to be replaced with latest version Numerical relays	
		110V/220V DC source earth to be removed.	
		Over Flux Relays to be provided for IBT and ST Transformers.	
		Time synchronisation equipment (GPS) to be provided for protection system	
		The old RAZOA (Electro Static) relays to be replaced with latest version Numerical relays	
13	220 kV Lanco Kondapalli Power Ltd.	Time synchronisation equipment (GPS) to be provided	
14	220 kV Malayalapalli S/S-APTRANSCO	GPS to be provided for time synchronization of protection system	
15	220 kV Munirabad	Time synchronising system (GPS), Distrubance Recorder (DR), Event Logger (ER), Synchro check relay not available in the station.	
16	220 kV N'Sagar	PLCC system is not functional for 220kV lines	
		Bus coupler distance protection to be replaced with numerical relay	
		Station event logger to be made available	
		No GPS is available. Time sync facility not available. Same to be provided	
		No A/R feature and no O/V feature is available. Same to be provided	
		There is only 3-phase tripping. No I-phase tripping. Same to be reviewed and provided	
		Sync facility available in Main-1 relays of all feeders except Talapalli-3. Same to be provided	
		Mutual compensation for Talapally 1 & 2 feeders is not available. The same to be reviewed.	
		PLCC protection panels for Talapally 1, 2,3 are to be commissioned.	
17	220 kV Ongole Substation	PLCC protection panels for Srisailam and Chalakurthy are not available. Provision for the same to be done	
18	220 kV Rayalaseema TPS	Provision of additional 220kV battery charger	
		Provision of Air conditioning to the Control Room to be done	
		All static relays on feeders to be replaced with nemerical distance relays	
		The static Bus Bar Protection to be replaced with numerical relays	
		Station Event logger to be madefunctional	

19	220 kV Renigunta Substation	GPS time synchronisation of relays shall be made available.	
		The carrier aided tripping not available in 220 kV Nagari feeder	
		Auto reclosure function to be enabled for all 220mkV feeders	
		Surge monitor for 220 kV C.K. Palli (R-Ph)and Nagari (B-ph) to be replaced	
		220 V battery charger to be made functional	
		Defective surge monitors to be replaced	
20	220 kV Samalkot Power Station	Possibility of differential or distance protection to be provided for 132 kV Grindwell Norton feeder and 132 kV Railway I & II feeders	
		Distance protection relay settings to be reviewed	
		PLCC Inter Tripping Scheme to be made functional	
21	220 KV Shahpurnagar Substation	Provision for O/V, U/F & df/dt protections for 220kV feeders to be reviewed.	
22	220 kV Shamshabad Substation	Over flux relay is to be provided on HV side of 220/132 kV, 100MVA PTR, 160 MVA PTR 1 & 2.	
		Static distance protection relays to be replaced with numerical relays	
		100 MVA PTR-2 remote temperature indicator to be replaced	
23	220 kV Shivarampally Substation	over flux relay to be provided for 100 MVA PTR-1	
		DC earth leakage to be rectified in 220KV DC-I system	
		Different Make and type of distance relays to be used for Main- & Main-2 protection for 220 KV mamidipally & Gachibowli lines Lines. Same to be implemented	
		Static differential and distance protection relays to be replaced with numerical relays	
		Overflux protection to be provided for 100MVA PTR-I, LV over flux is removed.	
		100MVA PTR-III Existing LV directional earth fault relay is to be made functional	
		100MVA PTR-III HV directional earth fault relay is to be made functional	
24	220 kV Spectrum Power Generation Limited	LV over flux protection in 100 MVA, PTR-II to be made available.	
		O/V protection, df/dt & UFR protection to be provided for 220 kV feeders.	
		PLCC inter trip protection to be made functional for 220kV feeders.	
25	220 kV Srisailam	GPS to be provided for time synchronization of protection system	
		Distance protection relay settings, power swing block settings to be reviewed for 220 kV lines	
		Disturbance recorder, Station Event logger and GPS to be made available	
		in Tallapalli feeder-1 (P442) relay configuration of voltage protection, CB failure are disabled. It is also noticed that KZ RES component and angle different from approved settings. Same to be reviewed	
		in N.Sagar line (P442) relay configuration of voltage protecgtion, CB failure and interval auto reclose configuration disabled instead of enable mode. KZ RES component and angle different from approved setting. Same to be reviewed	
		All static relays like distance relay, differential relay and Bus-Bar relays to be replaced with latest version numerical relays having inbuilt D.R	
26	220 kV Srisailam power station (right bank)	Earth resistance measuring instrument to be procured.	
		The Generator differential protection, GT O/C+ E/F protection , GT REF Protection, Overflux protection , UAT O/C + E/F protection settings to be duplicated and provided in Main-2 relay for increasing the reliability.	
		Older version of unit 4 Main-I & II relay (REG 316*4) relay to be replaced with REG 670 or other similar relay as provided for other units	
27	220 kV Sullurpet Substation	GPS to be provided for time synchronization of protection system	
		Eroded flexible copper earthing provided between CTs and structure of LV1& LV2 of 220/132kv Transformers to be rectified	
		Surge monitor in Yph of 132kv srikalahasti feeder to be rectified/ replaced	
		Oil leak noticed in 100MVA 220/132KV BHEL MAKE PTR to be rectified	
		PLCC equipment on 220kv Gummidipudi feeder to be replaced/ retrofitted	
28	220 kV Tadikonda	Enabling of Auto recloser in all 220kv feeders	
		Dual earthing for CTs and CVTs 220KV VTS-1 feeder to be done	

29	220 kV Vijayawada TPS	Earth fault/Strips in 220 KV Switchyard are rusty, to be bituminous painted.	
		DC earth leakage in station DC supply to be rectified.	
		Station Transformer Relays (EE Make, DTH31 Model) to be replaced with Numerical Relays	
		In stage-I (Units-1&2) Back-up Impedence Protection, Earth Fault Protection to be reviewed	
		In stage-3 (Units-5&6) Non directional Earth Fault Protection, Phase over current protection settings in UAT to be reviewed.	
30	220 kV Yeddumailaram Substation	DC earth fault in 220V DC system to be rectified	
		220 kV Bus bar protection relay along with in-built LBB function to be made functional	
		Replacement of static differential protection and distance protection relays with numerical relay	
		Provision of overflux protection for transsformers	
		100 MVA, PTR-III Earth fault relay Time setting for HV and LV side to be reviewed	
		160MVA, PTR-II HV O/L and E/F relays to be made functional. LV side E/F relay to be made functional.	
		O/L & E/F setting of transformers to be reviewed	
		220 kV Gachibowli line Main-II distance relay is be made functional	
		Zone-III setting in Shadnagar feeder to be reviewed	
31	400 kV Chitoor Substation	Zone-III Timing setting in Shamshabad-II to be reviewed.	
		Carrier aided protection to be made available in 220 KV Palmner feeder	
32	400 kV Gajuwaka substation	Auto reclosure function is to be enabled for all 220 KV feeders.	
33	400 kV Gajwel Substation	Distance protection relays to be replaced with Numerical Relay with inbuilt DR facility.	
		Replacement of PLCC panels of 400 kV Ramagundam line to be done	
		315 MVA ICT-1 O/L relay setting of HV & LV side to be reviewed	
		Distance protection relay setting to be reviewed	
		315 MVA ICT-2 OLTC tap position indicator in RTCC panel is to be made functional	
		Procurement of testing kit for testing switchyad equipment .	
34	400 kV Gajwel/Medak S/S / 400 kv side of 400/220 kv GAJWEL SS	Replacement of Static differencial protection relays provided for ICT-1&2 with numerical relays.	
		315 MVA ICT-1 O/L relay setting of HV & LV to be reviewed	
		Distance protection setting to be reviewed	
		315 MVA ICT-2 OLTC tap position indicator in RTCC panel is to be made functional	
35	400 kV GMR (Vemagiri)	Replacement of Static type ABB make Differntial relays (RADSB) provided in ICT-1&2 by numerical relays	
		Overvoltage stage-1 protection to be made functional in Main-1 relays of 400 kV feeders.	
		Over voltage stage 1&2 settings to be reviewed	
		Auto reclose to be made functional for 400 kV feeders	
		All the Numerical Protection relays to be time synchronized with as the GPS. Provision for GPS to be done.	
		Review of Power swing detection settings	
36	400 kV GMR Bordge SS (Gen) Energy Ltd., BMPP, Kakinada	Generator Transformer over current & high set settings to be reviewed	
		Distance protection settings, Powerswing block settings to be reviewed for 220kV lines	
37	400 kV GVK Gautami Power	Auto reclose scheme to be eanbled for both 400 kV feeders.	
		Over voltage stage-1 time setting of line-2 to be reviewed	
38	400 kV HVAC SS only Lanco Kondapalli Power Ltd. Phase-II	Provision for under frequency and df/dt protections to be reviewed	
		The relays settings to be reviewed	

39	400 kV Jegurupadu SS & 220 kV Jegurupadu SS(Gen)	Auto reclose to be made functional for 400 kV feeders	
40	400 kV Kalapaka	O/V Stage-1 protection setting to be reviewed	
41	400 kV Konaseema Gas Power Ltd.	Distance protection relays to be replaced with Numerical Relay with inbuilt DR facility.	
		Over current relay High. Set value of STGT to be reviewed	
		Over voltage stage-1 time delay settingto be reviewed	
		Auto reclose to be made functional for 400 kV feeders	
42	400 kV Kothagudam TPP	Provision for U/F & df/dt protection to be reviewed	
		Configuration of SAS to be completed early for Quick analysis of trippings.	
43	400 kV KTPS VI Switchyard/Paloncha - Kothagudem	Possibility of separate GPS for 400 KV Switch yard control room to be provided	
		Possibility of separate GPS for 400 KV Switch yard control room to be provided	
44	400 kV Kurnool (Nannur) Substation	Directional Earth Fault settings of Lines may reviewed on par with GT Back up O/C and Earth Fault Relay.	
		Provision to be made for having different make distance relays for Main I & Main II protection for Srisailam 400 kV feeders, 220 kV AP Carbides I & II, 220 KV Brahmanakottur feeder, Somayajulapalli I & II	
		63 MVAR Bus Reactor (TEED-I) Siemens make, Model 7UT613 the actual settings in "Power System Data 2" is different from approved setting by APTRANSCO.	
		Pole Open Current for S1, S2 and S3 approved setting is 0.10 and actual is 0.2. This is to be reviewed	
		All 220 kV side LBB relay time setting adopted is 100 ms instead of approved setting (200 ms). This is to be reviewed.	
		400 kV Kurnool (Nannur)-Gooty feeder Main - I Protection on SEL-421, the "Out-of-step - tripping/blocking" settings are different from approved setting. This is to be reviewed	
		All static relays are obsolete models which are recommended for replacement with numerical relays	
		The existing DR's and EL are obsolete model and it is breakdown condition, which is to be replaced immediately.	
		REL 100 ABB Make Distance Relay in 5 feeders (400 kV and 220 kV APTRANSCO feeders) are obsolete model needs to be replaced with new version	
		Time synchronisig of protection system through GPS is to be provided unit for 400 kV and 220 kV protection system.	
45	400 kV Mamidipally & 220 kV Mamidipally substation	Proper/balanced load staggering for 48 V DC Supply to be done.	
		Distance protection relays for 400 kV and 220 kV feeders to be replaced with numerical relays	
		protection settings for relays to be reviewed	
		Station Event logger to be made available	
		Analog meters & temperature indicators to be replaced with Digital Meters	
46	400 kV Mehboobnagar Substation	Review of distance protection setting of transmission lines	
		Replacement of Static Relay like differential relay (RADSB) of ICT01, Bus bar protection relay (RADSS) with numerical relay	
		Adopted relay setting in 400 kV Line distance relays, differential and O/C & E/F relay in ICT-3 is to be reviewed	
		DEF function in distance protection is found not enabled which is to be enabled/ activated	
		Dead time for Raichur Tie CB for A/R function is set to 2 sec instead of 1 sec. same to be rectified	
		Event logger in Micro SCADA needs to be properly configured. Also existing ABB make event logger is learnt to be not communicating with relay other than ABB make and also with ABB make REL316 relay. Hence upgrading the event logger to be done	
		ABB make distance relay of Type REL 316 to be replaced	

		Overflux relay setting of ICT-1 on HV side to be reviewed	
		Synchronising panel to be made functional	
47	400 kV Srisailam	PLCC protection codes to be tested for Raichur-Veltoor line	
		Power setting for excess power condenser mode relay in unit protection is to be reviewed	
		Time setting of Dead Machine protection Relay to be reviewed.	
		Setting of stub protection function in distance relay to be reviewed	
		Timing of Zone-2 Relay setting for Nunnar, Mamidapally and VTP-S to be re examined	
		Distance protection setting of Main-II Distance relay to be re-examined.	
		Numerical relays with inbuilt D.R function to be provided	
		Disturbance recorders (ABB Make Indactic) to be made functional	
		Station Event logger to be time synchronised with GPS. Provision for GPS to be made.	
		Static Bus bar protection relay to e replaced with numerical relay Relay.	
		Generator Protection id displaying only fault data records, but no graphical representation with time resolution upto milli sec. related to the disturbances. Same to be reviewed	
		provisions of GPS to be done for time synchronizing of protection system	
		APTRANSCO	
		Earth resistance measuring instruments to be made avilableis available.	
48	400 kV Vemagiri substation	Unhelathy PLCC protection couplers to be rectified	
		Provision for Under frequency and df/dt protection to be reviewed	
Karnataka - TRANSCO/ GEDCO/ IPP			
1	220 kV Allipura Substation - BELLARY	All 220 kV line and bus coupler C&R panels distance relays are retrofitted with ABB REL511 relays & REL670 respctively, but the existing panels back-up electromechanical relays are very old and sluggish, most of the TS relays are not working properly, announciation not in working condition. replacement of the relay panels.	Replacement of C&R panels under progress
		For both transformer protection relay setting adopted differs with the recommended setting same should be reviewed and adopted.	complied
		No PL carrier voice communication available.	complied
		For Ragulapadu line carrier inter tripping should be restored.	Work under progress
		For 100MVA-I No REF protection available and over flux relay should be restored.	Replacement of C&R panels under progress which includes over flux relay also
2	220 kV Ambewadi RS	Bus coupler relay setting for lines differ with recommended setting same to be reviewed and adopted.	complied
		ICT-1 220 kV side B-phase LA counter is defective	Complied
		220 kV Narendra 1 & 2 lines LA counters are not available	Complied
		Main-2 protection is not available for all the 220 kV lines.	Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation &upgradation DPR.
		ICTs 1 & 2 some of the fans are not in working condition.	Complied
		The ICT-2 Y phase LA counter is not available.	Complied

