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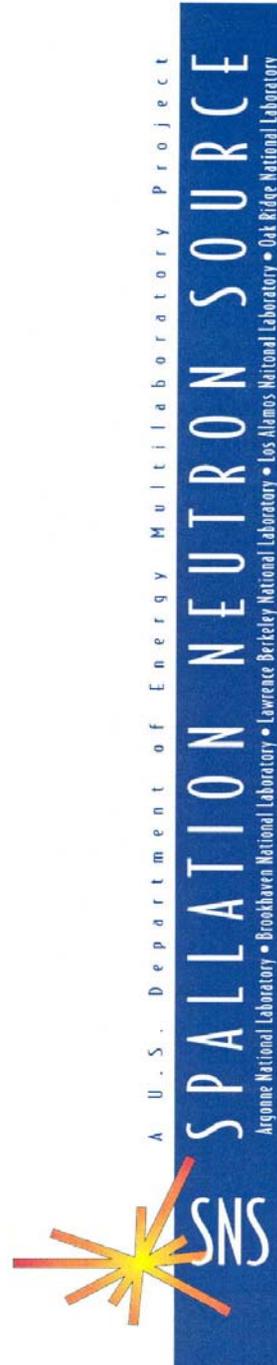
Spallation Neutron Source

Klystron Glycol Water System Functional System Design (FSD)

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Klystron Building Glycol Cooling Controls Description TD8008 Rev 0

Operating Philosophy

Purpose:

The purpose of RF Glycol cooling operation is to:

- a) Maintain the glycol at an appropriate temperature setpoint.

Assumptions: Running both pumps simultaneously is not acceptable.

Operator Controls and Operating Modes

- 1) OFF: Pumps are de-energized. Tower water return line control valve at 50% open.
- 2) PUMP A IS PRIMARY: Pump A is energized and pump B is de-energized.
- 3) PUMP B IS PRIMARY: Pump B is energized and pump A is de-energized

OPERATOR INTERFACE DEFINITIONS

Local Hardware/Manual Operator Controls

- 1) Post heat exchanger glycol water pressure (*PI 4307A*)
- 2) Pre heat exchanger glycol water pressure (*PI 4307B*)
- 4) Post heat exchanger glycol water temperature (*TI 4307A*)
- 5) Pre heat exchanger glycol water temperature (*TI 4307B*)
- 6) Tower water supply temperature (*TI 4307C*)
- 7) Tower water return temperature (*TI 4307D*)
- 8) HOA switch for Pump A (*HS 4307A*)
- 9) HOA switch for Pump B (*HS 4307B*)
- 10) Glycol water pressure gauge isolation valves (*HV 4307A,B*)
- 11) Glycol water pump isolation valves (*HV 4307W,X,Y,Z*)
- 12) FAULT indicator light on MCC
- 13) READY indicator light on MCC
- 14) RUN indicator light on MCC

Software HMI/EPICS Digital Operator Controls

- 1) Primary Pump Mode
 - a. OFF
 - b. Pump A is primary
 - c. Pump B is primary

Software HMI/EPICS Digital Displays

- 1) Primary Pump Mode switch status
 - a. OFF
 - b. Pump A is primary
 - c. Pump B is primary
- 2) Pump that is running and the pump that is de-energized. (*PDIS 4307A, PDIS 4307B*)
- 3) Failed Primary Pump: Differential pressure across primary pump is low. Logic de-energizes primary pump and energizes backup pump.

Software HMI/EPICS Analog Operator Controls

- 1) Glycol supply temperature

Software HMI/EPICS Analog Displays

- 1) Glycol water supply temperature (*TT 4307A*)
- 2) Tower water return line controller output (*IP 4307A/TCV 4307A*)

Alarms

- 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)
- 4) Primary pump failed, backup pump running (differential pressure is normal)
- 5) No flow (low differential pressure on both pumps)

Control Logic Description

In the OFF mode, the primary and backup pump will be de-energized .

In the PUMP A IS PRIMARY mode, the Pump A will be energized and the Pump B will be de-energized. After a delay period, the Pump A will be periodically checked for low flow. If low flow is detected, Pump A will be de-energized and Pump B will be energized. An alarm will be generated to the operator. After a delay period, the Pump B will be periodically checked for low flow. If low flow is detected, Pump B will be de-energized and a “No Flow” alarm will be generated to the operator.

In the PUMP B IS PRIMARY mode, the Pump B will be energized and the Pump A will be de-energized. After a delay period, the Pump B will be periodically checked for low flow. If low flow is detected, Pump B will be de-energized and Pump A will be energized. An alarm will be generated to the operator. After a delay period, the Pump A will be periodically checked for low flow. If low flow is detected, Pump A will be de-energized and a “No Flow” alarm will be generated to the operator.

For both the PUMP A IS PRIMARY and PUMP B IS PRIMARY modes, the Tower Water Return Line Control Valve is modulated by a PID algorithm to maintain the Glycol Supply Temperature Setpoint.

Screen

