

# Primary Beamline Radio-Activated Water (RAW) Preliminary Design Review

## Summary

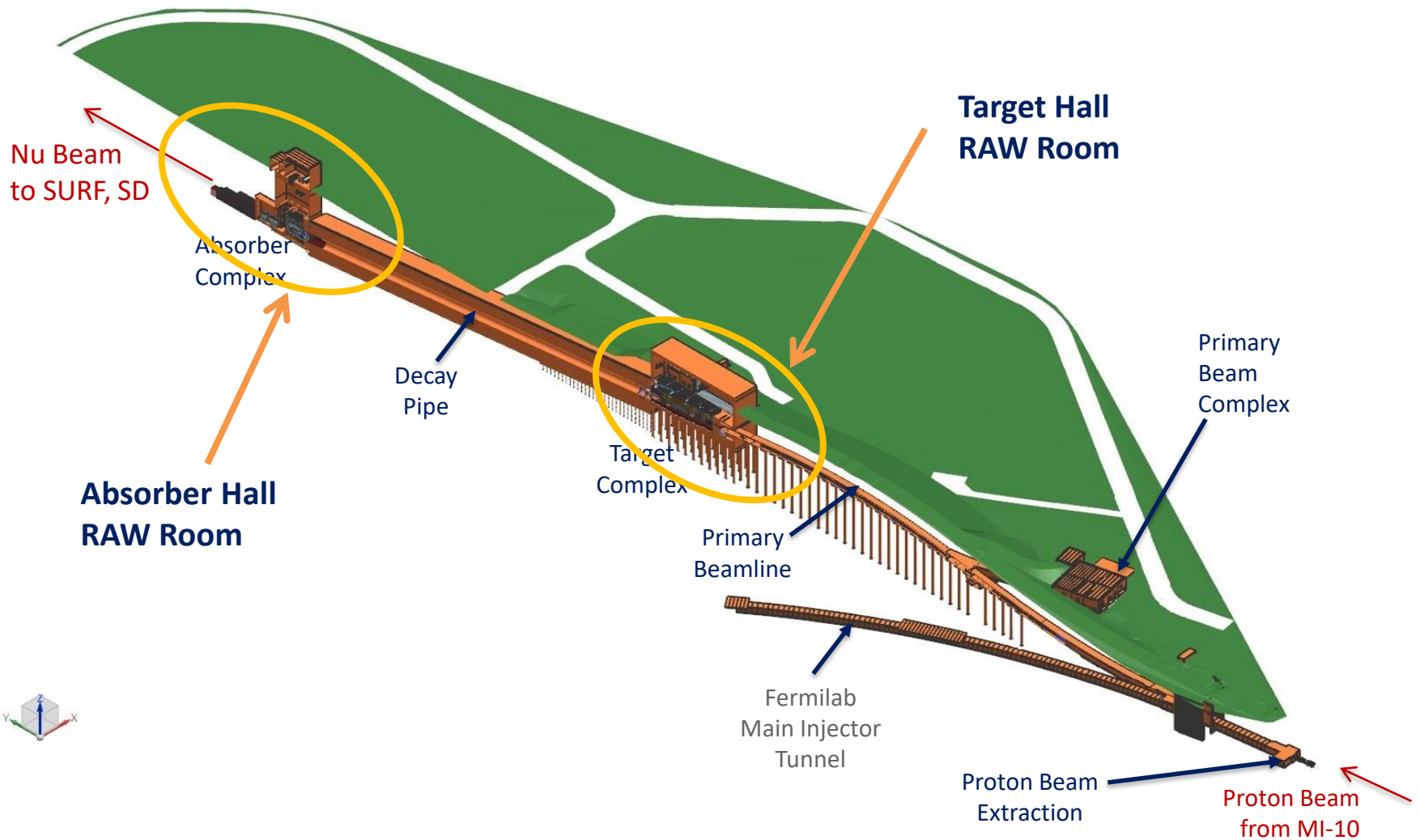
Karlon E. Williams, II

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# RAW Systems - Preliminary Design Review

## ISO Section View of Near Site – MI-10 to LBNF-30 Absorber Complex



# RAW Systems - Preliminary Design Review

## Review Emphasis:

The primary purpose of this review is technical in nature, to ensure the project is sufficiently mature to begin Final Design

