Scope of Design Review of ArgonCube2x2 Cryogenics

May 2, 2019

- Topics to be reviewed:
  - ODH calculation and mitigation method
  - Cryostat cooling scheme
    - Cryostat cooler sizing and selection
    - Thermal analysis FEA
    - Module vacuum insulation
  - Cryogenic scheme: PFD,PID, equipment sizing and layout
    - LAr filling scheme
    - LAr re-circulation and purification
  - Cryostat venting line size calculation and layout
    - vessel pressure release scheme
    - LAr supply dewar
    - a new pipe to extent the helium piping to reach ArgonCube2x2 vessel
    - assuming 2x2 vessel at the very downstream end of the hall
  - Cryostat vacuum insulation scheme, certification as low-pressure vessel
    - FEA and pressure test procedure
  - Cryogenic control and monitoring
  - (Possibly) Equipment layout, procurement, cost
- List of documentation to be prepared
  - Design requirement signoff
  - ODH analysis and mitigation
  - Argon piping engineering note
  - Low pressure vessel engineering note
  - Cryogenics: PFD, P&ID, instrument sizing and layout
    - BERN July cryogenic test result and module design decision
  - PLC system for control and monitoring
  - Equipment layout
  - Failure Mode & Effect Analysis
  - What-if analysis
- Prerequisite documentation: design requirement and BERN's cryogenic system

MINOS Cryogenic Safety Panel:

Mike White, Alexander Martinez, Del Allspach, Angela Aparicio, and TBD

Technical and system reviewers:

Review Documentation of ArgonCube2x2 Cryogenics

- Prerequisite documentation: design requirement and BERN's cryogenic system
- List of documentation to be prepared
    - Design requirement signoff **(6/27/19)**
    - ODH analysis and mitigation **(7/18/19)**
    - Venting note **(7/18/19)**
    - Low pressure vessel engineering note **(8/8/19)**
    - Cryogenics: PFD, P&ID, instrument sizing and layout **(8/8/19)**
        - BERN July cryogenic test result and decision **(7/18/19)**
    - PLC system for control and monitoring **(8/8/19)**
    - Argon piping engineering note **(8/22/19)**
    - Equipment layout **(9/5/19)**
    - Failure Mode & Effect Analysis **(10/3/19)**
    - What-if analysis **(10/3/19)**