		The 110 kV LA counters not available for both ICT 1 & 2.	Complied
3	220 kV BTPS	The Event Logger and GPS is not available.	R&M work under progress at Ambewadi
		Dead Earth fault in 220 V DC set 1 & 2.	
		relays not Synchronised with GPS.	
4	220 kV BWSSB, CWSS Pumping Station, TATAGUNI	A/R Scheme for 220 kV Lines not available for lines.	
5	220 kV Gerusoppa Dam Power House	Synchronising facility is not available.	
6	220 kV HAL	Different type of Numerical Distance Protection is to be provided as Main-II in place of Static Over Current and Earth Fault Protection.	
		Event logger is not available.	
		In CB two Nos. of trip coils energised from one DC source only.	Covered under renovation and ugradation DPR
7	220 kV Hebbal	For line protection, main-1, numerical distance relay has been provided & electromechanical relays are used as main-2 protection.	Covered under renovation and ugradation DPR
		Main-II protection is not available. However, electromechanical relay used as back up protection.	Covered under renovation and ugradation DPR Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation &upgradation DPR.
8	220 kV Hebbal - A Station	LBB relays not available.	Covered under renovation and ugradation DPR
9	220 kV HRS Hoody Substation	Main-II protection is not available. However, electromechanical type backup protection relays have been provided.	Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation &upgradation DPR.
10	220 kV HSR Layout	Main-II relays not available in all 220 kV feeders. The same to be provided.	Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation & upgradation DPR.
11		Main-1 protection is Distance Relay and Main-2 protection is Back up relays with OCR & EFR.	Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation &upgradation DPR.
12		Bus Bar protection relay is out of service, the same to be put back to service for protection.	Proposed to to provide numerical bus bar protection to HSR Lay out SS.Provision is made in renovation and upgradation DPR also.
13		DC Charger-I, the earth reference point to be rectified/checked.	complied
14	220 kV ITPL Substation	On 09.10.2012 for the 220 kV Hoody Line fault, the transformer-1 HV & LV tripped. The relay setting to be reviewed.	complied
		DC Main battery, +ve ground to be rectified.	complied
15	220 kV JSW ENERGY (JINDAL) Substation	PLCC / Protection Coupler not in service. The same to be put into service.	complied
16	220 kV Kadakola	The over voltage stage - 2 and stub protection functions for 400 kV lines to be enabled	Status of implementation will be updated shortly
		protection system to be time synchronized with GPS	Covered under renovation and ugradation DPR

17	220 kV Kadra (Gen)
18	220 kV Kodasalli S/S (Gen)
19	220 kV Kolar
20	220 kV Lingapura, Munirabad
21	220 kV Lingasugur
22	220 kV Naganathapura R/S
23	220 kV Nagjhari Power House
24	220 kV Narendra SS

17	220 kV Kadra (Gen)	Carrier protection is out of service for Karwar 1 & 2 feeders	
		Main-1 Distance protection (SHPM101) is not in service due to power supply module problem for Karwar 1 & 2 feeders	
		Double earthing of all the supporting structures/elements is to be ensured.	
18	220 kV Kodasalli S/S (Gen)	Neutrals of generating transformers and LAs are to be exclusively earthed.	
19	220 kV Kolar	Carrier protection is not in service for all feeders (the real time testing is pending).	
		Synchronisation facility not available	
20	220 kV Lingapura, Munirabad	DR and EL not provided. It is suggested that DR and EL to be provided with time synchronisation	Covered under renovation and ugradation DPR
		Surge monitor needs to be provided for Jindal feeder	complied. Also, LA s are provided to all 220kV lines.
		Only one core of CTs is used for both main and B/U relays for all feeders except Jindal 1 & 2	Covered under R&M Works
		GPS clock is not available	Covered under renovation and ugradation DPR
		Synchronisation relay is not working	Covered under R&M works
21	220 kV Lingasugur	For all feeders 2 O/C and 1 E/F relay as B/U protection can be replaced with distance scheme mostly numerical relay is recommended.	Covered under renovation and ugradation DPR
		New CTs and CVTs available at yard needs to be commissioned at the earliest.	Covered under R&M Works
22	220 kV Naganathapura R/S	relays & REL670 , but the existing panels back up electromechanical relays are very old and sluggish, most of the TS Relays are faulty, annunciation not working, hence it is suggested to	Procurement of new C&R panels is under progress.
		Capacity test and curative discharge needs to be done.	complied
		In Bus bar protection relay Master Card is faulty, sent for repair to M/s. ERL.	complied
23	220 kV Nagjhari Power House	Main-1: Numerical Distance Protection and Main-2 is Back up protection with OCR & EFR.	Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation &upgradation DPR.
24	220 kV Narendra SS	The LBB relay time & current are sdet at 1.5 sec & 0.2 A for all feeders and generating transformers.	
		ICT-1&2 220 KV LA counters are not available.	Work under progress
		ICT 1&2 Remote Temperature Indicators are not available.	complied
		ICT 2 MOG is filled with some liquid content and it needs to be rectified.	complied
		The 220 KV Belgaum lines 1 & 2, Hubli Lines 1 & 2, Ambewadi Line-1 and Haveri Line-2 LA counters are not available.	Work under progress
		The 220 KV Belgaum lines 1 & 2 Wave Trap is found to be bypassed and it needs be rectified.	complied

		Main 2 protection is not available for all the 220 KV lines.	Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation &upgradation DPR.
25	220 kV NRS Rajajinagar	Separate Event Logger, Disturbance Recorder and GPS is not available.	Covered under renovation and ugradation DPR
		Event logger and DRS not available for Peenya & Vrushabavathi Lines.	Covered under renovation and ugradation DPR
		Annunciation panel for Peenya line & Vrushabhavathy line are not in working condition. The same to be made available.	complied
		Winding/Oil temperature indicator are not in working condition. The same to be made in working condition.	complied
26	220 kV NRS, Bangalore S/S	Main II Distance protection Relays for all 220 Kv feeders is not available & the Protection Coupler for Peenya & Vrushabavathi Lines are not available.	Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation &upgradation DPR.
		Event logger and DRS not available for Peenya & Vrushabavathi Lines.	
		Annunciation panel for Peenya line & Vrushabhavathy line are not in working condition. The same to be made available.	
		Winding / Oil temperature Indicator are not in working condition. The same to be made in working condition.	
		Main II Distance protection Relays for all 220 Kv feeders is not available & the Protection Coupler for Peenya & Vrushabavathi Lines are not available.	
27	220 kV Peenya, Bangalore	GPS, Disturbance recorder and event logger are not available and same to be provided. Control panel annunciation not in working condition except transformers	Covered under renovation and ugradation DPR
		Main-II Distance protections were not propvided in all 220 kV feeders and PLCC/Protection coupler was not provided except 220 kV Hebbal feeder	Covered under renovation and ugradation DPR
28	220 kV Raichur TPS	DC negative to earth is persisting and same to be complied	complied
		220 V DC earth fault persisting negative dead grounded	
		Old electromagnetic relays can be replaced with numerical relays.	
29	220 kV Receiving Station, Yarandahalli, Bangalore	LBB Relay RAICA RXKL1 setting for ICT-II is kept at 50 mA.	
30	220 kV Sharavathi SS (Gen)	For Main-II distance relays preferably numerical relays are not available in all 220 kV feeders, the same to be provided.	Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation & upgradation DPR.
		LBB relay timing is observed to be 0.7 sec which is high, can be reduced to 250 to 300 m.sec in coordination with pole discrepancy relay of breaker.	
		Feeders with same Make & Type relay as Main-I & Main-II should be changed with different Make/Type relays for Main-I & Main-II.	
		Feeders having O/C and E/F relays as Main-II to be replaced with distance relays for good protection coordination on 220 kV Grid.	
		Carrier protection should be kept in service for the feeders having no carrier protection.	
		DC earth leakage should be arrested on top priority to avoid spurious trippings due to DC earth leakage.	

		Substation GPs to be connected to event logger and protection relays for correct recording of the sequence of events.	
31	220 kV Shimoga	Protection System shall be synchronised with GPS Time	Covered under renovation and ugradation DPR
32	220 kV Sir M.V. GIS Station	Feeders having O/C and E/F relays as Main-II to be replaced with distance relays	Covered under renovation and ugradation DPR
33	220 kV SUBRAMANYAPURA	In CB two Nos. of trip coils energised from one DC source only.	complied
34	220 kV T. K. HALLI	protection system to be time synchronized with GPS	Covered under renovation and ugradation DPR
35	220 kV Varahi (VUGPH Hosangadi) (Gen)	To provide GPS synchronisation for 220kV protection system.	Covered under renovation and ugradation DPR
		kV line feeders. Different type of numerical distance relays should be replaced in place of electromechanical relays.	
36	220 kV Vrushabavathi Substation	Time synchronisation of the distance relays with GPS may please be reviewed.	
		220 kV Lines provided with Main I only, Main II protection to be provided.	Covered under renovation and ugradation DPR
37	400 kV BTPS	GPS to be procured and installed for time synchronisation of protection system.	Covered under renovation and ugradation DPR
		High setting for the bus bar differential protection i.e. 325 V.	
		A/R Selection switch is kept in non auto mode for all 400 kV lines.	
		Dead 220 V DC Earth fault for both sets i.e. Positive to Earth 235 V.	
		GPS time synchronisation for all the relays & DR not carried.	
38	400 kV Guttur	Pole descripency relay setting kept at 0.1 Sec for all the lines.	
		Event logger and Time synchronisations facilities to be made available	Covered under renovation and ugradation DPR
		ICT-1 differential, bus bar relays and some of 220 kV lines distance relays are static type relays and are not having the disturbance recorder facilities. Replacement of the same with numerical type relays	Covered under renovation and ugradation DPR
39	400 kV Hoody Substation	SOTF time delay has observed high and same to be reviewed as per the requirements.	complied
		Main-II protection not provided in 220 kV feeders instead Backup protection are provided.	Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation &upgradation DPR.
40	400 kV Nelamangala & 220 kV Nelamangala	Main II distance protection were not provided in all 220 kV lines and	Replacement of back up OCRs and EFR by Main-2 numerical distance relay is covered under Renovation &upgradation DPR.
		PLCC/Protection Coupler were not provided except Nittur & Dabuspet lines	complied. PLCC/protection couplers are provided to all the 220kV lines at Nelamangala.
		Separate Event Loggers are not available, GPS are not synchronised with SAS & Distance Protection Relays.	complied

		Main II relays not in service in 400 kV Hassan line, 400 kV Talaguppa line & 400 kV Hoody line-1 and the same to be made available in the above feeders.	Main-2 relay of Talaguppa line is replaced and for Hassan and Hoody-1 line procurement of relays under process.
41	400 kV Raichur TPS SS (IS)	220 V DC earth fault persisting with leakage current of 15 mA	
		PD settings for Munirabad, BTPS and Mahboobnagar kept at 0.1 sec	
		RTPS-Munirabad line Zone-II setting (26.880 Ohm) is more than Zone-III (26.44 Ohm)	
		No fault locator working for Munirabad and Mehboobnagar lines	
		DR communication is not working for Munirabad and Mehboobnagar lines	
		DG set is not extended to 400 kV SS	
		Old electromagnetic relays can be replaced with numerical relays.	
42	400 kV UPCL	The extension of permissive trip to Hassa SS in the event of O/V trip also at Udipi end needs to be verified & rectified at Udipi end.	complied
KSEB			
1	220 kV Areacode S/S	The existing Main-1 (Electrostatic Quadramho) Distance Relays should retrofitted with latest version Numerical Relays for easy and quick analysis of the faults.	
2	220 kV Brahmapuram Substation	Over flux protection is not available 220/110 kV, 160 MVA Transformer.	
		Main-2 relay is not available inall 220 kV feeders. Only backup protection relays are provided.	
		Protection couplers are not provided in 220 kV AMBR 1 & 2 and 220 kV BRKL - 1 &2 feeders	
		Ratio test on CTs are done at lower currents only. Higher capacity not done due to non availability of kits with sufficient capacity.	
		Separate DC ground fault annunciation (+ve to GND & -ve to GND) to be provided.	
3	220 kV Edamon SS	GPS & Event logger is not available.	
		Zone 3 setting not common for all feeders.	
		Carrier inter tripping not available for SBEM 1, 2 & 3 feeders.	
		Main 2 distance protection for EMPC 1 feeder not available.	
4	220 kV Idukki HEP	LBB not in service for SBEM 2, 3 and EMPC 1	
		Provision for measuring earth resistance to be explored.	
		LBB protection for all Circuit Breakers shall be included.	
		Automatic change over facildity shall be made available for 110 V Switch Yard Battery system.	
		Main-II Distance protection shall be propvided for feeders	
		Distance Relay with Quadrilateral characteristics shall be provided for high resistance faults	
5	220 kV Kalamassery Substation	All Electro Mechanical Relays to be replaced with modern numerical relays.	
		Main-2 relay is not provided on 220 kV BRKL-1 feeder. Backup relays are provided in all feeders	
		Protection couplers are not provided in 220 kV BRKL-1 & 2 feeders	
		CT ratio tests are done at lower currents only. Higher capacity not done due to non-availability of kits with sufficient capacity.	
		GPS & Event logger is not available.	

