FERMILAB
Accelerator Division
ES&H Department

MeV Test Area Critical Device Justification

Area Information

Area/s or Enclosures Protected	MTA Hall and beamline stub (all areas downstream of shield wall)
Beam Type and Source	H- Beam from Linac; H- or proton beam to experiment
Beam Energy	400 MeV
Beam Intensity	2.7e15 ions per hour

Critical Device 1

Device Name	E:UHB03
Device Type	Power supply for 4-magnet dipole string
Device Location	MTA beamline, upstream of shield wall (linac side)
Critical Device Controller	L:MUCDC
CDC Location	Booster West Gallery
Method of Operation	Contactor Opened

Critical Device 2

Device Name	E:UBS01
Device Type	Beam Stop
Device Location	MTA beamline, upstream of shield wall (linac side)
Critical Device Controller	L:MUCDC
CDC Location	Booster West Gallery
Method of Operation	Air Solenoid/gravity closed

Failure Mode Backup

Backup System	RFQ Low Level Disable and Vacuum Gate Valve
Backup Device Names	RFQ and L:LVV
Location	RFQ and LEBT

Failure Analysis

Is there an unsafe failure mode? (If yes please explain)	None Identified At This Time
Is there a common failure mode between Device 1 and 2? (If yes, please explain)	None Identified At This Time

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Department: AD External Beamlines Department

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Interlock Engineer

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Assigned RSO

Description and Explanation:

The MeV Test Area is a facility, similar to the 120 GeV Fermilab Test Beam Facility operating in the Meson area, providing researches access to 400 MeV protons and H-.

MTA consists of two components, the beam line and the experimental hall. The beamline transports 400 MeV H- from the Linac, through a 12 foot wall, and into an upstream port of the hall. The beamline continues through the porch where the H- is stripped of two electrons and the remaining protons are focused onto the experimental apparatus.

Two critical devices are implemented for MTA operation which insure that beam will not reach the porch or adjoining hall; both of the devices are located on the Linac side of the 12 foot wall.

The first critical device, UHB03, is the power supply energizing four dipole magnets. Each dipole magnet provides 10 degrees of bend, resulting in a total bend angle of 40 degrees. When the power supply is de-energized (that is, the contactor is opened), beam cannot continue beyond the first magnet.

The second device, UBS01, is a pneumatically controlled beam stop. Positive (greater than atmospheric) pressure is required to keep the beam stop out of the beam trajectory; the device is fail-safe. Additionally, the beam stop ranges from 5.75 inches to 6.0 inches in diameter, but is flanged to 3.75" beam pipe; the beam stop completely occludes the aperture of the beam pipe. The beam stop consists of 18 inches of steel followed by eight inches of polyethylene. The steel is adequate to absorb the protons, and the polyethylene is adequate to absorb any resulting neutrons. When the air solenoid is de-energized, pressure is lost and the beam stop falls into the beam trajectory due to gravity.

Additional Work Required and Person(s) Responsible: