July 5, 2023

Scott Tingey
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Attn: Mr. Roger Snyder
Site Office Manager
Fermi Site Office
U.S. Department of Energy
P.O. Box 2000
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FRA 2nd Response to ASE and SAD Comment Resolution Form

Dear Mr. Snyder,

In your letter REQUEST TO APPROVE FERMILAB'S ACCELERATOR SAFETY ENVELOPE AND CONCURRENCE WITH SAFETY ASSESSSMENT DOCUMENTS FOR THE NEUTRINO, MESON AND NEUTRINO SWITCHYARD 120 EXPERIMENTAL AREAS INCLUDING SPINQUEST, dated January 4, 2023, you requested that Fermi Research Alliance (FRA) provide a proposed resolution for each comment in an attached FERMI ASE and SAD Comment Resolution Form. FRA's initial response and proposed resolutions were submitted April 24, 2023, however additional clarification was requested on May 9, 2023 to facilitate FSO review. Please see the attached updated response [1].

Additionally, example templates and outlines for the SAD, individual ASEs and individual SAD Chapters are provided as supporting documents for FRAs responses. See attachments [2] through [4].

Attachments:

[1] 20230630 – FRA 2nd Response to FSO SAD and ASE Comment Resolution Form
[2] Fermilab SAD Outline Example_20230705
[3] Individual SAD Chapter Outline Example_20230705
[4] ASE Template Example_20230705

Sincerely,

Scott Tingey, UID:stingey
Digitally signed by Scott Tingey, UID:stingey
Date: 2023.07.14 13:23:22 -05'00'

Scott Tingey
Chief Operating Officer
Office of the Director

cc: W. Begner
A. Kenney
R. Madiar
L. Merminga
M. Michels
M. Quinn
J. Sawyer
M. Schoell
J. Scott

	DOCUMENT	PAGE	Section	Comment/Issue	FERMI Comment/Issue Response	FSO Accept / Not Accept	FSO Response	Fermi Issue response	FSO Disposition
1	ASE Apendix A	Document	N/A	In accordance with DOE-HDBK-1163-2020, Standard Industrial Hazards(SIH) are hazards that are generally well understood and coverered by codes, standards, or other consensus standards. I am not sure if FERMI considers ODH as a SIH but since it is not covered by any codes, standards, or other consensus standard then this ASE must develop CC that will address the ODH concerns assocaietd with applicable accelerator facilities.	GENERAL COMMENT: Per ASO Guide, if hazards are fully addressed through their Integrated Safety Management program, they do not need to be controlled via Credited Controls. The Cryo hazards present for SpinQuest are fully covered by FESHM requiremetns and processes, which have been established following OSHA 1910 requirements. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: Discussion regarding what is considered a Credited Control for Fermilab is being discussed in the DOE O 420.2D Implementation SAD/ASE Working Group. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not Accepted	DOEs comment was not addressed. In accordance with DOE-HDBK-1163-2020, Standard Industrial Hazards (SIH) are hazards that are generally well understood and covered by codes, standards, or other consensus standards. Since ODH is not a SIH and in accordance with DOE G 420.2-1A then this ASE must develop credited controls that will address the ODH concerns associated with applicable accelerator facilities.	Fermilab has updated the ASE to incorporate ODH controls within applicable accelerator facilities as Credited Controls, and list these Credited Controls in the ASE. The Lab will consider areas posted as Exclusion Areas as applicable accelerator facilities for review of ODH hazards and incorporation of their controls as Credtied Controls. Other accelerator faciliteis are not applicable and ODH controls will follow OSHA/ISM/FESHM requirements. See Section 2 of the "ASE Template Example" for definitions and interpretations for the terms: Applicable Accelerator Facility and Credited Control. See Section 3 of the "ASE Template Example" for description of ODH System devices as Credited Controls. See Section 7 of the "ASE Template Example" for how ODH System Credited Controls will be listed in the ASE.	
2	ASE Apendix A	Document	N/A	Radiation detectors linked to the RSIS are required in the Shielding Assessment. These are not discussed in the ASE. Are the radiation area detectors/monitors (i.e Chipmunks, Fox, TLMs, etc) a credited control? They are not listed anywhere in the ASE. Further, how do other engineered controls that are required in the SA fit into the ASE as credited controls?	GENERAL COMMENT: No, the detectors themselves are not Creidted Controls. The only Engineered Credited Control is the Radiation Safety Interlock System (RSIS), and is already incorporated into the ASE. Specific detectors for each segment of the accelerator are listed in the Running Condition. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: n/a - question answered in "General Comment" section. No change to the SAD/ASE needed.	Not Accepted	Area radiation monitors mitigate consequences to personnel and the public located outside shielded facilities by monitoring radiation levels in occupied areas outside of shielding structures and terminate beam if a radiation trip limit is exceeded. Radiation monitors are essential to ensuring the safety of workers and the public during accelerator operations. (eg. In the case of the Booster, radiation levels outside shielding structures are controlled using total loss monitors to maintain dose rates and are not completely mitigated by passive shielding per the Booster Shielding Assessment Version 6, January 17, 2017. Section 17 Conclusions, states a TLM system covering the Booster ring needs to be part of the active shielding control.)	Fermilab has incorporated interlocked radiation monitors as required inputs for the RSIS, and list the detectors in the ASE. See Section 7 of the "ASE Template Example" for how interlocked detectors will be listed in the ASE.	
3	ASE Appendix A	Throughout	Throughout	The ASE discusses controls and requirements that are to be implemented and followed to ensure the level of risk to all workers, the public and the environment is maintained at acceptable levels. However, there is no risk analysis or risk matrix included in the ASE to justify this statement.	GENERAL COMMENT: All activities meet or exceed requirmentes stated in 420.2c, as documented and flowed down via FESHM and FRCM and the applicable SAD Chapter(s), these documents are continually reviewed and updated as risks throughout the lab change and fully apply to all accelerator operations. FRA intends to incorporate of risk matrices for each of the hazards discussed in SAD Chapters 1-10 into the specific accelerator, experimental, R&D, and support SAD chapters to improve our ability to increase awareness to various risks and possible mitigations to those risks. An implementation plan will be developed for systematically incorporating risk matrices into the SAD Chapters in a manner that facilitates ongoing operations. SPECIFIC FOR NM RESTART/SPINQUEST: Risk Matrices will be included for the NM and SY120 Experimental Chapters of the SAD for specific analysis for the SpinQuest experimnet. This will be addressed prior to the restart of NM Operations in support of SpinQuest. TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: Additional Risk Matrices will be developed for all other SAD Chapters. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	Fermilab is developing Risk Matrices for each SAD Chapter. See "Individual SAD Chapter Outline Example" for proposed location of Risk Matrices in each Chapter.	
4	ASE Appendix A	Throughout	Throughout	There is no mention of the Configuration Management Program. Does this fall under administrative credited control process?	GENERAL COMMENT: CMP would not be an administrative Credited Control, rathers it's the process used to ensure CCs are in place. CMP will be established and specified within the ASE. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: Additional details of the Configuration Management Program will be established and specified within the ASE. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	Fermilab is finalizing language for the Configuration Management Program, which will be incorporated into each ASE. See "ASE Template Example" for placeholder.	
5	ASE Apendix A	Throughout	Throughout	In various areas throughout the ASE, it was observed that the use of other words to describe Credited Controls (CC's) are documented (e.g., Condition, Control, Surveillance, etc.).For consistancy, please update the entire document and only use "Credited Contol".	GENERAL COMMENT: ASE updated to state "Credited Control" and clarify aspects (i.e., basis, requirement, surveillance, response) of each Credited Control. Including list of all specific elements within the ASE, will require substancial effort. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: Language in the ASE will be updated to stated "Credited Control" and clarify aspects of each Credited Control. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal	Not accepted	Prior to implementing the clarification process, DOE expects to see an example. The i.e., portion of the response indicates basis, requirement, surveillance, response of each Credited Control. DOE expects that all of the credited controls are requirements. It is assumed that you will have separate CC's (i.e., engineered, administrative, configuration management, and calibration, testing and inspection schedules.	Fermilab has updated the ASE to specify the requirements and required surveillance that must be in place and/or completed for each Credited Control. The ASE further specifies that if there is beam operation without the requirements in place or the required surveillance being performed within the minium specified interval, then it constitutes an ASE violation. See "ASE Template Example" Section 3 for descriptions of the aspects of Credited Controls. See "ASE Template Example" Section 7 to see this articlated in the "response" section for each Credited Control.	