6	220 kV Kaniyambetta S/S	Bus-bar protection is not available. The same to be provided.	
7	220 kV Madakkathara	The 220 kV line's Main I (Electrostatic QUADRAMHO) Distance Relays should retrofitted with latest version Numerical Relays for easy and quick analysis of faults.	
8	220 kV New Pallom Switching Station	1 phase auto reclosing to be provided for 220 kV feeders.	
		Resistance reaches to be examined for each zone of protection instead of setting it as a commoin parameter as in the 220 kV New Pallom-Kayamkulam 1 & 2.	
		Load encroachment impedance and the loadability of the relay to be examined depending upon the line length and loading nof the feeder.	
		Providing of stub/EFP protection to be examined for 220 kV lines.	
		For 220 kV Busbar protection check zone to be reviewed to take it from a separate PS class core to have additional security to prevent inadvertent tripping of bus zone protection due to main core saturation.	
		The carrier aided trip to be examined to have different channel for main-1 and main-2 protection as twin channel is available in protection coupler at different frequencies.	
		Delay in operating time for zone-2 and zone-3 to be reviewed to be set at 350ms and 800ms respectivedly as per SRPC & PGCIL direction, otherwise ensure setting to be identical for both local and remote end.	
		Enabling functionality for both main-1 and main-2 relay to be reviewed.	
9	220 kV Palakkad S/S	220 kV Idukki-New Pallom feeder has main-1 static version relay and main-2 has overcurrent relay which to be considered to be replaced with numerical distance protection relay.	
		Relay settings of LBB to be checked and corrected as per norms.	
		Back-up relay in service in all 220 kV feeders	
10	220 kV Pallom	Main-2 relay and PLCC are not available in all 220 kV ELPK-1 and ELPK-2 feeders.	
		CVT ratio is beyond permissible limit in R and Y phases of ELPK-2 and Bus-1 CVT	
		Load encroachment impedance and the loadability of the relay to be examined depending upon the line length and loading nof the feeder.	
		Providing of stub/EFP protection to be examined for 220 kV lines.	
		Possibility of providing different make distancve protection relay for main-1 and main-2 protection to be explored.	
		The carrier aided trip to be examined to have different channel for main-1 and main-2 protection as twin channel is available in protection coupler at different frequencies.	
		Enabling functionality for both main-1 and main-2 relay to be reviewed.	
		220 kV Sabarigiri-Pallom feeder protection is proposed to be replaced with numerical relay protection system may6 be expedited.	
11	220 kV Pothencode	Constructing of oil sump adjacent to the transformer at suitable location to be explored for collecting of oil in the case fire brokes out in the case of emergencies.	
		UFR setting needs to be changed as per recommended setting.	
		Galvanizing to be done for the supporting structures in the 220 kV switchyard.	
		Some of the CTs error is found above he recommende value. Retesting is required.	
12	220 kV Sabarigiri Moozhiyar HEP	Control Panel for transformer 1 & 2 numerical relay to be provided.	
		Earth resistance value is found to be on higher side. Remedial measures shall be taken.	
		Even though two 110 V DC sources available, redundancy for protection system not ensured.	
		48V DC positive earthing not proper in the carrier communication panel and also redundancy not ensured.	
		Main-II independent distance relay not available for all the lines.	
		Line distance relays zone-3 and zone-4 settings are found to be same but timings are different.	
		Some of the isolators not able to be operated from SCADA PC.	

66/11 kV, 4MVA Transformer CB closing voil taking 50A approximately for operation, hence it shall be replaced.	
High resistance fault are frequent in these lines, so lines tripping on back up E/F protection for the in zone line fault. It shall be avoided by providing carrier aided earth fault protection.	
LBB protection pickup current is less so it is to be compared with line charging current and set above it and LBB time delay to be reduced.	

Annexure - IB

Phase-2

Sl. No.	Name of Substation	Details of work	Remarks (As per inputs received from constituents)
POWERGRID			
1	400 kV Kochi	220V Battery bank-1&2 for protection system to be replaced with lead acid batteries	As per POWERGRID practice, VRLA batteries are in use for all the new substations.
2	400 kV Madakkathara substation	Fire hydrant system to be provided.	
3	400 kV Palakkad Substation	Outsource supply supplied from 11 kV Para feeder is having low reliability and hence alternate arrangements to be made for reliable supply.	
4	400 kV Sriperumbudur	In carrier aided protection, one channel is used. Provision of dual channels integrated to main-1 & main-2 distance protection relay to be examined.	complied
		The existing emulsifier system (for ICTs) meant for fire extinction is not in service.	
		It is suggested that providing separate dual DC source to be examined. One set of dual DC source for 400 kV side and second set of dual DC source 230 kV and 110 kV side so that fault in the dc system can be identified from where it develops.	
		Centralised AC to be expedited for proper functioning of protection system panels and to prevent failure of numerical protection system.	
		LAs on 230 kV line side is not provided. Provision of LAs on 230 kV side to be examined.	
		Replacement of 25 years old gaped surge surrestors with new gapless type for auto transformers to be examined.	
		The three phase but fault level on 400 kV side is 21901 MVA and on 230 kV side is 15239 MVA. The fault current based on the above fault level is 31.6 KA on 400 kV side and 38 KA on 230 KV side. The CTs and CBs which are in service are having the rated SC capacity of 40 KA which is almost on the verge. Exploring the possibility of upgrading the ratings of CBs and CTs are reducing the fault level to be reviewed.	
5	400 kV Trichy	Existing 50 V set-1 Batteries to be enhanced to adequate capacity. Same to be replaced	complied
6	400 KV Vijayawada (Nunna)	Fire fightened system is out of service for replacement of old damaged pipe line. The work is under progress.	
NLC			
1	400 kV Switchyard - NLC TPS-II Expn.	2nd source for 48 V PLCC battery system to be considered.	
2	400 kV Switchyard - NLC TPS-I Expn.	Only one bank of 48V battery for PLCC is available. 2nd bank to be provided	Preparatory works are in progress
NPCIL			After obtaining approval, second bank of 48 V Battery system will be procured and installed.
1	230KV Switch Yard - Kalpakkam MAPS	The Line CVT in the Y phase of the feeder was not available in all the feeders except SP koil 2 : To be reviewed	
TAMILNADU- TRANSCO/ GEDCO/ IPP			

1	230 kV Arni SS	Lightning Arrestors are not provided for 230 kV feededrs.	
		Second source of DC to be reviewed for connectivity.	
2	230 kV Basin Bridge SS	DG set is under faulty and enhancement proposed.	
		For 230 kV Mylapore Feeder Protection	
		DC System	
		For 48V (PLCC) only 1 set of Battery, No back up is available.	
		General	
3	230 kV Ennore, Chennai (ETPS) - TANTRANSCO	DG set is required for alternate source.	
		Synchronisation relay not available for feeders. Being done manually by watching indicating meters	
		Since switchyard is very old, it is advisable to physically see the rusting status of earth mat.	
		Switchyard equipment earthing needs to be improved.	
		No LA is available on R-phase LV side of Auto # 2	
4	230 KV Gobi SS	Dedicated feeder PT/CVT not available for feeders protection. However, single phase CVT available for measurement and synchronisation purpose.	
5	230 KV Hi-Tech Carbon Co-Gen.	As neutral bushing CT is not available for Auto transformer2,	
	230 kV Kayathar SS	Real time data transfer facility to SLDC shall be established.	
		There is no standby battery bank and charger.	
		Renovation of control room to be done.	
6	230 kV Kundah PH - II S/S	Proper fire fighting and oil drain pit to be provided for transformers.	
7	230 kV Kundah PH - III S/S - TANTRANSCO	230 kV GC Breaker to be erected and commissioned urgently to avoid tripping of tie feeders in the event of tripping of auto transformers	
8	230 kV Manali, Chennai	2 sets of LA's have been provided at bus only. Second core of Bus VT has been used for line protection. Line CVTs are only for synchronising purpose.	
		The condition of 230 kV & 110 kV switchyard is observed to be execessively deteriorating. May faults were attributable to conductor leads/jumpers cut or damage and non operation of circuit breakers. Heavy rusting on equipment and its earth flats is observed. It is felt that this fast deterioration to be due to prevailing environment conditions. To maintain the reliability of this substation, suitable alternatives to be explored to obviate the fast deterioration in future.	
9	230 kV Madurai S/S - Alundur	Providing LAs at entry and connecting TL earthwire to SS mat to be looked into.	
10	230 kV Mylapore	The existing 25 KVA DG set to be enhanced to 50 KVA.	
		An additional 48 V battery set to be provided for reliable PLCC operation.	
		For 230 kV Basin Bridge Feeder Protection	
		Auto Transformers I & II	
		LAs to be provided for desired protection of Auto Transformers	
		DC System	
		For 48V (SCADA/PLCC) only 1 set of Battery and Charger, No back up is available.	
		General	
11	230 kV NCTPS S/S	To maintain the adequate temperature for GIS equipments air conditioned to be required.	
		As per the data available regarding 2nd source of D.C supply it is not reliable to depend on this supply. It was also discussed with Generation wing and found that the 2nd source of supply cannot be relied on Gen station battery. Hence it is suggested for a new battery system as 2nd source of supply for the switch yard.	
12	230 kV Pugalur	Possibility of providing CB for sectionalised bus to be explored.	

		DG set capacity to be enhanced to 50 KVA from 25 KVA by providing additional 25 KVA DG set.	
13	230 kV Singaperumal Koil SS	Fire extinguisher system of the power transformer to be enhanced.	
		All Telk and Rade Koncar make 230/110 kV CTs has the short term current rating 19.7 KA, which is as per station fault MVA (7325 MVA) is under rated and replacement of CTs suitable to bus fault level to be examimed.	R&M work proposed
		Strengthening of 230/110 kV bus to be examined (presently two conductors as 230 kV Bus and 1 conductor as 110 kV bus).	
		Providing LAs on 230 kV line side to be examined.	
		Providing fire protection system for auto transformer to be examined.	
		It is found that the Tan Delta measurement of CTs of Auto Transformer 1 & 3 are in higher side, replacement of CTs to be examined.	
		Providing dual channel for carrier protection for 230 kV feeders duly integrated with main-1 and main-2 distance relays to be examined.	
		Accuracy class of 230 KV Bus PT's to be verified and replacement of the same by 0.2 class accuracy and other protection core to be examined since the existing PTs are very old commissioned during 1979.	
14	230 kV Singarapettai	There is one group control breaker for all the three 50 MVA transformers - to be replaced by individual control.	R&M work proposed
		LA is not provided for 230 kV feeders	
15	230 kV SSChekkanurani - Madurai	Single DC source is provided for breaker operation. Additional source to be provided.	
16	230 kV Thiruvalam S/S	LA is not available for the lines (230 kV & below), Earth Resistance value not available.	
17	230 kV Tondiarpet, Chennai	Lightning Arresters are not provided on all 230 and 110KV feeders.	
		Provision of LAs at line entry for 230 kV feeders to be considered.	
		Synchronous relay not available. Being done manually.	
18	230 kV Valuthur	Availing tertiary connection to be explored for auxiliary supply of station.	
19	400 kV Alamathy SS (IS) & 230 kV Almatty SS	LA is not available for 230 kV & below	
		In the 400 kV & 230 kV yard the following observations were made. i) Earth mat was designed and installed at the time of commissioning only. There is no provision to measure earth resistances. The Neutral of each ICT have individual earth pit but there is no provision to measure earth resistance and the earth pits are not maintained at regular periods. ii) The Mulsifire Systems are found to be not installed properly. Also since installation, no maintenance has been carried out.	
20	400 KV K R Thoppur SS - Salem (230 KV SS)	The existing 50 KVA DG set to be enhanced to 250 KVA.	
		Possibility of providing the Fire Protection wall to 400/230 KV AUTO Transformer 2 to be explored and AUTO Transformer 3 & 4 to be heightened.	
21	400 kV Sunguvarchathiram & 230 kV SS/SV Chathiran	The tie CB of ICT 1 & 2 is kept in open condition due to isolator mechanical problem from last 6 months. Early action to be taken to keep DIA in closed condition.	
		Incorporating the status of station aux. system like battery charger, dg set, IT a.c. etc in the HMI shall be examined.	
		Jelly spreading in the switchyard is insufficient.	
		It is suggested that providing separate dual DC source to be examined. One set of dual DC source for 400 kV side and second set of dual DC source 230 kV and 110 kV side so that fault in the dc system can be identified from where it develops.	
		Fire protection system is not provided for ICTs.	

		LAs on 230 kV line side is not provided. Provision of LAs on 230 kV side to be examined.	
Andrapradesh - TRANSCO/ GEDCO/ IPP			
1	220kv APGPCL - Stage-I Vijjeswaram GS	Only one set of Battery charger is available. Another set of charger to be provided.	
2	220 KV Chandrayanaghatta	Providing cartrier aided tripping for 220 kV feeders to be examined.	
		reliable protection.	
3	220 KV Chittoor SS	Metal spreading in switchyard was not done. The same to be taken up.	
		No LAs are available in 132 KV Pakala (3 No.s), 132 KV Irala (1 No.) and 132 KV Palmner-I (1 No.)	
		Heavy oil leak noticed in 100 MVA ASGEN make, B-Phase, 220/132 KV Auto Transformer-II and 50 MVA, APEX make 132/33 KV Power Transformer.	
		Most of the Structures of CTs and Breakers are single earthed only.	
		It is suggested to replace the existing STANDARD make battery with similar type of other VRLA HBL battery with change over switch arrangement. Also it is suggested to provide Station battery exclusively for 33 KV feeders	
		Possibility of introducing DC I&II source separately to the 220KV and 132KV system to be explored.	
4	220 KV Dr. NTTPS, Stage-I Switch yard. VTS 220 kV	Possibility of providing temparature controlled atmosphere for control room for protecting numerical relays.	
		Standby LT AC Supply (DG Set) is not available for 220 KV Switchyard Protection System.	
5	220kV Gachibowli S/S	Only 220 DC Source with one battery set is available for entire 220 KV SS. It is recommended to have redundant DC source.	
		Carrier aided protection scheme has to be implemented.	
6	220 kv Gajwel SS	Utilising the two DC sources available for all the control and relay panels to be examined.	
7	220 kV Ghanapur SS	Carrier aided protection scheme implementation to be examined.	
		Metal spreading in switchyard is not available.	
		Carrying out overhauling of 160 MVA PTRE-II (Siemens) HV Breaker (BHEL) to be examined since overhauling is not done from the date of commissioning, i.e. on 04.02.1991.	
		Carried aided protection is not provided for 220 kV Lines. Providing the same to be examined.	
8	220kv Jurala Generating Station	Providing two DC sources for DC system to be examined.	
		Protection	
		it is observed that no carrier aided protection is available	
		General:	
		At present 267.5 KVA two sets of DG SET available in station to meet lighting and dewatering pumps. This station to be considered for self start facility for Block start restoration feature by providing 500 KVA DG SET to meet the auxiliary consumption to start one unit of hydro (39 MW). Auto synchronisation featrures are available.	
9	220 KV KTPS SS A,B,C Unit (1-8) - Kothagudem	One set of 48 V DC Battery set is available for PLCC. Another set to be provided.	
		Separate DG set is not available, but same to be provided.	
10	220 kV Ongole Substation	Only one set of 48 V DC battery set is available and another set to be provided.	
		220 KV feeders are not provided with Protection Coupler. Provision of Protection Coupler for (Carrier Inter-Tripping) 220 KV feeders to be examined.	

