

Report of the Ad-hoc Interface Advisory Committee

Date: 4th & 5th October 2016

Place: 4th & 5th October: ESS HQ, Tunavägen 24 Lund, Meeting Room: Linneasalen
5th October: Lunch at ESS Construction site, Odarslövsvägen 113

Time: 4th October 09:00 – 17.30
5th October 09.00 – 14:00

Committee members:

Tim Broome ISIS (TAC member)
Peter Böni FRM-II (former SAC member)
Jack Carpenter ANL
Phil Ferguson ORNL (TAC member)
Matt Fletcher ISIS (ARC member)
Bernhard Frick (ILL, SAC member)
Ken Herwig SNS (SAC member)
Erik Iverson SNS (STAP member)
Fujio Maekawa J-PARC
Roger Pynn Indiana Univ. (SAC member) (Chair)

Charge to IAC:

The purpose of this meeting is to assess whether the interfaces between the ESS Instrument, Target, and Target Building systems are being properly addressed in the design of the beam extraction system and shielding bunker and to evaluate the design approaches proposed for these systems.

Specific questions that the committee should address are provided below:

1. Have the functional, performance, and interface requirements for the beam extraction system and bunker been defined and are they complete and adequate enough to ensure acceptable performance?
2. Are the proposed design approaches expected to meet these requirements?
3. Have appropriate options and alternatives been considered in selecting the design approaches? Are there further value engineering opportunities that should be considered?

The committee is asked to compile a set of comments and recommendations along the lines of enquiry stated above

Response to the Charge:

1. Requirements for BES and bunker are not yet completely defined but a good start has been made (e.g. seismic, local v global shielding in bunker)
2. Yes – to the extent they have been defined
3. Value engineering is needed if it does not imply significant delay
 - Alternate shielding design choices need to be tensioned against schedule, cost and resources
 - Windows need to be carefully considered (trade between safety assumptions and scientific performance)

Observations:

1. Each month of project delay costs \$20M
2. Bunker and beam extraction on critical path
3. Two moderators will be installed
4. Instrument teams asked to assess using upper moderator only
5. PDR for bunker is due Dec 2016
6. Interfaces are documented in ICDs that must be complete before PDR
7. ESS needs 5 – 10 additional engineers to meet instrument schedule
8. Scientific success is the driver
9. 1-cm-thick Al window at monolith exit
10. Unstacking bunker shielding requires dedicated use of main hall crane during significant part of every outage
11. Bunker & beam extraction will be designed and procured by ESS
12. Monolith insert alignment will be accomplished off-line on a test stand
13. Light shutters are not intended to be closed during beam delivery
14. Additional shutters are the responsibility of instrument teams
15. All biological shielding has to be approved by the shielding coordinator
16. Civil design is fixed (changes expensive)
17. Expect 3 mm of creep plus 3 mm elastic deflection for floor in bunker region
18. Bunker is not ventilated

Findings:

1. ESS has clearly recognized the importance of managing technical and organizational interfaces
 - a. A project manager & technical coordinators have been appointed to oversee interfaces
2. An encouraging start has been made on bunker design & operational plan
3. Self performing bunker work is a sensible step
4. Fully effective internal communication not yet achieved
5. ESS has a talented group of neutronics staff that are not yet effectively coordinated due to internal organizational barriers
6. Requirements for BES and bunker are not yet completely defined

Recommendations:

1. Pull together a team that can deliver the bunker (this requires a mix of personnel including leadership, neutronics, safety, operations, engineering, neutron optics)
 - a. Consider colocation of team
 - b. Eliminate potential for single-point failure, especially in the evaluation of shielding designs
 - c. A 3D print model of the bunker, kept up to date, could be used to focus ideas and plans for operational aspects as the design evolves
2. Pursue effective communication across organizational boundaries and with external partners
3. Conduct internal, followed by external, peer reviews of the shielding calculation suite (to include biological shielding, experimental background and residual activity) prior to sign-off by shielding coordinator
4. Review operational interfaces
 - a. Consider impacts of beam power increases on bunker access
5. Consider adding neutron beam transport and experimental hall layout to the tTAC scope