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6	ASE Apendix A	Throughout	Throughout	Consider changing the format of the ASE to a simple easy to use format. E.g., Section 1 Introduction to define the CC for the accelerator, unplanned lose of CC/ASE violations, planned and discovered USIs, USI high level process, Section 2 ALL CC (i.e, engineered, administrative, configuration management for CC, Required calibration, maintenance, and inspection schedules for CCs. I would also suggest that each of these areas allow for a brief write up documenting the Basis/Context.	GENERAL COMMENT: will update ASE layout SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: The ASE layout will be updated to a simple easy to use format. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accepted.	Simply stating that the ASE will be updated provides no clarity. DOE expects that FERMIs comment document specific information (e.g., Section 1 Introduction to define the CC for the accelerator, unplanned lose of CC/ASE violations, planned and discovered USIs, USI high level process, Section 2 ALL CC i.e., engineered, administrative, configuration management for CC. Required calibration, maintenance, and inspection schedules for CCs. Each of these sections will contain a brief write up documenting the Basis/Context.	Fermilab has updated the ASE template such that Section 1 will be the Introduction and Scope (of that ASE), Section 2 will include Select Definitions and Acronyms, Section 3 will provide a description of the Credited Controls, Section 4 will describe the ASE Violation Determination and Actions, Section 5 will describe the Configuration Management for Credtied Controls, Section 6 will provide an overview of the USI Process and how it's incorporated into the operation of that accelerator, and Section 7 will list all of hte Credited Controls. See "ASE Template Example".	
7	ASE Appendix A	7 of 15	Accel Safety Envelope	The statement "Variations beyond these limits are a violation of the ASE." is in contradiction to current practice. For example, overburden sink holes are a variation beyond the defined limit of credited passive controls defined in the current ASE (page 8 of 15). Any variation is a violation.	GENERAL COMMENT: ASE can be updated to specifically address what the requirement is, text can be updated to ensure variation from stated requirement is ASE violation. FSO expectations of including list of all specific elements within the ASE, will require substancial effort. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: Discussion regarding what is considered a Credited Control for Fermilab is being discussed in the DOE O 420.2D Implementation SAD/ASE Working Group. ASE will be updated to specifically address what the requirement is and ensure variation from stated requirement is an ASE violation. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accepted	FSO expects the ASE to document specific controls.	Fermilab has updated the ASE to ensure the requirements for each Credited Control are listed explicitely. See Section 6 of "ASE Template Example" to see template for how each individual Credited Control will be specified for each type of Credited Control.	
8	ASE Appendix A	7 of 15	Credited Controls	Where is the risk analysis/matrix to justify this statement and what is an acceptable level of risk? "Credited controls identified in the ASE are the primary controls that assure that the level of risk to all workers, the public, and the environment is maintained at acceptable levels."	GENERAL COMMENT: see response for #3 SPECIFIC FOR NM RESTART/SPINQUEST: same as response for #3 TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: see response for #3	Accepted		n/a - see #3	
9	ASE Appendix A	7 of 15	Credited Controls	The following statement needs clarification. "The assigned Radiation Safety Officer (RSO) may specify equivalent controls in accordance with the FRCM that do not reduce the level of safety to allow for maintenance or repairs." The use of any equivalent controls during beam operations needs to be added to the ASE and must approved by FSO prior to implementation.	GENERAL COMMENT: This statement is intended to allow RSO to implment control measures during times of maintenance or repairs, i.e., not during operations. (e.g., ensure access still controlled if rollup door shielding is removed). SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: n/a - question answered in "General Comment" section. No change to the SAD/ASE needed.	Not accepted.	Clarify that this is allowed only during maintenance periods and not during operations. Describe how conditions are returned to pre-maintenance period and what process verifies conditions return to pre-maintenance period.	Fermilab has updated the ASE to include Approved Alternatives that may be used as a temporary compensatory measure if the requirement is not in place during beam operations. See Section 3 of "ASE Template Example" for description of Approved Alternatives, and Section 7 for how they would be described for each Credited Control. It is further specified in Section 3 that Credited Controls may be removed during downtime/maintenance periods, and they are managed under the Safety Configuration Managemetn program to ensure they're replaced prior to resumption of operations.	
10	ASE Apendix A	7	Creditted Contorls	The last sentence of the first paragraph states in part that the RSO may specify equivalent controls that do not reduce the level of safety to allow for maintanance or repairs. Is the intent to allow for use of equivalent cotrols during beam operations?	GENERAL COMMENT: no - see response for issue #9. SPECIFIC FOR NM RESTART/SPINQUEST: n/a - see response for #9 TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: see response for #9	Not accepted.	DOE expects that the ASE contains the necessary controls to ensure safe operation of the accelerator. Discussion on how maintenance is performed when the accelerator is performed is better suited for the SAD. If captured in the SAD it would translate to a configuration management credited control in the ASE.	n/a - see #9	
11	ASE Apendix A	7	Accelerator safety Envelope	This section contains background information, some questionable, that is better captured in the SAD. Please see comment 6 and an example in comment # 10.	GENERAL COMMENT: will update SAD/ASE layout SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: The ASE/SAD layout will be updated to ensure information is in the correct document. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accepted.	Simply stating that the ASE and SAD will be updated provides no clarity. DOE expects that FERMIs comment document specific information (e.g., Section 1 Introduction to define the CC for the accelerator, unplanned lose of CC/ASE violations, planned and discovered USIs, USI high level process, Section 2 ALL CC (i.e., engineered, administrative, configuration management for CC. Required calibration, maintenance, and inspection schedules for CCs. Each of these sections will contain a brief write up documenting the Basis/Context.	n/a - see #6	
12	ASE Apendix A	7	Creditted Contorls	This section contains background information, some questionable, that is better captured in the SAD. Please see comment 6 and an example in comment # 10.	GENERAL COMMENT: will update SAD/ASE layout SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: The ASE/SAD layout will be updated to ensure information is in the correct document. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accepted.	Simply stating that the ASE will be updated provides no clarity. DOE expects that FERMIs comment document specific information (e.g., Section 1 Introduction to define the CC for the accelerator, unplanned lose of CC/ASE violations, planned and discovered USIs, USI high level process, Section 2 ALL CC (i.e., engineered, administrative, configuration management for CC. Required calibration, maintenance, and inspection schedules for CCs. Each of these sections will contain a brief write up documenting the Basis/Context.	n/a - see #6	

