108050000-TD8011-R00

Spallation Neutron Source

CHL Glycol Cooling Controls

Functional System Design (FSD)

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J. E. Cleaves 3/3/03
SNS Project Engineer

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SPALLATION NEUTRON SOURCE

Argonne National Laboratory • Brookhaven National Laboratory • Lawrence Berkeley National Laboratory • Los Alamos National Laboratory • Oak Ridge National Laboratory

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CHL Building RF Glycol Cooling Controls Description
TD8011 Rev 0

Operating Philosophy

<u>Purpose:</u>

The purpose of RF Glycol cooling operation is to:

a) Maintain the glycol at an appropriate temperature setpoint.

<u>Assumptions:</u> None

<u>Operator Controls and Operating Modes</u>

1) OFF: Pump is de-energized. Tower water return line control valve at 50% open.
2) ON: Pump is energized. Tower water return line control valve is modulated to control glycol supply temperature at setpoint selected by the operator.

OPERATOR INTERFACE DEFINITIONS

<u>Local Hardware Displays/Operator Controls</u>
1) Post heat exchanger glycol water pressure *(PI 5201A)*
2) Pre heat exchanger glycol water pressure *(PI 5201B)*
3) Post heat exchanger glycol water temperature *(TI 5201A)*
4) Pre heat exchanger glycol water temperature *(TI 5201B)*
5) Tower water supply pressure *(PI 5201C)*
6) Tower water return pressure *(PI 5201D)*
7) Tower water supply temperature *(TI 5201C)*
8) Tower water return temperature *(TI 5201D)*
9) HOA switch for Pump A *(HS 5201A)*
10) Pressure differential across pump *(PDIS 5201A)*
11) Glycol water pressure gauge isolation valves *(HV 5201A,B)*
12) Tower water pressure gauge isolation valves *(HV 5201C,D)*
13) Glycol water pump isolation valves *(HV 5201W, HV 5201X)*
14) Tower water return flow indicator *(FI 5201A)*
15) Pre heat exchanger glycol water flow *(FI 5201B)*
16) FAULT indicator light on MCC
17) READY indicator light on MCC
18) RUN indicator light on MCC

<u>Software HMI/EPICS Digital Operator Controls</u>
1) Pump Mode
   a. OFF
   b. ON

<u>Software HMI/EPICS Digital Displays</u>
1) Pump Mode switch status
    a. OFF
    b. ON
2) Pump energized or de-energized. *(PDIS 5201A)*

<u>Software HMI/EPICS Analog Operator Controls</u>
1) Glycol supply temperature

<u>Software HMI/EPICS Analog Displays</u>

1) Glycol water supply temperature *(TT 5201A)*
2) Tower water return line controller output *(IP 5201A/TCV 5201A)*

<u>Software HMI/EPICS Alarms (via EPICS Alarm Handler)</u>

1) Glycol supply temperature high and low
2) Low Flow due to Pump failure or massive leak (pump energized and differential pressure is low)
3) Flow path blocked (Pump energized and high differential pressure)

Control Logic Description

In the OFF mode, the pump is de-energized and the Tower Water Return Line Control Valve is set to 50 % open.

In the ON mode, the pump is energized and the Tower Water Return Line Control Valve is modulated by a PID algorithm to maintain the Glycol Supply Temperature Setpoint. After a delay period the differential pressure for the pump will be periodically checked for high or low flow. If either condition exists, the pump will be de-energized and the appropriate alarm returned to the operator.