Phase II

Shaun Alsum

What Is Phase II?

- 500+ kg LXe detector
- 2m diameter outer vessel, 1.6m inner
- Looks like Hamburger

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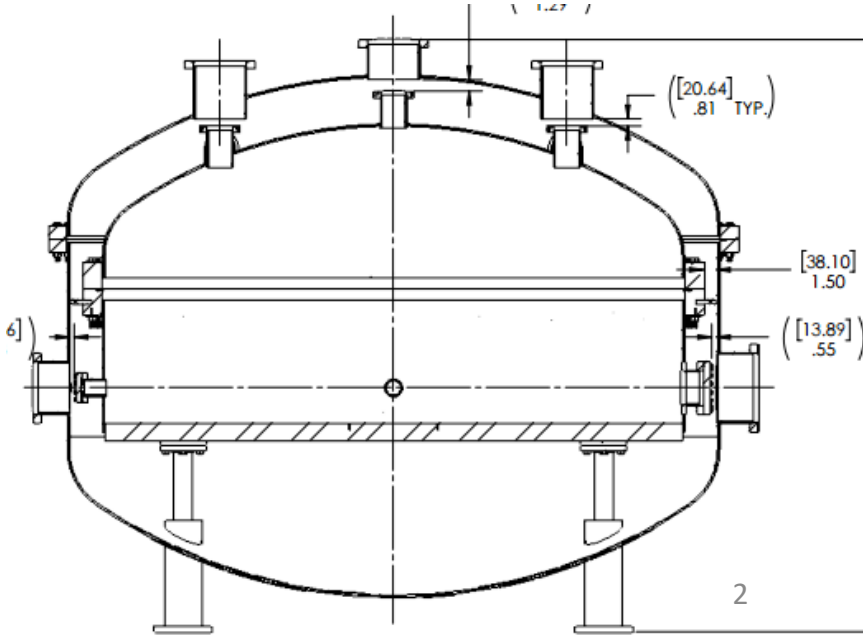
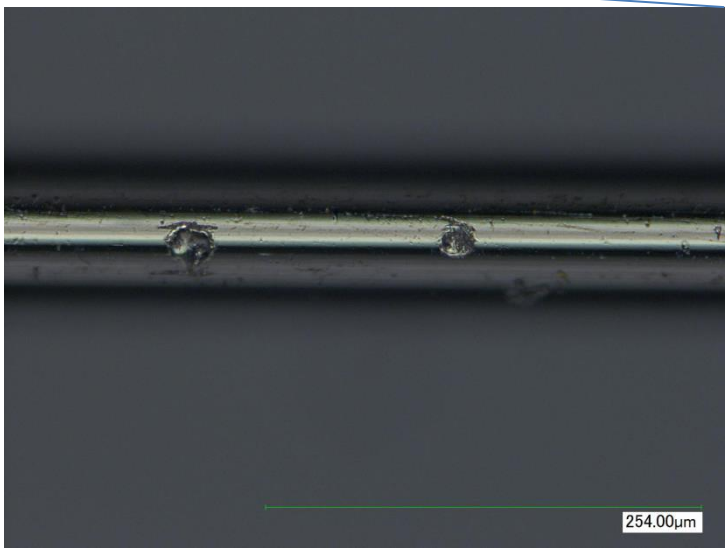


What is it for?

- Testing full-sized LZ grids (1.5m diameter!)
  - Preproduction grids: study grid responses
  - Final LZ grids: quality control
- Look for
  - sparking
  - electron emission



Examples of imperfections in wires that may distinguish two otherwise identical grids