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13	ASE Appendix A	7 of 15	Credited Controls	Where is the risk assessment to justify this statement and what is an acceptable level of risk? "Compliance with the requirements of the Beam Permit and Running Condition ensures that the level of risk to all workers, the public, and the environment is maintained at an acceptable level."	GENERAL COMMENT: see response for #3 SPECIFIC FOR NM RESTART/SPINQUEST: see response for #3 TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: see response for #3	Accepted		n/a - see #3	
14	ASE Apendix A	8	Credited Passive Controls	Permanent Shielding including labyrinths Controls :The is a vague CC that could be interpreted differently. The CC states in part that the shielding encompases the strucural elements. What is meant by structural elements? Additionally it states that it includes built in design features such as. Use of "such as" could lead personnel to believe that these are simply examples. Lastly, listing the earthen berms and overburden indicates to DOE that if there is ANY change to the lanscape (e.g., sinkhole, runoff, etc.) would be an ASE violation.	GENERAL COMMENT: FRA will clarify what is considered permanent shielding, and will further specify required permanent shielding for various segments of the accelerator complex. Discussions regarding what is considered a Credited Control for Fermilab is being discussed in the DOE O 420.2D Implementation SAD/ASE Working Group, and specifically how overburden is or is not incorporated. Structural elements include enclosure walls/floors/ceilings/labyrinths/stairwells/etc. ASE layout updated to have general description of the various CCs, which can include "such as" examples, with separate section for each segment stating specific requirements. See response #7. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: Discussion regarding what is considered a Credited Control for Fermilab is being discussed in the DOE O 420.2D Implementation SAD/ASE Working Group. ASE will be updated to specifically address what the requirement is and ensure variation from stated requirement is an ASE violation. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not Accepted	FSO expects that the ASE will document specific controls.	Fermilab has updated the ASE template to list the specific shielidng Credited Controls, including permantent shielidng and labyrinths. See Section 7 of "ASE Template Example" for how required shielding Credtied Controls will be listed.	
15	ASE Apendix A	8	Credited Passive Controls	Permanent Shielding including labyrinths Surveillance: This CC should not refer personnel back to a procedure. This should simply state the requirement from the procedure (e.g., Inspect the integrety of the shielding prior to initial start up of the accelerator facility and every 12 months).	GENERAL COMMENT: Will update ASE SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: Pending clarification of #39, ASE can be updated to state requirements rather than refernece a procedure. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not Accepted.	Simply stating that the ASE will be updated provides no clarity. DOE expects that FERMIs comment documents the specific information (e.g., the ASE will be updated to require inspection of the integrity of the shielding prior to initial start up of the accelerator facility and every 12 months).	Fermilab has updated the ASE template to list required surveillance, rather than reference a procedure. For shielding, the surveillance requiement states "required shielding shall be verified by the applicable department annually, not to exceed twelve months". See Section 7 of "ASE Template Example".	
16	ASE Apendix A	8	Credited Passive Controls	Movable Shielding Control: The CC states in part that movable shielding is any shielding that can be moved. Does this include moved by hand and an euqipment (e.g., crane, for lift, etc.)?	GENERAL COMMENT: yes - any shielding that is able to be moved to allow for access to areas or equipment. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: n/a - question answered in "General Comment" section. No change to the SAD/ASE needed.	Accepted	Question was answered see comment # 18 for additional thoughts.	n/a	
17	ASE Apendix A	8	Credited Passive Controls	Movable Shielding Control: The CC states in part that movable shileding shall be used as necessary in accordance with the Fermillab shielding policies specified in the FESHM and FRCM. The CC should document something that shielding must be installed in its proper configuration and list the type of shielding(e.g., steel, concrete blocks, etc.) This followed up with the addition of a configuration management CC would ensure consistancy.	GENERAL COMMENT: ASE will be updated. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE will be updated to state requirement for proper install and configuration for movable shielding. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accepted	Simply stating that the ASE will be updated provides no clarity. DOE expects that FERMIs comment will document the specific information (e.g., the ASE will be updated to document that shielding must be installed in its proper configuration and list the type of shielding(e.g., steel, concrete blocks, etc.) This followed up with the addition of a configuration management CC would ensure consistency.	Fermilab has updated the ASE template to list the specific shielidng Credited Controls, including movable shielding. See Section 7 of "ASE Template Example" for how required shielding Credtied Cotnrols will be listed. Additionally, the Preferred Method of Configuration will be listed for each Credited Control.	
18	ASE Apendix A	8	Credited Passive Controls	Movable Shielding Control: The CC states in part that movable shielding shall be locked in place or equivalent controls placed to assure correct placement. How is shielding locked and what would be an example of equivalency?	GENERAL COMMENT: shielding is configured in such a way that it would require a tool for removal. (locked using chains and Shielding Configuration Control locks, bolting unistrut to blocks to inhibit movement, cover plates over penetration holes, etc.) Shielding is also posted as required shielding. The term "equivalent controls" referred to the unistrut, coverplates, etc. where chains/locks are not feasible. Will update text and remove term "equivalency". SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE will be updated to describe acceptable controls for movable shielding and remove the term "equivalent". This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Accepted	The response is adequate, however, DOE expects that the term equivalent be removed and add the text that was used to explain equalency to the CC in the ASE. Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	Fermilab has updated the ASE to list methods of configuration for movable and penetration shielding, as well as the preferred method of configuration for each movable and penetration Credited Control. See "ASE Template Example" Section 2s and 7.	
19	ASE Apendix A	8	Credited Passive Controls	Movable Shielding Surveillance: This CC should not refer personnel back to a procedure. This should simply state the requirement from the procedure (e.g., Inspect the integrety of the shielding prior to initial start up of the accelerator facility and every 12 months).	GENERAL COMMENT: will update ASE SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: Pending clarification of #39, ASE can be updated to state requirements rather than refernece a procedure. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accepted.	Simply stating that the ASE will be updated provides no clarity. DOE expects that FERMIs comment will document the specific information (e.g., Inspect the integrity of the shielding prior to initial start up of the accelerator facility and every 12 months).	Fermilab has updated the ASE template to list required surveillance, rather than reference a procedure. For shielding, the surveillance requiement states "required shielding shall be verified by the applicable department annually, not to exceed twelve months". See Section 7 of "ASE Template Example".	

