Selectivity of Level Transmitter in Tanks susceptible to foam and moisture.

An innovative idea which is implemented

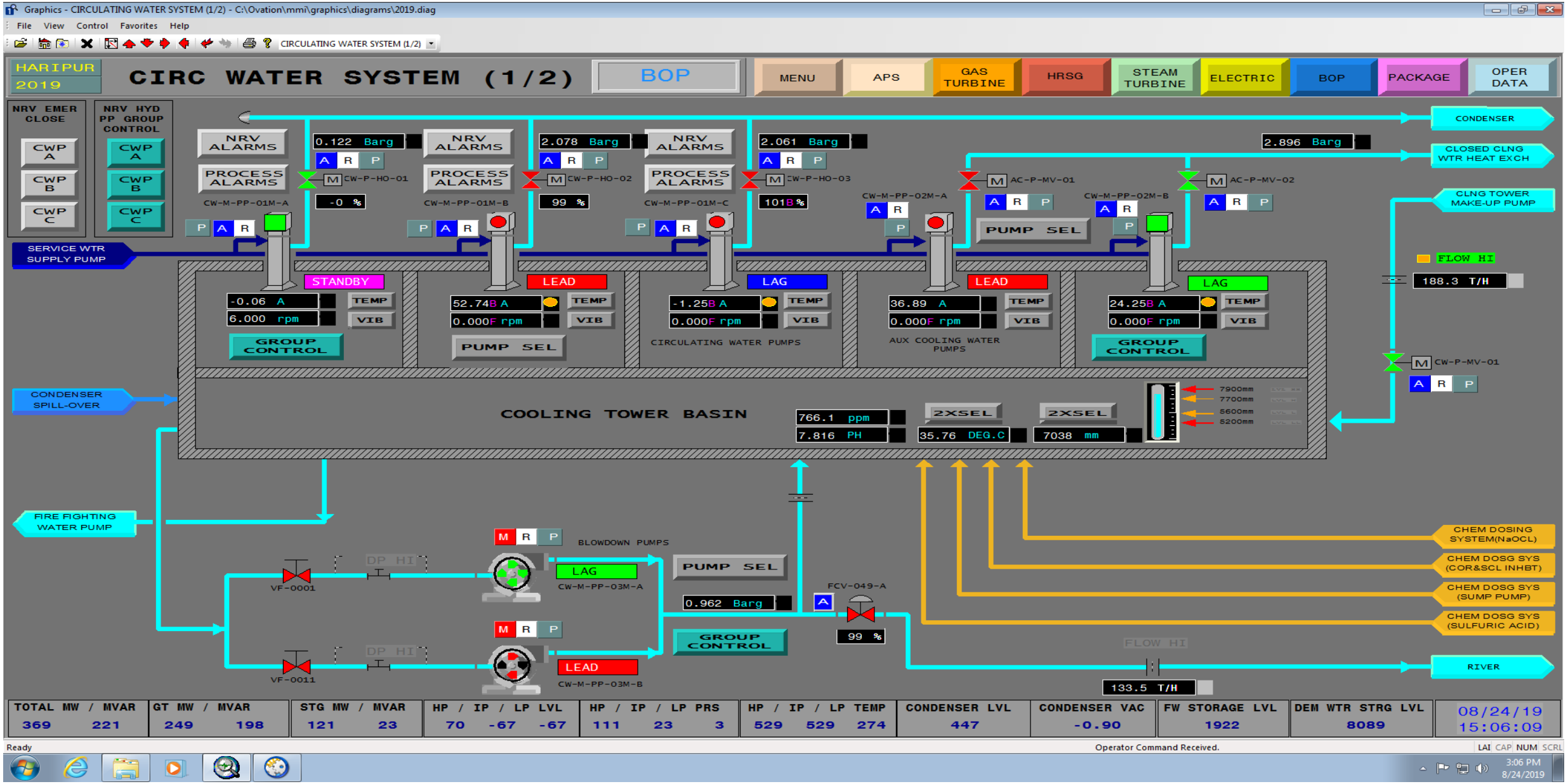
in Haripur 412 MW CCPP.

