LCLSII Cryo-Module in LERF

Attendees:
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Following are the summary of the discussions from the Meeting dated (27-Feb-2017) –

a) At present, contamination is the major cause of downtime for cryogenic systems. Connecting the LCLSII cryo-module (u-tube operations) in LERF, cool-down and warm-up cycles will create more risk of addition / migration of contamination.
b) When both the LINACs (NL and SL / FEL) are supported by one CHL, LINAC pressure is set higher than the operating pressure at 12 GeV configuration (0.0375 atm at SL Return Tee).
c) The cryo-module will be cooled down with direct injection of 4K stream (from primary supply).
d) There will not be a cool-down heat exchanger (neither a 3.0 atm/300K mixing HX nor a LN2 cool-down HX) involved.
e) At least one of the LERF cryo-modules (most possibly FL03) will be warmed-up to make room for the LCLSII cryo-module u-tubes.
f) Considering the above, three different configurations for connecting the LCLSII cryo-module is being evaluated (see attached for schematic diagrams) –
    1. 2K supply and returns are connected to primary supply (PS) and primary return (PR) bayonet (TL side) of FL03 respectively. Shield supply and returns are connected to shield supply (SS) and shield return (SR) bayonet (TL side) of FL03 respectively. 5K supply is tied-in with 2K supply (internal to bayonet box). 5K return is tied-in with shield return (internal to bayonet box).
    2. 2K supply and returns are connected to primary supply (PS) and primary return (PR) bayonet (TL side) of FL03 respectively. Shield supply and returns are connected to shield supply (SS) and shield return (SR) bayonet (TL side) of FL03 respectively. 5K supply is tied-in with 2K supply (internal to bayonet box). L-tube is installed in 5K return bayonet and connected to FEL cool-down header.
    3. 2K supply and returns are connected to primary supply (PS) and primary return (PR) bayonet (TL side) of FL03 respectively. Shield supply and returns are connected to shield supply (SS) and shield return (SR) bayonet (TL side) of FL03 respectively. 5K supply is connected to Primary supply (PS) bayonet (TL side) and 5K return is connected to primary supply (PS) bayonet (CM side).

Comments from Cryo:

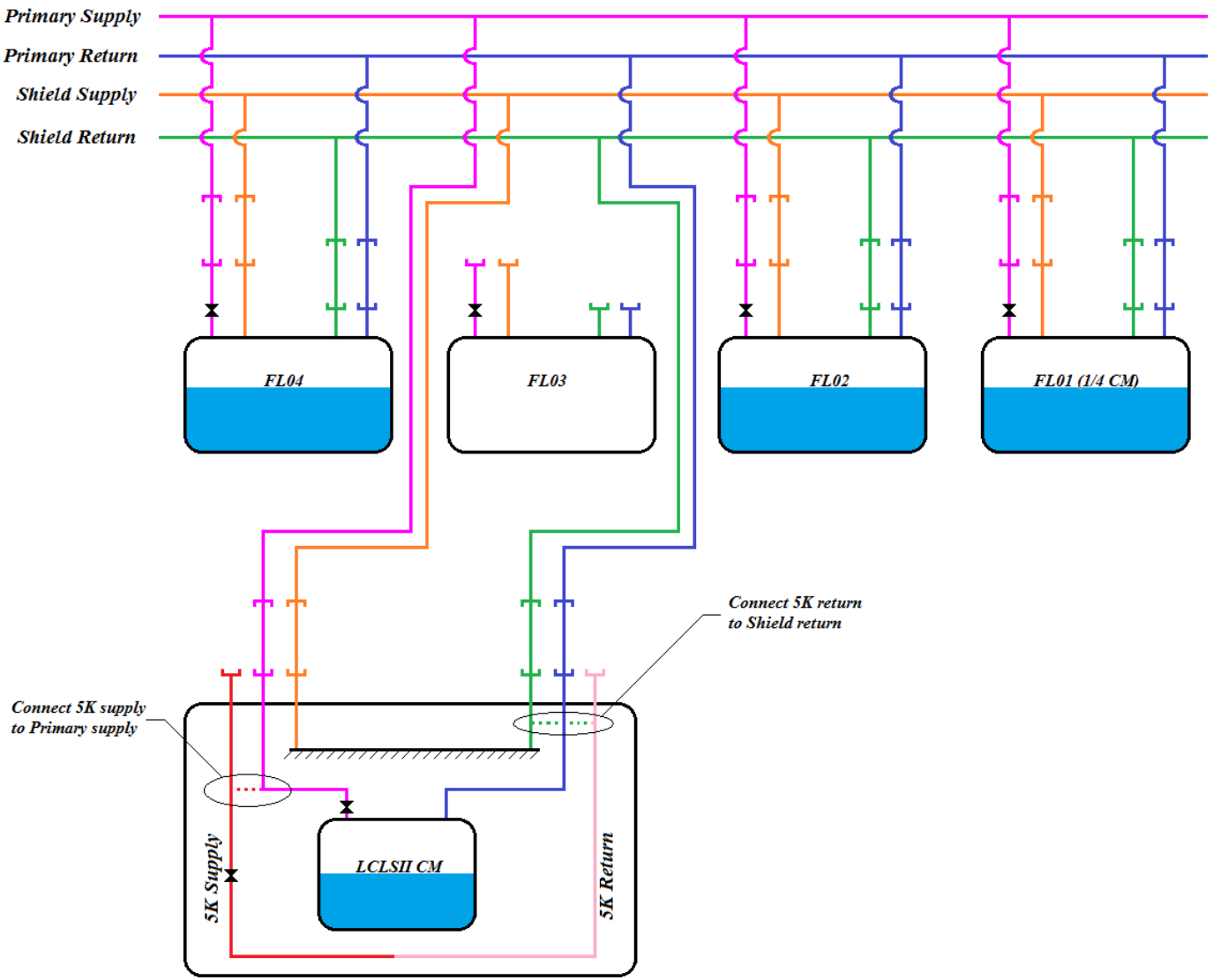
1. Option 1 is preferred over 2. Injecting the 5K return flow (approx. at 6K) in the shield return will lower the shield return temperature to the 4K plant.
2. Option 2 (*i.e.* using the cool-down system to process the 5K return flow) may cause issues in the long term due to ice build-up along the cool-down header.
3. Both options 1 and 2 will impose a liquefaction load (based on the 5K return flow) on the 4K plant. Based on the discussion from the meeting, the minimum required flow in the