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20	ASE Apendix A	8	Credited Passive Controls	Penetrating Shielding Control: This CC is vague, can be interperted differently and needs clarity such as listing the penetrations that can be tracked in configuration management process and also labled as cc.	GENERAL COMMENT: will update ASE. See response to #21 for effort needed to accomplish. SPECIFIC FOR NM RESTART/SPINQUEST: n/a - see response for #21 TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: see response for #21	Not Accepted.	Fermi must define and understand required shielding for all aspects of the accelerator as defined in credited controls.	Fermilab has updated the ASE template to list the specific shielidng Credited Controls, including penetrations. See Section 7 of "ASE Template Example" for how required shielding Credtied Controls will be listed.	
21	ASE Apendix A	8 of 15	Credited Passive Controls: Permanent shielding & labyrinths	Control section: Only list the minimum required shielding for the specific facility here. Any deviation from the ASE (sink hole of earthen berm or overburden) will be considered an ASE violation.	GENERAL COMMENT: FRA will clarify what is considered permanent shielding, and will further specify required permanent shielding for various segments of the accelerator complex. Discussions regarding what is considered a Credited Control for Fermilab is being discussed in the DOE O 420.2D Implementation SAD/ASE Working Group, and specifically how overburden is or is not incorporated. (similar to resonse for #14) Including a listing of all required shielding for each segment of the accelerator would take extensive effort. SPECIFIC FOR NM RESTART/SPINQUEST: ASE can be updated to list required permanent shielding & labyrinths for NM/SpinQuest. This will be addressed prior to the restart of NM Operations in support of SpinQuest. TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: Discussion regarding what is considered a Credited Control for Fermilab is being discussed in the DOE O 420.2D Implementation SAD/ASE Working Group. ASE will be updated to specifically address what the requirement is and ensure variation from stated requirement is an ASE violation. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not Accepted.	ASE must be updated to include required shielding as a credited control. Fermi must define and understand required shielding for all aspects of the accelerator as defined in credited controls.	Fermilab has updated the ASE to list specific requirements for shielding Credited Controls. See "ASE Template Example" Section 7.	
22	ASE Appendix A	8 of 15	Credited Passive Controls: Movable shielding	Control section: Only list the minimum required shielding for the specific facility here, in this case Spinquest.	GENERAL COMMENT: see response for #21 for effort needed to list all specifics. Can provide an updated ASE with specifics listed for NM initially, while specifics for remaining segments of the accelerator are added. SPECIFIC FOR NM RESTART/SPINQUEST: ASE can be updated to list required movable shielding for NM/SpinQuest. This will be addressed prior to the restart of NM Operations in support of SpinQuest. TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE will be updated to include required movable shielding for the remainder of the accelerator complex separate from requirements for NM/SpinQuest. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accepted	ASE must be updated to include required shielding as credited control. Fermi must define and understand required shielding for all aspects of the accelerator as defined in credited controls.	see #21	
23	ASE Appendix A	8 of 15	Credited Passive Controls: Penetration shielding	Control section: Only list the minimum required shielding for the specific facility here, in this case Spinquest.	GENERAL COMMENT: see response for #22. SPECIFIC FOR NM RESTART/SPINQUEST: ASE can be updated to list required penetration shielding for NM/SpinQuest. This will be addressed prior to the restart of NM Operations in support of SpinQuest. TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE will be updated to include required penetration shielding for the remainder of the accelerator complex separate from requirements for NM/SpinQuest. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not Accepted	ASE must be updated to include required shielding as a credited control. Fermi must define and understand required shielding for all aspects of the accelerator as defined in credited controls.	see #21	
24	ASE Appendix A	8 of 15	Credited Passive Controls: Penetration shielding	Surveillance Section: The penetration surviellance requirements need to be defined in this section. Do not point the reader to another document.	GENERAL COMMENT: will update ASE SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE will be updated to state requirements for surveillance of penetration shielding rather than refernece a procedure. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	Fermilab has updated the ASE template to list required surveillance, rather than reference a procedure. For shielding, the surveillance requiement states "required shielding shall be verified by the applicable department annually, not to exceed twelve months". See Section 7 of "ASE Template Example".	
25	ASE Apendix A	9	Credited Passive Controls	Radiation Fencing: This CC is ONLY applicable to radiation areas. What controls are in place for controlled areas? Since FERMI is open to the public, this CC needs to be more broad and include controls that ensure minors/members of the public and untrained employess do not receive 100mrem in a year.	GENERAL COMMENT: Will clarify fencing Credited Control requirements to consider both Radiaion Area and Controlled Area fencint. SPECIFIC FOR NM RESTART/SPINQUEST: ASE will be updated to list required fencing, for employees and members of the public, for NM/SpinQuest. This will be addressed prior to the restart of NM Operations in support of SpinQuest. TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE will be updated to include fencing requirement, for employees and members of the public, for the remainder of the accelerator complex separate from requiremetns for NM/SpinQuest. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	Fermilab has updated the ASE template to include fencing requirements for both Raditaion Areas as well as any Controlled Areas. See Sections 3 and 7 in "ASE Template Example".	

