

Memorandum

Michael Lindgren
Chief Accelerator Officer

Accelerator Division
P.O. Box 500, MS 306
Kirk Road and Pine Street
Batavia, Illinois 60510-5011

Office: 630.840.8409
mlindgre@fnal.gov

Date: December 19, 2020
To: Todd Sullivan
From: Mary Convery for Michael Lindgren **Mary Convery**, Digitally signed by Mary Convery, UID:convery
Re: Approval for Running Beam to Meson Test **UID:convery**, Date: 2020.12.19 13:03:08 -06'00'

Safety documentation and procedures for restart of Meson Test are now in place.
Therefore, you are hereby authorized to run beam to Meson Test.

cc: Gerald Annala
Mary Convery
Paul Czarapata
Tom Kobilarcik
Sue McGimpsey
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

DEPARTMENT	DATE	SIGNATURE (Department Head/Designee)
1. Controls	12-28-2020	<i>[Signature]</i> for J. Patrick
2. Cryogenics	N/A	
3. E/E Support	12/18/20	Chris Jensen <small>Digitally signed by Chris Jensen, o=Fermilab, email=ccjensen@fnal.gov, c=US Date: 2020.12.18 16:51:03 -06'00'</small>
4. RPO Manager	12/19/20	Maddie Schoell, UID:maddiew <small>Digitally signed by Maddie Schoell, UID:maddiew Date: 2020.12.19 12:51:35 -06'00'</small>
5. LSO	N/A	
6. External Beamlines	12/19/20	Thomas R. Kobilarcik <small>Digitally signed by Thomas R. Kobilarcik Date: 2020.12.19 11:16:06 -06'00'</small>
7. Instrumentation	10/27/2020	<i>[Signature]</i>
8. Interlocks	12/19/20	Randy Zifko, UID:rmzifko <small>Digitally signed by Randy Zifko, UID:rmzifko Date: 2020.12.19 11:11:22 -06'00'</small>
9. Main Injector	N/A	
10. Mechanical Support	12/4/20	<i>[Signature]</i>
11. Muon	N/A	
12. Operations	11/04/2020	<i>[Signature]</i>
13. Proton Source	N/A	
14. RF	N/A	
15. ENG Support	11/17/20	Paul C Czarapata <small>Digitally signed by Paul C Czarapata Date: 2020.11.17 09:48:19 -06'00'</small>
16. Target Systems	N/A	
17. Shutdown Coordinator	11/6/20	Consolato Gattuso <small>Digitally signed by Consolato Gattuso Date: 2020.11.06 14:47:18 -06'00'</small>

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

EE Support: Still investigating issue with MT4Q1. Does not hold up anything else.

Tom confirmed MT4Q1 issues have been resolved 12/19.

The MTest radiation shielding meets the requirements documented in the 2003 "Shielding Assessment for the SY 120 Project" and 2017 "P3 to SY Absorber Incremental" shielding assessment.

FINAL APPROVALS

System Department Head	Thomas R. Kobilarcik <small>Digitally signed by Thomas R. Kobilarcik Date: 2020.12.19 13:04:53 -06'00'</small>	Date	12/19/20
Assigned RSO	Maddie Schoell, UID:maddiew <small>Digitally signed by Maddie Schoell, UID:maddiew Date: 2020.12.19 12:51:51 -06'00'</small>	Date	12/19/20
AD Division Head	Mary Convery, UID:convery <small>Digitally signed by Mary Convery, UID:convery Date: 2020.12.19 13:14:55 -06'00'</small>	Date	12/19/20

BEAM PERMIT
12/19/2020

Meson Test Accelerator Safety Envelope (ASE) Limit

The maximum hourly beam power transmitted through the Meson Test beamline is limited as follows:

Meson Test: 1.03 x 10¹⁶ protons per hour at 120 GeV

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

Meson Test Beamline Operating Limits

The maximum hourly operational charge transmitted through the Meson Test beamline is limited as follows:

Meson Test: 1.20 x 10¹³ protons per hour at 120 GeV

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

Meson Test: 60 pulses per hour at 2.00 x 10¹¹ protons per pulse = 1.20 x 10¹³ protons per hour

Special conditions and comments:

Reviewed by Todd Sullivan Digitally signed by Todd Sullivan
Date: 2020.12.19 13:09:46 -06'00'
Operations Department Head

Reviewed by Thomas R. Kobilarcik Digitally signed by Thomas R. Kobilarcik
Date: 2020.12.19 13:04:09 -06'00'
Systems Department Head

Reviewed by Maddie Schoell, UID:maddiew Digitally signed by Maddie Schoell, UID:maddiew
Date: 2020.12.19 12:52:50 -06'00'
Assigned RSO

