

Fermi National Accelerator Laboratory

Safety Assessment Document

Revision 21

October 20, 2020

Operated by Fermi Research Alliance, LLC Under Contract with the United States Department of Energy

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SAFETY ASSESSMENT DOCUMENT ACCELERATOR READINESS REVIEW DOCUMENTATION FORM

This form records the PSAD/SAD/ARR review process required for operations at Fermi National Accelerator Laboratory.

PSAD/SAD/ARR TITLE AN	D DATE: Ferm	ni National Accelerator	<u>Laboratory</u>
	S	Safety Assessment Docu	ıment
		October 20, 2020	
THIS DOCUMENT DESCR	IBES:	,	
New Facility	Ne	w Experiment	
Existing Facility	<u>К</u> Ма	jor Modification	
Entire Program	De	commissioning	
Readiness Review			
FERMI NATIONAL ACCE	_		ess Review
Safety Assessment Document Approval X Authorization to Operate Facility		Program/Facility Req	
Authorization to Operate 1 ach		1 rogram/1 acmity Req	
Fermilab Division/Section/Pro	nject Stephen Brice, UID:sbrice	Digitally signed by Stephen Brice, UID:sbrice Date: 2020.10.21 16:20:12 -05'00'	Date: 10/21/20
Fermilab Chief Safety Officer	Amber Kenn	Digitally signed by Amber Kenney Date: 2020.10.22 16:32:12 -05'00'	Date: 10/21/20
Fermilab Director	Nigel Lockyer, UID:lockyer	Digitally signed by Nigel Lockyer, UID:lockyer Date: 2020.11.02 11:11:56 -06'00'	Date: 11/2/20



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Revision History

Revision 0, Fermilab SAD Section III, Chapter 6 1-10, Main Injector Neutrino Oscillation Search (MINOS) Experimental Hall, October 20, 2020. Angela Aparicio SAD Table of Contents: updated name for Chapter II-2 from Muon Collider Test Area to 400 MeV Test Area (MTA) to align with repurposed facility. Appendix A – Accelerator Safety Envelope, Revision 12, August 25, 2020 Tom Kobilarcik Evan Niner Chapter. August 25, 2020 Revision 1, 400 MeV Test Area (MTA) SAD Chapter. August 25, 2020 SAD Table of Contents: corrected abbreviation for RAF to Chapter V-4 title from V-5. Appendix A – Accelerator Safety Envelope, Revision 11, February 11, 2020 Revision 11, February 11, 2020 Revision 1, Muon Campus SAD Chapter. February 11, 2020 Revision 1, Muon Campus SAD Chapter. February 11, 2020 Appendix A - Accelerator Safety Envelope, Revision 19, November 12, 2019 Revision 3, Fermilab Accelerator Science & Technology (IOTA/FAST) Electron Injector SAD chapter. November 11, 2019. Revision 1, Meson Area SAD Chapter. Revision 17 Revision 17 Revision 17 Revision 1, Meson Area SAD Chapter. Prochology (IOTA/FAST) Electron Injector SAD chapter. January 18, 2019 Revision 2, Fermilab Accelerator Science & Technology (IOTA/FAST) Electron Injector SAD chapter. April 23, 2018 Revision 1, Meson Area SAD Chapter. Revision 16 Revision 16 Revision 16 Revision 18 Revision 16 Revision 16 Revision 16 Revision 18 Revision 16 Revision 18 Revision 16 Revision 16 Revision 18 Revision 16 Revision 16 Revision 18 Revision 16 Revision 18 Revision 19 Revisi	Author	Description of Change	Revision No. & Date
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	Daniel R. Broemmelsiek	chapter. April 23, 2018.	April 23, 2018