		220 KV PODILI – I & NELLORE Feeder breakers are having provision of only one Trip Coil (very old breaker-1980). Provision of new breaker with 2 Trip Coil to be examined.	
11	220kV Podili Substation	100 MVA Power Transformers OLTC Remote operations are to be rectified. (Only local operations available).	
		220 V DC source has only one battery set with 0ne chargers available. Provision of additional one more battery set with two more battery chargers to be examined.	
		PLCC for 220 KV feeders phase to ground coupling only available, for reliable data and communication phase to phase coupling is to be examined	
		220 KV feeders are not provided with Protection Coupler. Provision of Protection Coupler for (Carrier Inter-Tripping) 220 KV feeders to be examined, so that auto re close scheme can be implemented.	
		Only one source of station supply is available, providing one more source for station supply to be examined.	
12	220 KV Renigunta SS	Mostly Numerical Relays are available for all feeders. Provision of Air conditioning to the Control Room to be examined.	
13	220 kV Shamshabad S/S - APTRANSCO	Possibility of introducing DC I&II source separately to the 220KV and 132KV system to be explored.	
		Bus bar protection is not available and in turn there is no LBB protection for circuit breakers.	
14	220KV Shahpurnagar ss - APTRANSCO	Only one set of 220 v battery bank is available.	
15	220kV Shivarampally S/S	Carrier aided protection scheme has to be implemented.	
		Implementation of carrier aided protection scheme to be examined.	
16	220 KV Srisailam Project SS	Utilising the two DC sources available for all the control and relay panels to be examined.	
		Station fault level data is not Displayed/Available in the station. Old equipment like CT's and CVT's to be upgraded to new one to suite existing fault.	
		Station Battery is recently commissioned. It is a single source mDCV & charger. No stand by is available.	
		Protection	
		Accuracy class of Bus PT's line CVT's and CT's of units and power transformers are of 0.5 class for metering core. As per Standards the CT-PT should be on higher accuracy class than energy metering accuracy class.	
		APTRANSCO	
17	220 kv Srisailam Right Bank Power House (7x110MW	PLCC: No carrier protection coupler is available in 220 kV station feeders	
		CT accuracy class is 0.5. As per standards the CT accuracy to be higher than the energy meter accuracy class.	
		DG SET: Earlier DG set of 800 KVA was available. Now no DG set is available due to submerged in heavy floods in 2009. It is recommended for 1 MVA DG set to self start the units during block start facility & quick restoration.	
18	220 KV Sullurpet SS	220KV Cable duct is not available. all the cables are seems to burried. Duct to be provided at the earliest.	
		The dropper jumper between strung bus and the equipments of the 132kv feeders are seem to be long. to be provided with support wherever necessary.	
		Carrier aided protection not availble in 220kv feeders. to be provided.	

		20V DC source 2Nos. available. 1no Is connected to 220kv and 132kv system and 1no.is connected to 33kv system. Possibility of dc source i&ii seperately for 220kv and 132kv system to be explored.	
19	220 kV Tadikonda	In all the 220KV feeders, only phase to groung coupling is used. Providing phase to phase coupling to be examined for reliable of data transfer and communication.	
		All the 220KV feeeders were not provided with carrier inter-tripping. Providing of the same to be examined along with auto-reclosure scheme.	
		In the Yard, cable ducts were filled with sand. Providing clean cable duct (without sand) and replacement of broken slabs to be examined.	
		Only one DC source (220V) available for 220KV feeders and 220/132KV Power Transformers. Providing additional exclusive DC source to be examined. Alternate source is available from DC source -2 meant for 132KV feeders and 132/33KV PTRs.	
		Mostly numerical relays were available for feeders/PTRs. Hence provision of air-conditioning to the control room to be examined.	
20	220 kV Tandur, Rangareddy - APTRANSCO	Diesel set has to be commissioned.	
		APTRANSCO should have two independent DC sources to the protection and switchgears and one source should be for back up.	
21	220kV Yeddumailaram S/S	Carrier aided protection scheme has to be implemented.	
		Implementation of carrier aided protection scheme to be examined.	
		providing second DC sources for all the control and relay panels to be examined for better reliability.	
		Metal sprading is not found in 220 kV S/S yard & 132 kV yard.	
22	400 KV- Dr. NTTPS, Stage-IV, 400 KV Switch yard. VTS	Cable Trench is not provided in 220 kV Gachibowli, 100MVA PTR-II and B/C.	
		Standby LT AC Supply (DG Set) is not available for Switchyard Protection System.	
23	400 kV Kurnool (Nannur) s/s	**PROTECTION**	
		It is noted that in Srisailam 400 kV Line (Main CB & Tie CB), Future Bay (Tie CB), are having PIR units removal of sameto be examined (presence of that may lead to mal operation)	
		Earth Resistance	
		Carrier aided protection for 220 KV lines to be provided as per Grid Code.	
		PLCCBattery	
24	400 KV KTPP Switchyard (Bhupal Pally)	In ULDC equipment, 48 V DC supported thriugh Single Battery Bank. It needs to be examined and arrange for redundant battery bank.	
25	400 KV KTPS VI Switchyard/Paloncha - Kothagudem	Separate DG set is not available for 400 KV Switch yard control room. Same to be provided for reliability.	
		1 set of 48 V DC Batteries is only available. Another set to be provided.	
26	400 kV Mamidipally ss & 220 kV Mamidipally ss - APT	Separate DG set is not available for 400 KV Switch yard control room. Same to be provided for reliability.	
		Carrier aided protection is not implemented for some of the 220 kV feeders.	
		Closed circuit cameras to be arranged at strategic points inside the switchyard as well as along the fencing of the substation to monitor any critical situation insie and to keep vigilance on outside elements for taking view of changing security threat perceptions to substation.	

27	400 KV Mehboobnagar	Providing of dedicated feeder for AC Aux. Supply to be examined.	
		Carried aided protection is not provided for 220 kV Lines.	
28	400 KV SLBHES/APGENCO/Srisailem	Providing Reactor at 400 kV bus to be examined.	
		It is noticed that CT, CVT aand PT are of 0.5 class of accuracy. As per standards the metering core of above elements higher accuracy levels than energy meters.	
		Battery:	
		Load sharing in DC source is 30% and 70%. At present it is shared in such a way that DC 1 is feed untill 1, 2 and GIS, where as DC2 is Unit No.3,4 5 & 6 failure of DC2 may affected the units (3,4,5&6) and failure of DC1 may affect GIS, units (1&2). This may examined and redumdant supply to be recommended.	
		110 V DC is not hot stand by, it is through manual operation. This to be examine for automatic changer to avoid time delay in restoration.	
		APTRANSCO	
29	400kV Dichipalli, APTRANSCO	plcc 48 V DC single battery set is available. No redundant battery set with charger. Failure may affect carrier protection and real time data loss to the system operator due to communication Equipment power loss	
		Carrier protection to be provided for 220kV lines	
		Dedicated supply to be made available	
Karnataka - TRANSCO/ GEDCO/ IPP			
1	220kv Allipura S/S - BELLARY	Diesel set battery need to be replaced.	
		Bus coupler breaker is out of service due to compressor problem, needs immediate rectification.	complied
		Carrier aided protection scheme has only single channel for 220 kV BTPS feeder and for 220 kV Ragulapadu line is out of service. Telecome panel need to be replaced.	complied
2	220 kV Ambewadi RS	The 220 kV Narendra line-2 B-phase lightening arrester is not in service.	Action is being taken for attending the same.
		The 220 kV Narendra lines 1 & 2 R and Y phase CVTs are not available.	
		The 220 kV Nagjheri lines 1 & 2 Y and B phase CVTs are not available.	
		The 220 kV Ponda and Xeldom lines CVTs for three phases are not available. Carrier protection is not in service.	
		Busbar protection and LBB protection are not available.	Included in R&M works, which is under progress at Ambewadi.
		DG set is not available.	
		As observed by the audit tem in the switchyard and reported by SE/Electrical/R&D Centre, KPTCL Bangalore, the earthing of all equipmkents is required to be reviewed in the R&M works. All the earth points specified by SE/R&D should be taken up immediately.	
3	220 kV BTPS	220 kV Bus coupler not commissioned.	
4	220kv Gerusoppa Dam Power House	CVT to be provided for each Phase of the transmission lines.	
5	220 kV Hebbal	One DC source is being user for protection.	Procurement of required materials covered under renovtion and upgradation DPR.
		DG set is not available.	Action is being taken to provide tha same
6	220 kV Hebbal A Station	Busbar protection is to be commissioned	complied
		One DC source is being user for protection.	Procurement of required materials covered under renovtion and upgradation DPR.
7	220 kV HSR Layout substation	CVT not provided in all phases of all feeders in 220 kV feeders.	Covered under Renovation and upgradation DPR

		PLCC / Protection Coupler not provided in all 220 kV feeders. The same to be provided.	complied
		Protection Couplers are not provided in the 220 kV feeders.	complied
8	220 kV Kadakola	The 3 core CTs are provided in 220 kV feeders. The same to be replaced with 5 core CTs.	Covered under Renovation and upgradation DPR
9	220 kV Kadra (Gen)	Recommended to put 220 kV busbar protection system in service at the earliest possible.	Covered under Renovation and upgradation DPR
		Karwar 1 & 2 fereders have only R Ph CVT available (Y and B Ph CVTs are not available).	
		For Kaiga and Kodasalli feeders have only R & B CVTs available. (Y Ph CVT not available)	
10	220 kV Kodasalli S/S (Gen)	Bus coupler and transfer bus are out of service, bus coupler module on busbar protection panel is kept out of service.	
		Double earthing of all the supporting structures/elements is to be ensured and neutral of generting transformers and LAs should be exclusively earthed.	
		Bus coupler and transfer bus are out of service, bus coupler module on busbar protection panel is kept out of service.	
		i) Nagjheri Kodasalli line-1 having only R-ph CVT (Y and B Ph CVTs are not available. ii)Nagjheri Kodasalli line-2 CVTs are not available. iii)Kodasalli-Kadra line having only R and B Ph CVTs (Y Ph CVTs are not available. iv) Kodasalli-Kaiga line having only R and B Ph CVTs (Y Ph CVTs are not available.	
11	220 kV Kolar	220 kV Single Bus System is available and bus bar protection not provided. It is proposed for provision of 220 kV double bus system with bus bar protection.	Provision of bus bar protection is made under renovation and upgradation DPR
12	220 kV Lingasugur	Bus Bar protection is not available in the station, same is to be provided.	
13	220 kV Munirabad	PLCC Batteries set to be provided.	Covered under Renovation and upgradation DPR
		220kV Switchyard	
		Non-availability of bus bar protection	
		Non-Availability of LBB protection scheme	
14	220kv Nagjhari Power House	220kV Switchyard isolator operation of isolator from remote is to be made operational	
		220 kV Nagjhari-Ambewadi 1 & 2 lines does not have CVTs on the line. Carrier tripping was not available for these lines.	
		Remaining six 220 kV lines have only one R-Phase CVT and Y & B Phase CVTs are not available.	
		Synchronising of 220 kV feeders is not being done with synchroscope, only Generator Transformer Units are being synchronised.	
		The Neutrals of generator transformers are not earthed exclusively and all LAs also not found to be earthed exclusively.	
		The Emulsifier system nozzles are not directed towards Power Transformer body in the middle.	
15	220 KV Narendra SS	ICT-1&2 Fire Protection System is not available.	Acion is being taken to provide the same.
		The 220 KV Belgaum lines 1 & 2, Hubli Lines 1 & 2, Ambewadi Lines-1 & 2 and Haveri Line 2 and B Phase CVTs are not available.	Acion is being taken to provide the same.
16	220 kV NRS Rajajinagar	The 220 KV Ambewadi lines 1 & 2 and Haveri line 2 Wave Traps are not available.	Acion is being taken to provide the same.
17	220 kV NRS, Bangalore S/S	Capacity of the DG is insufficient for the Station Aux Supply.	
		Capacity of the DG is insufficient for the Station Aux Supply.	

18	220 kV ODY of Varahi (VUGPH Hosangadi) (Gen)	There is only one CVT available on all 220 kV lines. CVTs should be provided for all the three phases of all the 220 kV lines.	
19	220 kV Peenya, Bangalore	In Hebbal feeder CVT is provided in "R" ph only. The same to be provided in one more phase.	Covered under renovaion and upgradation DPR
		Bus bar protection was not available, same to be provided.	
20	220 KV Sharavathi SS (Gen)	The support structure and equipments to be replaced.	
		3 core CTs to be replaced with 5 crore CTs to keep the Bus Bar protection in full shape with both Main and Check Zone.	
		3 CVTs to be provided on all 220 kV feeders so as to keep the Main-II protections on Bus PT or CVT which increases the reliability of the protection system.	
		Bus bar protection panels to be replaced with new panels of numerical relay type to have the bus bar protection in full shape with all features (check zone, CT fail, iso fail etc. features) as the existing scheme is not having check zone facility. Certain CTs with 3 cores should also be changed to have 5 cores for bus bar protection.	
		Feeders having same core for Main-I and Main-II should be separated to individual cores, i.e. Main-I and Main-II should be on different CT cores.	
		The battery bank-II to be replaced with VRLA (maintenance free) type batteries to increase the reliability of DC system, as the existing both banks are of lead acid type are under complete deterioration condition.	
		All generator transformers OTI & WT1 shall be brought to control room for better monitoring of the transformer performance.	
		New SF6 type circuit breakers to be replaced without door type CTs on either side of the breaker in place of existing old BOCBs, as the sectionaliser breakers are very vital while clearing the very high level bus faults.	
21	220kV SRS Lingapura, KPTCL, Munirabad	3 CVTs should be there for all the feeders for protection.	
		LAs are not available for all feeders except Jindal 1 & 2	LA s are provided to all the lines. Remaining works are covered under R&M works
		Bus bar protection not available	
		PTs are to be commissioned on reserve bus	
22	220 kV SUBRAMANYAPURA	Only single carrier channel is available for carrier protection and all the feeders does not have carrier protection except BTPS, Sindanoor, Gudadahalli - 1 & 2 and Harthi.	
23	220 kV T. K. HALLI - KPTCL	To provide Bus bar protection relays for 220kV system.	Covered under Renovation and upgradation DPR
24	220 kV Yarandahalli, Bangalore	To provide Bus bar protection for 220kV Bus system at the earliest.	Covered under Renovation and upgradation DPR
25	400 kV Guttur R/S - KPTCL	Busbar protection is not provided in the 220 kV system, the same to be provided.	Covered under Renovation and upgradation DPR
		Atmospheric conditions as specified by the manufaturers of relays to be maintained for smooth operation of relays like cooling system which is observed insufficient.	Action is yet to be taken .
		Utilising the two DC sources available for all the control and relay panels to be examined.	Action is being taken to attend the same.
		400kV and 220kV bus coupler breakers to be made healthy	Problem with 220kV Bus coupler breaker is attended. Replacement of 400kV Bus coupler breaker is under progress.400kV Tie breaker will be used as bus coupler breaker till such time.

