TRIP ANALYSIS REPORT

TRIP ANALYSIS REPORT /TAR-12/ UNIT 2 / 06.04.17 Dt. 11-04-17

OCCURRENCE:

(a) **Condition:** Load: 492 MW at 23:38:00 hrs. on 06.04.17 with 6 Mills in LP mode and coal flow 291 TPH.

(b) **Incident:** Turbine tripped on Generator Electrical protection (Stator Winding Flow Very Low) at 23:47:39 hrs. Boiler was in service with support of 5 HFO oil guns and 66 TPH of coal flow. Boiler tripped at 01:59:34 hrs on MFT (All BFP Off) because MDBFP tripped on suction pressure Very low and TDBFP-2A & 2B were on STG.

OBSERVATIONS FROM SOE OF DDCMIS ALARM PAGES AND BOARD ENGINEER FEEDBACK:

TIME	DESCRIPTION	STATUS
23:39:55.285	FL Main Bushing T-1	V Low
23:39:55.285	FL Main Bushing R-3	V Low
23:39:55.285	FL Main Bushing R-1	V Low
23:39:55.285	FL MN BSG_R	Old =False and New=Tripped
23:39:55.357	FL MN BSG_T	Old =Tripped and New=False
23:39:55.845	FL MN BSG_R	Old =Tripped and New=False
23:46:38.286	Flow Stator Wnd-3	V Low_2TP2
23:46:38.286	Flow Stator Wnd-2	V Low_2TP2
23:46:38.286	Flow Stator Wnd-1	V Low_2TP2
23:46:38.286	ST WNG FL OL	Tripped_2TP2
23:46:38.720	Flow Stator Wnd-3	V Low_2TP1
23:46:38.720	Flow Stator Wnd-2	V Low_2TP1
23:46:38.720	Flow Stator Wnd-1	V Low_2TP1
23:46:38.720	ST WNG FL OL	Tripped_2TP1
23:47:10.810	PW Temp High	Alarm_2TP2
23:47:13.712	PW Temp High	Alarm_2TP1
23:47:38.834	Tur Trip CH2.3 CMD	
23:47:38.834	Tur Trip CH2.2 CMD	
23:47:38.834	Tur Trip CH2.1 CMD	
23:47:39.247	Tur Trip CH1.3 CMD	
23:47:39.247	Tur Trip CH1.2 CMD	
23:47:39.440	Tur Trip CH1.1 CMD	
23:47:40.612	ALL ESVs Closed	
01:59:20.077	MDBFP-C Suction Pr V Low	
01:59:22.056	BFP-C Tripped	
01:59:23.394	BFPs Tripped-1	
01:59:34.017	MFT CH3	
01:59:34.088	MFT CH2	
01:59:34.260	MFT CH1	

ANALYSIS FROM SOE:

From SOE following incidents were observed:

At 23:39:55.285 hrs, Stator Bushing flow very low appeared and trip command acted. As the corresponding trip was in bypass condition, it didn't process for turbine trip. At 23:46:38.720 hrs Stator winding flow very low 2/3 acted and turbine tripped at 23:47:38.834 hrs. Boiler was in service with HP & LP Bypass. At 01:59:20.007 hrs MDBFP suction pressure became low and it tripped on suction pr very low protection. It led to the condition of all BFP off, because both TDBFPs were on STG and MDBFP alone was in service to maintain drum level. Hence Boiler tripped on MFT (all BFP Off) at 01:59:34.017 hrs.

ANALYSIS on F/B FROM BOARD Operator:

As per board engineers' feedback, Primary water temperature was maintaining around 57.5 °C at the load of 500 MW. As the PW temperature was very close to trip value of 60 °C, the operation executive had opened the primary water tank drain with an intention to improve the temperature of primary water by draining hot water and admitting fresh cold water. However, the PW tank level suddenly reduced and it affected water flow to stator bushing and winding. After observing frequent fluctuation of bushing flow between trip value and normal value, bushing flow low protection was bypassed by the concerned operation executive one by one for R phase, Y phase and B phase. Subsequently primary water flow to stator winding became very low. In turn turbine tripped on stator winding flow very low protection. Boiler was in service with HPLP Bypass. Firing was limited to 66 TPH of coal flow with 2 mills (2D&2F) in service and 5 HFO guns. At 01:57 hrs, BPV-1 suddenly fluctuated and created disturbance in drum level control. In-order to maintain drum level, MDBFP scoop was loaded. Mean time MDBFP suction pressure suddenly reduced below 10 Ksc and MDBFP tripped on suction pressure V low protection. Boiler tripped on MFT (All BFP Off) at 01:59:34 hrs.

CONCLUSION:

Following points were concluded:

- Primary water temperature was maintaining at higher side 57.5 °C due to high DMCW TG water temperature at TG PHE outlet around 49 °C against normal value of 38 °C.
- In order to improve PW temperature by creating flow and admitting fresh water, the PW tank drain was opened.
- PW tank level became low and Stator winding flow reduced to trip value.
- Turbine tripped on Stator winding flow low.

- MDBFP tripped on suction pressure very low. And Boiler tripped on all BFP off.
- Suction strainer choke is suspected for BFP.
- BPV-1 haunting was due to servo unit problem.

After getting clearance, the boiler was light up at 02:20 hrs with one HP Bypass (BPV2) and the unit was synchronized at 03:21 hrs on 07.04.201.

RECOMMENDATIONS:

- Without consulting concerned maintenance division, any inadvertent operations in critical areas shall not be carried out.
- It may be noted that fresh DM water cannot be added to the closed circuit of Primary water system as conductivity of the water has to be maintained continuously as 500 MW Generator does not have Conductivity High protection. Moreover, DM water has to be added step by step only having a close watch on dissolved oxygen level.
- Protections shall not be bypassed without getting concurrence from concerned divisions and particularly Generator board engineer should not instruct for protection bypass. As O rings are assembled along with the bushings, damage to the O rings will result in longer shut down period.
- De-Scaling of TG PHE shall be carried out to improve DMCW TG temperature.
- Online Self-Cleaning (SCS) Strainer performance is not effective due to failure in mechanism. SCS shall be provided with proper manway for cleaning it during ensuing shutdown period. Suitable modification may be done to make it as like debris filter mechanism.

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