Effect of Level signal Malfunctioning

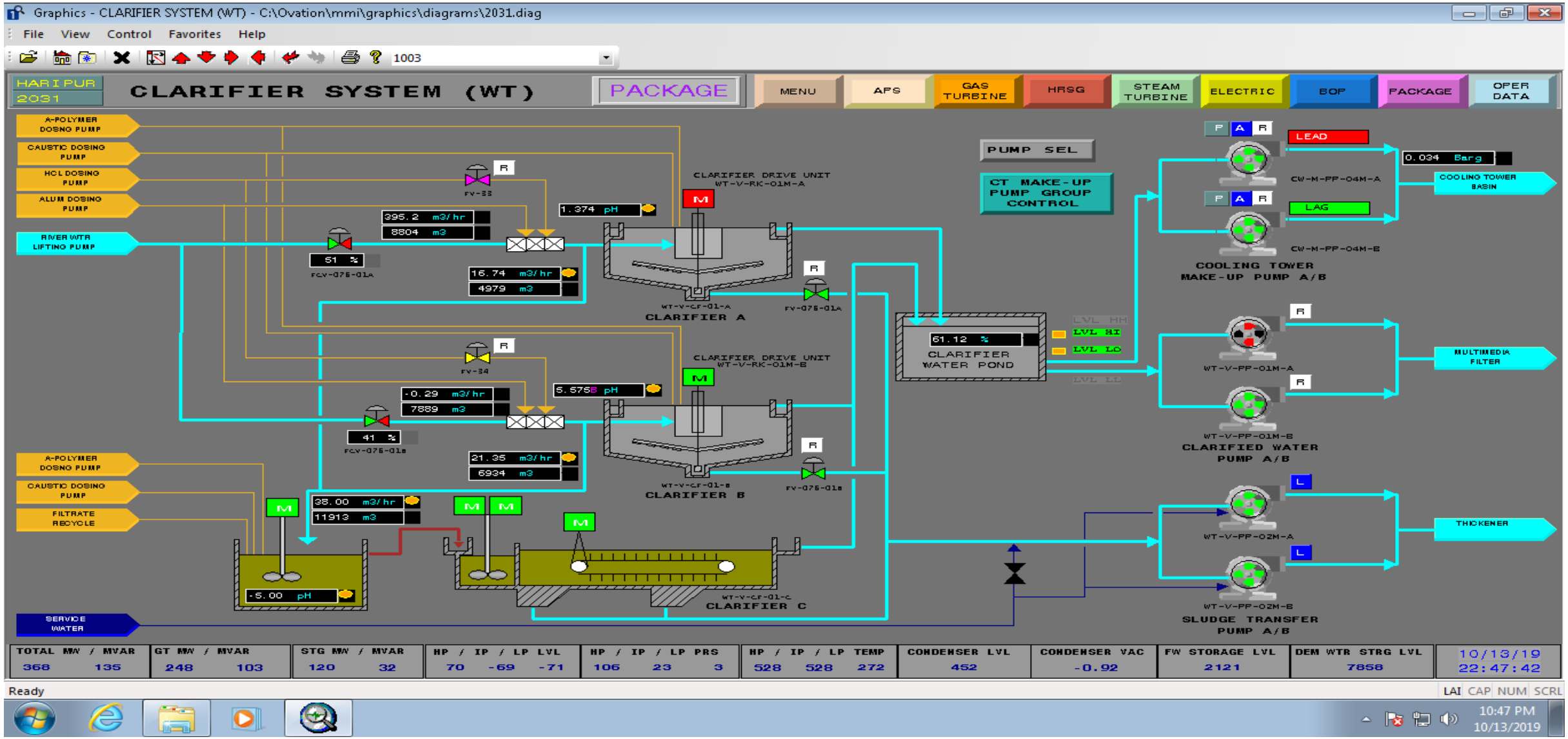
In CT Basin

- Level Measurement of Cooling Tower Basin Radar type LT
- Malfunction of Transmitter signal
- Override stopped of Circulating water pump
- Condenser Vacuum Fall
- Exhaust Steam Pressure high
- Tripping of Steam Turbine