26	400 kV Hoody	Busbar protection is not provided in the 220 kV systems since old and new stations share the common 220 kV Bus & CT's of the old station do not have separate core for Busbar protection.	Covered under R&M works which is under progress.
27	400 kV Nelamangala & 220 kV S/S Nelamangala	It is noticed that the LA is failed in the same phase (Talaguppa line) for 3 times previously. Analysis to be done and take remedial action to avoid reoccurrence.	complied
KSEB			
1	220 kV Areacode S/S	Possibility of using separate DC Sources for Main-1 & Main-2 to be explored for reiability of DC supply.	
2	220 kV Brahmapuram Substation	DG set is not available in the station.	
3	220 kV Edamon SS	The % error in some of the CVTs found to be high and there is proposal for replacing them.	
		Substation is under renovation hence earth pits shall be incorporated.	
		DG set not available.	
		48 V dc supply redundancy not available.	
4	220 KV Idukki HEP	Only one bus available, transfer bus shall be provided.	
		Fire protection operation with electrical sensor shall be provided for generator transformers.	
5	220 kV Kaniyambetta S/S	In some of the CTs, the ratio errors are found to be in higher side. It shall be checked and corrective measures to be taken.	
		Bus bar protection is not available.	
		DG Set is not available.	
6	220 kV New PallomSwitching Station	Only one set of Battery charger and battery set is available.	
		Transfer breaker scheme to be examined for substitution of main breaker.	
7	220 kV Pallom S/S	DG set is not available for emergency purpose for LT source and a 250 kVA DG set is suggested to be installed as a commom external electrical power source for both New Pallom and Pallom sub-stations.	
		Earth mat to be provided for Pallom 220 kV sub-station to have effective earthing.	
		220 kV Busbar protection & LBB protection are not there at Pallom 220 kV sub-station and it is suggtested to add up 220 kV numerical busbar protection & LBB protection to prevent severe damage to equipments and ultimate financial loss.	
		DG set is not available for emergency purpose for LT source and a 250 kVA DG set is suggested to be installed as a commom external electrical power source for both New Pallom and Pallom sub-stations.	
8	220 kV Pothencode	Compact size bus coupler [PASS (PLUG AND SWITCHED SYUSTEM) - HYBRID SWITCHGEAR] proposal to be considered for flexibility of operation and reliability to the 220 kV source for the station.	
9	220 KV Sabarigiri Moozhiyar HEP	Double Bus arrangement is required for 110 kV switchyard	
		Bus-I & II current carrying capacity is around 1600A, which is not sufficient hence Bus MVA capacity shall be reviewed by considering the bus fault level.	

Annexure - IIA

TRIPPING DETAILS FOR JUL 2013

Y: AVAILABLE with in 24 HR D: Available After 24 HR N: Not Available

S.NO.	ELEMENT NAME	TRIPPING DATE	TRIPPING TIME	FIR (S)	DR (S)	EL (S)	TR (S)	FIR (R)	DR (R)	EL (R)	TR (R)
1	400 kV VIJAYAWADA - VEMAGIRI 3	31-Jul-13	15:24	Y	NA	NA	NA	Y	NA	NA	N
2	400 kV VIJAYAWADA - VEMAGIRI 2	31-Jul-13	12:02	Y	D	D	D	D	NA	NA	NA
3	400 kV MADURAI - TIRUNELVELI 1	31-Jul-13	10:22	NA	NA	NA	NA	D	D	D	N
4	400 kV VEMAGIRI - SIMHADRI 1	31-Jul-13	03:00	Y	N	D	N	N	N	N	N
5	400 kV KURNOOL - SRISAILAM	30-Jul-13	21:47	NA	NA	NA	N	NA	NA	NA	N
6	400 kV SRISAILAM-MAMIDIPALLI 1	30-Jul-13	20:55	NA	NA	NA	N	NA	NA	D	N
7	220 kV AMBEWADI - PONDA 2	29-Jul-13	19:35	N	N	N	N	N	N	N	N
8	220 kV KAIGA - KODASALLY	29-Jul-13	19:34	N	N	N	N	N	N	N	N
9	220 kV SABARGIRI - THENI	29-Jul-13	13:39	N	N	N	N	N	N	N	N
10	220 kV AMBEWADI - PONDA 1	28-Jul-13	06:10	N	N	N	N	N	N	N	N
11	400 Kv GOOTY - NPS 2	27-Jul-13	15:24	NA	NA	NA	N	D	D	D	N
12	220 kV KODASALLY - NAGJERI 2	26-Jul-13	19:00	N	N	N	N	N	N	N	N
13	400 Kv HASSAN - UPCL 1	26-Jul-13	13:57	D	D	D	N	N	N	N	N
14	220 kV SEDAM - TANDUR	26-Jul-13	11:35	N	N	N	N	N	N	N	N
15	400 Kv HASSAN - UPCL 1	25-Jul-13	21:38	D	D	D	N	N	N	N	N
16	400 Kv HASSAN - UPCL 1	25-Jul-13	11:48	D	D	D	N	N	N	N	N
17	400 Kv NELLORE - SPDR	24-Jul-13	03:03	D	D	D	N	N	N	N	N
18	400 kV MALKARAM - HYDERABAD	24-Jul-13	02:05	D	D	D	N	NA	D	D	N
19	400 Kv HASSAN - UPCL 2	23-Jul-13	06:12	D	D	D	N	D	D	D	N
20	400 Kv NELLORE - SPDR	23-Jul-13	01:59	Y	Y	Y	N	N	N	N	N
21	400 Kv GOOTY - NPS 1	23-Jul-13	01:58	D	D	D	N	NA	D	D	N
22	400 Kv NPS- MEPL	23-Jul-13	01:58	Y	Y	Y	N	Y	Y	Y	N
23	400 kV N'SAGAR - GOOTY	22-Jul-13	23:32	Y	Y	Y	N	NA	NA	NA	N
24	400 kV MALKARAM - HYDERABAD	22-Jul-13	23:14	D	NA	D	N	D	D	D	N
25	400 kV N'SAGAR - MAHABOOB NAGAR	22-Jul-13	23:10	D	D	D	N	D	D	N	N
26	400 kV MAHABOOB NAGAR - RAICHUR	22-Jul-13	23:10	D	NA	NA	N	D	NA	NA	N
27	400 kV WARANGAL - BOOPALPPALLI 1	22-Jul-13	21:09	D	D	D	N	NA	NA	NA	N
28	400 kV KHAMMAM - N'SAGAR	21-Jul-13	23:58	D	D	D	N	NA	NA	NA	N
29	400 Kv NELLORE - SPDR	21-Jul-13	23:58	D	D	D	N	D	D	D	N
30	400 kV MALKARAM - HYDERABAD	21-Jul-13	23:58	NA	NA	NA	N	NA	NA	NA	N
31	400 kV VIJAYAWADA - GAZUWAKA 1	21-Jul-13	23:58	D	D	NA	N	D	D	D	N
32	400 Kv KRISHNAPATNAM - NELLORE 1	21-Jul-13	23:58	NA	NA	NA	N	D	D	D	N
33	400 kV RAMAGUNDAM - CHANDRAPUR 1	20-Jul-13	15:05	NA	NA	NA	N	D	NA	NA	N
34	400 kV KAIGA - GUTTUR 2	20-Jul-13	00:01	N	N	N	N	NA	NA	NA	N
35	400 Kv GOOTY - NPS 2	19-Jul-13	23:23	Y	D	Y	N	N	N	N	N
36	400 kV GUTTUR - HIRIYUR 1	19-Jul-13	23:23	N	N	N	N	Y	Y	Y	N
37	400 kV MALKARAM - HYDERABAD	19-Jul-13	23:22	NA	NA	NA	N	D	D	D	N
38	400 kV MAHABOOB NAGAR - RAICHUR	18-Jul-13	13:34	D	NA	NA	N	D	D	D	N
39	400 kV RAICHUR - GOOTY 1	18-Jul-13	13:34	NA	NA	NA	N	NA	NA	NA	N
40	400/220 kV ICT-1 AT BANGALORE	18-Jul-13	13:34	D	D	D	N	D	D	D	N
41	400/220 kV ICT-2 AT BANGALORE	18-Jul-13	13:34	D	D	D	N	N	N	N	N
42	400 kV GUTTUR - HIRIYUR 1	18-Jul-13	13:34	N	N	N	N	N	N	N	N
43	400 Kv HASSAN - UPCL 1	18-Jul-13	13:34	D	D	D	N	D	D	D	N
44	400 kV HIRIYUR - NELAMANGALA 1	18-Jul-13	13:34	D	D	D	N	D	N	D	N

Annexure - IIA

45	400 kV N'SAGAR - MAHABOOB NAGAR	18-Jul-13	13:34	D	D	D	N	NA	NA	NA	N	
46	400 Kv GOOTY - NPS 2	16-Jul-13	21:49	N	Y	Y	N	Y	Y	NA	N	
47	400 Kv NPS - NELLORE -1	16-Jul-13	21:49	Y	Y	NA	N	N	Y	N	N	
48	400 kV NELAMANGALA - HOODY 2	16-Jul-13	10:50	N	N	N	N	N	N	N	N	
49	400 Kv NPS - NELLORE -1	15-Jul-13	21:47	Y	Y	NA	N	D	Y	D	N	
50	400 Kv NPS - NELLORE -2	15-Jul-13	21:47	Y	Y	NA	N	D	Y	D	N	
51	400 Kv NPS - SEPL	15-Jul-13	21:47	Y	Y	NA	N	NA	D	D	N	
52	400 Kv NPS- MEPL	15-Jul-13	21:47	NA	NA	NA	N	NA	D	NA	N	
53	400 Kv SEPL - MEPL	15-Jul-13	21:47	D	D	D	N	Y	Y	NA	N	
54	400 Kv GOOTY - NPS 2	12-Jul-13	23:59	D	NA	NA	N	NA	NA	NA	N	
55	400 Kv GAJWEL - SHANKARPALLY 1	12-Jul-13	23:50	NA	NA	NA	N	D	D	D	N	
56	400 kV MALKARAM - HYDERABAD	12-Jul-13	23:37	D	D	D	N	D	NA	NA	N	
57	400 kV N'SAGAR - MAHABOOB NAGAR	12-Jul-13	23:37	D	NA	NA	N	NA	NA	NA	N	
58	400 kV MAHABOOB NAGAR - RAICHUR	12-Jul-13	23:16	Y	D	D	N	D	D	D	N	
59	400 kV KHAMMAM - N'SAGAR	12-Jul-13	10:52	NA	NA	NA	N	NA	NA	NA	N	
60	400 kV RAMAGUNDAM - CHANDRAPUR 2	11-Jul-13	23:37	Y	NA	Y	N	N	N	N	N	
61	400 kV GHANAPUR - MAMIDIPALLY	11-Jul-13	23:37	Y	Y	Y	N	Y	NA	Y	N	
62	400 kV HYDERABAD - N'SAGAR	11-Jul-13	23:10	Y	Y	Y	N	Y	Y	Y	N	
63	400 kV KHAMMAM - N'SAGAR	11-Jul-13	23:09	Y	Y	Y	N	NA	NA	NA	N	
64	400 kV KHAMMAM - KALPAKKA 2	11-Jul-13	21:23	N	N	N	N	N	N	N	N	
65	400/220 kV ICT-1 AT TALAGUPPA	11-Jul-13	20:52	Y	Y	Y	N	N	N	N	N	
66	400 kV N'SAGAR - MAHABOOB NAGAR	11-Jul-13	02:03	Y	Y	Y	N	Y	N	N	N	
67	400 kV KHAMMAM - KALPAKKA 2	11-Jul-13	01:40	Y	NA	NA	N	D	D	D	N	
68	400 kV MALKARAM - HYDERABAD	10-Jul-13	23:19	Y	Y	Y	N	Y	NA	NA	N	
69	400 kV N'SAGAR - MAHABOOB NAGAR	10-Jul-13	23:19	Y	NA	NA	N	NA	NA	NA	N	
70	400 kV MAHABOOB NAGAR - RAICHUR	09-Jul-13	23:42	NA	NA	NA	N	D	NA	NA	N	
71	400 kV HASSAN - NEELAMANGALA 1	09-Jul-13	23:37	NA	NA	NA	N	Y	NA	NA	N	
72	400 kV RAMAGUNDAM - MALKARAM	09-Jul-13	18:01	Y	N	N	N	Y	D	Y	N	
73	400 kV MALKARAM - HYDERABAD	09-Jul-13	13:05	NA	NA	NA	N	N	N	N	N	
74	400 kV KHAMMAM - KTPS 2	09-Jul-13	09:12	NA	NA	NA	N	N	N	N	N	
75	400 Kv HIRIYUR-BTPS 1	09-Jul-13	08:45	N	N	N	N	N	N	N	N	
76	400/230 kV ICT-2 AT SALEM	09-Jul-13	07:42	NA	NA	NA	N	N	N	N	N	
77	400 kV KHAMMAM - MAMIDIPALLY 1	09-Jul-13	03:33	Y	Y	Y	N	D	N	D	N	
78	400 kV HIRIYUR - NELAMANGALA 1	09-Jul-13	03:17	Y	Y	Y	N	D	N	D	N	
79	400 kV HIRIYUR - NELAMANGALA 1	08-Jul-13	23:38	NA	NA	NA	N	Y	NA	NA	N	
80	400 kV RAMAGUNDAM - MALKARAM	08-Jul-13	23:36	Y	NA	NA	N	Y	Y	Y	N	
81	400 kV MALKARAM - HYDERABAD	08-Jul-13	14:56	NA	NA	NA	N	N	N	N	N	
82	400 kV GHANAPUR - MAMIDIPALLY	08-Jul-13	12:13	D	NA	NA	N	D	D	D	N	
83	400 kV WARANGAL - KHAMMAM	08-Jul-13	10:24	D	NA	NA	N	NA	NA	NA	N	
84	400 kV VEMAGIRI - KONASEEMA 1	07-Jul-13	23:52	NA	NA	NA	N	Y	NA	NA	N	
85	400 kV RAMAGUNDAM - MALKARAM	07-Jul-13	23:52	Y	Y	Y	N	D	NA	N	N	
86	400 kV HASSAN - NEELAMANGALA 1	07-Jul-13	08:45	N	N	N	N	D	D	D	N	
87	400 kV TALAGUPPA - HASSAN	07-Jul-13	02:55	N	N	N	N	N	N	N	N	
88	220 kV KAIGA - KODASALLY	07-Jul-13	02:49	D	NA	NA	N	D	D	D	N	
89	400 kV MALKARAM - HYDERABAD	06-Jul-13	17:21	Y	Y	Y	N	Y	Y	Y	N	
90	400 Kv KOLAR - SOMANAHALLI	06-Jul-13	14:30	N	N	N	N	D	N	N	N	
91	220 kV GOOTY - ALIPUR LINE	06-Jul-13	03:24	N	N	N	N	N	N	N	N	
92	220 kV AMBEWADI - PONDA 1											

