COMMITTEE REPORT ON TDBFP UNLOADING IN UNIT1 ON 04.07.2017

PREAMBLE:

On 04.07.2017 at 02:44 hrs, Unit-1 was in service at 375 MW with both TDBFPs in service. At 02:48 hrs both TDBFPs were unloaded and created drum level disturbance. Later MDBFP was started and unit was stabilised. In this regard, a committee has been constituted on 05.07.2017 to study and analyse the root cause for unloading of TDBFPs and to provide suitable recommendations to prevent the repetition of it in future.

OBSERVATION and ANALYSIS:

Board Operator's Feedback:

As per concerned board operators, Unit was in service at 375 MW with TDBFP 1A & 1B in service and MDBFP in auto standby condition. At Around 02:48 hrs, TDBFP 1B suddenly unloaded and drum level started reducing. After observing the situation, TDBFP 1B was hand tripped. But MDBFP didn't come into service on auto. Hence MDBFP was started manually and feeding was given to normalise the drum level. When drum level was on rising trend, TDBFP 1A didn't respond to the variation. Hence it was hand tripped to control drum level.

Trend and SOE:

Trend:

Trend Data is attached in Annexure-A.

SOE:

Time	Description	
02:48:41.472	1TDBFPA	SPDREF > Actual (100rpm)
02:49:20.195	1BFPDTB_Ref_Rem	Old = Remote; New = Local
02:50:13.157	1BTURB_TRIP_HMI	TDBFP 1B Hand tripped
02:50:13.515	1BFPC SGC Auto Start	
02:50:14:005	MDBFP C AOP Auto Start	
02:50:14.015	Rapid Start Up 92 vlv Auto Open	
02:50:14.550	MDBFP AOP ON	
02:50:14.825	TDBFP 1B Tripped	
02:50:28.712	Feed Pump Limiting	

02:50:28.722	Runback Feed Pump Acted
02:50:32.167	Pulv Motor F Off
02:50:37.736	Pulv Motor E Off
02:50:39.010	MDBFP C Standby selection removed
02:52:49.527	Pulv Motor D Stop PB Pressed
02:53:22.466	MDBFP Manual Start

OBSERVATION:

Following observations were made from the trend and SOE:

1. Unit was in service at 375 MW with TDBFP- 1A & 1B in service with a feed water flow of 1226 tph and MS flow of 1136 tph and drum level -55mm at 02:44 hrs.
2. SC O/P, Suction flow, Actual speed, Discharge pressure for TDBFP 1A: 39 %, 827 tph, 4852 rpm, 167 Ksc and TDBFP 1B: 48%, 832 tph, 4844 rpm, 167 Ksc.
3. For the same Speed demand, difference in SC output between TDBFP 1A & 1B was found to be around 9 %.
4. Re-circulation valve for TDBFP 1A was in closed condition and for TDBFP 1B was in open condition with a flow of 437 tph.
5. TDBFP 1B was hand tripped at 02:50:13.157 hrs and MDBFP auto start command processed at 02:50:13.515. But Pump didn't start.
6. As TDBFP 1B tripped and MDBFP didn't start on Auto Run back was initiated at 02:50:28.722 hrs followed by tripping of top two pulverisers (Mill 1E & 1F). Total coal flow reduced from 194 tph to 139 tph. Correspondingly load reduction was observed from 375 MW to 297 MW. Again at 02:52:49.527 hrs, Mill 1D was manually tripped and coal flow reduced to 101 tph. Load also reduced to 265 MW.
7. As MDBFP didn't start on auto, it was deselected from remote mode and was started manually at 02:53:22.466 hrs and was loaded to maintain Drum Level.
8. At 02:58:40 hrs, TDBFP 1A was hand tripped.

ANALYSIS and RECCOMENDATIONS:

Based on above observations, following analysis was made:

1. From the trend it is clear that when unit-1 was in service at 375 MW with TDBFP 1A & 1B for pumping feed water to drum, the recirculation valve for TDBFP 1A was kept in close condition and for TDBFP 1B, it was kept in open condition. When the suction flow of both pumps was more than 800 tph each, only around 1226 tph was being pumped to drum

and balance water was recirculated to de-aerator. In order to maintain the drum level, speed controller output of both pumps were increased.