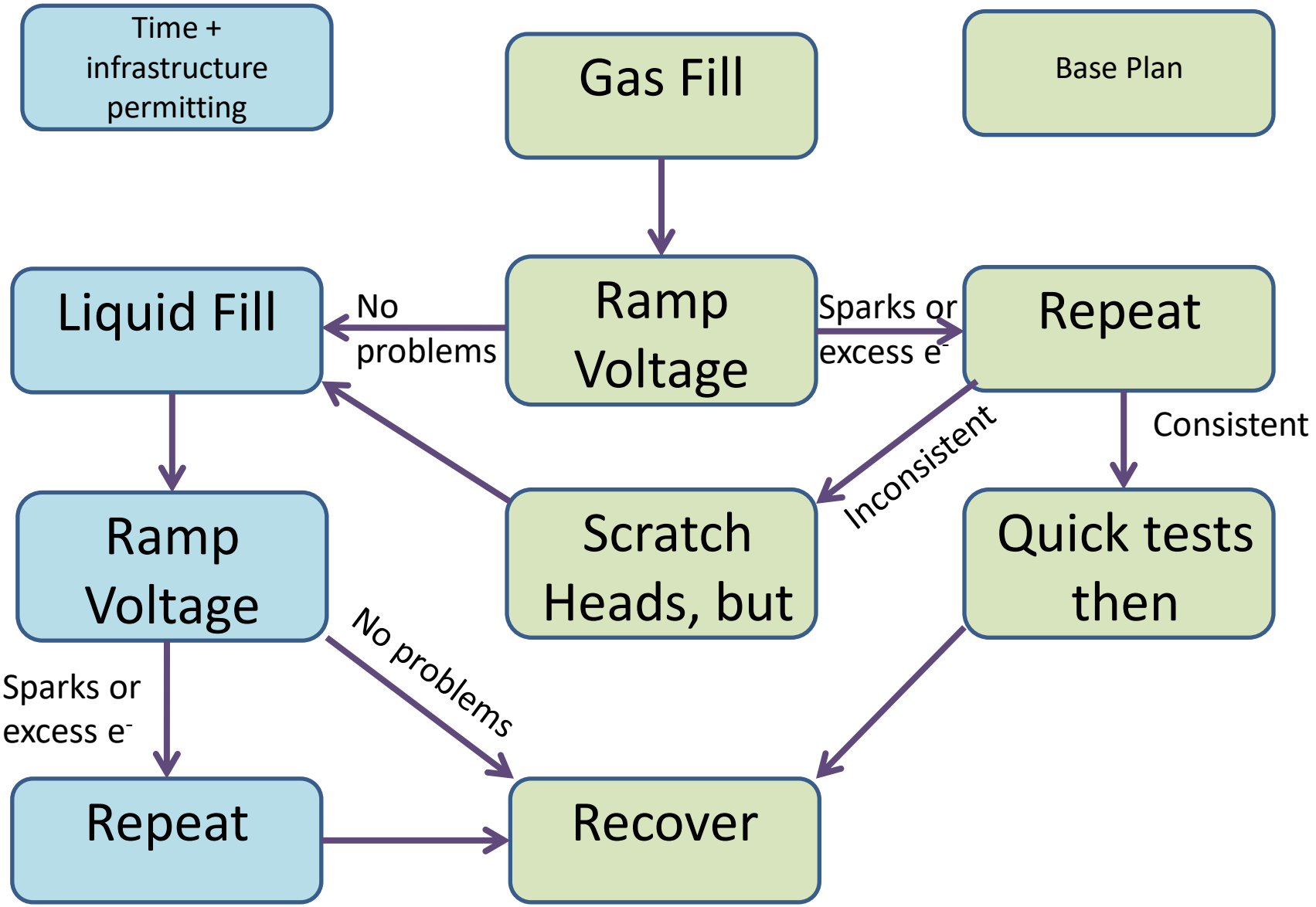
Proposed Test Plan

5 Grid sets

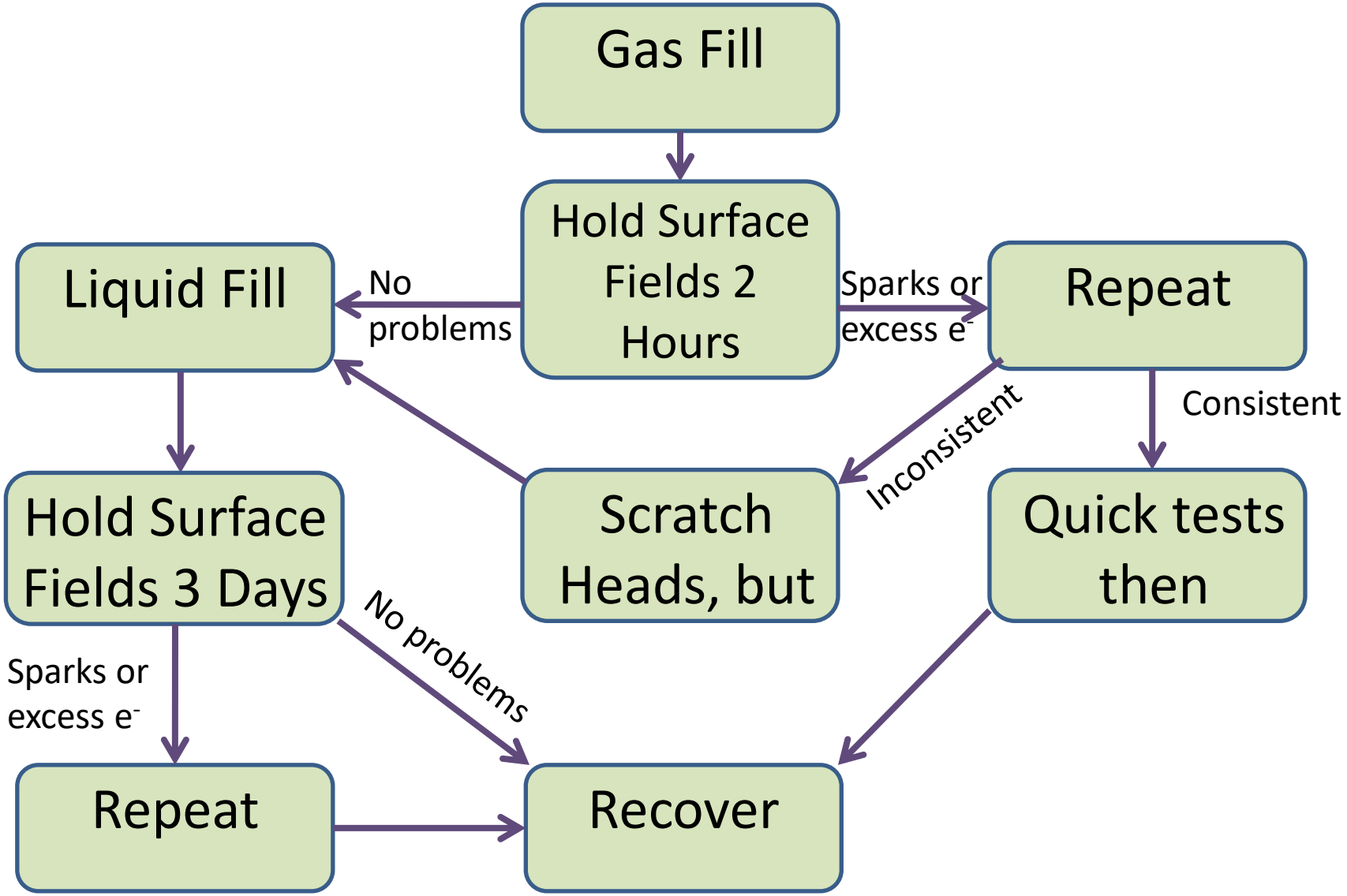
- Preproduction 1: bottom parameters, 1/3 scale
- Preproduction 2: bottom parameters, full scale (~1.5m)
- Bottom: .75mm wire diameter, 5mm pitch
- Cathode: (1cm, 5mm)
- Gate + Anode: full extraction region (.75, 5), (1, 2.5)

Grid	Liquid	Extraction
Preproduction 1	Conditional	No
Preproduction 2	Time permitting	Conditional
Bottom	Yes	No
Cathode	Yes	Conditional
Gate + Anode	Yes (over gate)	Yes

