



U.S. DEPARTMENT OF
ENERGY

Office of
Science

DOE Order 420.2D Implementation Assist Visit Closeout

Fermi National Accelerator Laboratory

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Closeout

Observations and Discussions

Summary

Fermi provided an overview of their accelerator safety program and DOE O 420.2D implementation approach. Collectively the group reviewed documents and discussed the relationship between the different directorates responsible for managing the accelerator safety program. As part of the implementation effort, program documents, processes, and procedures are being revised to address comments from FSO and recommendations from the August ARR. The team discussed Fermi's process for determining 420.2D applicability, management and tracking of exemptions and equivalencies, proposed approach to update the remaining safety documentation, and CAS elements developed to provide 420.2D Compliance Assurance. The group toured the PIP2IT, CMTS1 Cryo Plant, A2D2, and Mu2e DT Generator areas. Representatives from the Accelerator Directorate, ES&H Division, Laboratory Management and the Site Office were present throughout the visit and involved in all programmatic discussions.

General Comments

- **Current accelerator safety documents, processes, and procedures are being updated to reflect requirements in DOE O 420.2D and address comments from FSO and recommendations from the August ARR.**
- **Fermi expects to complete 420.2D implementation efforts for the main accelerator by March 2024.**
- **The team concurs with the recommendations and opportunities for improvement identified during the August 2023 ARR.**
- **Decoupling the remaining tasks required for 420.2D compliance from the actions required to satisfy the FY23 PEMP Notable, FSO Comments, and August ARR recommendations will help minimize the impact to the planned startup of the main accelerator complex.**

Implementation Plan Progress

- **Fermilab's plan to use a phased approach for completing the implementation effort and resuming beam operations under 420.2C and 420.2D must include a finite end date and be approved by FSO.**
- **FSO must provide approval if continued operation under 420.2C is desired.**
- **Update the 420.2D implementation plan to allow completion of the specific elements required in a timely manner not tied to general improvements of SAD/ASE documentation.**
- **Reconciliation of FSO comments, ARR recommendations, and Lab Management expectations for the Accelerator Safety Program will provide a clearer path forward and streamline the remaining implementation effort.**

SAD/ASE Updates

- **The current SAD and ASE are being revised to comply with 420.2D.**
 - A formal project has been created to complete the next iteration of SAD/ASE updates.
 - Consider framing the ASE in terms of the 3 areas defined in 420.2D, “verifiable physical and administrative requirements, bounding conditions, and credited controls”.
- **Currently Fermilab has one SAD and ASE for all > 10 MeV accelerators onsite.**
 - As part of the ASO implementation process, a separate ASE will be developed for each > 10 MeV accelerator (5 total).
 - Consider developing a separate SAD/ASE for the new accelerators to reduce complexity of revisions. Some program elements will be repeated but hazards can be detailed and managed on the accelerator level.

SAD/ASE Review Feedback

- **Review the SAD within the context of focusing on determining and then analyzing Accelerator Safety Hazards.**
- **Consider bolstering existing safety management programs to minimize unneeded overhead that the Accelerator Safety Program would impose.**
- **Consider mapping hazards within risk matrices to the relevant DOE approved safety management program.**
- **Revised SAD and ASE templates should help address comments on readability and flow for the documents.**

USIs

- **The USI process is being revised in response to the August Review. It was discussed but not provided.**
- **A fundamental change in expectations for the USI process occurred between DOE O 420.2C and DOE O 420.2D.**
 - 420.2D removes the “significant” language.
 - Current USI form still includes risk language.
- **Remember that USI can be considered part of the change management process. The process has requirements for screening ASE violations and activities against the SAD and ASE.**
- **Review the use of RSIS bypasses for specific planned evolutions, using the USI process to review specific study parameters, or add separate modes with analyzed hazards of that mode.**

Accelerators, RGDs and Equivalencies

- Fermilab's Process for identifying, evaluating, and categorizing accelerators has been updated and is appropriate.
- The Radiation Generating Device (RGD) Working Group performed a detailed Gap Analysis on the existing Laboratory RGD Procedure to include all documents referenced in the Equivalencies section of DOE O 420.2D.
- RGDs and Exempt / Equivalent Accelerators (Devices) are managed under the new RGD Program based on 10 CFR 835, DOE G 441.1-1C, and the 5-equivalency category/standards listed in DOE O 420.2D. An additional equivalency approval is not required for devices managed under the updated RGD program.
- Fermilab's plan to manage < 10 MeV accelerators, including DT generators, under the updated RGD program is appropriate, pending further comment from DOE-HQ.

Configuration Management

- **DOE O 420.2D requires that the Accelerator Readiness Review ensure that a Configuration Management Process that addresses accelerator safety is in place.**
- **During the tours, the Team noted the lack of visual cues in the work environment that would highlight equipment that was subject to Configuration Management and hence the USI Process.**
- **Fermilab might consider a uniform signage approach to ensure that field changes or discovered conditions relevant to the Accelerator Safety Program are identified. Awareness training then alerts the workforce to the relevant controls in the field.**
- **While not required, DOE's configuration management standard DOE-STD-1073-2016 may provide helpful guidance for continuous improvement.**

Contractor Assurance and Institutional Programs

- Fermilab has integrated the DOE O 420.2D CRD requirement for program element evaluation into the Integrated Assessment Schedule
- FSO has access to Fermilab's Integrated Assessment Schedule.
- Fermilab is standing up an office to specifically address Accelerator Safety Issues.

FSO/Fermilab Communication and Interface

- **Good communications and mutual understanding between Fermilab and FSO are essential for successful completion of the implementation effort.**
- **Fermilab's approach to the accelerator program needs to be clear to FSO due to the interdependence between FSO and Fermilab in the administration of the Accelerator Safety Program.**
- **The proposed SAD/ASE revision project schedule and updated implementation plan must allow adequate time for FSO review, feedback, and approval of required deliverables.**

Assist Visit Personnel

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Thank you