	Appendix A - Accelerator Safety Envelope,	
	Revision 9, January 11, 2018.	
	Removed Experimental ORC requirement from the	
	ASE. Updated reference to the Routine Monitoring	
	Program to reflect ESH Centralization. Clarified	
	when shielding deficiencies would be an ASE	Revision 15
John E. Anderson Jr.	violation.	January 11, 2018
	Appendix A - Accelerator Safety Envelope,	
	Revision 8, August 28, 2017.	
	Updated ASE energy limit for the Fermilab	
	Accelerator Science and Technology (FAST)	
John E. Anderson Jr.	Facility.	
	Revision 1, Fermilab Accelerator Science &	
Dean R Edstrom, Jr.	Technology (IOTA/FAST) Electron Injector SAD	Revision 14
Daniel R. Broemmelsiek	chapter. August 28, 2017.	August 28, 2017
	Appendix A - Accelerator Safety Envelope,	
	Revision 7, March 3, 2017.	
	Updated titles from ES&H reorganization, updated	
	PPD ORC process to the FESHM ORC Process, and	
	updated shielding assessment references for the	
	Muon Campus and Booster accelerator areas.	
	Safety envelope beam intensities did not change.	
	Added Muon Campus 8 GeV beam on target	
	intensity scaled from the 120 GeV intensity for	
John E. Anderson Jr.	clarity.	
	Litit I will a second of the Manney 2 standard of Classical	
	Initial release of the Muon g-2 storage ring Chapter	
D 1 C	for the Fermi National Accelerator Safety	
Brendan Casey	Assessment Document (SAD). March 2, 2017	
	Initial valence of the Myon Commus and a 2 Chapter	
	Initial release of the Muon Campus and g-2 Chapter	
	for the Fermi National Accelerator Laboratory	Revision 13
Lama Annala	Safety Assessment Document (SAD).	
Jerry Annala	February 24, 2017 Povision 1 Fermilah SAD Section I Chapters 1	March 3, 2017
John E. Andarson In	Revision 1, Fermilab SAD Section I, Chapters 1 –	
John E. Anderson Jr. T.J. Sarlina	10, Overview of Fermilab Facilities.	
1.J. Saiilla	January 4, 2017.	
	Revision 1, Initial release of the Fermilab Meson	
	and Neutrino Switchyard 120 Experimental Areas	
	Chapter of the Fermi National Accelerator Safety	
Eric McHugh	Assessment Document (SAD). January 15, 2017.	
Life Meriding	7 Socioment Document (SAD). January 13, 2017.	
	Revision 0, Initial release of the Booster Accelerator	
	Chapter of the Fermi National Accelerator Safety	Revision 12
William Pellico	Assessment Document (SAD). January 18, 2017.	January 18, 2017
	1 122 122 110 11 12 10 10 11 10 10 10 10 10 10 10 10 10 10	



	Initial release of the Railhead Storage Area Chapter of the Fermi National Accelerator Safety	
Sue McGimpsey	Assessment Document (SAD). Revision 0, April 28, 2015	
	Initial release of the Other Radioactive Material Storage Areas Chapter of the Fermi National	
Kathy J. Graden	Accelerator Safety Assessment Document (SAD). Revision 0, March 11, 2015	
Kathy J. Graden	Initial release of the Radiation Physics Calibration Facility Chapter of the Fermi National Accelerator Safety Assessment Document (SAD). Revision 0, June 12, 2015	
Matt Quinn	Initial release of the Radionuclide Analysis Facility Chapter of the Fermi National Accelerator Safety Assessment Document (SAD). Revision 0, June 10, 2015	
David Hockin Jon Ylinen	Initial release of the Waste Handling Facilities Chapter of the Fermi National Accelerator Safety Assessment Document (SAD). Revision 0, May 12, 2015	
Rich Ruthe	Initial release of the Technical Division Facilities Chapter of the Fermi National Accelerator Safety Assessment Document (SAD). Revision 0, June 1, 2015	
	Initial release of the Shipping and Receiving Operations (Site 38) Chapter of the Fermi National Accelerator Safety Assessment Document (SAD).	Revision 11
Sue McGimpsey	Revision 0, June 9, 2015	July 17, 2015



	Amandiy A Accolomaton Safaty Envelope	
	Appendix A - Accelerator Safety Envelope, Revision 6, January 2, 2015.	
	Added Safety Envelope beam intensity limits for the	
	Advanced Superconducting Test Accelerator	
	(ASTA) Injector. Changed Antiproton Source to	
John E. Anderson Jr.	Muon Campus. Updated references.	
John E. Anderson Jr.	Widon Campus. Opuated references.	
	Initial release of the Advanced Superconducting	
	Test Accelerator (ASTA) Injector Chapter of the	
Elvin Harms Jr.	Fermi National Accelerator Safety Assessment	
John E. Anderson Jr.	Document (SAD). Revision 0, December 31, 2014.	
	D-Zero Detector Chapter of the Fermi National	
	Accelerator Safety Assessment Document (SAD).	Revision 10
Angela Aparicio	Revision 4, November 13, 2014.	January 6, 2015
	Collider Detector at Fermilab (CDF) Chapter of the	
	Fermi National Accelerator Safety Assessment	
Angela Aparicio	Document (SAD). Revision 3, September 26, 2014.	
	Initial release of the Micro Booster Neutrino	
Angela Aparicio	Experiment (MicroBooNE) Chapter of the Fermi	
Catherine James	National Accelerator Safety Assessment Document	Revision 9
Eric McHugh	(SAD). Revision 0, June 23, 2014.	September 26, 2014
	Initial release of the Meson Area Chapter of the	
John E. Anderson Jr.	Fermi National Accelerator Safety Assessment	
Craig Moore	Document (SAD). Revision 0, April 29, 2014.	
	Initial release of the NuMI Off-axis Electron	
	Neutrino (ve) Appearance (NOvA) Experiment Near	
F : M II 1	Detector Chapter of the Fermi National Accelerator	
Eric McHugh,	Safety Assessment Document (SAD). Revision 0,	
TJ Sarlina	March 21, 2014.	
	Initial release of the Booster Neutrino Beam	
	Chapter of the Fermi National Accelerator Safety	
John E. Anderson Jr.	Assessment Document (SAD). Revision 0, January	Revision 8
Craig Moore	23, 2013.	May 6, 2014
Craig Moore	23, 2013.	1v1ay 0, 2014