Proposed Test Plan: Preproduction



Proposed Test Plan: LZ Grids



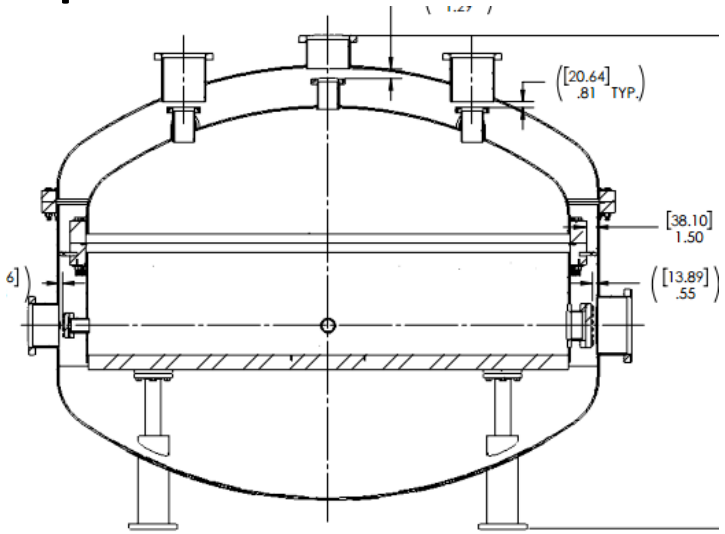
The Vessels

Outer Vessel

Inner Vessel

Vessel features

- 3 top ports
- 4 evenly spaced side ports, 2 big (4” diameter inner), 2 small (2” diameter). Same-size adjacent
- 3 feet, evenly spaced at a radius of 27.5”

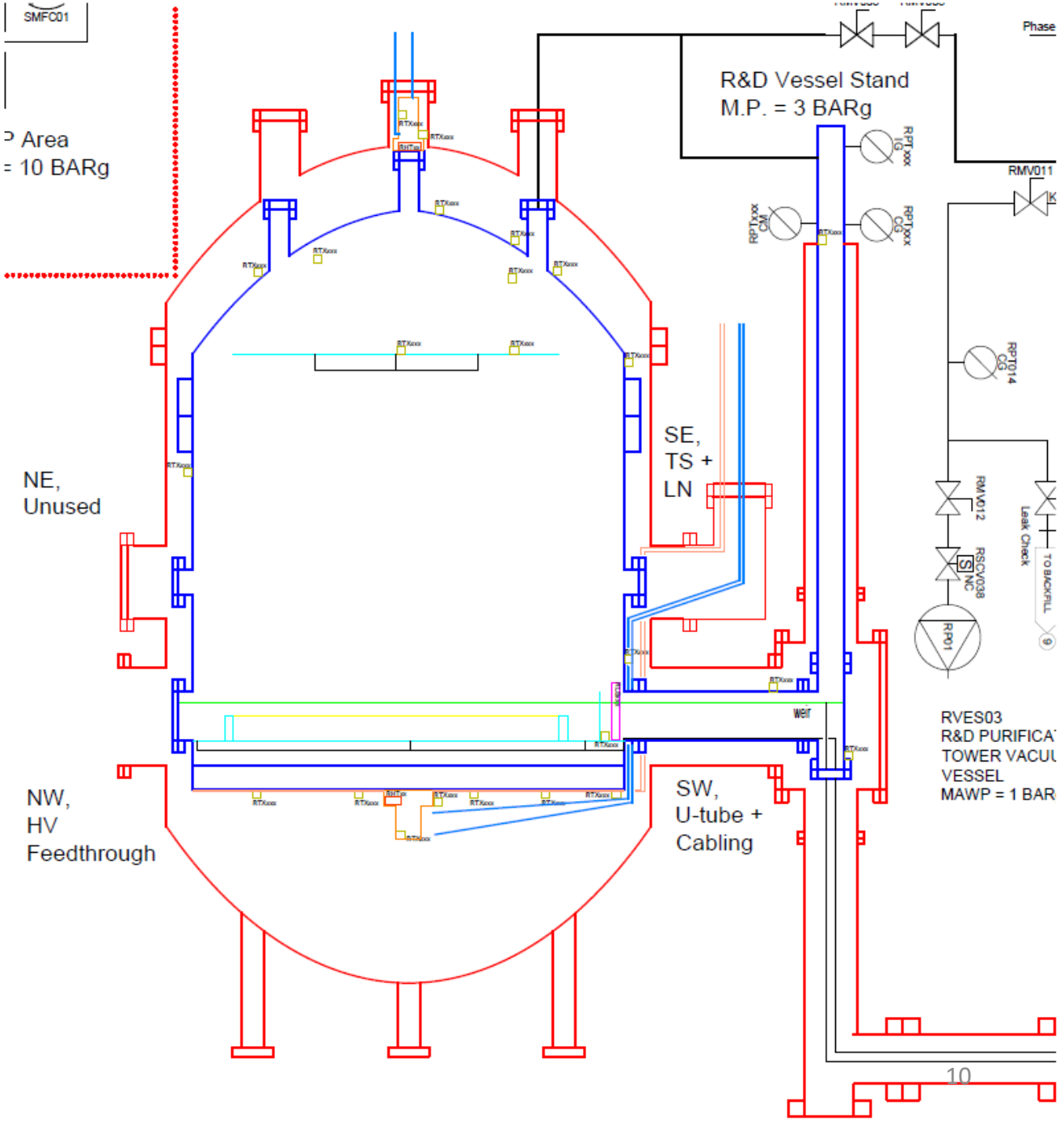


How's it going to work?