	DOCUMENT	PAGE	Section	Comment/Issue	FERMI Comment/Issue Response	FSO Accept / Not Accept	FSO Response	Fermi Issue response	FSO Disposition
26	ASE Apendix A	9	Credited Passive Controls	Radiation fencing Surveillance: This CC should not refer personnel back to a procedure. This should simply state the requirement from the procedure (e.g., Inspect the integretry of the shielding prior to initial start up of the accelerator facility and every 12 months).	GENERAL COMMENT: will update ASE SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE will be updated to state requirements for surveillance of fencing rather than refernece a procedure. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accepted	Simply stating that the ASE will be updated provides no clarity. DOE expects that FERMIs comment will document the specific information (e.g., Inspect the integrity of the fencing prior to initial start up of the accelerator facility and every 12 months).	Fermilab has updated the ASE template to list required surveillance, rather than reference a procedure. For fencing, the surveillance requiement states "required fencing shall be verified by the applicable department annually, not to exceed twelve months". See Section 7 of "ASE Template Example".	
27	ASE Apendix A	9	Credited Active Engineered Controls	Radiation Safety Interlock ControlSafety Envelope- Surveillance:This CC is vague and needs clarity. Additionally, the control needs to specify where interlocks are located to prevent beam during inadvertant accesses; ie are they located at all gates/doors/windows/emergency exit hatches/etc. An example could be the following - Access controls- During beam opertions, where beam is present to..... the access controls system must prevent enrty to the	GENERAL COMMENT: will update ASE to specify areas where access is prevented during beam operations. SPECIFIC FOR NM RESTART/SPINQUEST: ASE can be updated to specify areas where access is prevented during NM beam operations. This will be addressed prior to the restart of NM Operations in support of SpinQuest. TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE will be updated to specify areas where access is prevented during beam operations in various locations for the rmained of the accelerator complex separate from requirements for NM/SpinQuest. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Accept	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	Fermilab has updated the ASE to specify areas where access is prevented during beam operations. See Section 7, RSIS area of "ASE Template Example".	
28	ASE Appendix A	9 of 15	Credited Active Engineered Controls: RSIS	Control Section: The statement " All circuits are designed in such a way that if a circuit fails, the failure would most likely initiate a system shutdown resulting in a safe condition." needs to be clarified. The wording "would most likely initiate" implies there is a chance the circuits are not fail safe.	GENERAL COMMENT: ASE will be updated to clairify statemenet SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE will be updated to clarify RSIS circuit design with regards to failures. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accept	Clarify if in the case of a circuit failure, the RSIS system will initiate shutdown resulting in a safe condition or not.	Verified that in the case of a circuit failure, the RSIS system will initiate shutdown resulting in a safe condition. Updated language that will be incorporated into the ASE: "All circuits within the RSIS are designed in such a way that if a circuit fails, or specified input is lost, the failure would initiate a system shutdown resulting in a safe condition."	
29	ASE Appendix A	10 of 15	Credited Administrative Controls: Accelerator Operational Approvals	Control: List the specific elements that are captured in the Beam Permit and Running Condition for clarification. Each element and associated admin control needs to be clearly stated in the ASE. Ie. List the beam power & operating parameters for Spinquest and required admin control. List theree are CDCs for Spinquest and associated administrative credited control in ASE. Do not point reader to an internal procedure. Summarize/define these in the ASE.	GENERAL COMMENT: Most can be done with updated ASE. Additional discussion will be needed between ESH/AD/FSO to determine if appropriate to include Operating Limit in ASE, to avoid confusion with the ASE Limit. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE will be updated to specify elements included in the Beam Permit and Running Condition. ASE will be updated to state requirements for surveillance of fencing rather than refernece a procedure. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accepted.	The specific elements that will be controlled by administrative credited controls need to be understood and defined in the ASE.	Fermilab has updated the ASE to list the elements required to be included in the Operation Authorization Document. See Section 3, Administrative area, in the "ASE Template Example" for full list of elements. The Staffing Credited Control ensures that tht Operation Authorization Document (and all necessary elements) are in place during accelerator operation. This will be included in the Staffing Basis, within Section 7 of "ASE Template Example", once full language is finalized.	
30	ASE Appendix A	10 of 15	Credited Administrative Controls: Accelerator Operations Staffing	Safety Envelope: List the number of required Operators for Spinquest and their required location in ASE, in the remote control room or MCR?	GENERAL COMMENT: There is no requirement for experimenters during beam operation, as they do not perform beam operation/manipulation. MCR Operation Staffing is the only needed Credited Control, as they are the individuals who operate beam. Updated ASE layout to clafiry MCR Operation Staffing requirement. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: n/a - question answered in "General Comment" section. No change to the SAD/ASE needed.	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	Fermilab has updated the ASE to list required staffing, making it clear if the requirement refers to MCR/AD Ops or others. See Section 7, Administrative/staffing in "ASE Template Example".	
31	ASE Apendix A	11	Credited Administrative Controls	Accelerator Beam Intensity Limits - Safety Envelope: The CC states in part that beam intensities are monitored. Who monitors the beam intensities? If monitoring is being performed then it appears as though an added CC should be for personel oversight where you list the # of operators required in the control room during operations.	GENERAL COMMENT: Beam intensities are monitored by MCR Operators. MCR Operation Staffing is a listed Credited Control, see item #30. Responsibility of monitoring beam intensities will be added to basis for MCR Staffing CC. SPECIFIC FOR NM RESTART/SPINQUEST: n/a - see response for #30 TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: see response for #30	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	Fermilab has updated the ASE to specify the Operating Parameters (beam intensity for accelerators with particle beam) for each accelerator within its ASE. The Staffing Credited Control ensures that the Operating Parameters are monitored during accelerator operation. This will be included in the Staffing Basis, within Section 7 of "ASE Template Example", once full language is finalized.	
32	ASE Appendix A	11 of 15	Credited Administrative Controls: Accelerator Beam Intensity Limits	Why are all limits listed in this ASE for Spinquest? Only list the intensity limits for the Spinquest beamline that is being reviewed.	GENERAL COMMENT: The ASE is for the Fermilab Main Accelerator, which includes all segments (i.e., machines and beamlines, including the NM beamline which supports the SpinQuest experiment). Upstream segments are necessary for NM/SpinQuest operation. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: n/a - question answered in "General Comment" section. No change to the SAD/ASE needed.	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	n/a	

