108050000-TD8003-R00

Spallation Neutron Source

FE Chilled Water Pumps Controls Functional System Design (FSD)

May, 2002

APPROVED
BY: David Meyer
DATE: 3/10/03

F. E. Cullano 3/3/03
SNS Project Engineer

A U.S. Department of Energy Multilaboratory Project

SPALLATION NEUTRON SOURCE

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

SNS

FE Chilled Water Pumps Controls Description
TD8003 Rev 0

Operating Philosophy

Purpose:

The purpose of chilled water booster pump operation is to:

a) Energize one of two chilled water booster pumps
b) Provide detection of pump failure and automatically switch to the backup pump

Assumptions: Running two pumps simultaneously is not acceptable.

Operator Controls and Operating Modes

1) OFF: Both pumps are de-energized.
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) Pump A pressure differential indicator *(PDIS 4100A)*
2) Pump B pressure differential indicator *(PDIS 4100B)*
3) HOA switch *(HS 4100)*
4) FAULT indicator light on MCC
5) READY indicator light on MCC
6) 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 4100A,PDIS 4100B)*
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

None

Software HMI/EPICS Analog Displays

None

Alarms

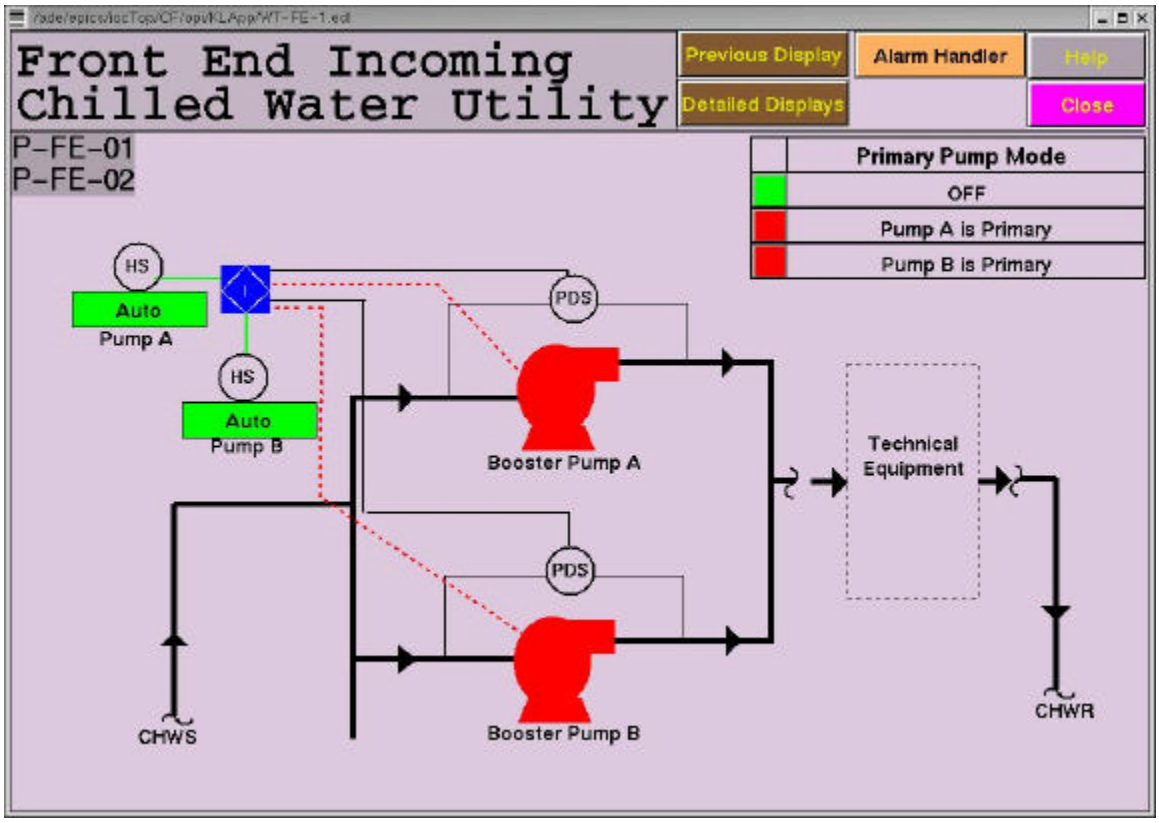
1) Primary pump failed, backup pump running (differential pressure is normal)
2) No flow (low differential pressure on both pumps)