2. As per logic, when SC OP reaches around 50 %, MCV of TDBFP will go for 100 % open. On further increase in SC OP, TDBFP speed will be controlled by ACV and subsequently opening of MCV will reduce to 65 %. On reduction in MCV opening from 100 % to 65 %, TDBFP may unload if ACV doesn't open and create disturbances in drum level. At 02:44 hrs, TDBFP 1B was in service with Speed Controller OP 48 % and at 002:46 hrs it was 50.9 %. As SC OP was more than 50 %, TDBFP 1B unloaded due to closing of MCV from 100 % to 65 % and ACV didn't open even though LP secondary oil pressure increased to 2.5 Ksc.
3. Due to above problem, TDBFP 1B was manually tripped at 02:50:13.157 hrs and auto start command for MDBFP initiated at 02:50:13.515 hrs. But MDBFP didn't start on auto as pressure low switch was provided in DMCW upstream of working oil cooler instead of pressure adequate switch. (As MOV was inoperative, the pressure switch healthiness couldn't be checked since commissioning). MDBFP was started manually and loaded to maintain drum level.
4. Since TDBFP 1A alone was in service to feed the water to the drum, SC OP increased to more than 50 % and similar trend happened as in TDBFP 1B. LP secondary oil pressure increased to 3.49 Ksc and ACV didn't open. When the drum level was at +176 with MDBFP and TDBFP 1A in service, TDBFP 1A response to drum level controller was not in synchronous. Hence it was manually tripped by the operator in order to maintain drum level.
5. For same speed demand in both TDBFPs, BFP 1B speed controller Out Put was maintaining 9 % higher than BFP 1A. Hence SC OP for TDBFP 1B increased to more than 50 % earlier than BFP 1A and resulting in unloading of pump due to no response from ACV.
6. Valve characteristics of both TDBFP's were compared with design valves and found that TDBFP-1B opening of MCV is less compared to TDBFP-1A. Valve characteristic is attached in (Annexure-B).

RECCOMENDATIONS:

Following points are recommended based on the analysis:

1. MCV closing from 100% to 65%, when Speed Controller Output demand >51% logic may be modified as follows.

"As per the existing logic, "when the speed controller output demand of TDBFP crosses 51%, MCV opening comes to 65% from 100% without ensuring ACV opening". Hence it is suggested to

modify this logic as “When the speed controller output demand crosses 51%, its opening is to be reduced to 65% from 100 % only after ensuring demand >51% and open feedback from ACV. So that unloading of TDBFP can be avoided.” This can be implemented as trial measure.

2. Valve characteristics of MCV’s & ACV’s to be adjusted equally.
3. Oil quality in TDBFP 1A and 1B shall be ensured. One time all ACV pilot valve block shall be cleaned with oil stone so that it should be free from any high spot ensuring free pilot rotation. Oil flushing shall be done for at least for 4 hrs.
4. Continuous Operation of centrifuge shall be ensured till oil quality improves.
5. MOV to DMCW working oil cooler was made ready and DMCW to working oil cooler upstream pressure switch is suitably modified as adequate switch by negating the low switch in the logic (not less than 3 ksc) and implemented in Start permissive of MDBFP.
6. When both TDBFPs are in service, the recirculation valves can be closed based on the demand. When Re-circulation valves for any TDBFP is kept open purposefully to tackle any adversary situation at low load, enough care shall be taken to close it during load raising period.
7. During auto start of MDBFP, Close F/B for DMCW 43 (DMCW TG cooling water for working oil cooler) shall be available.
8. Turbine seal steam pressure shall be maintained around 200 mmWC always.
9. Main pump and BP seal leak shall be as per recommended norms. If seal leak is more, it shall be attended immediately to prevent water entry into Pump bearing casing, causing oil contamination.

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