Fermi National Accelerator Laboratory

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Meson Area Maximum Credible Incident (MCI)

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Scope

The following document describes the Maximum Credible Incident (MCI) for the Meson Area.

Basis of Analysis

The MCI for the Meson Area is based on the MCI analysis presented in SAD Section III Chapter 12.3 for the Switchyard Fixed Target Beamlines. It is also available in the *Switchyard Fixed-Target Areas Maximum Credible Incident (MCI)*. In the Meson Area, the MCI scenario must be evaluated for both the Meson Test (MTest) segment and Meson Center (MCenter) segment.

The MCI scenario evaluated for the Meson Area is 14.66kW beam power delivered, 2.75E15 protons per hour, 4.2E13 protons per event, at 120GeV, once every fifty-five (55) seconds.

For the MTest beamline segment, the use of the MTest Primary Logic Chassis in the MTest Critical Device Controller precludes the scenario of unattenuated beam reaching the MT6-1 and MT6-2 enclosures.

The three operating modes of the MTest beamline, “Diffracted Proton Mode”, “High Energy Pion Mode”, and “Low Energy Pion Mode” are the only credible beam delivery scenarios. Diffracted Proton Mode uses the MTest M01 Target and the M03 Pinhole Collimator to attenuate the beam by a factor of 8.4E-6. High Energy Pion Mode does not use the pinhole collimator; however, production rates have shown that the attenuation of the beam in this mode at 66GeV, the upper limit of the beam energy in this mode, is 2E-7. In Low Energy Pion mode, the primary beam is allowed past the M01 Target and is delivered to the MT4 Low Energy Pion Mode Target, located at FSCSz=5164’. This target attenuates the primary beam by a factor of 1E-5. Therefore, the beam the MCI scenario for MTest assumes that the beamline is configured in “Low Energy Pion Mode”. The upper limit of the energy allowed in this mode is 30GeV. Based on the MCI for the primary beam, the secondary beam MCI for MTest is 4.2E8 secondaries per cycle, 30 GeV, once every fifty-five (55) seconds.

For the MCenter segment, the MCI scenario evaluated assumes that the primary beam reaches the MC6 Target, in the MC6 Enclosure at FSCSz=5728’. The MC6 Target is required to be in place before beam operation is authorized. The MC6 Target attenuates the primary beam by a factor of 4.7E-4. The upper limit of the secondary beamline energy is 90GeV. This is maintained by a current window monitor on the MC6D magnet string, which is an input to the MCenter CDC. Based on the MCI for the primary beam, the secondary beam MCI for MCenter is 1.97E10 secondaries per cycle, 90GeV, once every fifty-five (55) seconds.