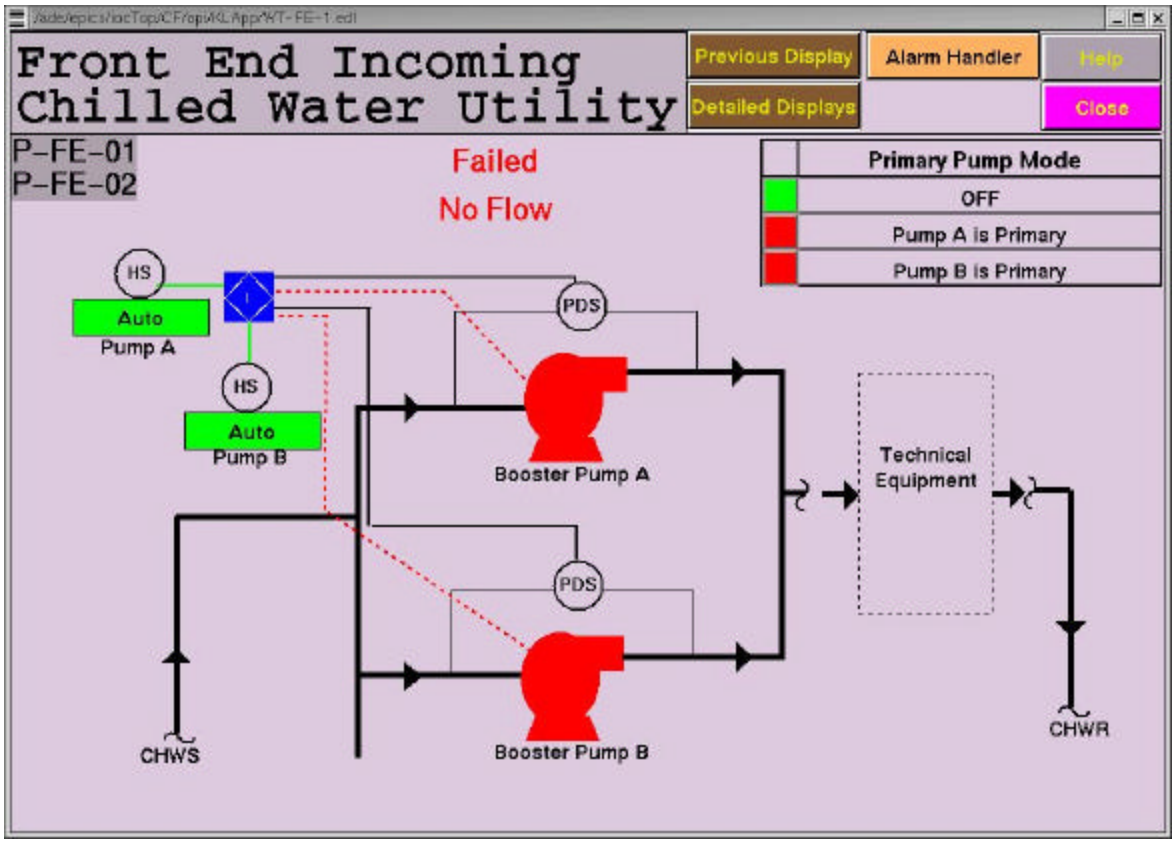
Control Logic Description

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.


Front End Incoming
Chilled Water Utility
Previous Display
Alarm Handler
Help
Detailed Displays
Close
P-FE-01
P-FE-02
Primary Pump Mode
OFF
Pump A is Primary
Pump B is Primary
HS
Auto
Pump A
HS
Auto
Pump B
PDS
Booster Pump A
PDS
Booster Pump B
Technical
Equipment
CHWS
CHWR


Front End Incoming
Chilled Water Utility
Previous Display
Alarm Handler
Help
Detailed Displays
Close
P-FE-01
P-FE-02
Failed
No Flow
Primary Pump Mode
OFF
Pump A is Primary
Pump B is Primary
HS
Auto
Pump A
HS
Auto
Pump B
PDS
Booster Pump A
PDS
Booster Pump B
Technical
Equipment
CHWS
CHWR