

Memorandum

Michael Lindgren
Chief Accelerator Officer

Accelerator Division
P.O. Box 500, MS 306
Kirk Road and Pine Street
Batavia, Illinois 60510-5011
USA
Office: 630.840.8409
mlindgre@fnal.gov

Date: November 24, 2020
To: Todd Sullivan
From: Mike Lindgren Michael Lindgren, UID:mlindgre
Date: 2020.11.24 12:42:40
-06'00'
Re: Approval for running of P1 - P2 beamline

Safety documentation and procedures for approval to run P1 - P2 beamline are now complete and in place. Therefore, you are hereby authorized to run beam through P1 -P2.

cc: Gerald Annala
Mary Convery
Paul Czarapata
Tom Kobilarcik
Eric McHugh
Maddie Schoell
Diktys Stratakis

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

<u>DEPARTMENT</u>	<u>DATE</u>	<u>SIGNATURE (Department Head/Designee)</u>
1. Controls	11/6/20	James Patrick <small>Digitally signed by James Patrick Date: 2020.11.06 14:37:20 -06'00'</small>
2. Cryogenics	N/A	
3. E/E Support	11/12/20	Chris Jensen <small>Digitally signed by Chris Jensen DN: cn=Chris Jensen, o=USFermilab, email=cjensen@fnal.gov, c=US Date: 2020.11.12 17:28:07 -06'00'</small>
4. RPO Manager	11/24/20	Madelyn Schoell, UID:maddiew <small>Digitally signed by Madelyn Schoell, UID:maddiew Date: 2020.11.24 12:19:20 -06'00'</small>
5. LSO	N/A	
6. External Beamlines	11/17/20	Thomas R. Kobilarcik <small>Digitally signed by Thomas R. Kobilarcik Date: 2020.11.17 12:32:56 -06'00'</small>
7. Instrumentation	11/6/20	Craig Drennan <small>Digitally signed by Craig Drennan Date: 2020.11.06 13:56:14 -06'00'</small>
8. Interlocks	11/17/20	Randy Zifko, UID:rmzifko <small>Digitally signed by Randy Zifko, UID:rmzifko Date: 2020.11.17 11:04:47 -06'00'</small>
9. Main Injector	11/7/20	Ioanis Kourbanis, UID:ioanis <small>Digitally signed by Ioanis Kourbanis, UID:ioanis Date: 2020.11.07 10:08:11 -06'00'</small>
10. Mechanical Support	11/9/20	<i>[Signature]</i>
11. Muon	11/6/20	Gerald Annala <small>Digitally signed by Gerald Annala Date: 2020.11.06 08:22:04 -06'00'</small>
12. Operations	11/04/2020	<i>Todd Fisher</i>
13. Proton Source	N/A	
14. RF	N/A	
15. ENG Support	11/6/20	Paul C Czarapata <small>Digitally signed by Paul C Czarapata Date: 2020.11.06 10:42:01 -06'00'</small>
16. Target Systems	N/A	
17. Shutdown Coordinator		Consolato Gattuso <small>Digitally signed by Consolato Gattuso Date: 2020.11.06 11:21:39 -06'00'</small>

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

MSD: The REM LCW is currently in operation but the F-sector pond pumps are not on, due to nearby PIP-II construction. Before beam is in operation through P1-P2, FESS must give their approval to turn ON the F1 and F2 pond pumps. Also, the LCW temperature must be carefully monitored. If the temperature is too high due to the heat load, then the F3 and F4 pond pumps must also be turned on.

EES: I think this is actually on Muon lines, but F27 supplies are configuration control locked off at windowed disconnect until local pump is running. From Jerry: F Sector pond pumps on and LCW pumps configured for operation. F27 pump issue repaired.

The P1-P2 radiation shielding meets the requirements documented in the 2016 'P1 and P2 Beamline Incremental Shielding Assessment' shielding assessment.