- Wide pressure vessel
- Minimal internal structure
  - Not meant to mock up LZ, just the grid surface fields (excepting extraction region during gate-annode test only)
  - Grid: supported by stands, or small tpc-like sections
  - PMTs: probably suspended independent of any TPC-like structure
  - Wier: likely just a tube or tubes

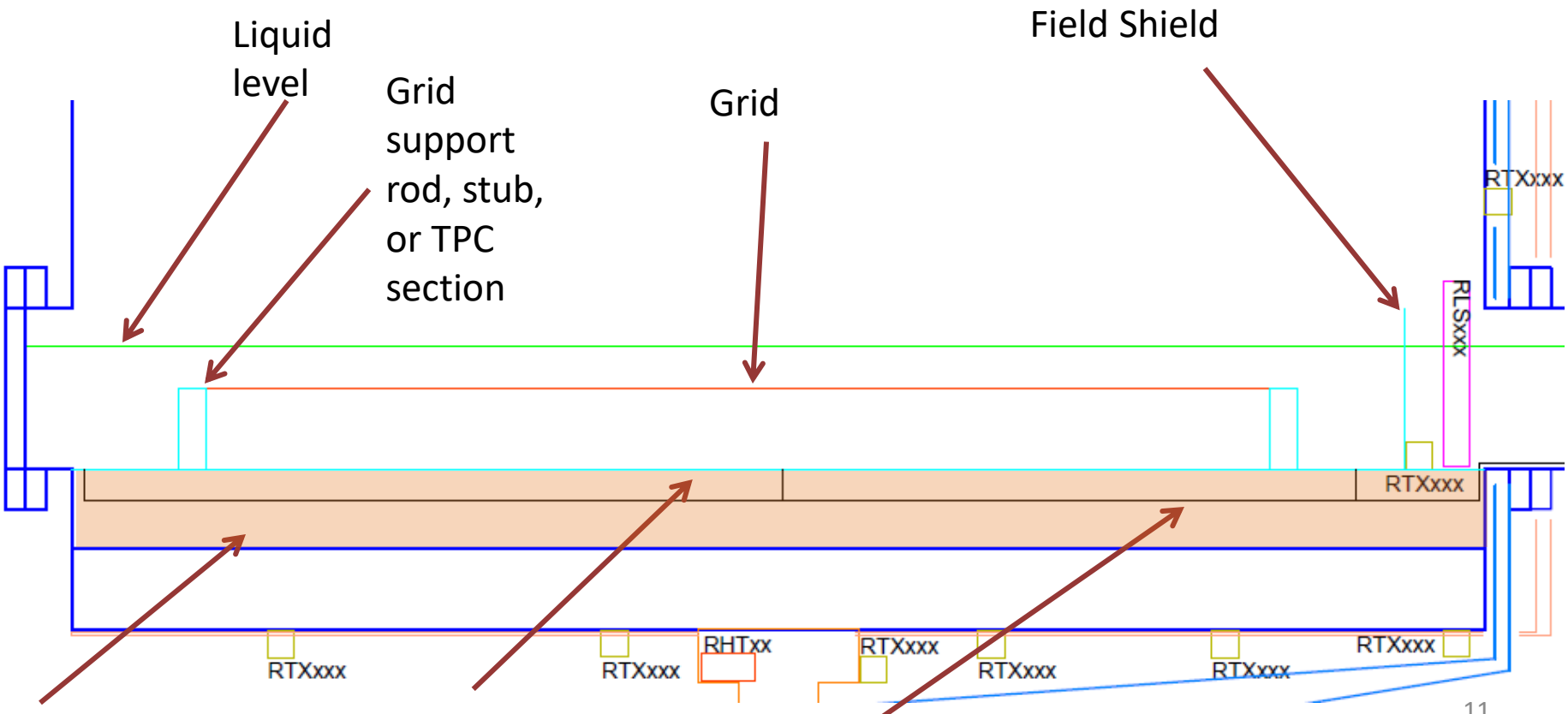
P&ID

In Progress…

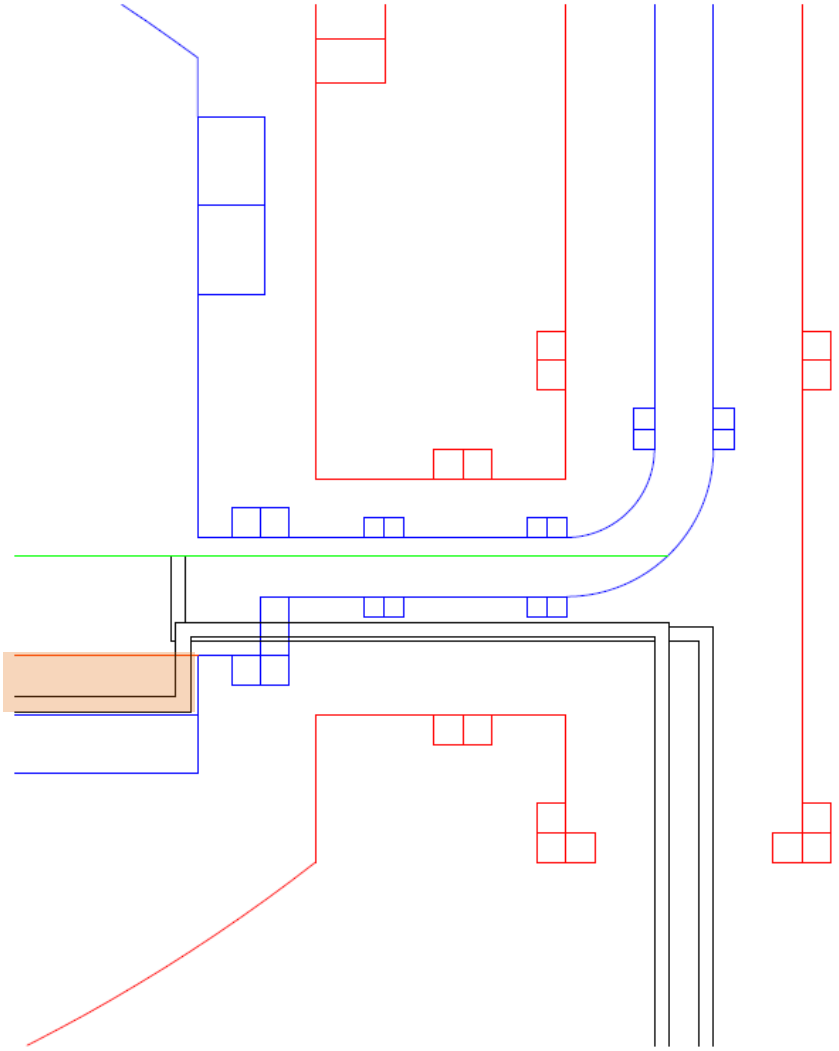


Grid section

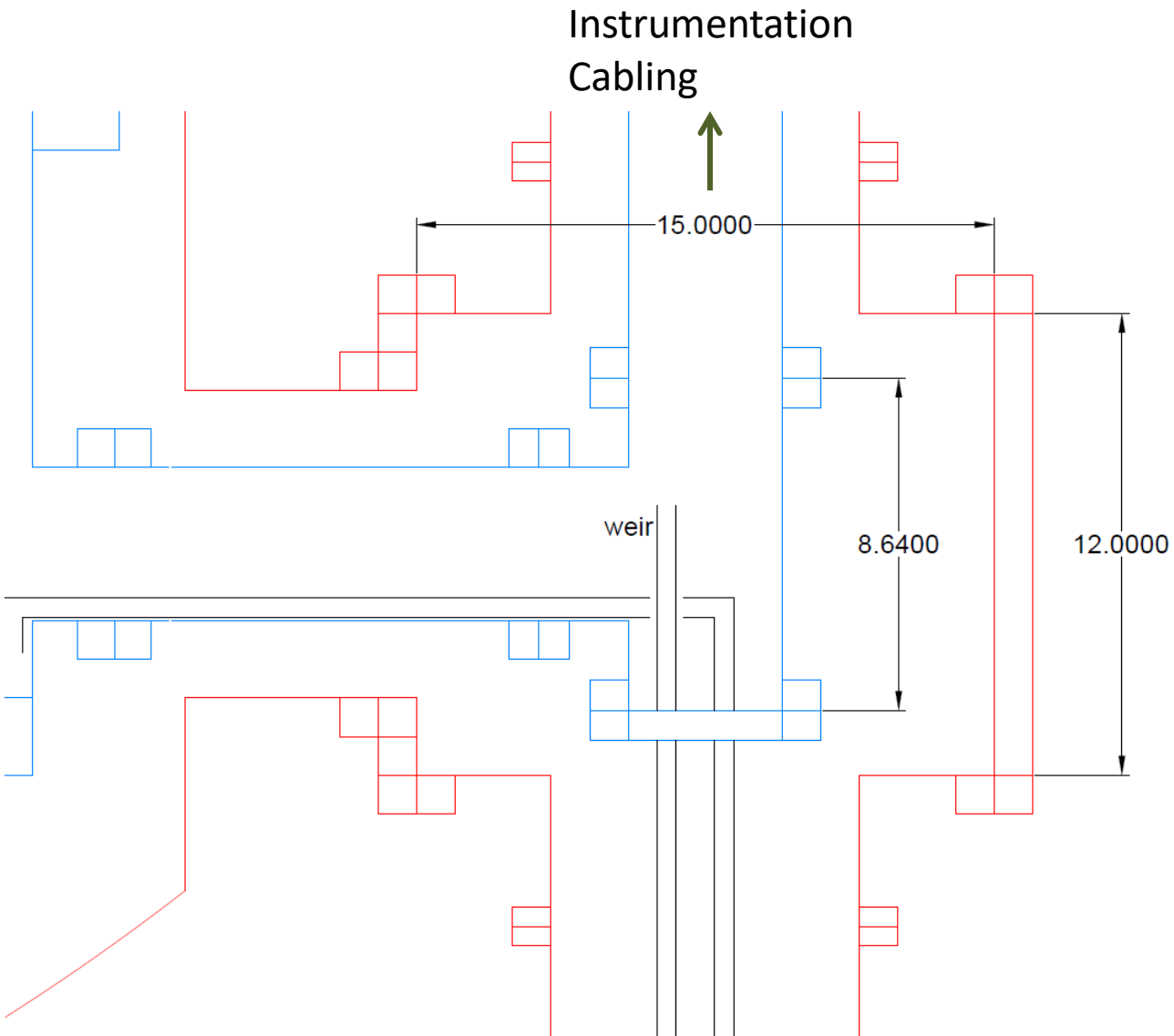
For gate-anode, full extraction region will be mounted