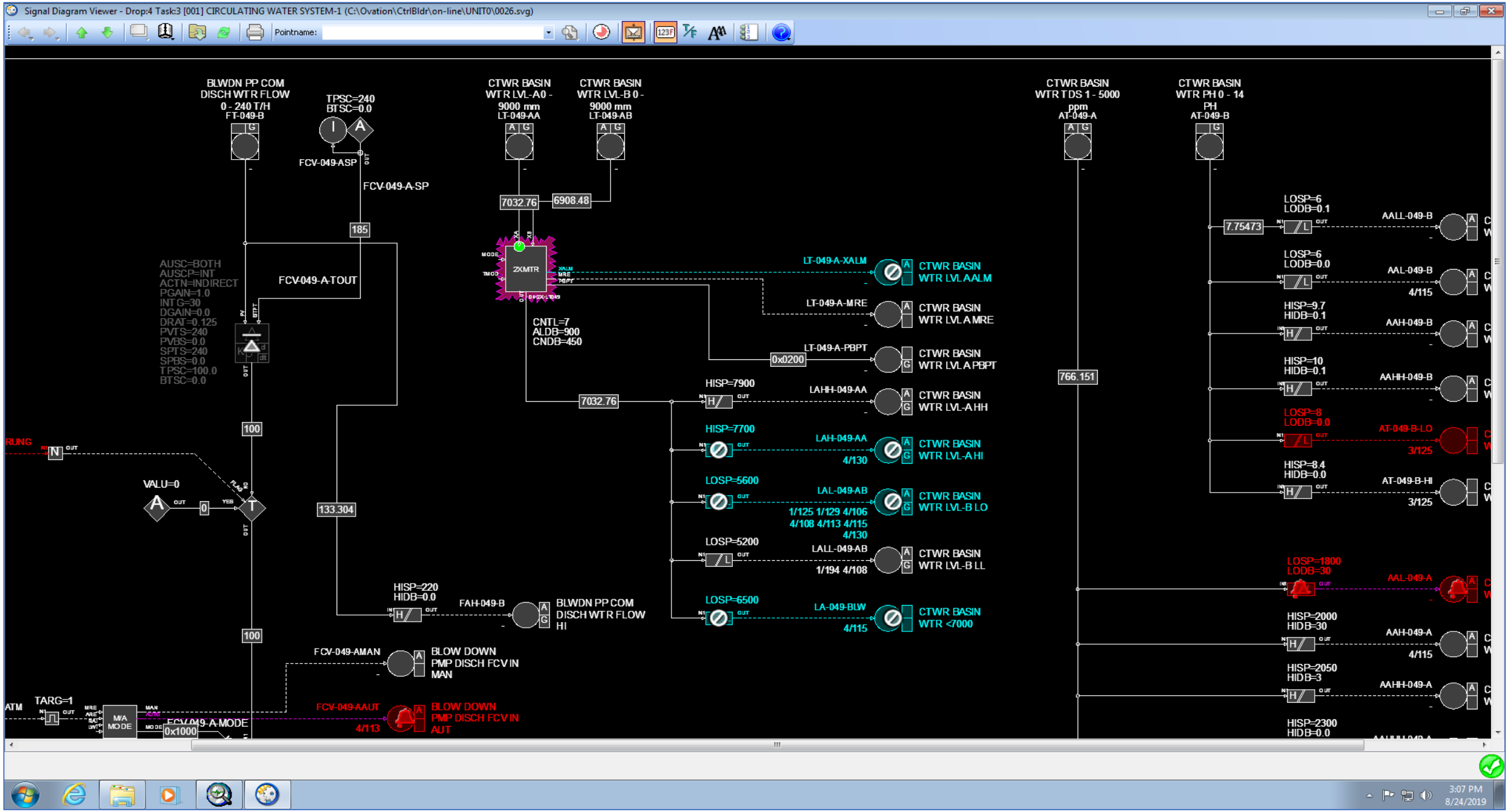
Process Diagram-1

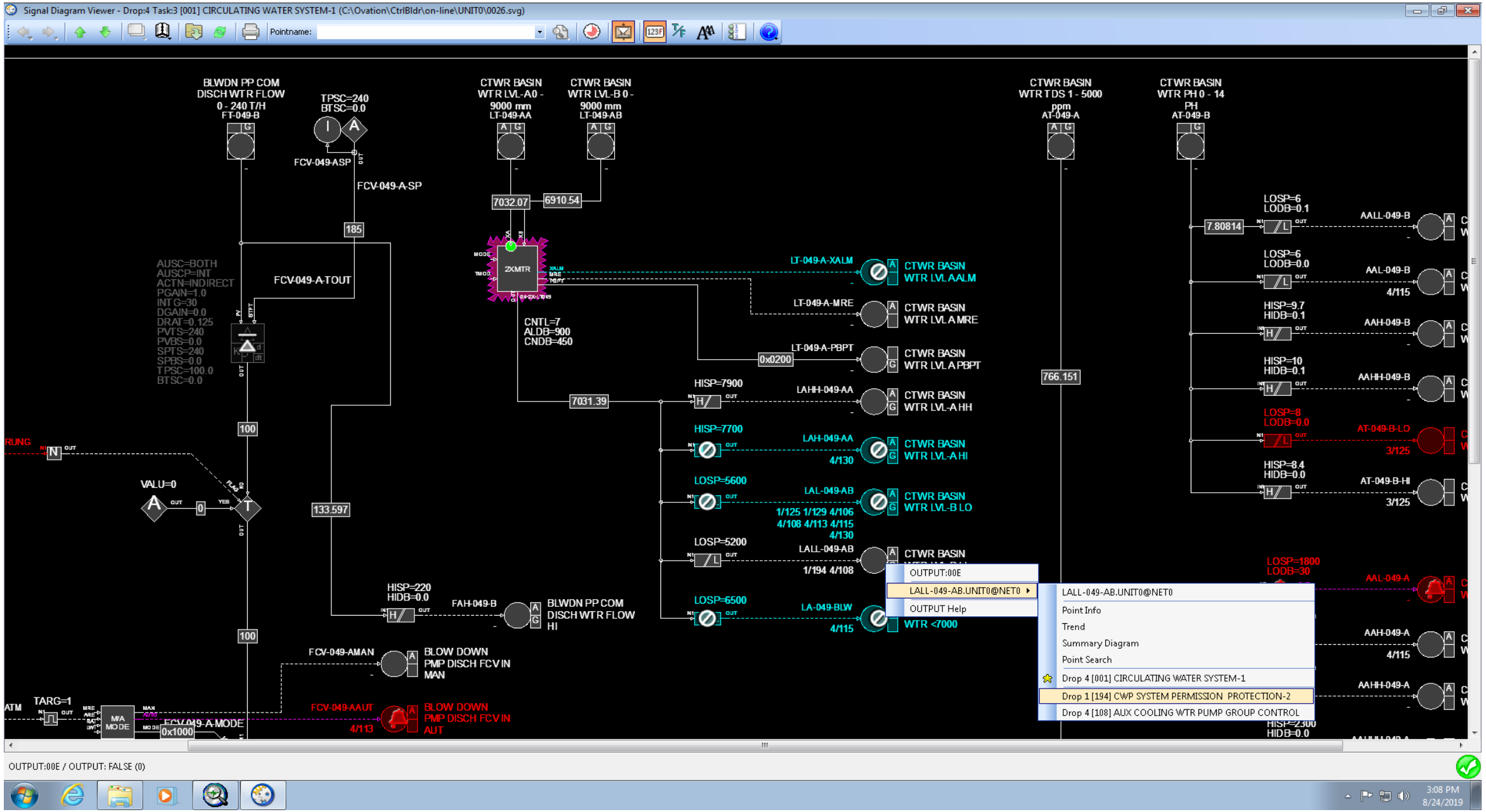


Process Diagram-2

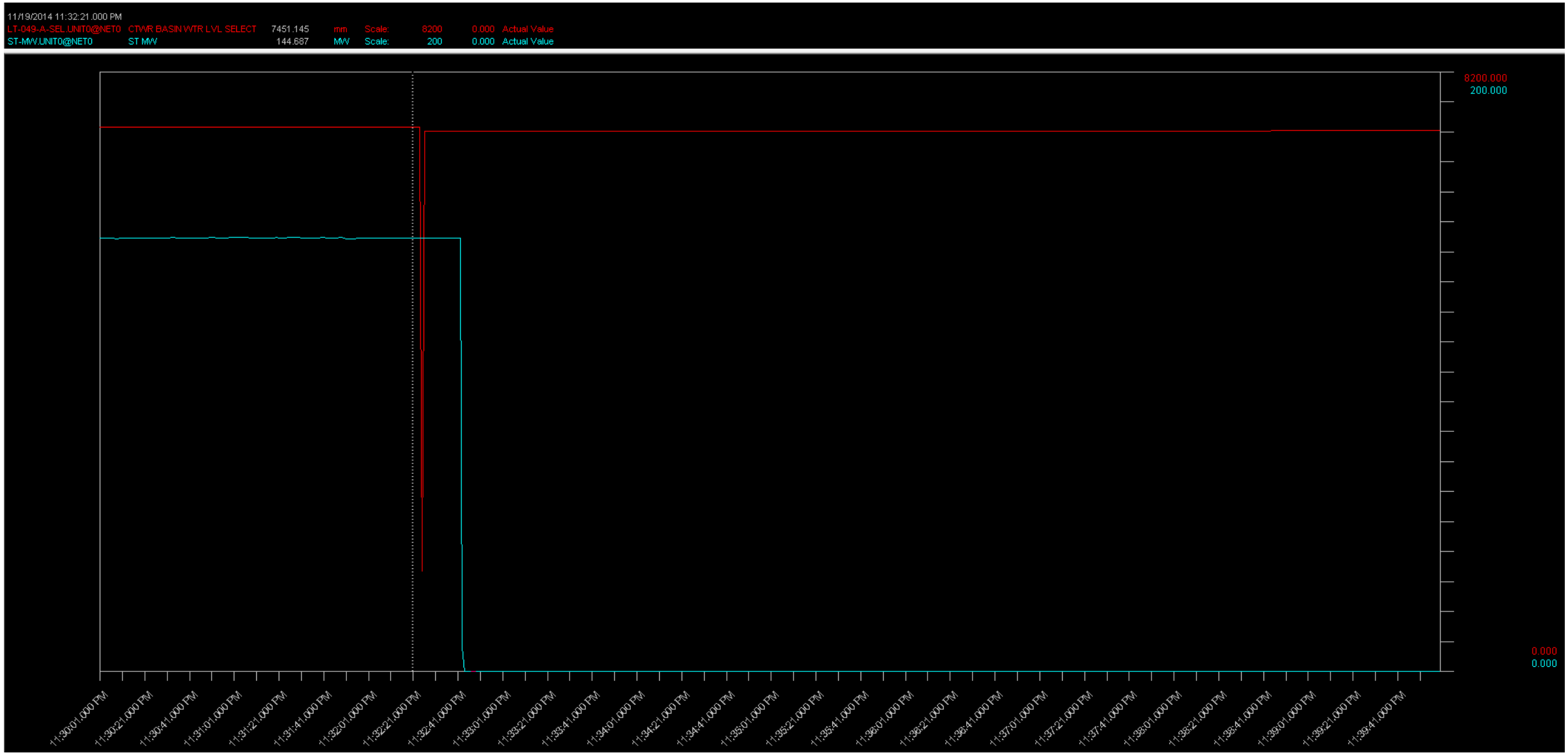


Logic and Interlock

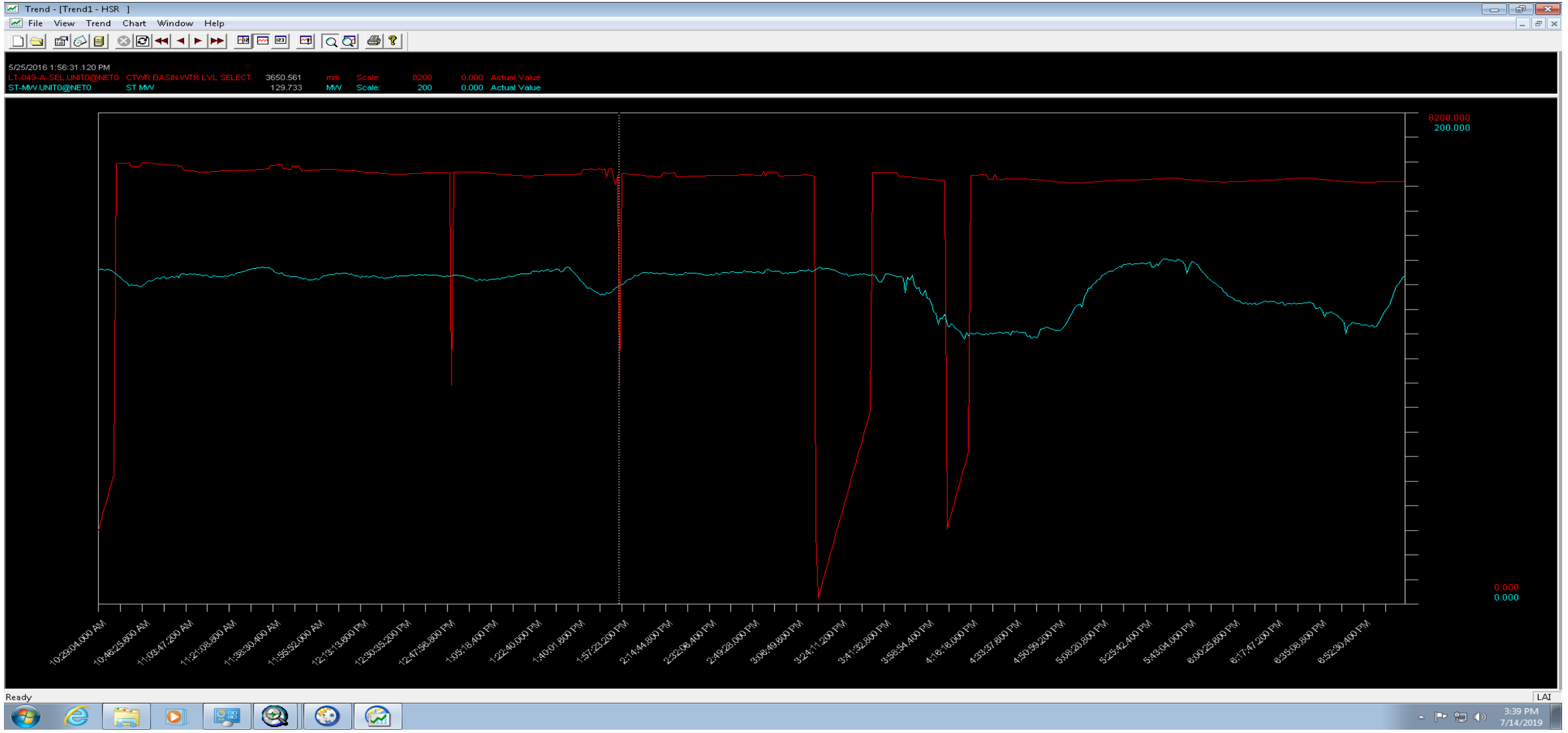



Signal Diagram Viewer - Drop:4 Task:3 [001] CIRCULATING WATER SYSTEM-1 (C:\Ovation\CtrlBldr\on-line\UNIT0\0026.svg)
Pointname:
BLWDN PP COM DISCH WTR FLOW 0 - 240 T/H FT-049-B
TPSC=240 BTSC=0.0
FCV-049-ASP
FCV-049-A-SP
CTWR BASIN WTR LVL-A 0 - 9000 mm LT-049-AA
