

CRYOGENIC INTEGRATION

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GOALS

- Improved flow of information between main control and cryo control
 - Status of quench recovery
 - Status of recovery from cryogenic operational problems
 - Contact with Cryo shift supervisor
- Clear indication of cryo release for Park, Injection and Ramp

CRYO-READY

PERMISSIVE INTERLOCKS

- Temperatures outside of prescribed limits
- A Helium Circulator off for more than 60 seconds
- More than one re cooler in a ring less than 5% liquid Helium Level
- Low CQS Lead flow for more than 20 seconds – pulls Beam Permit
- Loss of communication with a ring I/O Rack- unable to remotely reset
- Refrigerator Operations

Warnings

- Loss of communication with Service building PLC's
 - Lose man magnet lead flows, local ring temperature, re cooler valve control
- Loss of CRYO Write Server
 - Loss of current signals
 - Floods magnet power leads

PLANS

- Training MCR staff on basics of cryogenic operations
- Cryo E-log
- ‘CRYO Status ‘ Screen In Main Control
Web based?
- Shift supervisor pager

CRYO STATUS

YELLOW RING

ZERO CURRENT

PARK

INJECTION

RAMP

CRYO PERMISSIVE INTERLOCK ENABLED

HELIUM CIRCULATOR OFF

LOW RECOOLER LEVEL

2/3 4/5 6/7 8/9 10/11 12/1

HIGH MAGNET TEMPERATURE

2/3 4/5 6/7 8/9 10/11 12/1

I/O RACK COMMUNICATIONS FAILURE

2/3 4/5 6/7 8/9 10/11 12/1

CQS LEAD FLOW ALARM—BEAM PERMIT PULLED

2/3 4/5 6/7 8/9 10/11 12/1

BLUE RING

ZERO CURRENT

PARK

INJECTION

RAMP

CRYO PERMISSIVE INTERLOCK ENABLED

HELIUM CIRCULATOR OFF

LOW RECOOLER LEVEL

2/3 4/5 6/7 8/9 10/11 12/1

HIGH MAGNET TEMPERATURE

2/3 4/5 6/7 8/9 10/11 12/1

I/O RACK COMMUNICATIONS FAILURE

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CQS LEAD FLOW ALARM—BEAM PERMIT PULLED

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REFRIGERATOR OPERATIONS