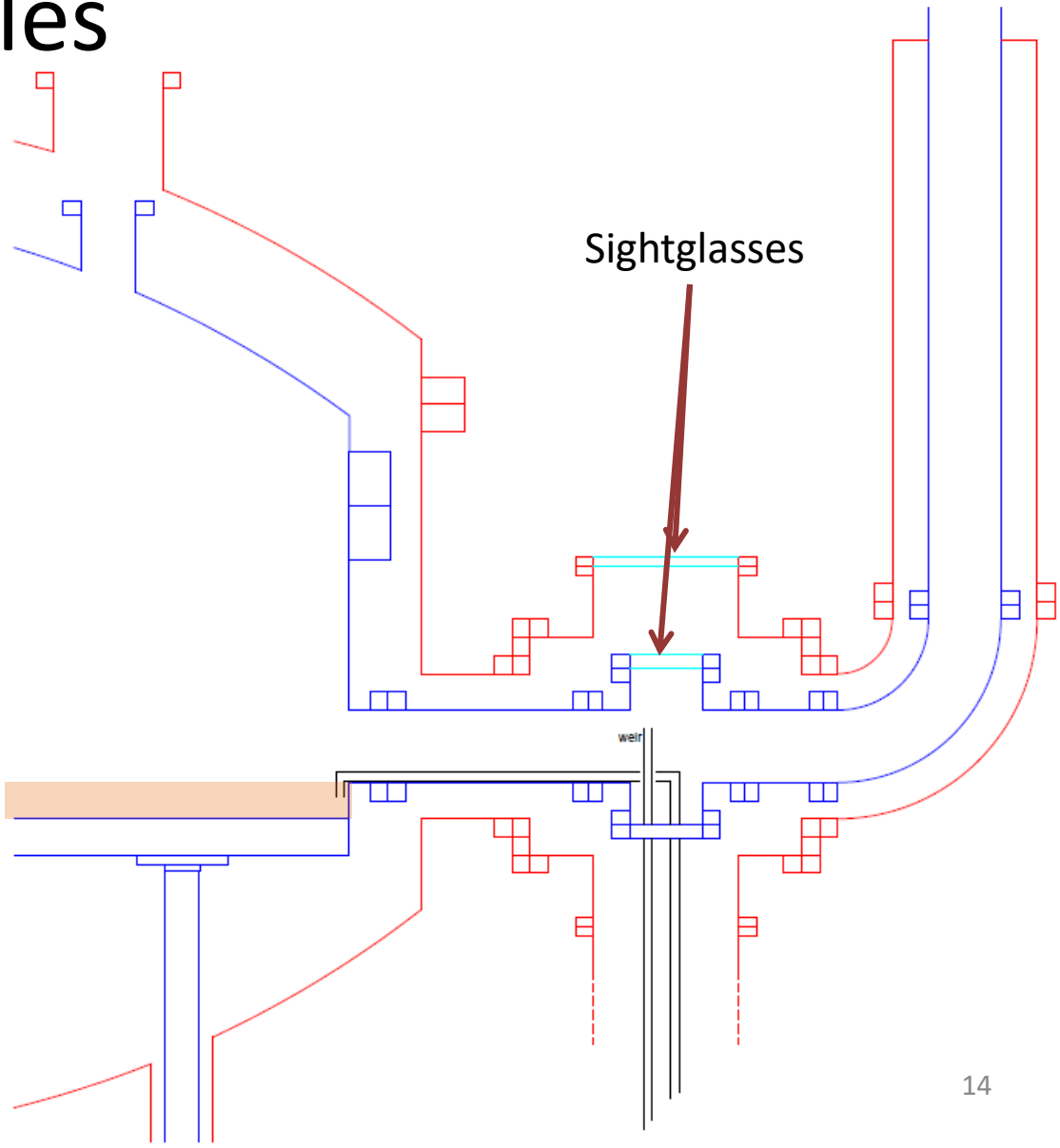
Weir Section - Simpler



Weir Section – More Complex

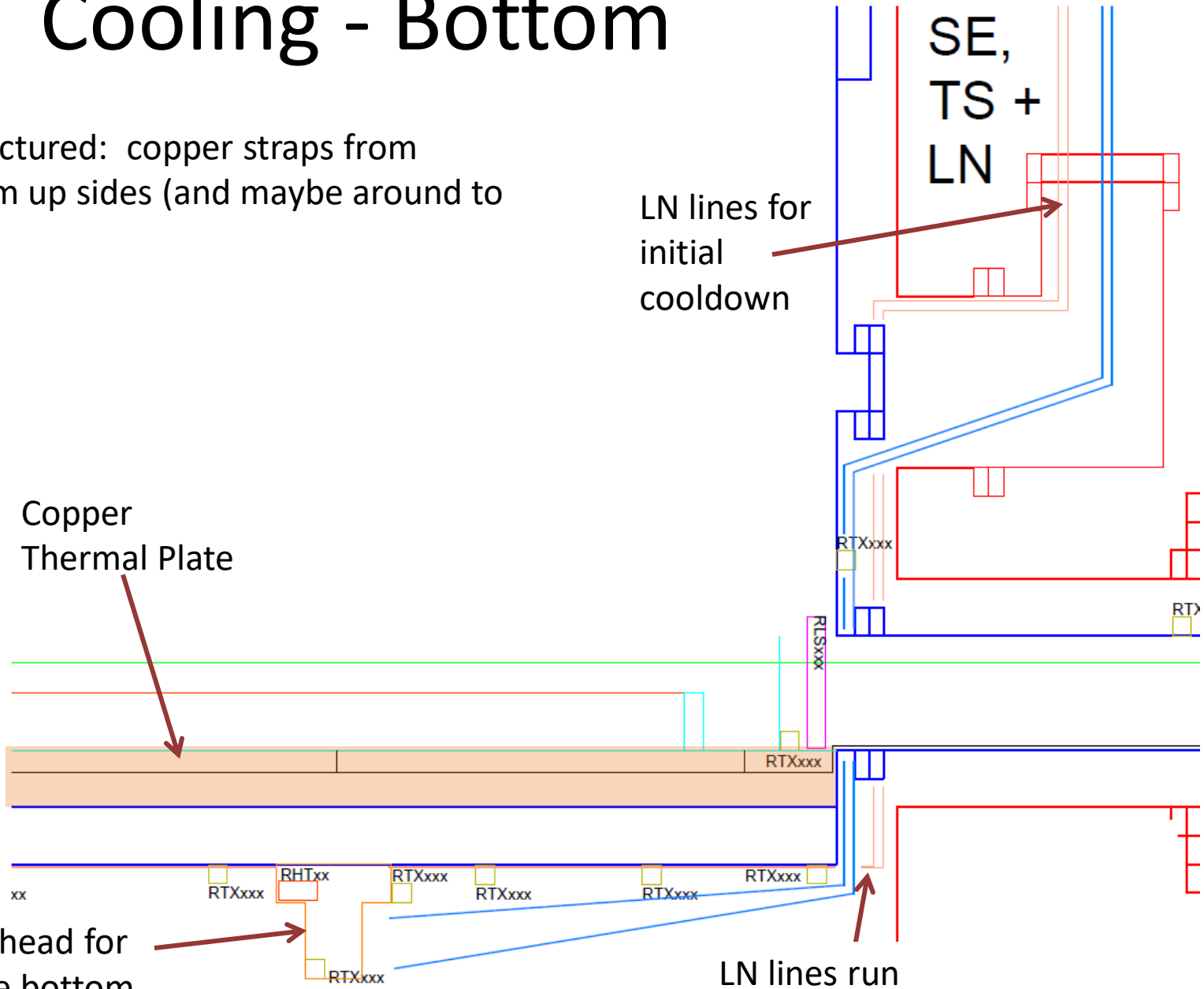