CTWR BASIN WTR LVL-B 0 - 9000 mm LT-049-AB
7032.07
6910.54
185
AUSC=BOTH
AUSP=INT
ACTN=INDIRECT
PGAIN=1.0
INTG=30
DGAIN=0.0
DRAT=0.125
PVTS=240
PVBS=0.0
SPTS=240
SPBS=0.0
TPSC=100.0
BTSC=0.0
FCV-049-A-TOUT
2XMTR
CNTL=7
ALDB=900
CNDB=450
LT-049-A-XALM
LT-049-A-MRE
LT-049-A-PBPT
0x0200
CTWR BASIN WTR LVL A ALM
CTWR BASIN WTR LVL A MRE
CTWR BASIN WTR LVL A PBPT
7031.39
HISP=7900
LAHH-049-AA
CTWR BASIN WTR LVL-A HH
HISP=7700
LAH-049-AA
4/130
CTWR BASIN WTR LVL-A HI
LOSP=5600
LAL-049-AB
1/125 1/129 4/106 4/108 4/113 4/115 4/130
CTWR BASIN WTR LVL-B LO
LOSP=5200
LALL-049-AB
1/194 4/108
CTWR BASIN
LOSP=6500
LA-049-BLW
4/115
WTR <7000
OUTPUT:00E
LALL-049-AB.UNIT0@NET0
OUTPUT Help
LALL-049-AB.UNIT0@NET0
Point Info
Trend
Summary Diagram
Point Search
Drop 4 [001] CIRCULATING WATER SYSTEM-1
Drop 1 [194] CWP SYSTEM PERMISSION PROTECTION-2
Drop 4 [108] AUX COOLING WTR PUMP GROUP CONTROL
CTWR BASIN WTR TDS 1 - 5000 ppm AT-049-A
766.151
CTWR BASIN WTR PH 0 - 14 PH AT-049-B
7.80814
LOSP=6 LODB=0.1
AALL-049-B
LOSP=6 LODB=0.0
AAL-049-B
4/115
HISP=9.7 HIDB=0.1
AAH-049-B
HISP=10 HIDB=0.1
AAHH-049-B
LOSP=8 LODB=0.0
AT-049-B-LO
3/125
HISP=8.4 HIDB=0.0
AT-049-B-HI
3/125
LOSP=1800 LODB=30
AAL-049-A
AAH-049-A
4/115
AAHH-049-A
HISP=2300 HIDB=0.0
RUNG
VALU=0
133.597
100
100
HISP=220 HIDB=0.0
FAH-049-B
BLWDN PP COM DISCH WTR FLOW HI
FCV-049-AMAN
BLOW DOWN PMP DISCH FCV IN MAN
ATM
TARG=1
M/A MODE
FCV-049-A-MODE
0x1000
FCV-049-AAUT
4/113
BLOW DOWN PMP DISCH FCV IN AUT
OUTPUT:00E / OUTPUT: FALSE (0)
3:08 PM
8/24/2019