Reviewed by Maddie Schoell, UID:maddiew Digitally signed by Maddie Schoell, UID:maddiew
Date: 2020.12.19 12:52:58 -06'00'
ES&H Radiation Physics Operations Department Head

Approved by Mary Convery, UID:convery Digitally signed by Mary Convery, UID:convery
Date: 2020.12.19 13:14:19 -06'00'
Accelerator Division Head

Operator Signatures

Crew Chiefs

Duff Linn 12/19/20 ✓
Phil S. Del 12/19/20 ✓
Kel R 12/21/20

Crew A

Jay Inhammin ✓
Judges Nicholas 12-19-20
Janey Potters 12-20-20 ✓
Chris Chen 12-20-20 ✓

Crew B

Blair 12/19/20 ✓
George Williams 12/19/20 ✓
James John 12/19/2020 ✓
Course 12/21/2020 ✓

Crew C

Gilbert Perez 12/21/20
Jake T. Hooper 12/21/20
Kymberly Pullen 12/21/20
Jacob O'Neil 12/21/20
Kath Ruffolo

Crew D

Crew E

Other

Running Condition Meson Test

December 19, 2020

Maddie Schoell

Area RSO

Mode of Operation Diffracted Proton Mode

Beam Limits	Beam Energy	ASE Limit	Operating Limit
	120 GeV	1.03 E16 protons/hr	1.20 E13 protons/hr

Critical Devices F:MW1W & MT3 Beam Stop

Enclosures Protected MT6 Section 1 and MT6 Section 2

Preferred Monitoring Devices* Intensity is monitored via F:MW1SEM

*Other methods of monitoring intensity may be used.

Requirements

Access Devices F:MW1W and MT3 Beam Stop must be disabled in order to access MT6 Section 1 or MT6 Section 2.

Cool Off Period

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.

Shielding, fencing and posting are in accordance with the following shielding assessment document:
2003 "Shielding Assessment for the Switchyard 120 Project"

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

Ops. Dept. Head Approval

Todd Sullivan

Digitally signed by Todd Sullivan
Date: 2020.12.19 13:10:12 -08'00'

Assigned RSO Approval

Maddie Schoell,
UID:maddiew

Digitally signed by Maddie Schoell,
UID:maddiew
Date: 2020.12.19 12:52:15 -08'00'

Sys. Dept. Head Approval

Thomas R. Kobilarcik

Digitally signed by Thomas R.
Kobilarcik
Date: 2020.12.19 13:08:32 -08'00'

AD Head Approval

Mary Convery,
UID:convery

Digitally signed by Mary Convery,
UID:convery
Date: 2020.12.19 13:12:26 -05'00'

December 19, 2020

Area RSO

Maddie Schoell

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.

When changing modes, the beam should be disabled. When the parameters are satisfied, the critical devices are enabled.

The inputs required to enable the Diffracted Proton Mode are as follows:

F:MT2WD1 must be operating between 900-1,100 amps

F:MT2WD2 must be operating between 350-450 amps

F:MT2Q1, F:MT2Q2, F:MT3Q1 and F:MT3Q2 must be off

F:MT2WU must be operating between 640-780 amps

F:MT3PUV and F:MT3PDV Pinhole Collimator IN the 1 mm hole

F:MW1TGT IN

Running Condition Meson Test

December 19, 2020

Area RSO

Maddie Schoell

Operator Signatures

Crew Chiefs

Dan Johnson 12/19/20
Michael S. O'Neil 12/19/20
Kell 12/21/20

Crew A

Jay Johnson
Jorge M. L. L. L. 12-19-20
Andreas P. L. L. 12-20-20
Chris L. L. 12-20-20

Crew B

Blair L. L. 19 Dec 21
George Williams 12/19/20
Jamal L. L. 12/19/2020
Laura 12/21/2020

Crew C

Jill L. L. 12/21/2020
John L. L. 12/21/20
Kenneth L. L. 12/21/20
Judith L. L. 12/21/20
Walter L. L. 12/21/20

Crew D

Crew E

Other

Running Condition Meson Test

December 19, 2020

Area RSO

Maddie Schoell

Mode of Operation High Energy Pion Mode

Beam Limits	Beam Energy	ASE Limit	Operating Limit
	120 GeV	1.03 E16 protons/hr	1.20 E13 protons/hr

Critical Devices F:MW1W & MT3 Beam Stop

Enclosures Protected MT6 Section 1 and MT6 Section 2

Preferred Monitoring Devices* Intensity is monitored via F:MW1SEM

*Other methods of monitoring intensity may be used.

Requirements

Access Devices F:MW1W and MT3 Beam Stop must be disabled in order to access MT6 Section 1 or MT6 Section 2.

Cool Off Period

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.

