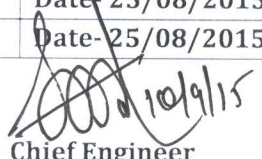


EVENT ANALYSIS REPORT

UNIT NO : 04					TPS : Khaperkheda TPS		Unit Capacity : 210 MW		
1. *HO Code :		Station Code : T003		Time - 12:59 Hrs		Date - 25/08/2015		No. of days from last sync. : 9 days	
2. Operating conditions at the time of Event :-									
Load			Coal Cycles in service				Oil Support		
94 MW			A, C & D				AB & CD, 3 Gun at each elevn.		
3. Nature of Event : Set tripped on 'Generator Reverse Power Protection' due to sudden closure of turbine control valves.									
4. Name of First Up , Main Protections & Protection on which GCB tripped : Gen Trip (First Up) Gen Trip, Turbine Trip, MFT operated, Trip gear operated.									
5 A) Observations : Due to loss of HPSO / IPSO pressure, turbine control valves closed suddenly but EHC demand was persisting. This resulted in actual EHC position zero and thereby load dropped to zero. Consequently, T.A. Set tripped on 'Generator Reverse Power Protection'.									
5 B) Remedial Action/work done: <i>No work done.</i>									
6. Root Cause Analysis : Load Shedding Relay (LSR) operates under following conditions - (1) Sudden load throw off is more than 50% of running load on turbine. (2) Frequency is more than 50 HZ. In this instance turbine control valves did not open even after persisting demand from EHC due to mal-operation of Load shedding Relay. (Detail sheet attached seperately)									
7. Preventive action suggested (Short Term) :-									
8. Preventive action suggested (Long Term) :-									
9. Similar event occurred last time:-				Unit No # 4 , 210MW		Time : Hrs		Date:	
Event: No similar event found.									
Remedial Actions :									
9A. Implementation Status of Long Term/Short Term measures stated at Sr No 7 & 8 :-									
10. Boiler lighted up				Time - 13:50 Hrs		Date- 25/08/2015			
11. T-A Set Synchronized				Time - 15:09Hrs		Date- 25/08/2015			
12. Remark :-									
 Chief Engineer									
13. Recommendations of Works Section:									
1. Procurement/Replacement Plan:									
2. Operational Error:									
3. Delay in Maintenance:									
4. Delay in bringing back the Unit:									
5. Training of Staff:									
6. Whether remedial action is completed satisfactory & point is closed:									
C E/Dy C E (Works)									

Date:02/09/2015

Unit-4 Tripping analysis dtd. 25/08/2015

As per the trip log sheet it is observed that all HP/IP control valves observed in closed/not closed position simultaneously; without closure of ESV/IV.

This action is possible only when LSR(Load Shedding Relay) gets operated under following conditions:

- 1.) Sudden load throw off is more than 50% of running load on turbine.
- 2.) Frequency is more than 50Hz.


Trip oil pressure is responsible for generation of HPSO/IPSO pressure which operates HPCV/PCV. Also ESV/IV gets operated by trip oil pressure. Therefore HPSO/IPSO oil pressure will be reduced only in case of loss of trip oil pressure.

In this tripping incidence, HPSO/IPSO pressure reduced which resulted into closure of control valves while ESV/IV remained open as there was no loss of trip oil pressure.

Only LSR operation individually reduces HPSO/IPSO oil pressure by keeping the trip oil pressure constant.

Due to mal-operation of LSR even after command from EHC the control valves did not open & causing tripping of the turbine on generator reverse power protection. I&C may check mal-operation of LSR.

In this regard manual reference sheet attached here with.


EE(TM-1)

The low-vacuum trip is fitted with an additional piston arranged above the adjustable spring and is supplied with primary oil pressure so that with shut-down turbine and lack of vacuum it is possible to latch the trip devices and thus build up trip oil pressure for adjusting and testing the control loop and similar purposes. When the turbine is shut down there is no primary oil pressure which causes the additional piston to unload the adjustable spring which is arranged above the diaphragm system. The spool valve is raised so high by the spring installed below the diaphragm system that the auxiliary trip oil circuit is closed and the trip devices may be latched in.

As soon as the turbine is started up and brought up to speed, primary oil enters above the additional piston and forces it into the lower limit position even at a speed far below rated speed. Thus the normally set response value of the low-vacuum trip for initiation of the turbine trip is the governing factor again before the turbine has reached rated speed.

Solenoid Valves for Load Shedding Relay

Solenoid valves MAX45 AA001 and MAX46 AA011 are provided to prevent the turbine from reaching

trip-out speed in the event of a sudden load rejection. These valves are actuated by the load shedding relay if the rate of load drop relative to time exceeds a predetermined value. Solenoid valve MAX45 AA001 then directly opens the i.p. secondary oil circuit. Solenoid valve MAX46 AA011 opens the auxiliary secondary oil circuit. Pilot valve KA07 of hydraulic converter MAX45 BY011 moves upwards and allows the control oil to flow to the area below piston KA08 of hydraulic amplifier MAX45 BY011. Piston KA08 moves to its upper limit position and all secondary oil circuits are depressurised.

Since the IP secondary oil circuit opens directly, the reheat stop and intercept valves (which control the major portion of the power output) close without any appreciable delay. A slight delay is involved in closing all control valves by opening the auxiliary secondary oil circuit before an increase in speed causes the speed governor to respond. At the same time extraction check valves LBQ50, LBS21, LBS31, LBS40 AA, which are dependent on secondary oil also close. After an adjustable interval, the solenoid valves are reclosed and the new secondary oil pressures corresponding to the reduced load may build up.