Example of process interruption



Plant Running By signal Forcing

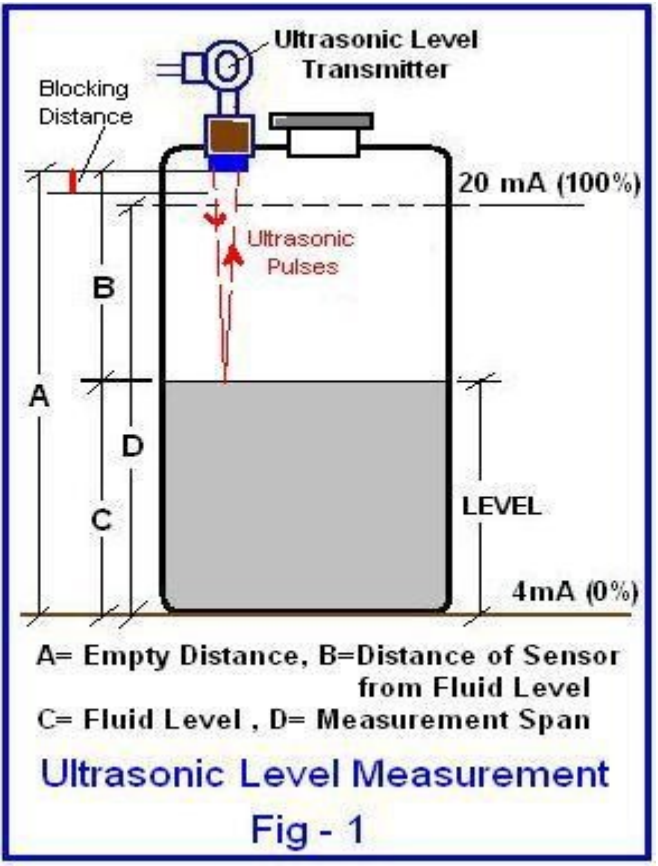


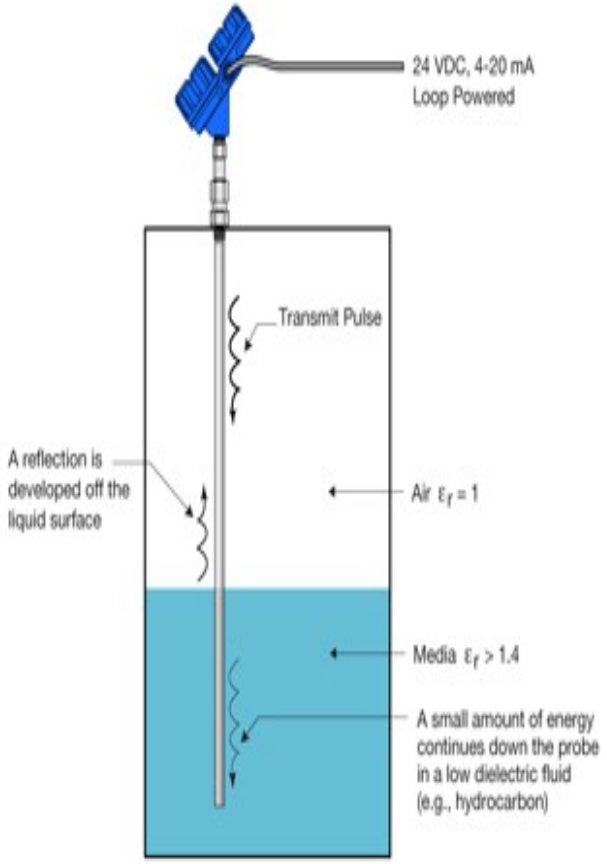
Cause of problem:

- **Generation of foam in liquid:** As the water source of our plant, river Shitalakhya supplies rather contaminated water, moderately high amount of chemical dosing is done to get the desired quality specially in the winter season. As a result, the foam is produced in quite a high amount in cooling tower, clarified water tank and in other such tanks. Such foaming incident is shown below:
- **Moisture:** The presence of moisture in enclosed vessel is another recurring factor in level transmitter malfunction. The moisture gets accumulated on the head of level transmitter and cause it to send erroneous output.
- It is to be mentioned that foam and moisture caused problem in the transmitter because the level transmitters originally installed in the system were ultrasonic/radar type level transmitters. These type of level transmitters sends a wave and waits for the reflected wave. The time lapse between sending and receiving the reflection is then utilized to calculate the level. Due to their working principle, the ultrasonic/radar type level sensors are susceptible to malfunction in presence of foam and moisture.