	DOCUMENT	PAGE	Section	Comment/Issue	FERMI Comment/Issue Response	FSO Accept / Not Accept	FSO Response	Fermi Issue response	FSO Disposition
33	ASE Appendix A	12 of 15	ASE Violation Determination and Actions	This section is confusing. The statement "Determining whether a condition is a violation of the ASE may be subjective." contradicts the statement on Page 7 that states "Variations beyond these limits are a violation of the ASE." This section needs to be clarified to state that any variations from the bounds defined in this ASE is an ASE violation. This section needs to list the actions that will be taken if an ASE violation is identified (e.g., stop the activity causing the violation, work with DOE, etc). Do not point readers to an internal procedure, list the steps in the ASE specific to Spinquest.	GENERAL COMMENT: Will update ASE with clarity on what constitutes an ASE violation. Adding in Response section specifying actions to be taken. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: Discussion regarding what is considered a Credited Control for Fermilab is being discussed in the DOE O 420.2D Implementation SAD/ASE Working Group. ASE will be updated to specifically address what the requirement is and ensure variation from stated requirement is an ASE violation. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	Fermilab has updated the ASE to include an overview of the ASE Violation Determination and Actions, see Section 4 in "ASE Template Example", as well as specific responses for potential violations of each specific Credited Control, See Section 7.	
34	ASE Appendix A	12 of 15	ASE Violation Determination and Actions	Clarification is needed. This statement, "Any deficiencies found in a credited control that are not an ASE violation are handled in accordance with FESHM and FRCM requirements." contradicts the statement on Page 7 "Variations beyond these limits are a violation of the ASE."	GENERAL COMMENT: will update the ASE to ensure clarity on what is a violation and the appropriate response SPECIFIC FOR NM RESTART/SPINQUEST: n/a - see response to #33 TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: see response to #33	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	see #33	
35	SAD Submittals	Throughout	Throughout	While DOE does not approve SADs, it should be understood that DOE needs to support the SAD otherwise there will be issues identified in the ASE. The contractor should benchmark how other laboratories document there SADs, consider having seperate SADs and ASEs for each accelerator operations.	GENERAL COMMENT: DOE participates in the SAD Review Subcommittee and has opportunity during SAD chapter revisions to review and provide comment. Many of the chapters in the current SAD are for machiens/beamlines that make up the Fermilab Main Accelerator (one accelerator), with downstream areas (i.e., SpinQuest) relying on upstream areas (i.e., Linac, Booster, 8 GeV, MI, P1-P2, SY Primary, NM) for operation. (The exception being FAST.) Separating the various machines/beamlines of the Fermilab Main Accelerator into separate SADs does not make sense. Lab could consider separating FAST into it's own SAD/ASE. Benchmarking with a few other labs has already taken place, and found that Labs have one ASE per accelerator, and ORNL/SNS has an integrated ASE to include multiple segments similar to what Fermilab has in place. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: FRA will consider separating FAST into its own SAD/ASE, while maintaining an integrated ASE for the main accelerator complex. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Accepted		Fermilab has updated the structure of the SAD/ASE to continue having one SAD, but have separate Sections within the SAD for each Accelerator. Each Accelerator will have its own ASE as a separate appendix to the SAD. This ensures consistency in information maintined in SAD Chapters 1-10 and a consistent template for the SAD Chapters, but allows for the level of specificity requested in the ASEs. See "Fermilab SAD Outline Example" for proposed updated layout of the SAD, including Sections and separate ASE appendices for each accelerator. See "ASE Template Example" for the Fermilab Main Accelerator, this same template (once approved) will be used for the other Accelerator ASEs.	
36	SAD Submittals	Throughout	Throughout	Having one SAD and one ASE is problematic. It causes the reader confusion and also leads to the development of CC's that are generic and vague. As noted in comments 1-34 there are issues with the major portions of the ASE, including each of the listed CC's.	GENERAL COMMENT: See comments for Issue #35 for discussion on having multiple machines/beamlines in single SAD/ASE, as they make up one accelerator. ASE layout updated to provide clarification on specific requirements for each machine/beamline with the ASE. SPECIFIC FOR NM RESTART/SPINQUEST: n/a TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: ASE layout will be updated to provide clarification on specific requirements for each segment of the accelerator complex. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Accepted		See #35	
37	SAD Submittals	Throughout	Throughout	The content in each of the SADs that were reviewed was broad. It lacked specific details explaining the facility, operational aspects, and function. They frequently referenced back to procedures/policies that may provide some or all of the details.	GENERAL COMMENT: SAD chapters will be reviewed to ensure detailed analysis for the facility are included wihtin the SAD (either in the chapter or as a reference in the chapter), rather than only stating which FESHM/FRCM process is followed. SPECIFIC FOR NM RESTART/SPINQUEST: NM and SY120 chapters will be reviewed to ensure that any analysis performed per FESHM/FRCM requirements are specifically discussed and/or referenced in the SAD chapters, rather than just referencing the process. This will be addressed prior to the restart of NM Operations in support of SpinQuest. TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: All other SAD chapters will be reviewed to ensure that any analysis performed per FESHM/FRCM requirements are specifically discussed and/or referenced in the SAD chapters, rather than just referencing the process. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	Fermilab will update the SAD to ensure that each SAD chapter contains detailed analysis for the facility are included within the SAD (either in the chapter or as areference within the chapter), rather than stating the FESHM/FRCM process followed.	
38	SAD Submittals	Throughout	Throughout	There was no reference to configuration management in the ASE and/or SAD's. This practice would prove useful (e.g., shielding set up, etc.).	GENERAL COMMENT: see response for #4 SPECIFIC FOR NM RESTART/SPINQUEST: n/a - see response to #4 TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: see response to #4	Accepted	Contingent upon FSO review, concurrence and approval of SAD/ASE submittal.	see #4	

	DOCUMENT	PAGE	Section	Comment/Issue	FERMI Comment/Issue Response	FSO Accept / Not Accept	FSO Response	Fermi Issue response	FSO Disposition
39	ASE and SAD Submittals	Throughout	Throughout	Please clarify how the USI process is implemented when only an internal procedure is referenced in the SAD and/or ASE as the method to control a hazard and no specific details are documented.	GENERAL COMMENT: Any procedure referenced in the SAD or ASE will be subject to the FSO approved USI process. SPECIFIC FOR NM RESTART/SPINQUEST: n/a - USI process still undergoing updates per 420.2D TO BE ADDRESSED WITH FULL SAD/ASE REVISION WITH 420.2D IMPLEMENTATION & PEMP NOTABLE: SAD and ASE will be reviewed to ensure that any procedure referenced is identified as subject to the updated, and FSO approved, USI process. This will be addressed in the full SAD/ASE revision, in accordance with DOE O 420.2D Implementation and the FY23 PEMP Goal 4 Notable.	Not accepted	FSO expects the SAD/ASE will include detailed analysis rather than reference a procedure.	see #37	

FERMILAB SAFETY ASSESSMENT DOCUMENT

Revision xx month dd, yyyy

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SAD Chapter
Approval Page

Fermilab Directorate/Division

The Directorate/Division Head(s) for areas with updated and/or added chapter(s) should review their applicable chapters and provide approval for inclusion in the Fermilab Safety Assessment Document.

☐ _____
AD Head

☐ _____
APS-TD Head

☐ _____
ESH Head

☐ _____
FESS Head

☐ _____
ND Head

☐ _____
PPD Head

☐ _____
<other> Head

☐ _____
<other> Head

Directorate

Final approval of the Fermilab Safety Assessment Document is granted by the Fermilab Director.

_____
Fermilab Director

Revision History

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<NAME>

SECTION X CHAPTER XX OF THE FERMILAB SAD

Revision xx month dd, yyyy

This Chapter of the Fermilab Safety Assessment Document (SAD) contains a summary of the results of the Safety Analysis for the of the <accelerator> that are pertinent to understanding the risks to the workers, the public, and the environment due to its operation.

SAD CHAPTER OUTLINE EXAMPLE

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FERMI NATIONAL ACCELERATOR LABORATORY

ACCELERATOR SAFETY ENVELOPE

<ACCELERATOR>

Revision xx month dd, yyyy

Appendix x of the Safety Assessment Document

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Department of Energy Office of Science
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Accelerator Safety Envelope

<Accelerator>

Approval Page

Final approval of this Accelerator Safety Envelope for the <Accelerator> is granted by the Fermilab Director and the DOE Field Element Manager.

_____	_____
Director, Fermi National Accelerator Laboratory	DOE Field Element Manager, Fermi Site Office

Revision History

Author	Rev. No.	Date	Description of Change

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Section 1. Introduction and Scope

This document constitutes the Accelerator Safety Envelope (ASE) for full power operation of the <Accelerator>. It defines the Credited Controls that are established for the <Accelerator> to assure that the level of risk to all workers, the public, and the environment is maintained at acceptable levels. This ASE is established in accordance with the DOE Order 420.2D, *Safety of Accelerators*, (DOE O 420.2D), and as flowed down through the Fermilab Director's Policies and the Fermilab Environment, Safety and Health Manual (FESHM) including the Fermilab Radiological Control Manual (FRCM).

