

Memorandum

Michael Lindgren
Division Head

Accelerator Division
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Date: December 4, 2019
To: Todd Sullivan
From: Michael Lindgren 
Re: Approval for running beam to Meson Center

Safety documentation and procedures for restart of beam operations to the Meson Center are now complete and in place. Therefore, you are hereby authorized to deliver beam to Meson Center.

cc: Nino Chelidze
Mary Convery
Paul Czarapata
Tom Kobilarcik
Eric McHugh
Maddie Schoell

SYSTEM START-UP SIGN-OFF

The signatures below, unless noted in the comments section, indicate that the relevant systems are ready for the restart of beam operation. Indicate in the comments section any remaining work that would affect the restart of beam operations. Indicate N/A for departments that did not do any work on the system.

SYSTEM BEING SIGNED OFF: Linac NIF MTA Booster [8-GeV Line-MI-10 Region]
 (Circle as Applicable) [MI-20-MI-62/Recycler] BNB NuMI P1-P2 Muon P3-Switchyard
Meson Primary MT MC NM FAST PIP-II _____

<u>DEPARTMENT</u>	<u>DATE</u>	<u>SIGNATURE (Department Head/Designee)</u>
1. Controls	11/21/19	
2. Cryogenics	N/A	
3. E/E Support	11/22/19	
4. RPO Manager	12/4/19	Madeline Schoell
5. LSO	N/A	
6. External Beamlines	11/27/2019	
7. Instrumentation	11/21/2019	
8. Interlocks	11/26/2019	Lung M. Zafko
9. Main Injector	N/A	
10. Mechanical Support	21 Nov 2019	M. Wong-Sgura
11. Muon	N/A	
12. Operations	11/27/2019	Todd Hallin
13. Proton Source	N/A	
14. RF	N/A	
15. ENG Support	11/21/19	Paul C Gargate
16. Target Systems	N/A	
17. Shutdown Coordinator	11/21/19	

Comments and special conditions (please mark comment with department # to connect comment with appropriate department):

The MCenter radiation shielding meets the requirements documented in the 2013 "Addendum to the SY120 Shielding Assessment for the Continued Operation of the Meson Center Beamline" shielding assessment.

FINAL APPROVALS

System Department Head Fernando Kohliar Date 12/4/2019
 Assigned RSO N. Chelidze Date 12/4/2019
 AD Division Head [unclear] Date 12/4/2019

BEAM PERMIT
12/4/2019

Meson Center Accelerator Safety Envelope (ASE) Limit

The maximum beam intensity transmitted through the Meson Center Beamline is limited to:
 9.60×10^{16} protons/hr up to 120 GeV

No accelerator or beam line will transmit beam without an operational beam interlock safety system.

Meson Center Beamline Operating Limits

The maximum beam intensity transmitted through the Meson Center Beamline is limited to:
 1.02×10^{12} protons/hr up to 120 GeV

Examples: Protons/hr = number of pulses/hr x number of protons/pulse

Meson Center:

60 pulses per hour at 1.7×10^{10} protons per pulse = 1.02×10^{12} protons per hour for the primary beam

Special conditions and comments:

Reviewed by Todd Sullivan 12/04/19
Operations Department Head

Reviewed by Thomas H. Holmberg 12/4/2019
Systems Department Head

Reviewed by W. Chelidge 12/4/19
Assigned RSO

Reviewed by Madelyn Schreell 12/4/2019
ESH&Q Radiation Physics Operations Department Head

Approved by Mark Ziegler 12/4/2019
Accelerator Division Head

Operator Signatures

Crew Chiefs

Crew A

Crew B

Crew C

Crew D

Crew E

Other

Running Condition Meson Center

December 4, 2019

Nino Chelidze

Area RSO

Mode of Operation Pion Mode

Beam Limits	Beam Energy 120 GeV	ASE Limit 9.60 E16 protons/hr	Operating Limit 1.02 E12 protons/hr
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Critical Devices F:MC1D & MC2 Beam Stop

Enclosures Protected MC6, MC7, MB7

Preferred Monitoring Devices* Intensity is monitored via F:MC6IC

*Other methods of monitoring intensity may be used.

Requirements

Access Devices F:MC1D & MC2 Beam Stop must be disabled in order to access MC6, MC7, MB7

Cool Off Period none

Special Interlocks The CDC Inputs including failure mode devices may all be found on the Safety System Status pages.

Special Concerns Any work performed on critical devices or obtaining a critical device key requires prior RSO approval.

Gates, Fencing and Passive Shielding Requirements

There is no access to radiologically fenced areas without prior RSO approval.

All fencing from M01 through and including MB7 & MC8 must be intact whenever MCenter is enabled to take beam. There are two types of rad fence keys associated with the MC6, MC7, MC8 fence areas. Rad fence gates on the North end of the beamline, West and East of MC8 building gates are locked with a normal rad fence padlock. The special rad fence key allows access through the special rad fence gate near the MC7 remote keytree. The special rad fence key is attached to the MC6, MC7 and MB7 Enclosure Access key fobs, which allows access to the special rad fenced area. RSO approval for access this special rad fence area is not required when MC6, MC7 or MB7 Enclosure Access keys are issued, since beam is disabled in order to issue these Enclosure keys. The North, East and West rollup doors in MC7 are locked with Ops Dept. padlocks. The North rollup door is also locked with an RSO lock. Shielding, fencing and posting are in accordance with the following shielding assessment documents:
 2003 "Shielding Assessment for the Switchyard 120 Project"
 2013 "Addendum to the Switchyard 120 Shielding Assessment for Continued Operation of the Meson Center Beamline"
 2018 "MC7 NOvA Tertiary Beamline Post Assessment"

Assigned RSO approval also signifies that all necessary Interlock Tests have been completed and Removable Shielding is installed.

Ops. Dept. Head Approval <u>Todd Sullivan 12/04/19</u>	Assigned RSO Approval <u>N. Chelidze 12/4/19</u>
Sys. Dept. Head Approval <u>Nino Chelidze 12/4/2019</u>	AD Head Approval <u>Nino Chelidze 12/4/2019</u>

December 4, 2019

Area RSO

Nino Chelidze

Operational Comments

MCR must be appropriately staffed according to the Accelerator Safety Envelope.

Both slow resonant and single turn extraction are acceptable at this time.

MC6 Target Temperature must be < 100 degrees C, monitored via F:MCTMPA & F:MCTMPB

Target over-temperature trips shall be documented in the MCR E-log. Over-temperature trips may be reset as the safety system allows.

The inputs required to enable the Pion Mode are as follows:

F:MC6D must be running less than 575 amps

Per current shielding assessment,

The MC6 Target is locked in the IN position with a Radiation Safety lock.

LArIAT Target is locked in OUT position with RSO lock.

Analyzing magnets Jolly Green Giant and Rosie must be de-energized per RSO configuration control.

December 4, 2019

Area RSO

Nino Chelidze

Operator Signatures

Crew Chiefs

Crew A

Crew B

Crew C

Crew D

Crew E

Other