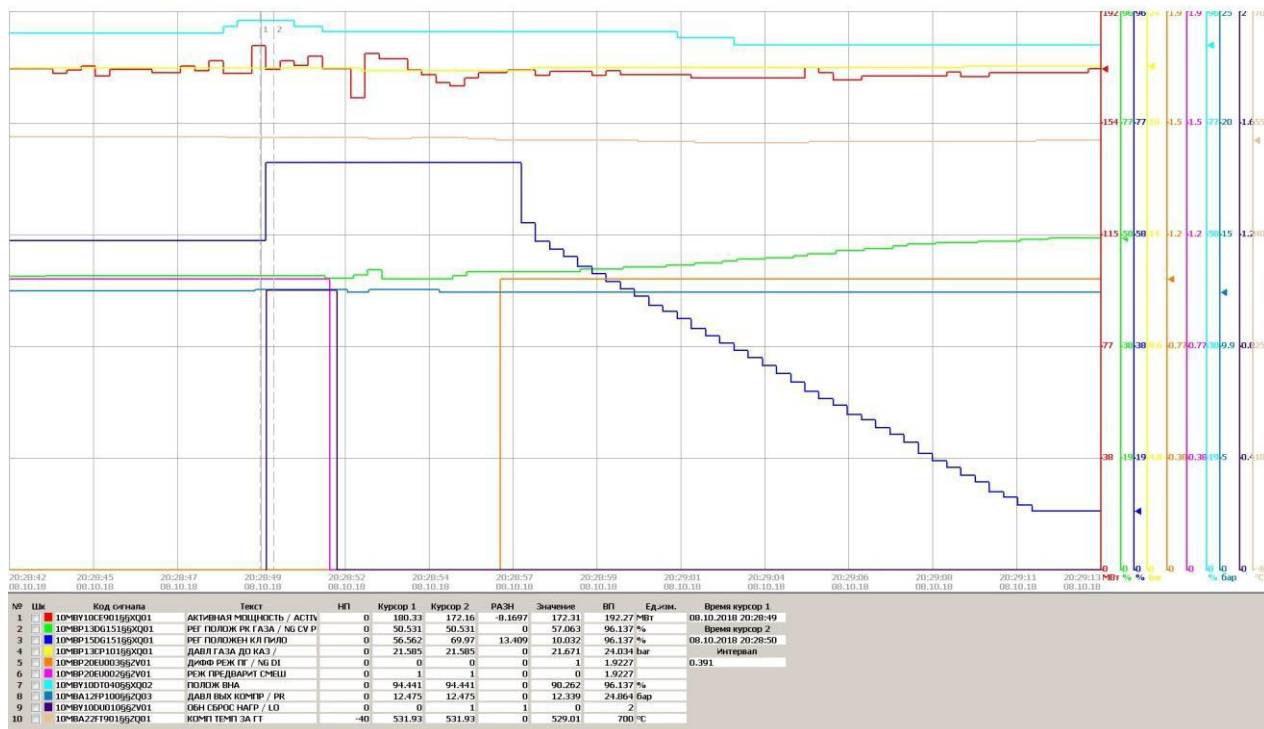


IS/18
dated --.--.2018

Information Message on PRANA Predictive Analytics and Remote Monitoring System

On --.--. 2018 at 20:29, the PRANA predictive analytics and remote monitoring system revealed a change in the technical condition of GTU, associated with the transition from pre-blend to diffusion mode at the load of 171 MW and the corrected temperature at the GT exhaust of 531 °C.



CV Alarm Sequence

Name:

Created: 2018/10/09 09:17:46,527

Time: c 2018/10/08 19:00:00,000 no 2018/10/08 21:00:00,000

Time	Type of s.	Prio	Name	Designation	Meaning	Note
2018/10/08 20:24:39,565	ACU	0	10NDG20AA801 TRBL_AL	Report, Pipeline from AIS (air intake system) heaters	ERROR/	
2018/10/08 20:28:50,098	П	0	10MBY10DU010 ZV01	ОБН СВРОС НАР / LOAD REJECTION DETECT	INPUT IN	
2018/10/08 20:28:52,098	П	0	10MBY10DU010 ZV01	ОБН СВРОС НАР / LOAD REJECTION DETECT	INPUT IN	

Fig. 1 Switching to diffusion on 08.09.2018

In the course of identification of the reason for the change of the combustion mode, an archive in a *IDB format and an event logging were requested from the facility. As a result of the analysis of archive and event logging, it has been established that:

- On --.--.2018 at 20:28:50, a quick (abnormal) transition from pre-mixing to diffusion was automatically performed due to load shedding (Fig. 1).
- During the analysis of the Event Log, periodic signal passages were also detected (see Fig. 2, marked by hatching):