5K loop is ~3.0 g/s. Considering ESR is not demanding in excess of approx. 10-12 g/s of 4K support flow from CHL during this time period, providing this liquefaction load should not be difficult.

4. Option 3 is not recommend. At this point, heat in-leaks and pressure drop in the 5K loop is not well established. During the testing period, FL04 and FL02 will be heavily relied upon to keep the RTL stable. Supplying the 5K circuit return flow to FL04 may cause instability (in maintaining liquid level and return temperature), which will affect the 2KCB.

LCLSII Cryo-Module in LERF: Options

Option 1:



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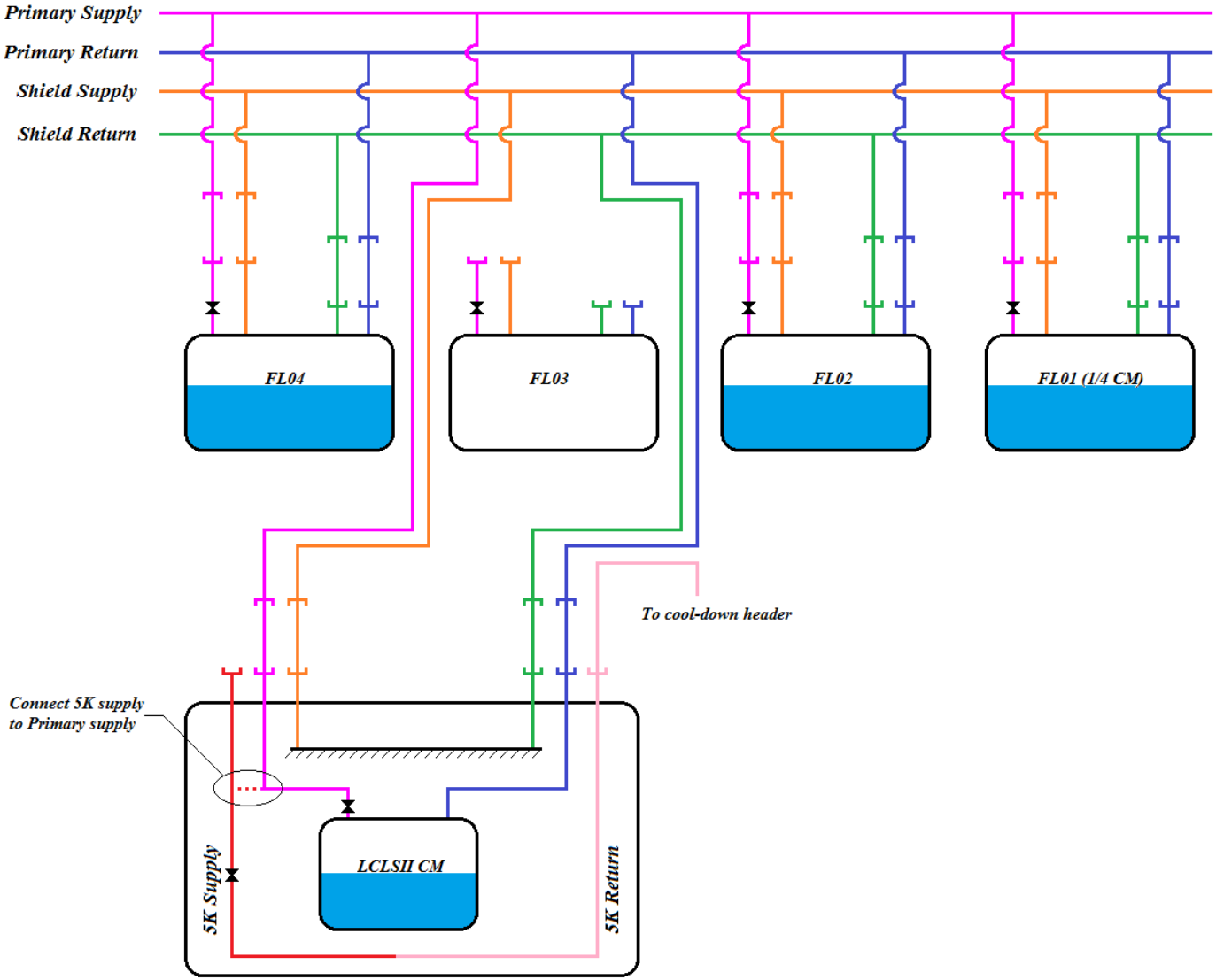
Option 2:



LCLSII Cryo-Module in LERF: Options

Option 3: