2 May2014

Dear Scott DeBarger,

RE: CRYO SYSTEMS INTEGRATED SAFETY REVIEW

In coordination with SLAC, Jefferson Lab was requested to develop and coordinate an integrated safety review for the cryo system.

Deliverables, as detailed in this document, are as follows:

- Provide a draft charge
- Provide a list of potential reviewers (showing especially third-party reviewers)
- Provide a proposed review date

We are also providing additional information regarding this review to include SLAC participants listed (either for technical support or to present), logistics information, and what is needed by SLAC and/or partner labs in order to have this review.

We are proposing this review to be broken in to 2 separate reviews. The first review to consist of the preliminary version of the failure mode analysis. The second review to consist of the integrated safety review to confirm the preliminary and further details developed before the final 4.5K cold box contract is signed.

Draft Charge

Charge to LCLS-II Cryo Systems Integrated Safety Review Panel

A preliminary systems design review was held xx 2014 of the design for the cryo systems for the SLAC LCLS-II Project. That review addressed issues of technical design, ES&H, cost, and schedule. (Note: This statement assumes we are having the preliminary systems design review prior to this review as suggested by Lori). We would like you to review the current conceptual design as well as the failure mode analysis. To this end, please respond to the following questions:

1. Is the failure-mode analysis, for each of the three systems (plant, distribution, and cryomodules) appropriately developed for this stage of the project? Are the impacts to each system appropriately identified for this stage of the project?

2. Are ES&H matters being properly addressed?

3. Are there any open technical risks with respect to safety?

To prepare for this review, we recommend the following to be addressed:

- Failure mode analysis for each of the three systems (plant, distribution, CMs) & Impacts on other 2 systems
    - CMs – loss of beam vacuum, insulating vacuum etc.)
    - What happens in a power outage, control valves, lock flow, etc.
- Present Normal operations & operator error
- Present ODH system/analysis– lentils, vents, JT valve leaks, broken supply pipes, etc.
    - Lab policy on required ODH monitoring, ODH areas, required training, access to various hazardous levels
    - Cryoplant, shell, slab foundation, inside tunnel, gallery, and plant building
    - SLAC tunnel/helium inventory
    - Engineering mitigation (lentils, stairways, tunnel protection, fire walls, ODH walls)
    - Penetrations in the tunnel that lead to service building
    - Planned verification tests
- Present PSS & MPS
    - Don't need the entire system information – just the hooks into the CMs, Cryoplant, distribution systems, and lab policy on required ODH monitoring
- Present Pressure Systems Requirements: how is the project handling pressure vessel compliance coordination
- Present Operational Safety Procedures (existing and ones to be developed) to include ODH, pressure systems, etc.
- Present Equipment Material Handling/Installation/PM program
- Present Radiation protection NIRD - but not for waveguides under pressure
- One of the outputs of review that is needed – basis of design for what is to come (max allowable working pressures, etc.)

Potential Reviewers (Third-Party Reviewers)

- Technical:
    - Dr. John Weisend john.weisend@esss.se
    - Dr. Fabio Casagrande casagrande@frib.msu.edu
    - Dr. Yatming Than (Roberto) ythan@bnl.gov
- Safety: One reviewer is needed, SLAC to provide

Participants (technical support or in attendance – TBD by SLAC and partner labs)

- Jefferson Lab:
  - Dana Arenius – JLab Cryoplant CAM
  - Joe Preble & Ed Daly – JLab cryomodules
  - George Neil – JLab Project Manager
  - Dianne Napier – JLab Review Coordinator
- Fermilab:
  - Arkadiy Klebaner – FermiLab cryogenic distribution system
  - Tom Peterson – Fermilab cryomodules
  - Jay Thilacker – Fermilab cryomodules
- SLAC:
  - Scott DeBarger - SLAC-AD Mechanical Engineering Lead (representing LCLS-II Cryogenic Systems for SLAC)
  - Bob Law (SLAC) - Civil/Facilities
  - Hamid – PSS/MPS – Global Controls
  - Jim Healey – SLAC safety procedures (to include equipment handling, installation)
  - SLAC SOTR?
  - Mike McDaniel – SLAC ODH/Cryogenics Manager
  - Mohammad Malek – SLAC Pressure systems manager
  - Roger Garison? - Nick Colez? – SLAC Machine Operations
  - Marc Ross/Cryogenic Engineer (TB D) – SLAC Machine operations for cryoplant
  - Jose Chan
  - Lori Plummer – SLAC systems integration
  - Darren Marsh – SLAC QA

We propose a June 30th/July 1st review date, but the following items are listed for your consideration regarding this date:

- Marc Ross proposed this review to occur prior to the DOE status review in August 2014
- This review will assist in getting the RFP for the 4.5K Cold Box ready by Oct 1, 2014
- SLAC, Lori Plummer, suggested scheduling this review in conjunction with the Cryo Systems Preliminary Design Review. Currently Greg Hayes is coordinating this review.
- SLAC's FAC review is scheduled for July 1st and 2nd
- Proposed date depends on availability of reviewers
- Need SLAC Functional Requirements of each of the three systems (plant, distribution, and cryomodules), PSS/MPS, & Civil/Facilities
- Need SLAC ODH analysis
- See section above regarding preparing for this review

Logistics

- 1 or 2 day review
  - Intro, presentations, private discussions with panel, follow up/closeout
- Location TBD based on participants/attendees required for this meeting (JLab or SLAC).
- All information regarding this review can be posted on the SLAC Systems Integration Website per Lori Plummer
- Teleconferencing/Videoconferencing is recommended for this review.

If you have any questions or comments, please do not hesitate to contact me.

Sincerely,

Dianne Napier
Jefferson Lab LCLS-II Systems Integration Engineer, Review Coordinator
dnapier@jlab.org
1-757-269-7475