Shielding, fencing and posting are in accordance with the following shielding assessment document:
2003 "Shielding Assessment for the Switchyard 120 Project"

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

Ops. Dept. Head Approval

Todd Sullivan
Digitally signed by Todd Sullivan
Date: 2020.12.19 13:09:20 -08'00'

Assigned RSO Approval

Maddie Schoell,
UID:maddiew
Digitally signed by Maddie Schoell,
UID:maddiew
Date: 2020.12.19 12:52:27 -08'00'

Sys. Dept. Head Approval

Thomas R. Kobilarcik
Digitally signed by Thomas R.
Kobilarcik
Date: 2020.12.19 13:08:01 -08'00'

AD Head Approval

Mary Convery,
UID:convery
Digitally signed by Mary Convery,
UID:convery
Date: 2020.12.19 13:13:10 -08'00'

December 19, 2020

Area RSO

Maddie Schoell

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.

When changing modes, the beam should be disabled. When the parameters are satisfied, the critical devices are enabled.

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

F:MT2WD1 must be running less than 600 amps

F:MT2WD2 must be running less than 240 amps

F:MT2WU must be running less than 425 amps

F:MT3PUV and F:MT3PDV Pinhole Collimator OUT

F:MW1TGT IN

Running Condition Meson Test

December 19, 2020

Area RSO

Maddie Schoell

Operator Signatures

Crew Chiefs

Duff [Signature] 12/19/20

Michael [Signature] 12/19/20

Kell [Signature] 12/21/20

Crew A

Jay [Signature]

Jaymes [Signature] 12-19-20

Andrew [Signature] 12-20-20

Ch [Signature] 12-20-20

Crew B

[Signature] 19 Dec 21

George [Signature] 12/19/20

Jamal [Signature] 12/19/20

Laurel [Signature] 12/21/2020

Crew C

Gilbert [Signature] 12/21/2020

John T. [Signature] 12/21/20

Keymaster [Signature] 12/21/20

Joshua [Signature] 12/21/20

Mike [Signature] 12/21/20

Crew D

Crew E

Other

Running Condition Meson Test

December 19, 2020

Area RSO

Maddie Schoell

Mode of Operation Low Energy Pion Mode

Beam Limits	Beam Energy	ASE Limit	Operating Limit
	120 GeV	1.03 E16 protons/hr	1.20 E13 protons/hr

Critical Devices F:MW1W & MT3 Beam Stop

Enclosures Protected MT6 Section 1 and MT6 Section 2

Preferred Monitoring Devices* Intensity is monitored via F:MW1SEM

*Other methods of monitoring intensity may be used.

Requirements

Access Devices F:MW1W and MT3 Beam Stop must be disabled in order to access MT6 Section 1 or MT6 Section 2.

Cool Off Period

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

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Gates, Fencing and Passive Shielding Requirements There is no access to radiologically fenced areas without prior RSO approval.

Shielding, fencing and posting are in accordance with the following shielding assessment document:
2003 "Shielding Assessment for the Switchyard 120 Project"

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

Ops. Dept. Head Approval Todd Sullivan
Digitally signed by Todd Sullivan
Date: 2020.12.19 13:08:48 -06'00'

Assigned RSO Approval Maddie Schoell, UID:maddiew
Digitally signed by Maddie Schoell, UID:maddiew
Date: 2020.12.19 12:52:37 -06'00'

Sys. Dept. Head Approval Thomas R. Kobilarcik
Digitally signed by Thomas R. Kobilarcik
Date: 2020.12.19 13:05:28 -06'00'

AD Head Approval Mary Convery, UID:convery
Digitally signed by Mary Convery, UID:convery
Date: 2020.12.19 13:13:44 -06'00'

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.

When changing modes, the beam should be disabled. When the parameters are satisfied, the critical devices are enabled.

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

F:MT2WD1 must be operating between 900-1,100 amps

F:MT2WD2 must be operating between 350-450 amps

F:MT2WU must be operating between 640-780 amps

F:MT3PUV and F:MT3PDV Pinhole Collimator Out

F:MT4W must be running less than 320 amps

F:MT5E must be running less than 340 amps

F:MT4TGT is IN

Running Condition Meson Test

December 19, 2020

Area RSO

Maddie Schoell

Operator Signatures

Crew Chiefs

Duff [Signature] 12/19/20

Mark [Signature] 12/19/20

Kelp 12/21/20

Crew A

[Signature]

[Signature] 12-17-20

[Signature] 12-20-20

[Signature]

Crew B

[Signature] 19 Dec 20

George Williams 12/19/20

Jamal Johnson 12/19/2020

Course 12/21/2020

Crew C

[Signature] 12/21/2020

John T. Hogan 12/21/20

[Signature] 12/21/20

[Signature] 12/21/20

[Signature] 12/21/20

Crew D

Crew E

Other