10MBP13DG151|XM03 NG CV POSN CTRL OPER POINT

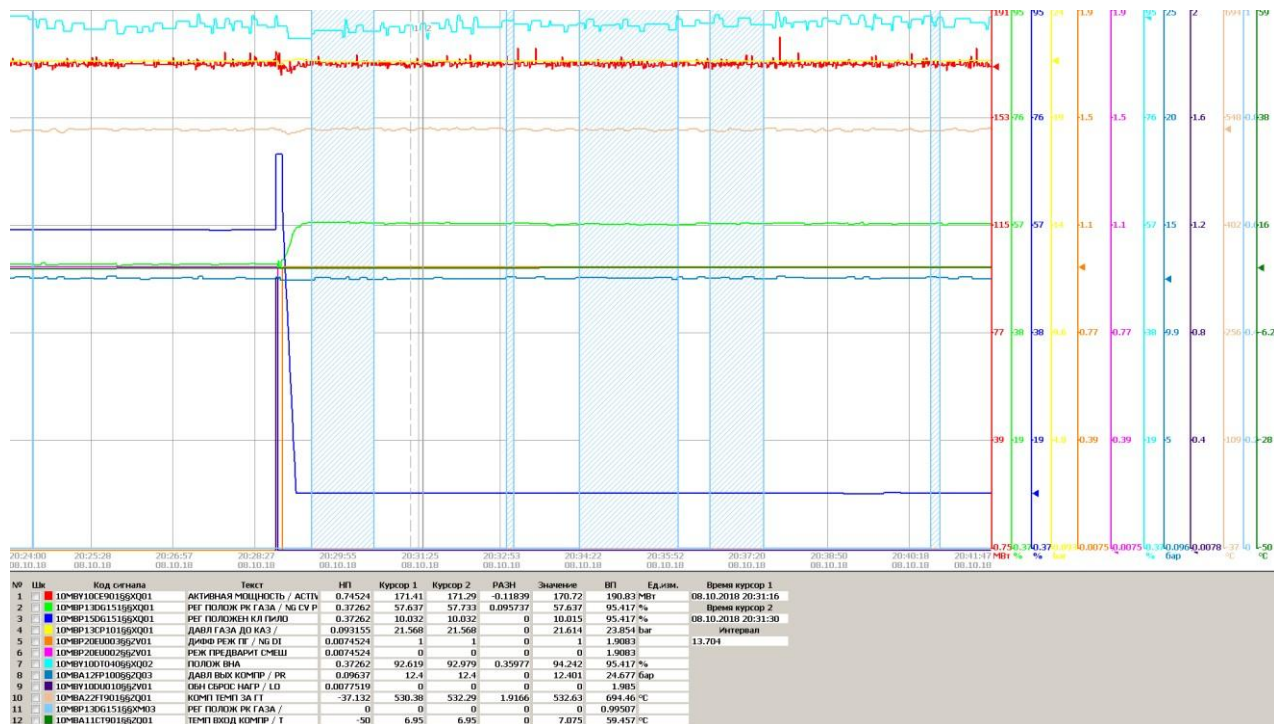


Fig. 2. 10MBP13DG151||XM03 signal passage on --.---.2018

Passage of this signal indicates that an absolute value at the position controller output for a natural gas master valve (11MBP13AA151) exceeds the specified upper limit.

Consequences:

- Impact is made on the proper functioning of position control of natural gas master valve (11MBP13AA151);
- The control valve actuator should be checked and reset with the next turbine downtime.

To ensure the control valve movement to a safe boundary position even at the loss of power, a servo valve should be mechanically pre-positioned or "adjusted". This adjustment, also called as "operating point", must be compensated in the controller. This message about disfunction becomes active only when the control valve is in its control range (1%<valve position <99%), the position sensor does not fail, and power is supplied to the preliminary control solenoid valves.

Thus, the improper functioning of the natural gas master valve can lead to the malfunctions in gas distribution system and deviations in the combustion mode.

It is worth noting that the transition from the diffusion combustion mode to the preliminary mixing mode is possible at joint fulfillment of the following conditions:

- corrected temperature at the GT exhaust should be over 510 °C;
- IGV position should be less than 5%;
- absence of failure in gaseous fuel controls;
- fuel gas pressure is in the acceptable range.

It is recommended to:

1. Check the valve for mechanical and/or electrical damage, check the valve stroke with a comparison of the position in place against the readings at operator workstation.
2. Check the servo driven coils for wire breaks.
3. Check the servo valve for wear (flexible hose, pullback spring, control piston, etc.).
4. Check hydraulic oil characteristics (temperature, viscosity, moisture absorption).
5. Adjustment point should be checked and, if necessary, set to a reference value by the ACS technician. If deviation is > 5%, contact the service company or the equipment manufacturer.

Chief Specialist
on Turbine Equipment

/Signature/

P.V. Mudrov