Weir Section – More Bells and whistles

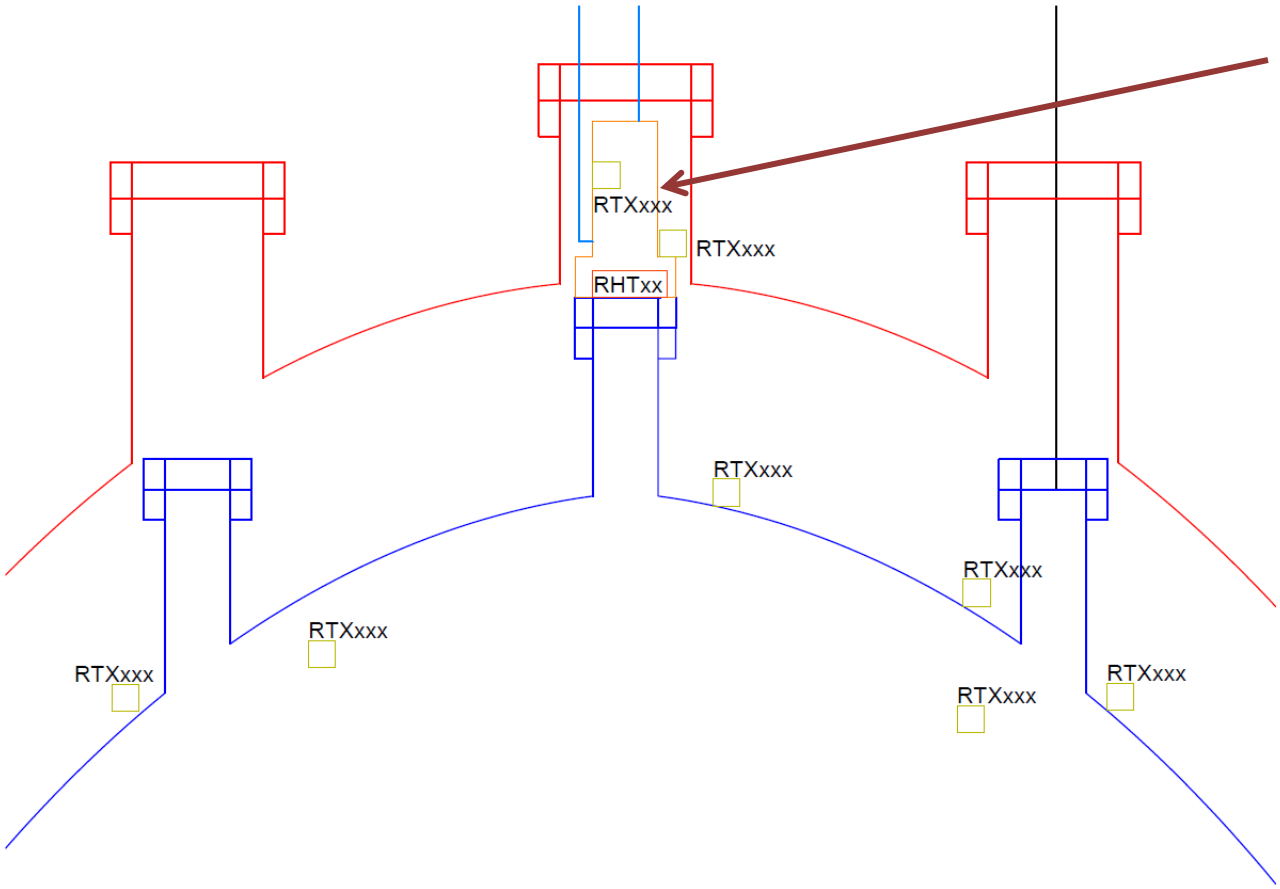


Cooling - Bottom

Not pictured: copper straps from bottom up sides (and maybe around to top)