Annexure - IIA

93	400 kV RAMAGUNDAM - MALKARAM	04-Jul-13	18:02	NA	NA	NA	N	Y	NA	NA	N
94	400 kV MALKARAM - HYDERABAD	04-Jul-13	18:00	Y	NA	NA	N	D	D	D	N
95	400 kV MALKARAM - HYDERABAD	04-Jul-13	13:13	D	NA	NA	N	Y	Y	D	N
96	400 kV RAMAGUNDAM - MALKARAM	03-Jul-13	21:56	NA	NA	NA	N	Y	NA	NA	N
97	400 kV MALKARAM - HYDERABAD	03-Jul-13	21:45	Y	NA	D	N	Y	Y	Y	N
98	220 kV NEYVLI - VILLIANUR	03-Jul-13	18:04	N	N	N	N	N	N	N	N
99	220 kV PONDYCHERRY- VILLIANUR	03-Jul-13	18:04	N	N	N	N	N	N	N	N
100	400 kV MALKARAM - HYDERABAD	02-Jul-13	23:58	D	D	D	N	Y	Y	Y	N
101	400 kV VIJAYAWADA - GAZUWAKA 1	02-Jul-13	16:17	Y	Y	Y	N	Y	Y	Y	N
102	400 kV NELAMANGALA - MYSORE 2	01-Jul-13	23:49	D	NA	NA	N	Y	Y	Y	N
103	400 kV GUTTUR - NARENDRA 2	01-Jul-13	22:22	N	N	N	N	Y	Y	Y	N

FIR - First Information Report
D.R - Disturbance recorder Data
E.L - Event logger data
T.R - Trip report

Annexure - IIB

Y: AVAILABLE with in 24 HR D: Available After 24 HR

TRIPPING DETAILS FOR AUG 2013

N: Not Available

S.NO.	ELEMENT NAME	TRIPPING DATE	TRIPPING TIME	FIR (S)	DR (S)	EL (S)	TR (S)	FIR (R)	DR (R)	EL (R)	TR (R)
1	400 kV RAMAGUNDAM - HYDERABAD 4	31-Aug-13	14:42	N	N	N	N	D	NA	D	N
2	400 kV TIRUNELVELI - KUDAMKULAM 2	30-Aug-13	14:57	D	D	D	D	N	NA	NA	D
3	400 kV UDUMALPET - TIRUNELVELI 2	30-Aug-13	14:57	D	D	D	D	D	D	D	D
4	HVDC TALCHER - KOLAR POLE 2 AT TALCHER	30-Aug-13	10:41	D	N	N	N	N	D	D	D
5	400 kV MADURAI - TIRUNELVELI 1	29-Aug-13	22:37	Y	Y	Y	Y	D	Y	Y	Y
6	400 kV TIRUNELVELI - KUDAMKULAM 2	29-Aug-13	16:11	D	Y	Y	Y	D	D	NA	D
7	400 kV MYSORE - HASAN 2	29-Aug-13	07:39	D	D	D	D	D	D	D	D
8	400 kV UDUMALPET - ARASUR 1	29-Aug-13	02:57	D	D	N	D	D	D	D	D
9	400 Kv UDUMALPET - PALLAKAD 1	29-Aug-13	02:57	D	D	D	D	D	D	D	D
10	400 kV UDUMALPET - ARASUR 2	29-Aug-13	02:57	D	D	D	D	D	D	D	D
11	400 Kv HIRIYUR-BTPS 1	28-Aug-13	11:31	D	D	D	D	N	N	N	N
12	400 kV MYSORE - HASAN 1	27-Aug-13	23:52	Y	Y	Y	Y	Y	Y	Y	Y
13	400 kV TIRUNELVELI - KUDAMKULAM 2	27-Aug-13	17:10	D	Y	D	Y	D	D	D	D
14	400 kV KHAMMAM - KALPAKKA 2	27-Aug-13	12:44	Y	Y	Y	Y	N	N	N	N
15	220 kV KAIGA - KADRA 1	27-Aug-13	01:45	D	D	N	D	N	N	N	N
16	220 kV KAIGA - KODASALLY	27-Aug-13	01:45	D	D	N	D	N	N	N	N
17	400 kV HIRIYUR - NELAMANGALA 1	26-Aug-13	09:01	D	D	D	D	D	D	D	D
18	400 kV JEYPORE - GAZUWAKA 2	25-Aug-13	10:53	N	N	N	N	D	D	D	D
19	400 kV SRISAILAM-MAMIDIPALLI 1	25-Aug-13	07:56	D	N	D	N	D	D	D	D
20	400 kV SRISAILAM-MAMIDIPALLI 2	25-Aug-13	07:56	N	N	N	N	N	D	N	D
21	400 kV MYSORE - HASAN 1	24-Aug-13	23:55	Y	Y	Y	Y	Y	Y	Y	Y
22	400 kV MYSORE - HASAN 1	24-Aug-13	01:59	D	D	D	D	D	D	D	D
23	400 kV HYDERABAD - KURNOOL	23-Aug-13	21:11	D	D	D	D	Y	N	N	N
24	400 kV SRISAILAM-MAMIDIPALLI 1	21-Aug-13	15:46	D	N	D	N	Y	N	Y	N
25	400 kV NEYVELI TS 2 - TRICHY	21-Aug-13	00:05	Y	Y	Y	Y	D	D	D	D
26	400 kV NEYVELI TS 2- PONDICHERY	21-Aug-13	00:05	Y	Y	Y	Y	D	NA	NA	NA
27	400 kV NEYVELI TS 2- SALEM 1	21-Aug-13	00:05	Y	Y	N	N	D	D	D	D
28	400 kV NEYVELI TS2- NEYVELI TS-2 (EXP)	21-Aug-13	00:05	N	N	N	N	N	N	N	N
29	400/230 kV ICT-2 AT NEYVELI	21-Aug-13	00:05	Y	Y	Y	Y	N	N	N	N
30	400 kV MYSORE - HASAN 1	20-Aug-13	00:01	D	NA	D	D	D	D	D	D
31	HVDC BHADRAVATHI POLE 2	19-Aug-13	22:44	N	N	N	N	N	N	N	N
32	400 Kv GOOTY - NPS 2	19-Aug-13	03:58	N	D	D	D	Y	Y	Y	Y
33	400 Kv NELLORE - SPDR	19-Aug-13	03:57	Y	Y	Y	Y	Y	Y	Y	Y
34	400/220 kV ICT-2 AT TALAGUPPA	19-Aug-13	02:05	Y	N	N	N	N	N	N	N
35	400 kV VIJAYAWADA - VTPS IV 1	19-Aug-13	00:15	Y	Y	Y	Y	D	N	N	N
36	400 kV DICHIPALLY - RAMAGUNDAM	18-Aug-13	23:43	D	N	N	N	N	D	D	D
37	400 kV RAMAGUNDAM - HYDERABAD 3	18-Aug-13	23:42	Y	Y	Y	N	N	Y	Y	Y
38	400 kV MYSORE - HASAN 1	18-Aug-13	21:50	Y	Y	Y	Y	Y	Y	Y	Y

39	400 Kv HASSAN - UPCL 2	18-Aug-13	21:50	Y	Y	Y	Y	N	N	N	N	N
40	400 kV TALAGUPPA - HASSAN 1	18-Aug-13	20:52	D	N	N	D	Y	Y	Y	Y	Y
41	400 kV KAIGA - NARENDRA 1	17-Aug-13	23:21	N	N	N	N	Y	Y	Y	Y	Y
42	400 kV CUDDAPPA - CHITTOOR	16-Aug-13	23:59	Y	Y	Y	N	Y	D	D	D	D
43	400 Kv HASSAN - UPCL 2	16-Aug-13	22:33	D	D	D	D	N	N	N	N	N
44	400 kV KAIGA - GUTTUR 2	16-Aug-13	06:47	N	N	N	N	D	Y	Y	Y	D
45	400/230 kV ICT-1 AT UDUMALPET	16-Aug-13	04:16	D	D	D	D	N	N	N	N	N
46	400/230 kV ICT-2 AT UDUMALPET	16-Aug-13	04:16	D	D	D	D	N	N	N	N	N
47	400/230 kV ICT-3 AT UDUMALPET	16-Aug-13	04:16	D	D	D	D	N	N	N	N	N
48	400 kV UDUMALPET - TIRUNELVELI 2	16-Aug-13	03:52	Y	D	Y	Y	Y	Y	Y	Y	Y
49	400 kV N'SAGAR - MAHABOOB NAGAR	16-Aug-13	02:41	Y	Y	Y	Y	Y	N	N	N	N
50	400 kV MAHABOOB NAGAR - RAICHUR	16-Aug-13	02:41	Y	N	N	N	N	N	N	N	N
51	400 kV RAMAGUNDAM - GAJWEL	16-Aug-13	00:49	N	D	D	N	Y	D	D	D	N
52	400 Kv GOOTY - NPS_2	15-Aug-13	23:57	N	Y	Y	Y	Y	Y	Y	Y	Y
53	400 Kv KRISHNAPATNAM - NELLORE 2	15-Aug-13	23:49	N	Y	Y	N	D	D	D	D	N
54	400 kV VIJAYAWADA - NELLORE 2	15-Aug-13	23:08	Y	Y	Y	Y	Y	Y	Y	Y	Y
55	400 Kv NELLORE - SPDR	15-Aug-13	23:06	Y	Y	Y	Y	Y	Y	Y	Y	Y
56	400 Kv HASSAN - UPCL 2	15-Aug-13	23:01	Y	Y	Y	Y	Y	Y	Y	Y	Y
57	400 Kv BANGALORE - BIDADI 1	15-Aug-13	07:31	D	NA	NA	NA	D	D	D	D	D
58	400 Kv BANGALORE - BIDADI 2	14-Aug-13	10:19	D	NA	NA	NA	D	D	D	D	D
59	400 kV KURNOOL - SRISAILAM	14-Aug-13	02:09	Y	N	N	N	Y	N	N	N	Y
60	400 kV SRISAILAM-MAMIDIPALLI 2	14-Aug-13	02:09	Y	N	N	Y	Y	N	Y	Y	Y
61	400 kV VTPS IV - SRISAILAM 1	14-Aug-13	02:09	Y	N	N	N	Y	N	N	N	Y
62	400 kV SRISAILAM-MAMIDIPALLI 1	14-Aug-13	02:09	Y	N	N	N	Y	N	N	N	Y
63	400 kV MYSORE - HASAN 1	14-Aug-13	02:01	Y	Y	Y	Y	Y	N	Y	Y	Y
64	400 Kv HASSAN - UPCL 1	14-Aug-13	02:01	Y	Y	Y	Y	Y	Y	Y	Y	Y
65	400 Kv NELLORE - SPDR	13-Aug-13	03:01	Y	Y	Y	Y	N	N	N	N	N
66	400 kV VIJAYAWADA - NELLORE 2	13-Aug-13	03:01	Y	Y	Y	Y	Y	Y	Y	Y	Y
67	400 Kv NELLORE - SPDR	12-Aug-13	02:34	Y	Y	Y	Y	Y	Y	Y	Y	Y
68	400 kV VIJAYAWADA - NELLORE 2	12-Aug-13	02:34	Y	Y	Y	D	Y	Y	Y	Y	N
69	400 kV MYSORE - HASAN 1	12-Aug-13	00:01	Y	Y	Y	Y	Y	Y	Y	Y	Y
70	400/220 kV ICT-3 AT TALAGUPPA	11-Aug-13	18:43	NA	D	N	D	Y	Y	Y	Y	D
71	400 kV MADURAI - PUGALUR 2	11-Aug-13	03:22	D	Y	Y	Y	D	NA	NA	N	N
72	GOOTY-NELAMANGALA AT GOOTY	11-Aug-13	01:36	N	N	N	N	N	D	D	Y	Y
73	400 kV GOOTY - NELAMANGALA	11-Aug-13	01:36	Y	D	D	D	D	N	N	N	N
74	400 kV MADURAI - PUGALUR 1	11-Aug-13	01:31	D	D	D	D	D	D	D	D	D
75	400 kV MADURAI - PUGALUR 2	11-Aug-13	01:31	D	D	D	D	D	D	D	D	Y
76	400 Kv HASSAN - UPCL 1	09-Aug-13	02:01	Y	Y	Y	N	N	N	N	N	Y
77	220 kV NEYVLI - BAHOOR	08-Aug-13	21:05	N	N	N	N	N	N	N	N	N
78	400 kV RAMAGUNDAM - GAJWEL	08-Aug-13	01:05	N	N	N	N	Y	N	N	N	N
79	400 Kv HASSAN - UPCL 1	07-Aug-13	23:48	D	D	D	N	N	N	N	N	N
80	400 kV KHAMMAM - KALPAKKA 2	07-Aug-13	00:59	D	D	D	D	Y	N	N	N	N

81	400 kV KHAMMAM - N'SAGAR	07-Aug-13	00:59	D	D	D	D	D	D	D	D
82	400 kV MALKARAM - HYDERABAD	07-Aug-13	00:59	Y	N	N	N	D	D	D	D
83	400 kV VIJAYAWADA - GAZUWAKA 1	07-Aug-13	00:58	D	D	D	D	N	D.	D	N
84	400 kV VIJAYAWADA - VEMAGIRI 1	07-Aug-13	00:58	D	D	D	N	Y	D	D	N
85	400 kV VEMAGIRI - SIMHADRI 1	05-Aug-13	13:13	D	N	D	N	N	N	N	N
86	400 Kv HASSAN - UPCL 2	04-Aug-13	23:51	D	D	D	N	N	N	N	N
87	400 kV VTPS IV - SRISAILAM 2	04-Aug-13	21:55	Y	N	N	N	Y	N	N	N
88	400 kV KURNOOL - GOOTY	04-Aug-13	21:55	Y	N	N	N	D	D	D	D
89	220 kV KAIGA - KODASALLY	04-Aug-13	14:44	N	N	N	N	N	N	N	N
90	400 kV KAIGA - GUTTUR 2	04-Aug-13	14:44	N	N	N	N	D	D	NA	D
91	220 kV AMBEWADI - PONDA 2	04-Aug-13	14:42	N	N	N	N	N	N	N	N
92	400 kV VEMAGIRI - SIMHADRI 1	04-Aug-13	09:58	D	N	D	N	N	N	N	N
93	400 kV GHANAPUR - MAMIDIPALLY	03-Aug-13	05:26	D	D	D	D	Y	N	Y	N
94	400 kV KHAMMAM - MAMIDIPALLY 1	03-Aug-13	05:26	D	D	D	D	Y	NA	Y	NA
95	400 kV KHAMMAM - MAMIDIPALLY 2	03-Aug-13	05:26	D	D	D	D	Y	D	Y	N
96	400 kV SRISAILAM-MAMIDIPALLI 1	03-Aug-13	05:26	N	N	D	N	Y	N	Y	N
97	400 kV SRISAILAM-MAMIDIPALLI 2	03-Aug-13	05:26	N	N	D	N	Y	N	Y	N
98	400/220 kV ICT-1 AT MAMIDIPALLY	03-Aug-13	05:26	Y	N	Y	N	Y	N	Y	N
99	400/220 kV ICT-2 AT MAMIDIPALLY	03-Aug-13	05:26	Y	N	Y	N	Y	N	Y	N
100	400/220 kV ICT-3 AT MAMIDIPALLY	03-Aug-13	05:26	Y	N	Y	N	Y	N	Y	N
101	400 kV KHAMMAM - N'SAGAR	02-Aug-13	02:01	Y	Y	Y	Y	D	D	D	N
102	400 kV KHAMMAM - KALPAKKA 2	02-Aug-13	02:00	Y	D	Y	Y	Y	N	Y	N