<finalizing additional language for this Section>

Section 2. Select Definitions and Acronyms

The following terms and/or acronyms are commonly used when discussing operation of the <Accelerator>. Definitions that come directly from DOE O 420.2D, *Safety of Accelerators*, are noted with an asterisk (*), with further information on the interpretation and application of the definition for use at the <Accelerator> in italics.

***Accelerator** A device and its components employing electrostatic or electromagnetic fields to impart kinetic energy to molecular, atomic, or sub-atomic particles and capable of creating a radiological area as defined by 10 CFR Part 835, Occupational Radiation Protection. Accelerator components include injectors, targets, beam dumps, detectors, experimental enclosures, accelerator enclosures, experimental areas, and experimental apparatus utilizing the accelerator. The accelerator also includes associated support and test facilities, equipment, systems, and utilities necessary to operate the accelerator or utilize the accelerated beam.

<finalizing interpretations/application>

***Accelerator Facility** The accelerator, plant, buildings, structures, and equipment supporting the accelerator and its operations that are under direct control of the contractor

<finalizing interpretations/application>

***Accelerator Operations** Activities within the accelerator facility that, over the lifecycle of the facility, support 1) production or utilization of accelerator beams; 2) research and experimental activities utilizing accelerator beams; 3) handling, storage and analysis of accelerator induced radioactive components and materials within the accelerator facility boundary; 4) receipt, preparation, assembly, inspection, and installation of samples into the accelerator beam; or 5) removal, disassembly, handling, analysis, and storage for radioactive dose minimization to meet the definition of ALARA in 10 CFR Part 835, Occupational Radiation Protection, or transportation requirements, and packaging of samples after use in the

accelerator beam. Accelerator Operations excludes radioisotope processing activities that are not required to operate or maintain the accelerator.

<finalizing interpretations/application>

Accelerator Specific Hazard <finalizing proposed new term/definition>

Applicable Accelerator Facility <finalizing proposed new term/definition>

***Commissioning** A phase of an accelerator facility operation that is typically used to conduct initial beam testing and/or verify design specifications. Commissioning periods may be tailored to the needs of each facility and there may be great variations in their duration, breadth, and formality, but in all cases, the activities will be bounded by an ASE and preceded by an ARR and DOE approval.

<finalizing interpretations/application>

Compensatory Measure <finalizing proposed new term/definition>

***Credited Control** controls determined through the Safety Analysis to be essential for safe operation directly related to the protection of workers, the public, and the environment.

<finalizing interpretations/application>

Nominal Operating Intensity **<finalizing>** Intensity identified by the machine and/or Project, analyzed in the Shielding Assessment.

Maximum Operating Intensity **<finalizing>** The maximum intensity a given segment is allowed to operate at without requiring additional actions/approvals/responses. This value is the Nominal Operating Intensity plus 5%, in order to accommodate potential fluctuation in beam intensity due to changes in efficiency.

Section 3. Description of Credited Controls

The Credited Controls identified in the ASE are a set of passive, active engineered, and administrative mitigations in use at the <Accelerator> that define the bounding conditions and limitations for safe and environmentally sound operations. In accordance with FRCM Article 236, Fermilab utilized Credited Passive and Active Engineered Controls whenever the maximum calculated accident condition can exceed 500 mrem in an hour. The Credited Controls listed in the ASE must be in place and functional for all operational areas. During periods of down time or maintenance, Credited Controls may be removed and managed under the Safety Configuration Management program to ensure they are replaced prior to resumption of operations.

For each Credited Control, the following is specified:

- **Applicability** – the condition in which the Credited Control is valid.

- **Basis** – description of the need for the Credited Control, including event numbers where applicable.
- **Requirement** – specific elements that must be in place during beam operation. Beam operation to the affected area without required elements in place is an ASE violation.
- **Compensatory Measure(s)** – An approved temporary alternative that may be taken to allow for safe operation when a requirement is not in place.
- **Required Surveillance** – management and monitoring practices that must be performed to assure continued effectiveness of the Credited Control. Surveillances are to be carried out at the minimum specified interval. Beam operation to the affected area without the required surveillance being performed within the minimum specified interval is an ASE violation.
- **Response** – actions to be taken if there is a suspected deficiency, missing control, or other potential ASE violation for that particular Credited Control.

The Credited Controls are divided into three main categories: passive controls, active engineered controls, and administrative controls.

Passive

Passive Credited Controls are elements that are part of the physical design of the facility that require no action to function properly. These are fixed elements that take human intervention to remove. The types of Passive Credited Controls in use for the <Accelerator> include:

- Shielding (i.e., Permanent/Structural, Labyrinths, Movable, Penetration Shielding)
- Fencing (i.e., Radiation Area fencing, Controlled Area fencing)

Acceptable methods for configuration of movable and/or penetration shielding include, but is not limited to: locked chains, Unistrut to block or inhibit movement, cover plates over penetration holes, etc. The Preferred Method of Configuration, as well as Compensatory Measures, is described in Section 7.

Active Engineered

Active engineered Credited Controls are systems designed to reduce the risks from accelerator operations to an acceptable level. The types of Active Engineered Credited Controls in use for the <Accelerator> include:

- Radiation Safety Interlock System (RSIS)
- <placeholder for ODH related Credited Controls>

Radiation Safety Interlock System (RSIS)

Radiation Safety Interlock Systems (RSIS) are used to prevent injury, death, or serious over-exposure from beam-on radiation. The principal method employed by the RSIS is to establish and maintain Exclusion Areas surrounding accelerator operating areas. If there is a potential for personnel to inadvertently access the defined Exclusion Area, the RSIS is designed to inhibit accelerator operations in that area.

The RSIS may also include interlocked radiation monitors to supplement passive shielding Credited Controls. If dose rates exceed specified levels analyzed in the Shielding Assessment, the RSIS is designed to inhibit accelerator operations in that area.

The RSIS utilize a modular redundant design where no single component failure will result in a loss of protection. To accomplish this, two separate fail-safe circuits are used to detect specific conditions. All circuits within the RSIS are designed in such a way that if a circuit fails, or specified input is lost, the failure would initiate a system shutdown resulting in a safe condition.

ODH

Text

Administrative

Administrative Credited Controls encompass the human interactions that define safe operations. These are the accelerator operating policies and procedures that are followed to ensure safe accelerator operations. The types of Administrative Credited Controls in use for the <Accelerator> include:

- Operation Authorization Document
  - Must include the following information:
    - Segment Name
    - Issue Date
    - Mode(s) of Operation
    - Operating Parameters
    - Critical Device Controller (CDC)
    - Critical Devices
    - Exclusion Area(s)
    - Credited Controls
      i. Shielding Requirements
      ii. Fencing Requirements
      iii. RSIS Required Components and Inputs, including interlocked detector information
      iv. ODH System Requirements
      v. Staffing Requirements
      vi. Accelerator Operating Parameters
  - May also include additional information, such as
    - <finalizing>
- Staffing
- Accelerator Operating Parameters

Section 4. ASE Violation Determination and Actions

Determination

<placeholder updated/finalized ASE Violation Determination language>

Actions

<placeholder updated/finalized ASE Violation Actions language>

Section 5. Configuration Management for Credited Controls

<placeholder updated/finalized Configuration Management program description language>.