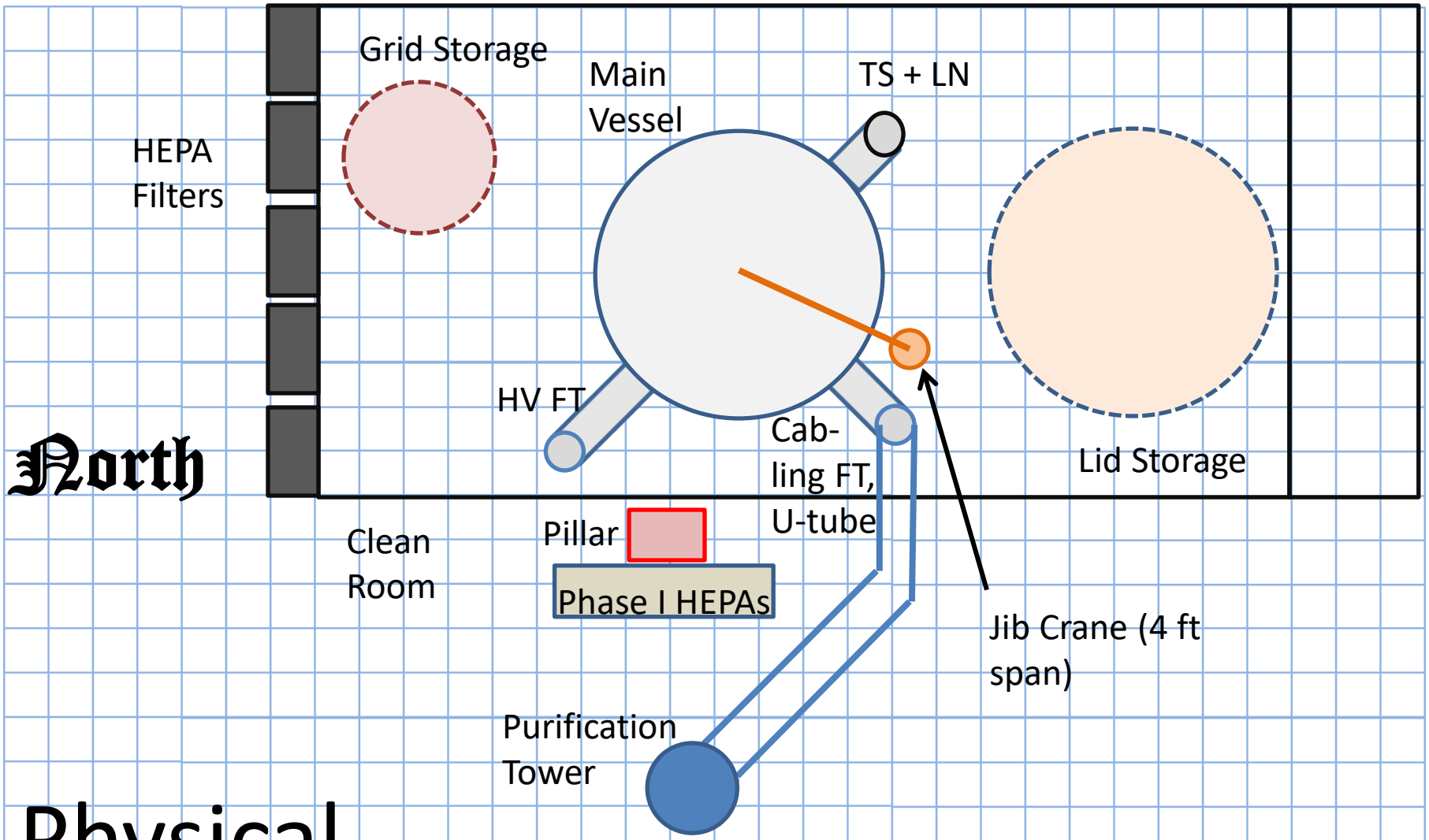
Cooling - Top



One coldhead for the entire top: dubious

Straps or LN may also be desired for the top.

Physical Layout

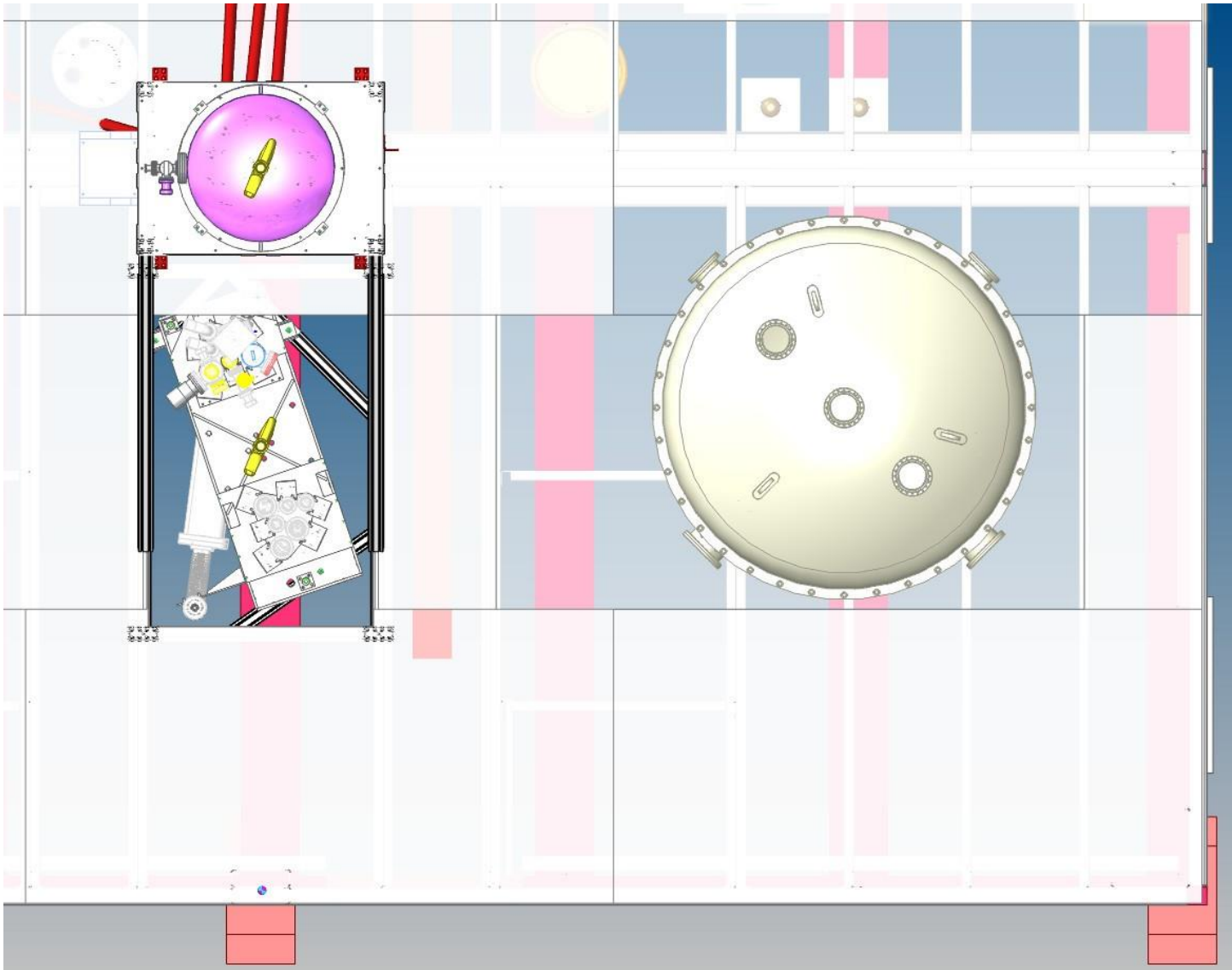


Moving In

Drawing from Stuart of Phase II vessel superimposed over hut structure.

Two plates as well as several cross-bars will have to be removed

Vessel will then be rolled into place by stand designed by Stuart



Xenon Recovery and Storage

- Need new recovery method
  - More than SRV can hold
  - More than cryopumping to few bottles can hold
- Recovery will be to the LZ Xenon Storage Cylinder pack recently constructed at PSL

Recovery con’t

Recovery path in blue