

## Solenoid / Torus – Fast Dump Investigations/Actions Taken

**Date: February 18, 2019**

**Time: 08:00 – 10:30**

*Attendees: Pablo Campero, Brian Eng, Ruben Fair, Probir Ghoshal, Denny Insley, Carroll Jones, Dave Kashy, Nicholas Sandoval, Stepan Stepanyan and Tyler Lemon.*

### 1. Results of Solenoid and Torus Fast Dump analysis presented by Ruben Fair

- 1.1. On 2/17/2019 at ~ 4:12 AM, both Solenoid and Torus fast dumped at full current 2416 and 3770 A respectively.
- 1.2. Second Torus Fast Dump occurred on 2/17/2019 at ~ 17:50 PM, due to low  $\Delta P_{(sup-ret)}$ .
- 1.3. Solenoid had a Controlled Fast dump on 2/17/2017 at ~ 17:55 PM due to PT8620 pressure signal that exceeded interlock threshold, as a consequence of Torus Fast Dump cryogenic conditions.
- 1.4. Archived data pointed to spikes of LCW: 92\_Flow\_Makeup signal as the most suspicious to generate fast dumps for the Solenoid and Torus.
- 1.5. From data archived for Solenoid MPS water supply and return pressure transducers, normal  $\Delta P_{(sup-ret)} \sim 75$  psi.
  - 1.5.1. Right before Solenoid dumped, water return pressure increased from 43 psi to 63 psi, water supply pressure was stable ~112 psi;  $\Delta P_{(sup-ret)} \sim 49$  psi
  - 1.5.2. The spikes for LCW: 92\_Flow\_Makeup signal represents the water tank being filled; units for LCW:92\_Flow\_Makeup are in [gal/min].

### 2. Solenoid and DBX PLCs issues.

- 2.1. Solenoid PLC was running, but not communicating with Studio500 PLC software. Investigated issues, and it turned to be the same error as the Torus presented on October, 2018. (Error 701-800429B7: Failed to go online with the controller).
- 2.2. Immediate actions taken to solve Solenoid PLC issues during the meeting:
  - 2.2.1. PLC power cycled, downloaded PLC code and cleared errors and faults.
  - 2.2.2. Nick Sandoval, Dave Kashy verified PID values used for EV and heaters.
- 2.3. Cryo DBX PLC loses communication (Happened during the meeting), it was power cycled to recover communications and run the system back to normal operations.
  - 2.3.1. Brian Eng and Denny Insley verified set points for PID control over EV and heaters.

### 3. Planned forward activities to test Solenoid and Torus MPS water flows.

- 3.1. Meeting agreed on 2/19/2019 to determinate the Torus and Solenoid MPS flows.
- 3.2. Nick Sandoval will add PLC code logic to generate a Torus/ Solenoid Controlled Ramp Down if the  $\Delta P_{(sup-ret)}$  goes below 55 psi (value TBD after test on 2/19).
- 3.3. Carroll Jones will investigate the possible solutions to stabilize the LCW pressure in three halls (A, B and C), so then keep the  $\Delta P_{(sup-ret)}$  stable for Solenoid and Torus MPS supply, possible solutions are:
  - 3.3.1. Add a relief valve to allow faster venting of nitrogen located in the tank.
  - 3.3.2. Change the set points for batch fill switches.
- 3.4. Carroll Jones will communicate with Magnets Support group and related personnel with the best solution found.