Section 6. Unreviewed Safety Issue (USI) Process

<placeholder updated/finalized USI Process description language>

Section 7. Summary of Credited Controls for All Segments of the Fermilab Main Accelerator Complex

Template Credited Controls – to be used for Other Segments Once Finalized

Passive – Shielding

Applicability During beam operations to the segment of the <Accelerator>.

Basis Based on the operating intensity of _____, analyzed in the following Shielding Assessments, the shielding is required in the locations listed below.
Shielding Assessment(s):
- <List oldest to newest>

Requirement (option 1) Required shielding specified in the listed Shielding Assessments will be installed in its proper configuration during applicable beam operations.

Permanent Facility Shielding
- <list>

Permanent Longitudinal Shielding

Z-Range (ft)	Enclosure Type	Current (e.f.d.)	Required (e.f.d.)
<list>			

Permanent Transverse Shielding

Transverse Station (ft)	Enclosure Type	Current (e.f.d.)	Required (e.f.d.)
<list>			

Movable Shielding

Location	Shielding Type	Quantity	Purpose	Preferred Method of Configuration	Comments
<list>					

Penetration Shielding

Station (ft)	Enclosure Type	Current (e.f.d.)	Required (e.f.d.)	Preferred Method of Configuration
<list>				

Requirement (Option 2) Required shielding specified in the listed Shielding Assessments will be installed in its proper configuration during applicable beam operations.

Description	Preferred Method of Configuration	Type
<list>		

Compensatory Measure(s) <finalizing Shielding Approved Alternatives language>

Required Surveillance Required shielding shall be verified annually, not to exceed twelve (12) months.

Response <finalizing Shielding Response language>

Passive – Fencing

Applicability During beam operations to the segment of the <Accelerator>.

Basis Based on the operating intensity of _____, analyzed in the following Shielding Assessments, fencing is required in the locations listed below.
Shielding Assessment(s):
- <List oldest to newest>

Requirement Required fencing specified in the listed Shielding Assessments will be installed in its proper configuration during applicable beam operations.

Radiation Area Fencing

Fence Location	Required Posting	Gates (if applicable)	Configuration
<list>			

Controlled Area Fencing

Fence Location	Required Posting	Gates (if applicable)	Configuration
<list>			

Compensatory Measure(s) <finalizing Fencing Approved Alternatives language>

Required Surveillance Required fencing shall be verified annually, not to exceed twelve (12) months.

Response <finalizing Fencing Response language>

Active Engineered – Radiation Safety Interlock System (RSIS)

Applicability During beam operations to the segment of the <Accelerator>.

Basis Based on the operating intensity of _____, analyzed in the following Shielding Assessments, the RSIS is established with interlocked barriers around the Exclusion Area, as well as inclusion of required interlocked radiation monitors.
Shielding Assessment(s):
- <List oldest to newest>

Requirement The Radiation Safety Interlock System (RSIS) must prevent entry into the following Exclusion Area(s) during appliable beam operation:
- <list>

Required components of the RSIS shall be specified in the 's Operation Authorization Document.

The following components of the Radiation Safety Interlock System (RSIS) shall be in place, with no known loss of safety function, during applicable beam operations.

Radiation Safety System – Interlocked Radiation Monitors
Required radiation monitors specified in the listed Shielding Assessments, or as required by the assigned Radiation Safety Officer (RSO), must be interlocked to the RSIS.

Type	Location

Compensatory Measure(s) <finalizing RSIS Approved Alternatives language>

Required Surveillance The RSIS for the segment shall undergo certification annually, not to exceed twelve (12) months.

Response <finalizing RSIS Response language>

Active Engineered – <ODH Credited Control>

Applicability <finalizing ODH Applicability language>

Basis <finalizing ODH Basis language>

Requirement <finalizing ODH Requirement language>

The components of the ODH System shall be in place, with no known loss of safety function, during applicable beam operations.

Component	Type	Location	Configuration

Compensatory Measure(s) <finalizing ODH Approved Alternative language>

Required Surveillance <finalizing ODH Required Surveillance language>

Response <finalizing ODH Response language>

Administrative – Operation Authorization Document

Applicability During beam operations to the segment of the <Accelerator>.

Basis <basis>

Requirement An approved Operation Authorization Document shall be in place during applicable beam operations.

Compensatory Measure(s) <finalizing Operation Authorization Document Approved Alternative language>

Required Surveillance <finalizing Operation Authorization Document Required Surveillance language>

Response <finalizing Operation Authorization Document Response language>

Administrative – Staffing

Applicability During beam operations to the segment of the <Accelerator>.

Basis <finalizing Staffing Basis language>

Requirement The following staffing shall be in place during applicable beam operation:

- At least one member of the AD Operations Department who has achieved the rank of Operator II or higher shall be on shift.
- At least one member of the AD Operations Department shall be present in the Main Control Room (MCR).

Compensatory Measure(s) <finalizing Staffing Approved Alternatives language>

Required Surveillance <finalizing Staffing Required Surveillance language>

Response <finalizing Staffing Response language>

Administrative – Accelerator Operating Parameters

Applicability During beam operations to the segment of the <Accelerator>.

Basis <insert ASE calculation analysis here>

Requirement The segment will be operated within the following parameters:

Mode	Intensity	Energy

Linac intensity is monitored via: <device>

Compensatory Measure(s) <finalizing Operating Parameters Approved Alternatives language>

Required Surveillance <finalizing Operating Parameters Required Surveillance language>

Response <finalizing Operating Parameters Response language>

Linac Credited Controls
<insert and fill out template once finalized>

Neutron Irradiation Facility (NIF) Credited Controls
<insert and fill out template once finalized>

400 MeV Test Area (MTA) Credited Controls
<insert and fill out template once finalized>

Booster (Dump Mode) Credited Controls
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Booster (MI Mode) Credited Controls
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8 GeV Credited Controls
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Booster Neutrino Beam (BNB) Credited Controls
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Main Injector (MI) Credited Controls
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Recycler Credited Controls
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P1-P2 Line Credited Controls
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Muon Campus (g-2 Experimental Mode) Credited Controls
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Muon Campus (Mu2e Experimental Mode) Credited Controls
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P3-Switchyard Credited Controls
<insert and fill out template once finalized>

Meson Primary Credited Controls

<insert and fill out template once finalized>

Meson Test Credited Controls

<insert and fill out template once finalized>

Meson Center Credited Controls

<insert and fill out template once finalized>

Neutrino Muon Credited Controls

<insert and fill out template once finalized>

Section 8. References

<placeholder for references>