FIR - First Information Report
D.R - Disturbance recorder Data
E.L - Event logger data
T.R - Trip report

Annexure - IIC

TRIPPING DETAILS FOR SEP 2013

Y: AVAILABLE with in 24 HR D: Available After 24 HR N: Not Available

S.NO.	ELEMENT NAME	TRIPPING DATE	TRIPPING TIME	FIR (S)	DR (S)	EL (S)	TR (S)	FIR (R)	DR (R)	EL (R)	TR (R)
1	220 kV AMBEWADI - PONDA 1	29-Sep-13	21:47	N	N	N	N	N	N	N	N
2	220 kV KAIGA - KODASALLY	29-Sep-13	21:47	N	N	N	N	N	N	N	N
3	400 kV MYSORE - HASAN 2	29-Sep-13	17:59	Y	Y	Y	Y	Y	D	D	D
4	400 kV KAIGA - GUTTUR 2	29-Sep-13	15:12	N	N	N	N	N	N	N	N
5	400 kV KHAMMAM - MAMIDIPALLY 1	28-Sep-13	19:44	Y	Y	Y	Y	D	D	D	N
6	220 kV AMBEWADI - PONDA 1	28-Sep-13	15:23	N	N	N	N	N	N	N	N
7	220 kV KANIAMPET - KADAKOLA	28-Sep-13	12:08	D	D	D	N	N	N	N	N
8	220 kV IDUKKI - UDUMALPET	27-Sep-13	13:07	N	N	N	N	N	N	N	N
9	400 kV TIRUNELVELI - KUDAMKULAM 3	27-Sep-13	12:41	D	D	Y	Y	Y	N	N	D
10	400/220 kV ICT-1 AT KHAMMAM	25-Sep-13	11:45	Y	Y	Y	Y	N	N	N	N
11	400/220 kV ICT-2 AT KHAMMAM	25-Sep-13	11:45	Y	Y	Y	Y	N	N	N	N
12	400 kV TALAGUPPA - HASSAN	24-Sep-13	22:17	Y	N	N	Y	D	D	D	D
13	400/230 kV ICT-1 AT NEYVELI	24-Sep-13	14:06	N	N	N	N	N	N	N	N
14	400 kV KAIGA - GUTTUR 1	24-Sep-13	00:16	N	N	N	N	NA	Y	Y	D
15	400 Kv HASSAN - UPCL 2	23-Sep-13	23:44	D	D	D	D	N	N	N	N
16	400 Kv GOOTY - NPS 1	22-Sep-13	03:02	Y	Y	Y	Y	Y	Y	Y	Y
17	400 kV KAIGA - NARENDRA 1	21-Sep-13	23:51	N	N	N	N	D	D	D	D
18	400kV SIMHADRI-GAZUWAKA 2	21-Sep-13	22:39	N	N	N	N	Y	N	Y	Y
19	400 kV RAMAGUNDAM - GAJWEL	20-Sep-13	17:09	N	N	N	N	Y	D	D	N
20	220 kV SEDAM - TANDUR	20-Sep-13	07:23	N	N	N	N	N	N	N	N
21	400 kV TALAGUPPA - NEELAMANGALA	20-Sep-13	02:10	N	N	N	N	N	N	N	N
22	400 kV VTPS IV - SRISAILAM 2	19-Sep-13	10:05	N	N	N	N	N	N	N	N
23	400 Kv VTPS - MALKARAM 2	19-Sep-13	09:54	N	N	N	N	N	N	N	N
24	400 kV TALAGUPPA - HASSAN	18-Sep-13	23:56	Y	N	N	N	N	N	N	N
25	400 kV MYSORE - HASAN 1	18-Sep-13	23:29	Y	Y	Y	N	Y	Y	Y	Y
26	400 kV KAIGA - NARENDRA 1	18-Sep-13	23:20	N	N	N	Y	Y	Y	Y	Y
27	400 Kv HASSAN - UPCL 2	18-Sep-13	16:00	Y	Y	Y	N	Y	Y	Y	Y
28	400 Kv HASSAN - UPCL 1	18-Sep-13	16:00	Y	Y	Y	Y	D	D	D	D
29	400 kV RAMAGUNDAM - N'SAGAR 1	18-Sep-13	03:23	N	N	N	Y	D	D	D	D
30	400 kV MADURAI - PUGALUR 1	17-Sep-13	15:01	Y	D	D	N	D	D	D	D
31	400 Kv HIRIYUR-BTPS 1	17-Sep-13	04:33	D	NA	NA	D	Y	Y	Y	Y
32	400 kV TALAGUPPA - HASSAN	16-Sep-13	23:43	Y	N	N	Y	D	D	N	N
33	400 kV GOOTY - NELAMANGALA	16-Sep-13	23:16	D	D	D	D	Y	D	D	D
34	400/220 kV ICT-1 AT CUDDAPAH	16-Sep-13	04:14	D	D	D	D	N	Y	Y	Y
35	400/220 kV ICT-2 AT CUDDAPAH	16-Sep-13	04:14	D	D	D	D	N	N	N	N
36	400 kV GUTTUR - HIRIYUR 1	16-Sep-13	01:56	Y	NA	NA	NA	D	NA	D	D
37	400 Kv GOOTY - NPS 1	16-Sep-13	00:01	D	D	D	D	D	D	D	D
38	400 kV MYSORE - HASAN 1	15-Sep-13	23:31	Y	Y	Y	Y	D	D	D	D
39	220 kV CHITTOR - THIRUVALEM	15-Sep-13	22:45	N	N	N	N	N	N	N	N

40	400 kV GUTTUR - NARENDRA 1	15-Sep-13	00:01	N	N	N	N	Y	Y	Y	Y	
41	400 kV KAIGA - NARENDRA 1	15-Sep-13	00:01	N	N	N	N	Y	D	Y	Y	
42	400 kV MYSORE - HASAN 1	15-Sep-13	00:01	Y	Y	Y	Y	Y	Y	Y	Y	
43	400/230 kV ICT 1 AT PONDYCHERRY	13-Sep-13	12:52	D	NA	NA	NA	NA	NA	NA	NA	
44	400 kV HASSAN - NEELAMANGALA 1	13-Sep-13	03:02	Y	Y	Y	Y	N	N	N	N	
45	400 kV KAIGA - GUTTUR 2	13-Sep-13	00:05	N	N	N	N	D	NA	NA	NA	
46	400 kV MYSORE - HASAN 1	12-Sep-13	23:10	Y	Y	Y	Y	Y	Y	Y	Y	
47	400 Kv GOOTY - NPS 2	12-Sep-13	02:55	D	D	D	D	Y	D	Y	Y	
48	400/220 kV ICT-1 AT HOODY	12-Sep-13	00:04	N	N	N	N	N	N	N	N	
49	400 kV MYSORE - HASAN 1	12-Sep-13	00:01	Y	Y	Y	Y	Y	Y	Y	Y	
50	400 kV MYSORE - HASAN 1	11-Sep-13	00:01	Y	Y	Y	Y	Y	Y	Y	Y	
51	400 kV VIJAYAWADA - NELLORE 1	10-Sep-13	03:04	Y	D	D	D	Y	Y	Y	D	
52	400 Kv KRISHNAPATNAM - NELLORE 1	10-Sep-13	03:04	Y	D	D	D	D	Y	Y	D	
53	400 Kv NPS - NELLORE -2	10-Sep-13	03:04	Y	D	Y	D	Y	Y	D	D	
54	400 kV VIJAYAWADA - NELLORE 2	10-Sep-13	03:04	Y	D	D	D	Y	Y	Y	D	
55	400 Kv GOOTY - NPS 2	10-Sep-13	03:04	D	Y	Y	D	Y	Y	Y	D	
56	400 kV NELLORE - ALAMATHI	10-Sep-13	03:04	D	D	D	N	N	N	N	N	
57	400 Kv NELLORE - SPDR	10-Sep-13	03:04	Y	N	N	D	Y	D	D	D	
58	400 kV KURNOOL - GOOTY	10-Sep-13	02:46	Y	Y	Y	D	Y	D	Y	D	
59	400 Kv NPS - NELLORE -1	09-Sep-13	23:59	Y	D	D	D	N	N	N	N	
60	400 kV HASSAN - NEELAMANGALA 1	09-Sep-13	23:49	Y	Y	Y	Y	Y	D	D	D	
61	400 kV MYSORE - HASAN 1	09-Sep-13	02:24	Y	Y	Y	Y	Y	Y	Y	Y	
62	400 kV VIJAYAWADA - NELLORE 2	09-Sep-13	01:34	D	D	D	N	Y	Y	Y	Y	
63	400 Kv KRISHNAPATNAM - NELLORE 2	09-Sep-13	01:34	Y	Y	Y	Y	Y	Y	Y	Y	
64	400 Kv NPS - NELLORE -2	09-Sep-13	01:34	Y	Y	Y	Y	N	N	N	N	
65	400 kV NELLORE - ALAMATHI	09-Sep-13	01:34	Y	Y	Y	Y	Y	Y	Y	Y	
66	400 kV VIJAYAWADA - NELLORE 1	09-Sep-13	01:33	Y	Y	Y	Y	Y	Y	Y	N	
67	400 Kv NELLORE - SPDR	09-Sep-13	01:01	Y	Y	Y	Y	Y	Y	Y	Y	
68	400 Kv NPS - NELLORE -1	08-Sep-13	22:57	Y	Y	Y	Y	Y	D	D	D	
69	400 kV MYSORE - HASAN 1	07-Sep-13	23:56	D	D	D	D	D	D	D	D	
70	400 kV MYSORE - HASAN 1	07-Sep-13	17:16	D	NA	D	D	N	N	N	N	
71	400/220 kV ICT-2 AT N'SAGAR	07-Sep-13	17:16	N	N	N	N	D	D	D	D	
72	400 kV RAMAGUNDAM - N'SAGAR 1	07-Sep-13	00:13	N	N	N	N	N	N	N	N	
73	220 kV SEDAM - TANDUR	06-Sep-13	04:03	Y	Y	Y	Y	Y	Y	Y	Y	
74	400 Kv NPS - NELLORE -1	05-Sep-13	18:51	D	D	D	D	N	N	N	N	
75	220 kV PONDYCHERRY- VILLIANUR	05-Sep-13	09:15	N	N	N	N	N	N	N	N	
76	400/230 kV ICT-3 AT S'PUDUR	04-Sep-13	00:24	D	D	D	D	Y	Y	Y	Y	
77	400 Kv GOOTY - NPS 2	03-Sep-13	23:58	Y	Y	Y	Y	D	D	D	N	
78	400 kV HASSAN - NEELAMANGALA 1	03-Sep-13	23:58	Y	Y	Y	Y	Y	Y	Y	Y	
79	400 Kv KOLAR - SPDR	03-Sep-13	23:55	Y	Y	Y	Y	Y	Y	Y	Y	
80	400 Kv NPS - NELLORE -1	03-Sep-13	23:48	Y	Y	Y	Y	Y	Y	Y	Y	
81	400 kV MYSORE - HASAN 1	03-Sep-13	18:15	D	NA	D	D	N	N	N	N	
82	400/220 kV ICT-1 AT HYDERABAD											

83	220 kV KANIAMPET - KADAKOLA	03-Sep-13	12:57	D	D	D	N	N	N	N	N	
84	220 kV AMBEWADI - PONDA 2	03-Sep-13	12:52	N	N	N	NA	N	N	N	N	
85	400 kV TALAGUPPA - HASSAN 1	02-Sep-13	22:42	D	D	D	N	D	D	D	D	
86	400 Kv HIRIYUR-BTPS 2	02-Sep-13	22:36	D	NA	NA	NA	N	N	N	N	
87	400 kV KAIGA - GUTTUR 2	02-Sep-13	11:41	N	N	N	N	D	D	D	D	
88	400/220 kV ICT-1 AT GUTTUR	02-Sep-13	11:41	D	NA	NA	D	N	N	N	N	
89	400/220 kV ICT-2 AT GUTTUR	02-Sep-13	11:41	D	NA	NA	D	N	N	N	N	
90	400 kV UDUMALPET - TIRUNELVELI 1	01-Sep-13	17:59	D	Y	Y	Y	D	Y	Y	Y	
91	220 kV AMBEWADI - PONDA 2	01-Sep-13	03:05	N	N	N	N	N	N	N	N	
92	400 Kv KRISHNAPATNAM - NELLORE 1	01-Sep-13	02:13	N	N	N	N	D	N	N	N	
93	400 Kv NELLORE - SPDR	01-Sep-13	02:01	Y	Y	Y	Y	D	D	D	D	
94	400 Kv NPS - NELLORE -1	01-Sep-13	02:01	Y	Y	Y	Y	Y	Y	Y	Y	
95	400 kV VIJAYAWADA - NELLORE 2	01-Sep-13	02:01	Y	Y	Y	Y	Y	Y	Y	Y	

FIR - First Information Report
D.R - Disturbance recorder Data
E.L - Event logger data
T.R - Trip report