# RAW Systems - Preliminary Design Review

## Systems Reviewed

- Target Hall RAW Systems
  - Target RAW (Raina Wang)
  - Horns A, B, C RAW (Karl Williams)
  - Shielding Panel RAW (Raina Wang)
  - TH RAW Exchange (Raina Wang)
  - TH Intermediate (Dave Hixson)
  - H+OH System (Dez Deshpande, Karl Williams)
- Absorber Hall RAW Systems
  - Absorber RAW (Dez Deshpande)
  - AH RAW Exchange (Dave Hixson)
  - AH Intermediate (Dave Hixson)
- TH & AH Controls (Paul Kasley)

# RAW Systems - Preliminary Design Review

## System Maturity

- Design work at this stage is building off the Conceptual Design work as recorded over the past 10 years
- Designed for 2.4MW beam, some systems can have VE for smaller heat exchangers and/or pumps at 1.2MW beam
- RAW system preliminary design work at this stage is still in progress
- Largest Issue in Final Design:  
Keeping up with design changes as component designs mature

# RAW Systems - Preliminary Design Review

## System Maturity, cont.

- Confidence of maturity of beamline component design is:
  - Excellent –
    - TH & AH RAW Exchange Systems
  - Very Good –
    - Shielding RAW
    - Absorber RAW
    - Absorber Intermediate
  - Reasonable –
    - Target RAW
    - Horn A RAW
  - Low –
    - Horns B & C RAW
    - H+OH Mediation System

# RAW Systems - Preliminary Design Review

## Conclusions, Risks, and Concerns

### General

- Largest risk is due to matching RAW systems to component design which may not be mature enough at this time
- Some risk remains as CF adjust layouts and details of buildings
- Designs incorporate significant input and interfacing with all Component design parties, as well as CF, ES&H Safety and Radiation, and other parties
- Component design specifications lead to suitable system temperature, pressure, and flow capabilities
- Designs to follow current accelerator practices, and lessons learned from MI, NuMI, NOvA
- P&ID drawings and AFT Fathom modeling show reasonable system design and operational parameters
- 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

# RAW Systems - Preliminary Design Review

## Conclusions, Risks, and Concerns

### Target Hall

- The Target is undergoing preliminary design, which may require alterations to the current system. It is thought these will be minimal, and that final design could begin
- The component Horn A is currently completing preliminary design, Horns B and C are roughly conceptual, and Horn B & C RAW systems which are currently simply scaled will need adjusted accordingly
- Horn Ejector Pump prototyping necessary for further RAW system development, and may lead to Horn design alterations
- Final design of Horn RAW systems will need to wait until further maturity of the horn designs, as well as for feedback from the ejector pump prototyping
- Target Shielding Panel loads and requirements appear well known and understood, and final design could begin



# RAW Systems - Preliminary Design Review

## Conclusions, Risks, and Concerns

### Target Hall (cont.)

- TH RAW Exchange System is well understood and straight-forward design , and final design may be able to begin
- TH Intermediate Cooling System is straight-forward design, but depends on finalization of Target Helium system before final design may begin
- H+OH System will require significant development to achieve Conceptual and Preliminary Design, but does not hold up progress on other TH systems

# RAW Systems - Preliminary Design Review

## Conclusions, Risks, and Concerns

### Absorber Hall

- Although looking promising, the Absorber Hall layout change may pose additional concerns impacting Absorber RAW and Intermediate systems, requiring some rework
- Absorber loads and requirements appear well known and understood
- AH RAW Exchange System needs decision of simpler system with only transfer pumps, or more extensive system with capture and fill tanks, but is otherwise straight-forward design
- Once building layout is decided, AH systems may be ready to begin final design

# RAW Systems - Preliminary Design Review

## Conclusions, Risks, and Concerns

### Controls

- Design based on a competent design with today's level of technology, knowing that technology will advance significantly between now and installation (5+ years away)
- Controls re-estimation for current system layouts gives a reasonable cost at this time
- Following inflation, estimated cost should remain similar even considering the advance of technology

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Thank You!

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