TRIP ANALYSIS REPORT

TRIP ANALYSIS REPORT /TAR-013/ UNIT 1 / 08.08.2017 **Dt. 08-08-17**

OCCURRENCE:

(a) **Condition:** Unit-1 was in service with 505 MW in LP mode with 6 mills in service at 7:53 hrs on 08.08. 2017.Both UTs were not available due to breaker problem and the HT buses were fed from station transformer no1 and ST2 was under LC.

(b) **Incident:** Boiler tripped at 7:55:40 hrs on 08.08.17 on MFT (Both ID fans off) due to electrical bus failure on over current because of overcurrent in ST-1 (primary 227 A for 5.9 seconds) due to starting of MDBFP in Unit-2 for hydro-test purpose. LPT rupture diaphragms opened because of both CW Pump tripped during this unit disturbance. Unit-1 was light up at 16:37 hrs and synchronized at 20:46 hrs on 08.08.2017.

SOE OF DDCMIS ALARM PAGES:

TIME	DESCRIPTION	STATUS
07:55:39.771	ID FAN A-1	Off
07:55:39.771	ID FAN A-2	Off
07:55:39.999	IDF B VFD CH1 Tripped	
07:55:39.999	IDF B VFD CH2 Tripped	
07:56:39.771	ID FAN A-3	Off
07:56:39.771	APH A Motor	Off
07:56:39.792	APH B Motor	Off
07:55:40.009	Both FD Fans On & IDF B Off	True
07:55:40.009	IDF B & A Protection acted	True
07:55:40.148	Both ID Fans Off	True
07:55:40.164	Cond Tr PC Tripped	True
07:55:40.168	**MFT Ch1**	**True**
07:55:40.174	IA-1 Tripped	True
07:55:40.174	IA-2 Tripped	True
07:55:40.174	SA-1 Tripped	True
07:55:40.213	**MFT Ch2**	**True**
07:55:40.350	IDF A VFD CH1 Tripped	
07:55:40.350	IDF A VFD CH2 Tripped	
07:55:40.360	Both FD Fans on IDFA Off	True
07:55:40.360	IDF A Protection Acted	
07:55:40.395	MFT CH-1 TP1	
07:55:40.395	MFT CH-2 TP1	
07:55:40.398	MFT Ch3	True
07:55:40.719	0BA-0BC Tie Close	Not True
07:55:40.767	1CA Bus-B UV	Failure
07:55:41.148	All FD Fans Off	True
07:55:41.195	TP CHNL1.1 On	True

07:55:41.370	RTS 1 On	
07:55:41.385	Turb Trip Ch1.1 CMD	On
07:55:41.385	Turb Trip Ch1.2 CMD	On
07:55:41.602	Main Trip VLV-1	Tripped

ANALYSIS from SOE and feedback from board engineers.:

1. Unit was in service at 505 MW and 6 mills in service.
2. ST2 was under maintenance due to low insulation resistance of R phase and Y phase 11KV cable between 0BC winding and OBC incomer breaker.
3. At 07:55:35 MDBFP-2C was started for unit-2 boiler hydraulic test after raising bus voltage.
4. At 07:55:40.168 unit-1 tripped on MFT (both IDFs Off) on loss of 11kV, 3.3 KV and 0.4 KV supply. All the running equipments tripped in unit-1 & 2. Meantime DG set came in auto and 0.4kV supply was fed N/E bus. In Unit 1, as 24V C&I Supply MCB tripped in CRE 61 Panel, the alternator breaker from DG set was closed manually and subsequently MCB was normalized.
5. DC driven equipment for all critical equipment were in service.
6. On failure of 11 kV & 3.3 kV all running equipments tripped and some of the critical equipments are mentioned below:
    a. CW Pump-A & B.
    b. Vacuum Pump-A&B tripped.
    c. ACW-B tripped.
    d. CEP-B & C tripped
    e. HPCF-1 tripped.
    f. TG DMCW –A & B tripped.
    g. SG DMCW-B tripped.
    h. AOP-1 & JOP-1 tripped.
    i. HPBP OSU-1 & 2 tripped.
7. On Turbine trip, both HP Bypass valves (BPVs) opened 100 %. But BPVs couldn't be closed neither in remote nor from local due to non-availability of both OSU Pumps.
8. Condenser vacuum breaker got opened due to tripping of HPCF pump. LPBP was closed immediately to stop steam dumping inside condenser. Close command for Boiler stop valve (MSV-1&2) was given. Seal steam for both TDBFPs and main turbine was isolated. Meantime, LP Turbine rupture diaphragm (boiler side) got opened.

CONCLUSION:

Following points were concluded:

1. When MDBFP was started in unit-2, heavy current drawl was noticed momentarily. Hence, primary current (227 A) in ST-1 exceeded for more than 5.9 seconds and it tripped on Inverse definite over current protection. As ST-1 was only in charged condition, 11kV supply failed and subsequently 3.3 kV and 0.4 KV supply failed.
2. Due to non-availability of Cooling water inside condenser on tripping of both CW pumps lead to LPT rupture diaphragm explosion though vacuum breaker was in open condition.
3. Both bypasses could not be closed immediately and steam continuously supplied to condenser. this led to failure of explosion diaphragm even though vacuum breaker was opened.
4. The ST1 was charged and the system was normalized and 0BB was charged and TIE was availed for 0BD bus. The circulating water pump house service transformers are in 1BA and 2BB bus. 1BA bus gets power supply from 0BA bus and 2BB bus gets power supply from 0BC bus which in turn gets supply from 0BA bus as ST2 is under maintenance. There was a minor breaker problem in 0BA incomer breaker and that was attended and then the 11KV and then 3.3KV buses and then 0.4 KV buses were normalized.

RECOMMENDATIONS:

1. To prevent LPT rupture diaphragm explosion during station pullout conditions, following suggestions shall be adopted/implemented:
    a. Tripping of boiler on tripping of all CW Pumps(1A,1B,1C/2A,2B,1C).
    b. Protection closing of line drain MOVs before HPH 6A & 6B on tripping of both CW Pumps.
    c. For Turbine valve MCC one supply is from unit service Transformer 1DA and other supply is from N/E bus 1DG. Whenever the main supply from 1DA fails the power supply will automatically changeover to N/E supply source once the bus gets supply from the DG set. This changeover has to be checked during the next available opportunity.
    d. One HPBP OSU supply shall be taken from Normal/Emergency bus (1DG/2DG). Now both the HPBP OSU are getting supply from Turbine MCC bus (1KA/2KA).
    e. HRH ERVs shall be opened to reduce the accumulated pressure in RH coils.

2. The Normal Inverse setting of station transformer 1 and 2 may be revised from 175A 0.22sec TMS to 180A 0.26 sec TMS. However, when only one station transformer is feeding the entire station loads before starting MDBFP it should be analyzed case by case and then only it should be taken into service. The overloading capacity of transformer depends on the normal loading status of the transformer just before overloading and the average ambient temperature of medium. It may be noted that NTPL Station Transformers capacity is 63MVA each only but power stations of similar capacities are having station transformers of capacity 80MVA each.
3. The load on the CHS, shore unloader may be temporarily stopped before starting MDBFP whenever one station transformer is feeding the entire station load.
4. As station transformer capacity limitation comes when one station transformer is feeding the entire station, the process of starting TD BFP with AST without entirely depending on MD BFP in such cases may be explored and expedited.

CM/OS(T) DGM/C&I DGM/Elec DGM/O&C