

6 February 2020

To: LBNF Neutrino Beam RAW Preliminary Design Review Panel
From: K. Williams, L4 Technical Lead for NB RAW Systems
CC: K. Gollwitzer, S. Tariq, J. Lewis
Re: Charge to Review Panel

Karlton E. Williams, II

Senior Engineering Physicist,
as Lead Fluid Systems Engineer
Accelerator Division
Mechanical Support Department

MS-340
Fermi National Accelerator Laboratory
Batavia, IL 60510
630-840-3043 Direct
karlw@fnal.gov

The LBNF Beamline is currently in the Preliminary Design phase, with CD-2 expected towards end of 2020. The Neutrino Beamline Target Hall (TH) and Absorber Hall (AH) Enclosures, together with their major components (target, horns, chase cooling panels, and the absorber core), are still in preliminary design but **considered well understood, with adequate design maturity to advance the RAW system designs**. It should be noted that as preliminary design progresses for these major components, changes in their design are possible, however the corresponding impact to RAW system requirements is expected to be minimal but may not be insignificant. This has been captured through estimate uncertainty and risks, and will be addressed during the final design phase for the RAW systems. In order to ensure that the level of preliminary design is sufficient to move to final design, this panel is asked to perform a Preliminary Design Review of the RAW Systems. The review is scheduled for February 19 & 20, 2020.

The specific charge questions are:

1. Does the preliminary design meet the requirements of the beamline components?
2. Is the design maturity presented for the Target Hall and Absorber Hall RAW systems at a level appropriate for the Preliminary Design Phase, as guided by EDMS # 2173197 LBNF / DUNE Review Plan?
 - a. Based on acceptable progress for Preliminary Design as 50 to 70%, with 100% equal to "completion of Preliminary Design phase"
 - b. Are areas where components are awaiting forthcoming development well understood?
 - c. Final Design will be drawing-intensive in comparison to the first two phases of design
3. Have suitable engineering analyses been performed and documented, and reviewed/peer reviewed and approved, where applicable?
4. Are the appropriate codes and standards adequately applied to the design?
5. Have the ES&H issues been identified and analyzed appropriately?
6. Have the Fermilab Engineering Manual standards been applied to the design?

7. Have potential design, manufacturing, and installation risks and challenges been identified within the Neutrino Beamline components, and has it been adequately planned to address these during the final design?
8. Are difficult design features and possible prototyping issues identified?
9. Is the level of integration with other LBNF beamline entities appropriate for this stage of the work?
I.E. Are interfaces and collaborative design inputs being managed appropriately?
10. All LBNF RAW systems are currently undergoing estimation review through the Project Estimator. This includes the submission of sample packages to outside vendors for spot-checking of current values. With this in mind, a cursory check of the Cost and Schedule are desired:
 - a. To reflect & verify known changes, such as where flows to the shielding panels were greatly reduced
 - b. To question sufficiency of design resources in the light of known complexity of certain situations, such as selection and prototyping of horn ejector pumps
 - c. To review estimated design effort, as preliminary design effort to date has suggested that engineering and drafting resources may be under-estimated

In addition to answering the charge questions, the panel is welcome to comment and offer recommendations on other aspects of the Neutrino Beam RAW Systems Preliminary Design.

It is requested that the panel chairperson collect the findings, comments, and recommendations of the panel, and summarize them along with the answers to the charge questions in a brief written report. This report is hopefully available approximately 1 week after the review.

Review Panel Members:

1. Chris Ader, Chair, Senior Engineer, AD/ENG/MSD
2. Marty Murphy, Operations Specialist, AD/ENG/ENG_SUP
3. Maurice Ball, Principal Engineer, FE/ENGR,FE/ENGR/ARCH