- **FACTORS CAUSING FOAM:** Excessively High Alkalinity, Chemical Overfeed, Increased Bacteriological Activity , Reduction of Biological Activity ,Process Contamination, High Degree of Suspended Solids. Many cooling towers will produce a small to a moderate amount of foam , depending on water chemistry, treatment chemicals and the presence of bio fouling (algae and bacterial) supplying natural surfactants.
- **FACTORS CAUSING MOISTURE:** Due to the temperature difference and different humidity

Radar /Ultrasonic Level Transmitter replaced by Magnetic float/gear type Level Transmitter in a closed vessels/Tanks.



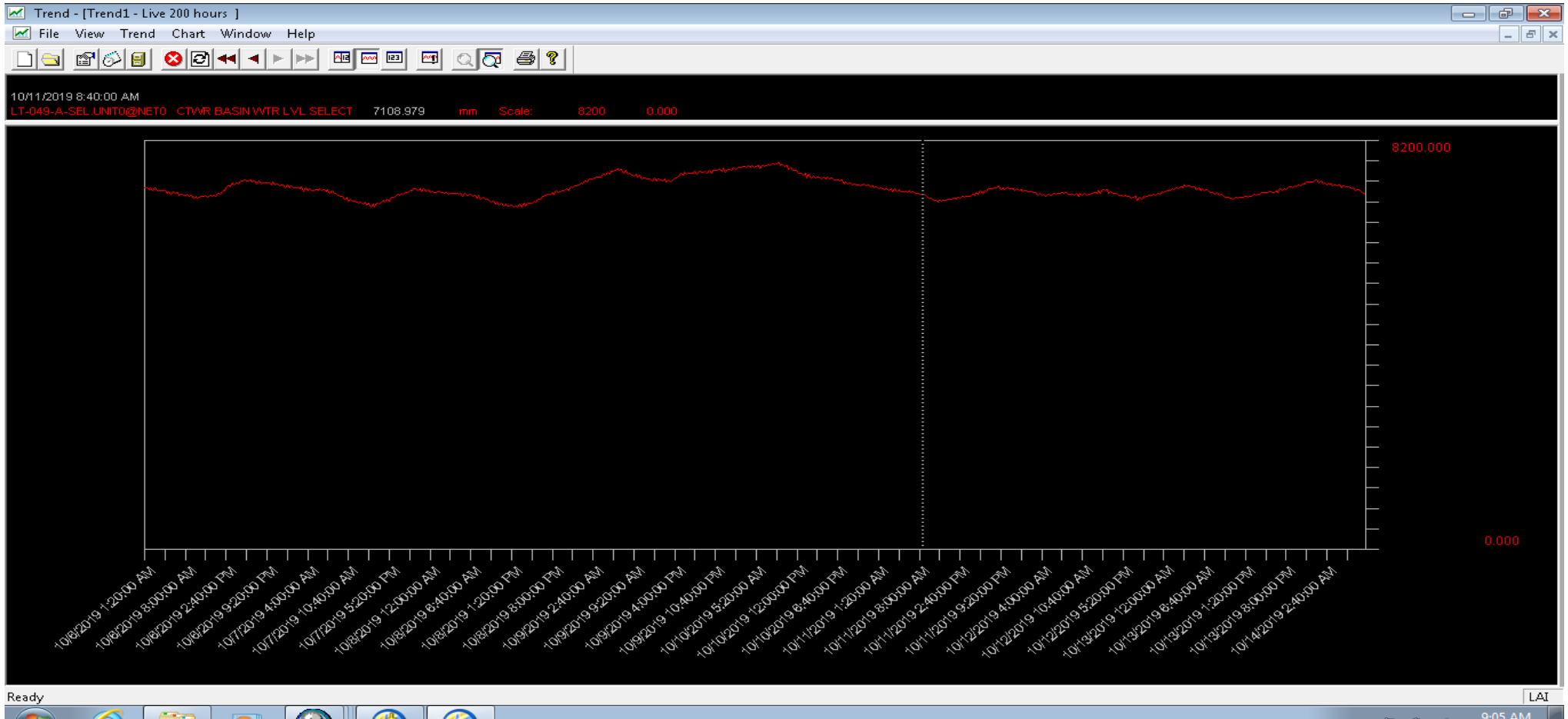


Level = Speed of sound in air x Time delay / 2

Gear type

Magnetic float

Outcome: After installing float type of level transmitter in place of ultrasonic/radar type in both cooling tower basin and clarified water tank, discrepancies due to level transmitter and eventual ST trips are avoided altogether.



Conclusion

The decision to change ultrasonic/radar type level transmitters to float type level sensors increased system reliability and prevented unwanted ST trip resulting from level transmitter malfunction.

So the idea ultimately may considered an effort to maintain uninterrupted power supply.