	Appendix A - Accelerator Safety Envelope,	
	Revision 5, January 3, 2014.	
	Updated ASE text to reflect recommendations from	
	the Accelerator Readiness Review conducted	
	October 1-3, 2013. Changes included moving	
	numerical beam operating intensity limits from the	
	ASE to a Division Level document, scaling	
	numerical beam safety envelope intensity limits to a	
	500 mrem accident condition, removing Operating	
	surveillance limits, and removing industrial hazards	
	such as oxygen monitoring, cryogenic relief valve	
I.I. T. A. I I.		
John E. Anderson Jr.	monitoring, and flammable gas system monitoring.	
	Initial release of the Switchyard Fixed Target Beam	
	Lines Chapter of the Fermi National Accelerator	
John E. Andonson In	_	Revision 7
John E. Anderson Jr.	Safety Assessment Document (SAD). Revision 0,	
Craig Moore	October 15, 2013.	January 16, 2014
	Initial release of the Neutrinos at the Main Injector	
	(NuMI) Beam Line Chapter of the Fermi National	D
John E. Anderson Jr.	Accelerator Safety Assessment Document (SAD).	Revision 6
Craig Moore	Revision 0, June 3, 2013.	October 7, 2013
	Appendix A - Accelerator Safety Envelope,	
	Revision 4, April 25, 2013.	
	Updated DOE O 420.2B to DOE O 420.2C.	
	Updated ASE text to reflect credible accident	
	scenarios. Modified Operating and Safety Envelope	
	beam parameters for the Main Injector, Recycler,	
	and NuMI. Updated shielding assessment	
	references for the revised Main Injector, Recycler,	
	and NuMI shielding assessments. Updated Linac	
	groundwater limit reference to new MARS	
	calculations. Removed Operating and Safety	
	Envelope beam parameters for Tevatron Circulating	
	Beam, A0 and C0 Abort Absorbers, and the	
	Pelletron; placing the areas in standby. Removed	
	the Booster Radiation Damage Facility Operating	
John E. Anderson Jr.	and Safety Envelope beam parameters.	
	Initial release of the Main Injector/Deciveler Chanter	
	Initial release of the Main Injector/Recycler Chapter	
	for the Fermi National Accelerator Safety	
John E. Anderson Jr.	Assessment Document (SAD). Revision 0	
David Capista	April 23, 2013.	
	Initial release of the Lines Assolute Chapter of	
William Pollins	Initial release of the Linac Accelerator Chapter of	Revision 5
William Pellico,	the Fermi National Accelerator Safety Assessment	
Fernanda G. Garcia	Document (SAD). Revision 0, March 18, 2013.	April 30, 2013



	Appendix A - Accelerator Safety Envelope,	
John E. Anderson Jr.	Revision 3, February 15, 2012. Added beam limits for the Neutrino Area.	
	Initial release of the Neutrino Area Chapter for the	
	Fermi National Accelerator Safety Assessment Document (SAD). Revision 0	
Thomas R. Kobilarcik	February 14, 2012	
	Initial release of the 8 GeV Line Chapter for the	
	Fermi National Accelerator Safety Assessment Document (SAD). Revision 0	
John E. Anderson Jr.	January 20, 2012	
	Initial release of the MiniBooNE Detector chapter	
	of the Fermilab Safety Assessment Document	D
Eric McHugh	(SAD). Revision 0 January 9, 2012	Revision 4 February 16, 2012
Life Weilugh	Initial release of the High Intensity Neutrino Source	1 cordary 10, 2012
	(HINS) Linac at Meson Detector Building (MDB)	
Peter Kasper	Chapter for the Fermi National Accelerator Safety	
Elmie Peoples-Evans	Assessment Document (SAD) Revision 0	
Robert C. Webber	March 21, 2011	
	Revision 2, Appendix A - Accelerator Safety	Revision 3
John E. Anderson Jr.	Envelope. Added beam limits for HINS Linac.	March 21, 2011
	Initial release of the MuCool Test Area (MTA)	
	Chapter for the Fermi National Accelerator Safety	
II D WILL	Assessment Document (SAD) Revision 0	
Herman B. White	January 20, 2011	
	Revision 1, Appendix A - Accelerator Safety	Revision 2
John E. Anderson Jr.	Envelope. Added beam limits for MTA.	January 20, 2011
	Revision 0, initial release of the Fermilab SAD	
	Section ,I Chapters 1 – 10, Overview of Fermilab	
	Facilities.	
	Revision 0, initial release of Appendix B - Fermi	Revision 1
John E. Anderson Jr.	National Accelerator Laboratory Shielding Policy.	October 26, 2010
	Revision 0, initial release of Appendix A -	Revision 0
John E. Anderson Jr.	Accelerator Safety Envelope.	December 10, 2009



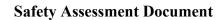
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