Annexure - IID

TRIPPING DETAILS FOR OCT 2013

Y: AVAILABLE with in 24 HR D: Available After 24 HR N: Not Available

S.NO.	ELEMENT NAME	TRIPPING DATE	TRIPPING TIME	FIR (S)	DR (S)	EL (S)	TR (S)	FIR (R)	DR (R)	EL (R)	TR (R)
1	400/220 kV ICT-1 AT CHITTOOR	09-Oct-13	13:48	D	N	N	N	N	N	N	N
2	400/220 kV ICT-1 AT CUDDAPAH	09-Oct-13	12:00	N	N	N	N	N	N	N	N
3	400/220 kV ICT-2 AT CHITTOOR	09-Oct-13	10:36	D	N	N	N	N	N	N	N
4	400 kV KURNOOL - SRISAILAM	08-Oct-13	15:53	Y	N	N	N	N	N	N	N
5	400 kV SRISAILAM-MAMIDIPALLI 2	08-Oct-13	15:51	N	Y	Y	N	Y	N	N	N
6	400 Kv TRICHUR - KOCHI 1	08-Oct-13	13:31	Y	Y	Y	Y	Y	Y	Y	N
7	400/220 kV ICT-2 AT CHITTOOR	08-Oct-13	12:09	D	N	N	N	N	N	N	N
8	400 kV KAIGA - GUTTUR 1	08-Oct-13	10:19	N	N	N	N	N	N	N	D
9	400/220 kV ICT-1 AT N'SAGAR	07-Oct-13	23:57	N	N	N	N	N	N	N	N
10	400 kV KALPAKKA - VEMAGIRI 1	07-Oct-13	17:57	Y	N	N	N	Y	N	N	N
11	400 kV VTPS IV - SRISAILAM 2	07-Oct-13	17:57	Y	N	N	N	Y	N	N	N
12	400 kV VIJAYAWADA - VEMAGIRI 1	07-Oct-13	14:55	N	N	N	N	D	N	N	N
13	400 kV VIJAYAWADA - VEMAGIRI 1	07-Oct-13	14:03	N	N	N	N	D	N	N	N
14	400 kV KALPAKKA - VEMAGIRI 1	07-Oct-13	14:03	D	N	N	N	D	N	N	N
15	400 kV CHITTOOR - SPDR	07-Oct-13	12:50	N	N	N	N	D	N	N	N
16	400 kV CUDDAPPA - CHITTOOR	07-Oct-13	12:50	N	N	N	N	D	NA	NA	NA
17	400/220 kV ICT-1 AT CHITTOOR	07-Oct-13	12:50	N	N	N	N	N	N	N	N
18	400/220 kV ICT-2 AT CHITTOOR	07-Oct-13	12:50	N	N	N	N	N	N	N	N
19	400 kV KAIGA - GUTTUR 1	07-Oct-13	12:47	N	N	N	N	D	N	N	N
20	400/220 kV ICT-2 AT GOOTY	06-Oct-13	12:56	D	NA	D	D	N	N	N	D
21	400/220 kV ICT-2 AT CHITTOOR	06-Oct-13	12:25	D	N	N	N	N	N	N	N
22	220 kV KANIAMPET - KADAKOLA	06-Oct-13	11:52	D	D	D	D	N	N	N	N
23	400 kV KURNOOL - GOOTY	06-Oct-13	10:42	N	N	N	N	D	D	D	D
24	400 kV HYDERABAD - KURNOOL	06-Oct-13	10:35	N	N	N	N	N	N	N	N
25	400 kV KURNOOL - SRISAILAM	06-Oct-13	10:35	N	N	N	N	N	N	N	N
26	400/220 kV ICT-1 AT KARNOOL	06-Oct-13	10:25	N	N	N	N	N	N	N	N
27	400/220 kV ICT-2 AT KARNOOL	06-Oct-13	10:25	N	N	N	N	N	N	N	N
28	400 kV TALAGUPPA - HASSAN	05-Oct-13	22:50	N	N	N	N	N	N	N	N
29	400 kV MAHABOOB NAGAR - RAICHUR	04-Oct-13	10:25	N	N	N	Y	Y	Y	Y	Y
30	400 Kv GAJWEL - BHOOPALAPALLY 2	03-Oct-13	16:13	D	N	N	N	N	N	N	N
31	400 kV VEMAGIRI - GOUTHAMI CCCP 2	03-Oct-13	15:18	N	N	N	D	N	N	N	N
32	400/230 Kv ICT-1 AT SUNGUVARCHATRAM	03-Oct-13	15:02	D	D	D	N	N	N	N	N
33	220 kV AMBEWADI - PONDA 2	03-Oct-13	12:45	N	N	N	N	N	N	N	N
34	400 Kv NPS - SEPL	03-Oct-13	10:38	N	N	N	N	N	N	N	N
35	400 kV VIJAYAWADA - VTPS IV 2	03-Oct-13	06:49	N	N	N	N	N	N	N	N
36	GOOTY-SOMANAHALLI AT GOOTY	03-Oct-13	03:43	Y	D	D	D	Y	Y	Y	Y
37	400 kV NEYVELI TS 2- PONDICHERY	02-Oct-13	23:48	Y	NA	Y	Y	D	D	D	D
38	400 Kv PONDICHERY - SPCHATRAM	02-Oct-13	23:48	D	D	D	D	D	N	N	N
39	220 kV AMBEWADI - PONDA 2	02-Oct-13	14:37	N	N	N	NA	N	N	N	N

40	220 kV GUMMUDIPUNDI - SULLURPET	02-Oct-13	14:00	N	N	N	N	D	N	N	N
41	HVDC BHADRAVATHI POLE 1	01-Oct-13	16:28	N	N	N	N	N	N	N	N
42	HVDC BHADRAVATHI POLE 2	01-Oct-13	16:28	N	N	N	N	N	N	N	N
43	400 kV TIRUNELVELI - KUDAMKULAM 2	01-Oct-13	03:58	Y	D	D	Y	Y	N	N	D
44	400 kV TIRUNELVELI - KUDAMKULAM 2	01-Oct-13	02:57	Y	D	D	Y	Y	N	N	D

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TRIPPING DETAILS FOR NOV 2013

Y: AVAILABLE with in 24 HR
D: Available After 24 HR
N: Not Available
Nc:Correct Operation
Nu:Unwanted Operation
Nf:Fail to Operate at Internal Power System Fault

S.NO.	ELEMENT NAME	TRIPPING DATE	TRIPPING TIME	FIR (S)	DR (S)	EL (S)	TR (S)	FIR (R)	DR (R)	EL (R)	TR (R)
1	400/220 kV ICT-1 AT CUDDAPAH	30-Nov-13	16:35	D	D	D	D	NA	NA	NA	NA
2	400 kV HYDERABAD - N'SAGAR	29-Nov-13	17:02	Y	Y	Y	Y	NA	NA	NA	NA
3	220 kV EDAMON - EDAPPON	25-Nov-13	18:49	N	N	N	N	N	N	N	N
4	220 kV KAIGA - KADRA 1	24-Nov-13	10:15	Y	N	N	N	D	N	N	D
5	220 kV KAIGA - KODASALLY	24-Nov-13	10:15	Y	N	N	N	D	N	N	N
6	220 kV EDAMON - EDAPPON	22-Nov-13	18:44	N	N	N	N	N	N	N	N
7	HVDC BHADRAVATHI POLE 2	22-Nov-13	15:26	N	N	N	N	N	N	N	N
8	400 kV HYDERABAD - N'SAGAR	21-Nov-13	23:56	Y	Y	Y	Y	NA	NA	NA	NA
9	HVDC GAJUWAKA POLE 1	21-Nov-13	21:58	Y	NA	Y	Y	NA	NA	NA	NA
10	400 kV N'SAGAR - CUDDAPPA 1	21-Nov-13	17:27	NA	NA	NA	NA	Y	Y	Y	Y
11	220 kV SABARGIRI - THENI	20-Nov-13	13:02	N	N	N	N	D	D	D	D
12	400/220 kV ICT-1 AT NEELAMANGALA	18-Nov-13	01:18	Y	Y	Y	Y	N	Y	N	N
13	400/220 kV ICT-1 AT NEELAMANGALA	12-Nov-13	23:30	Y	Y	Y	Y	N	N	N	N
14	220 kV KAIGA - KODASALLY	11-Nov-13	13:20	N	N	N	D	N	N	N	D
15	400 Kv KLVDPT - VALLUR 1	11-Nov-13	01:51	D	D	D	D	N	N	N	N
16	400 kV RAMAGUNDAM - N'SAGAR 2	10-Nov-13	07:21	Y	Y	Y	Y	Y	Y	Y	Y
17	HVDC BHADRAVATHI POLE 1	09-Nov-13	14:50	N	N	N	N	N	N	N	N
18	400 Kv UDUMALPET - PALLAKAD 1	07-Nov-13	17:30	D	NA	NA	NA	Y	Y	Y	Y
19	400 Kv HASSAN - UPCL 2	05-Nov-13	10:48	D	D	D	D	Y	Y	Y	Y
20	220 kV IDUKKI - UDUMALPET	04-Nov-13	10:52	Y	Y	Y	N	D	D	D	D
21	400 kV KAIGA - GUTTUR 1	04-Nov-13	10:32	N	N	N	D	N	N	N	D
22	220 kV IDUKKI - UDUMALPET	03-Nov-13	18:17	Y	D	D	N	D	D	D	NA
23	400 kV KAIGA - GUTTUR 1	03-Nov-13	13:47	N	N	N	D	N	N	N	D
24	220 kV GOOTY - ALIPUR LINE	03-Nov-13	12:44	Y	Y	Y	Y	N	N	N	N
25	220 kV KAYAMKULAM - NEW PALLAM 2	02-Nov-13	16:00	Y	Y	Y	Y	N	N	D	D
26	220 kV IDUKKI - UDUMALPET	02-Nov-13	13:15	D	D	D	N	D	D	D	NA

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T.R - Trip report

Annexure - IIF

TRIPPING DETAILS FOR DEC 2013

Y: AVAILABLE with in 24 HR D: Available After 24 HR N: Not Available

Nc:Correct Operation Nu:Unwanted Operation

Nf:Fail to Operate at Internal Power System Fault

S.NO.	ELEMENT NAME	TRIPPING DATE	TRIPPING TIME	FIR (S)	DR (S)	EL (S)	TR (S)	FIR (R)	DR (R)	EL (R)	TR (R)
1	400/230 kV ICT-1 AT S'PUDUR	30-Dec-13	15:41	N	N	N	N	N	N	N	N
2	400 kV TALAGUPPA - NEELAMANGALA	29-Dec-13	14:01	N	N	N	N	D	N	N	N
3	400 kV GAJWEL - HYDERABAD	25-Dec-13	09:55	Y	N	N	N	N	N	D	D
4	400 kV GAJWEL - HYDERABAD	25-Dec-13	09:06	Y	N	N	N	N	N	D	D
5	400 kV GUTTUR - NARENDRA 1	24-Dec-13	21:14	Y	NA	NA	Y	Y	Y	Y	Y
6	400 kV GUTTUR - NARENDRA 2	24-Dec-13	21:14	Y	NA	NA	Y	Y	Y	Y	Y
7	400 kV KAIGA - GUTTUR 2	24-Dec-13	21:14	D	NA	N	NA	Y	NA	NA	Y
8	400 kV GUTTUR - HIRIYUR 1	24-Dec-13	21:14	Y	NA	NA	Y	Y	Y	Y	Y
9	400 kV JSW TORANAGALLU-GUTTUR	24-Dec-13	21:14	N	N	N	N	Y	NA	NA	Y
10	400 kV MUNIRABAD - GUTTUR	24-Dec-13	21:14	N	N	N	N	Y	NA	NA	Y
11	400/220 kV ICT-1 AT GUTTUR	24-Dec-13	21:14	N	N	N	N	Y	NA	NA	Y
12	400/220 kV ICT-2 AT GUTTUR	24-Dec-13	21:14	N	N	N	N	Y	NA	NA	Y
13	400 kV KAIGA - GUTTUR 1	24-Dec-13	21:14	D	NA	N	NA	Y	NA	NA	Y
14	400 kV VIJAYAWADA - VEMAGIRI 1	24-Dec-13	02:01	Y	Y	Y	Y	Y	NA	Y	Y
15	400 kV MAHABOOB NAGAR - RAICHUR	22-Dec-13	02:03	N	N	Y	N	N	N	N	N
16	400 kV MAHABOOB NAGAR - RAICHUR	22-Dec-13	01:21	N	N	Y	N	N	N	N	N
17	220 kV EDAMON - EDAPPON	20-Dec-13	12:06	N	N	N	N	N	N	N	N
18	400 kV MAHABOOB NAGAR - RAICHUR	19-Dec-13	22:16	N	N	D	D	N	N	N	N
19	400 kV TALAGUPPA - NEELAMANGALA	19-Dec-13	15:06	N	N	N	N	N	N	N	N
20	HVDC GAJUWAKA POLE 1	19-Dec-13	12:58	N	N	N	N	N	N	N	N
21	400/220 kV ICT-1 AT GUTTUR	15-Dec-13	13:06	N	N	N	N	N	N	N	N
22	400 kV VIJAYAWADA - VEMAGIRI 1	15-Dec-13	03:00	Y	D	Y	Y	D	N	D	D
23	400 kV VTPS IV - SRISAILAM 1	14-Dec-13	20:30	N	N	N	N	N	N	N	N
24	400 kV SRISAILAM-MAMIDIPALLI 1	14-Dec-13	20:12	N	N	N	N	D	N	N	N
25	400 Kv GAJWEL - SHANKARPALLY 1	13-Dec-13	02:59	D	D	D	N	D	N	N	N
26	400 kV NEYVELI TS 2- PONDICHERY	12-Dec-13	15:16	Y	Y	Y	Y	D	N	N	N
27	400 kV NEYVELI TS 2- SALEM 2	12-Dec-13	15:16	Y	Y	Y	Y	D	D	D	Y
28	400 kV NEYVELI TS2- NEYVELI TS-2 (EXP)	12-Dec-13	15:16	Y	Y	Y	Y	D	D	D	D
29	400 kV NEYVELI TS2- NEYVELI TS-I (EXP)	12-Dec-13	15:16	Y	Y	Y	Y	N	N	N	N
30	400 Kv PALLAKAD - TRICHUR 2	11-Dec-13	17:19	Y	Y	Y	Y	N	N	N	N
31	400 kV TALAGUPPA - HASSAN	09-Dec-13	23:35	Y	NA	NA	Y	Y	Y	Y	Y
32	400 kV N'SAGAR - CUDDAPPA 1	09-Dec-13	18:49	Y	Y	Y	Y	Y	Y	Y	Y
33	400 Kv VTPS - MALKARAM 2	09-Dec-13	11:35	N	N	N	N	Y	Y	Y	Y
34	400/220 kV ICT-2 AT BANGALORE	08-Dec-13	11:44	Y	NA	Y	Y	D	N	N	N
35	400 Kv ALAMATHI - NCTPS ST2 -1	05-Dec-13	14:16	D	D	D	D	NA	NA	NA	NA
36	400 Kv NCTPS - VALLUR 1	05-Dec-13	14:16	D	D	D	D	D	D	D	D
37	400 kV N'SAGAR - CUDDAPPA 1	05-Dec-13	12:47	D	N	N	N	N	N	N	N
38	N'SAGAR - CUDDAPAH FSC-I AT CUDDAPAH	05-Dec-13	12:47	N	N	N	N	D	D	D	D
								N	N	N	N

39	400 kV MUNIRABAD - GUTTUR	05-Dec-13	09:49	N	N	N	N	N	N	N	N
40	400 kV KHAMMAM - KTPS 2	04-Dec-13	03:00	D	N	D	D	N	N	N	N
41	400 Kv ALAMATHI - NCTPS ST2 -1	02-Dec-13	11:29	D	D	D	N	D	D	D	D
42	400 Kv NCTPS - VALLUR 1	02-Dec-13	11:29	D	D	D	D	N	N	N	N
43	400 kV TALAGUPPA - HASSAN	01-Dec-13	22:00	Y	N	N	Y	Y	Y	Y	Y