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, Tyler Lemon, Nicholas Sandoval, and Stepan Stepanyan

1. Results of Solenoid and Torus Fast Dump analysis presented by Ruben Fair
    - 1.1. On 2/17/2019 at ~ 04:12, both Solenoid and Torus fast dumped at full current 2416 A and 3770 A, respectively.
    - 1.2. Second Torus Fast Dump occurred on 2/17/2019 at ~ 17:50, due to low $\Delta P_{(sup-ret)}$; return pressure increased.
    - 1.3. Solenoid had a Controlled Fast dump on 2/17/2017 at ~ 17:55 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 probable cause for the fast dumps of the Solenoid and Torus.
    - 1.5. From data archived for Solenoid MPS water supply and return pressure transducers, normal $\Delta P_{(sup-ret)}$ ~ 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; $\Delta P_{(sup-ret)}$ ~49 psi
        - 1.5.2. The spikes for LCW: 92_Flow_Makeup signal represent 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 found it to be the same error as the Torus presented in 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 lost communication during the meeting; it was power-cycled to recover communications and return the system back to normal operations.
        - 2.3.1. Brian Eng and Denny Insley verified set points for PID control of EV and heaters.
3. Planned activities to test Solenoid and Torus MPS water flows.
    - 3.1. Determine 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 2/19/19).
    - 3.3. Carroll Jones will investigate solutions to stabilize the LCW pressure in the three Halls (A, B and C), to 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 level set points for batch fill switches.