FINAL APPROVALS

System Department Head Gerald Annala Digitally signed by Gerald Annala
Date: 2020.11.24 12:42:28 -06'00' Date _____

Assigned RSO Madelyn Schoell, UID:maddiew Digitally signed by Madelyn Schoell, UID:maddiew
Date: 2020.11.24 12:19:49 -06'00' Date 11/24/20

AD Division Head Michael Lindgren, UID:mlindgre Digitally signed by Michael Lindgren, UID:mlindgre
Date: 2020.11.24 12:47:59 -06'00' Date 11/24/20

BEAM PERMIT
11/24/2020

P1-P2 Beamline Accelerator Safety Envelope (ASE) Limits

The maximum beam intensity transmitted through the P1-P2 Beamline is limited to:

1.35 x 10¹⁸ protons per hour at 8 GeV
9.00 x 10¹⁶ protons per hour at 120 GeV

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

P1-P2 Beamline Operating Limits

The maximum beam intensity transmitted through the P1-P2 Beamline is limited to:

5.41 x 10¹⁶ protons per hour at 8 GeV
1.25 x 10¹⁵ protons per hour at 120 GeV

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

#1 36,000 pulses per hour at 1.50 x 10¹² protons per pulse = 5.41 x 10¹⁶ protons per hour at 8 GeV

#2 60 pulses per hour at 2.08 x 10¹³ protons per pulse = 1.25 x 10¹⁵ protons per hour at 120 GeV

Special conditions and comments:

Reviewed by Todd Sullivan Digitally signed by Todd Sullivan
Date: 2020.11.24 12:48:24 -06'00'

Operations Department Head

Reviewed by Gerald Annala Digitally signed by Gerald Annala
Date: 2020.11.24 12:44:32 -06'00'

Systems Department Head

Reviewed by Madelyn Schoell, UID:maddiew Digitally signed by Madelyn Schoell, UID:maddiew
Date: 2020.11.24 12:20:17 -06'00'

Assigned RSO

Reviewed by Madelyn Schoell, UID:maddiew Digitally signed by Madelyn Schoell, UID:maddiew
Date: 2020.11.24 12:20:27 -06'00'

ESH Radiation Physics Operations Department Head

Approved by Michael Lindgren, UID:mlindgre Digitally signed by Michael Lindgren, UID:mlindgre
Date: 2020.11.24 12:52:00 -06'00'

Accelerator Division Head

Operator Signatures

Crew Chiefs

Crew A

Crew B

Crew C

Crew D

Crew E

Other

Running Condition P1-P2 Beamline

November 24, 2020

Maddie Schoell

Area RSO

Mode of Operation Beam to F17: 8 GeV for Muon Campus Operations, 120 GeV for Switchyard Operations

Beam Limits	Beam Energy	ASE Limit	Operating Limit
	8 GeV	1.35 E18 protons/hr	5.41 E16 protons/hr
	120 GeV	9.00 E16 protons/hr	1.25 E15 protons/hr

Critical Devices R:LAM52, R:V703, I:LAM52, I:V701

Enclosures Protected F-Sector, Muon Campus Pre-Target

Preferred 8 GeV intensity is monitored via R:TOR 703

Monitoring Devices* 120 GeV intensity is monitored via I:BEAM sampled on the \$39.

*Other methods of monitoring intensity may be used.

Requirements

Access Devices R:LAM52, R:V703, I:LAM52 and I:V701 must be disabled to access the enclosures protected.

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

Requirements Shielding, fencing and posting are in accordance with the following shielding assessment documents:
2016 "P1 and P2 Beamline Incremental Shielding Assessment"

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

 **Sys. Dept. Head Approval** Todd Sullivan
Digitally signed by Todd Sullivan
Date: 2020.11.24 12:49:11 -06'00'

Assigned RSO Approval Madelyn Schoell, UID:maddiew
Digitally signed by Madelyn Schoell, UID:maddiew
Date: 2020.11.24 12:20:55 -06'00'

Sys. Dept. Head Approval Gerald Annala
Digitally signed by Gerald Annala
Date: 2020.11.24 12:45:31 -06'00'

AD Head Approval Michael Lindgren, UID:mlindgre
Digitally signed by Michael Lindgren, UID:mlindgre
Date: 2020.11.24 12:53:48 -06'00'

November 24, 2020

Area RSO

Maddie Schoell

Operational Comments

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

Running Condition P1-P2 Beamline

November 24, 2020

Area RSO

Maddie Schoell

Operator Signatures

Crew Chiefs

Crew A

Crew B

Crew C

Crew D

Crew E

Other
