

To: Phil Pfund
Chair, Village & Misc. Cryogenic Safety Review Panel

From: Terry Tope

Subject: PAB FLARE Safety Review – Phase 2 (“Bo”)

Dear Phil,

I request that the Village & Misc. Cryogenic Safety Review Panel begin review of the addition of the second cryostat (“Bo”) to the PAB liquid argon TPC R&D setup.

The documentation again resides at <http://lartpc-docdb.fnal.gov:8080/cgi-bin/ShowDocument?docid=265>

login: lartpc

password: argon!

Dave Pushka has agreed to review the pressure vessel engineering note for “Bo” because it is nearly identical to the note he reviewed for “Luke.”

Because the second cryostat utilizes much of the previously reviewed infrastructure, the original safety document has been updated. In an attempt to help the reviewers identify the new material, comments with respect to the update are provided for each section. Sections that have been modified since the last review have a “*” after the heading.

- 1.1 Materials Test Station System Description ***
An overview of “Bo” has been added to the system description.
- 1.2 Flow Schematic ***
The flow schematic has been updated to include the piping associated with Bo. The rest of the system has undergone several minor changes since the last review. These changes are also detailed.
- 1.3 Instrument and Valve Summary ***
The instrument and valve summary spreadsheet has been updated to reflect the revised flow schematic.
- 1.4 System Control Loops, Interlocks, and Electrical Schematics ***
Several instruments have been added to the PLC. However, none of these additions perform any safety functions.
- 2.1a Procedure for Filling “Luke” ***
A few minor changes based on operational experience.
- 2.1b Procedure for Emptying “Luke” ***
A few minor changes based on operational experience.
- 2.1c Procedure for Operating “Air Lock” During Material Insertion ***
A few minor changes based on operational experience.
- 2.1d Procedure for Operating “Air Lock” During Material Removal ***
A few minor changes based on operational experience.
- 2.1e Procedure for Filling the LN2 dewar ***

- A few minor changes based on operational experience.
- 2.1f **Normal Nitrogen Circuit Valve Positions During Operation**
No changes.
 - 2.1g **Procedure for Connecting Stockroom Liquid Argon Dewars to the System**
No changes.
 - 2.1h **Procedure for Removing Stockroom Liquid Argon Dewars from the System**
No changes.
 - 2.1i **Procedure for Molecular Sieve Regeneration**
No changes.
 - 2.1j **Procedure for O2 Filter Regeneration**
No changes.
 - 2.1k **Procedure for filling “Bo” ***
New.
 - 2.1l **Procedure for emptying “Bo” ***
New.
 - 2.2a **Startup Check List for Filling the Material Test Station (“Luke”) ***
A few minor changes based on operational experience.
 - 2.2b **Startup Check List for Filling the TPC Cryostat (“Bo”) ***
New.
 - 2.3 **Training List for Operators of the FLARE Material Test Station (“Luke”) and the TPC cryostat (“Bo”) ***
Updated.
 - 3.1 **FMEA ***
Updated to reflect hardware changes.
 - 3.2 **WHAT-IF WORKSHEET**
No changes.
 - 3.5a1 **ODH Analysis of the Proton Assembly Building for the FLARE Materials Test Station and the TPC Cryostat ***
Revised to include new components.
 - 3.5a2 **ODH Fan Manufacturer Info**
No changes.
 - 3.5b1 **Pressure Vessel Engineering Note for “Luke” Including Relief Valve Certification and U-1A Manufacturers Data Report for Pressure Vessels**
No changes.
 - 3.5b2 **Updated Pressure Vessel Engineering Note for PAB (Formally PS1) Liquid Nitrogen Dewar Including Relief Valve Certifications.**
No changes.
 - 3.5b3 **Old Pressure Vessel Engineering Note for PS1 Liquid Nitrogen Dewar**
No changes.
 - 3.5b4 **Vacuum Vessel Engineering Note for PS1 Liquid Nitrogen Dewar**
No changes.
 - 3.5b5 **Pressure Vessel Engineering Note for “Bo” Including Relief Valve Certification and U-1A Manufacturers Data Report for Pressure Vessels ***
New.
 - 3.5c **PAB LN2 Dewar Compliance with Fermilab ES&H 5032.1TA**
No changes.
 - 3.5d **LN2 Dewar Fill Line Pressure Test Documentation**
No changes.
 - 3.5e **LN2 Transfer Line Pressure Test Documentation**
No changes.
 - 3.5f **LAr Transfer Line Pressure Test Documentation (up to “Luke”)**
No changes.
 - 3.5g **“Luke” Materials Lock Bellows and Gate Valve Pressure Test**
No changes.
 - 3.5h **LN2 Dewar Piping Pressure Test**
No changes.

- 3.5i “Bo” High Voltage Feed Thru Pressure Test ***
New.
- 3.5j “Bo” Signal Feed Thru Pressure Test ***
New.
- 3.5k “Bo” LAr Piping Pressure Test * (Incomplete, likely will finish week of May 19th)**
New.
- 4.1a Relief Valve Sizing for the FLARE Materials Test Station and TPC Cryostats With Supporting Documentation ***
Minor changes to reflect the addition of “Bo.”
- 4.1aa Supporting Documentation for Relief Valve Calculations**
No changes.
- 4.1b Relief Valve Sizing for Piping Associated with the FLARE Materials Test Station and TPC Cryostats ***
Very minor update to note the function of PSV-378-Ar.
- 4.1c Relief Valve Sizing for the PAB LN2 Dewar**
No changes.
- 4.2 Material Stress Levels ***
Updated to include “Bo” piping and non-commercial electrical feed thrus. See pdf bookmark entitled “4.2 – Material Stress Levels Continued – Bo Feedthrus and Piping.”
- 4.3 Correspondence Related to Operational Readiness Clearance**
No changes.

Regards,

Terry Tope

Copy: Panel Members (Brian DeGraff, Tom Page, Dave Pushka)
Win Baker
Martha Heflin
Stephen Pordes