

Status Update of the E1039 Project

Target

All installation has been completed. The target has been in operation since early December last year. The superconducting magnet was ramped up a couple of times and kept in persistent mode. The liquification system has been operating well and meets the design specs, in terms of production rate and transfer efficiency.

Spectrometer

The spectrometer has been operating well and taking cosmic data since 2019.

Accelerator Readiness Review (ARR)

The new FSO requested a set of new safety documents (Safety Assessment Document, SAD, Accelerator Safety Envelop, ASE) for the operation of the FNAL accelerator complex. The SAD and ASE for the entire accelerator were scheduled to be completed and reviewed in the summer of 2023. All the existing experiments were operating before the new requirements and thus grandfathered in. Back in 12/2022, FNAL assumed SpinQuest could be also grandfathered in, so the ARR was scheduled. However, the head of FSO objected to this approach at the last minute and requested the SAD/ASE must be completed before the SpinQuest ARR could happen.

Recently FNAL proposed to write a special mini-SAD/ ASE to cover only the part that involves SpinQuest, and presented this plan to the FSO. The FSO didn't give a very clear yes/no answer. FNAL is going to proceed with the assumption that this is the path forward and start preparing the mini-SAD/ASE documents. I'm quite concerned about this situation since the same situation happened in December last year when the FSO didn't object to Fermilab's proposal until the last minute.

Safety Pause - cause

The safety pause happened at the end of January. The direct cause of the pause was two consecutive incidents that happened within 2 weeks.

1. The first incident: in early January we shipped a small amount of frozen ammonia (about 10g) to Fermilab. This shipping was done correctly; however, we were unaware that the designated storage area we had intended was not yet approved. We had submitted a safety engineering document to Fermilab in 2018, but we never received a response, so we mistakenly assumed that the plan had been approved. Upon discovering this issue, we temporarily stored the material in an open area before ultimately deciding to ship it back to UVA.
2. The second incident: before shipping the target material back, it was necessary to routinely add liquid nitrogen to maintain the appropriate temperature. The Hazard Analysis for this refill work required the use of a cryo-apron for PPE, as well as a requirement to notify the Fire Department before commencing the refill. During one refill, a worker was unable to locate a cryo-apron on-site and instead brought a Tyvek suit, asking Fire Department personnel if it was acceptable. The Fire Department personnel deemed the Tyvek suit to be inadequate and halted the work. Subsequently, the Division Safety Officer approved the substitution, but it was perceived as an attempt to begin work without appropriate PPE and was stopped by Fermilab personnel.

Safety pause – current status

After the two incidents, FNAL issued a stop-work on all target-related activities and made two requests:

1. We should organize a collaboration safety day to reflect on the incidents and discuss how to move forward safely
2. We should provide a complete list of activities we plan to do in the near future, have prepared procedures for Fermilab to review (a lot of the procedures have been reviewed and approved in the past).

The safety day was organized in early Feb, and we discussed a new work planning model following the same example from g-2 experiment. The new work planning model has been presented to FNAL management several times, and we have been using this new model for two weeks.

The complete re-review of all the procedures happened in parallel but took much longer time. We prepared a total of 43 procedures covering every aspect of the target activities. It has been 4 weeks since this re-review process officially started, and we only have 8 procedures approved as of today. In a recent meeting with Fermilab management, we agreed to reduce the scope of the review to about 20 procedures, and Fermilab told us to expect to have it completed by the end of next week.

Beam schedule concerns

At this time, the summer shutdown is scheduled to happen on 7/10. Assuming the ARR path is cleared today, it generally takes 2-3 weeks to schedule and review, and one more week for signatures. So the earliest time we can have beam is in May, which leads to 1 month of commissioning and 5 weeks of physics data taking. Any delay in the ARR would eat into our physics data taking time, and eventually the commissioning time. From my perspective, Fermilab is not communicating with FSO frequently enough to push for a timely solution for the ARR. This is my biggest concern and hopefully the program office could help with it.