

Preliminary Analysis on A Maintainable Test Cell Concept for IFMIF-DONES

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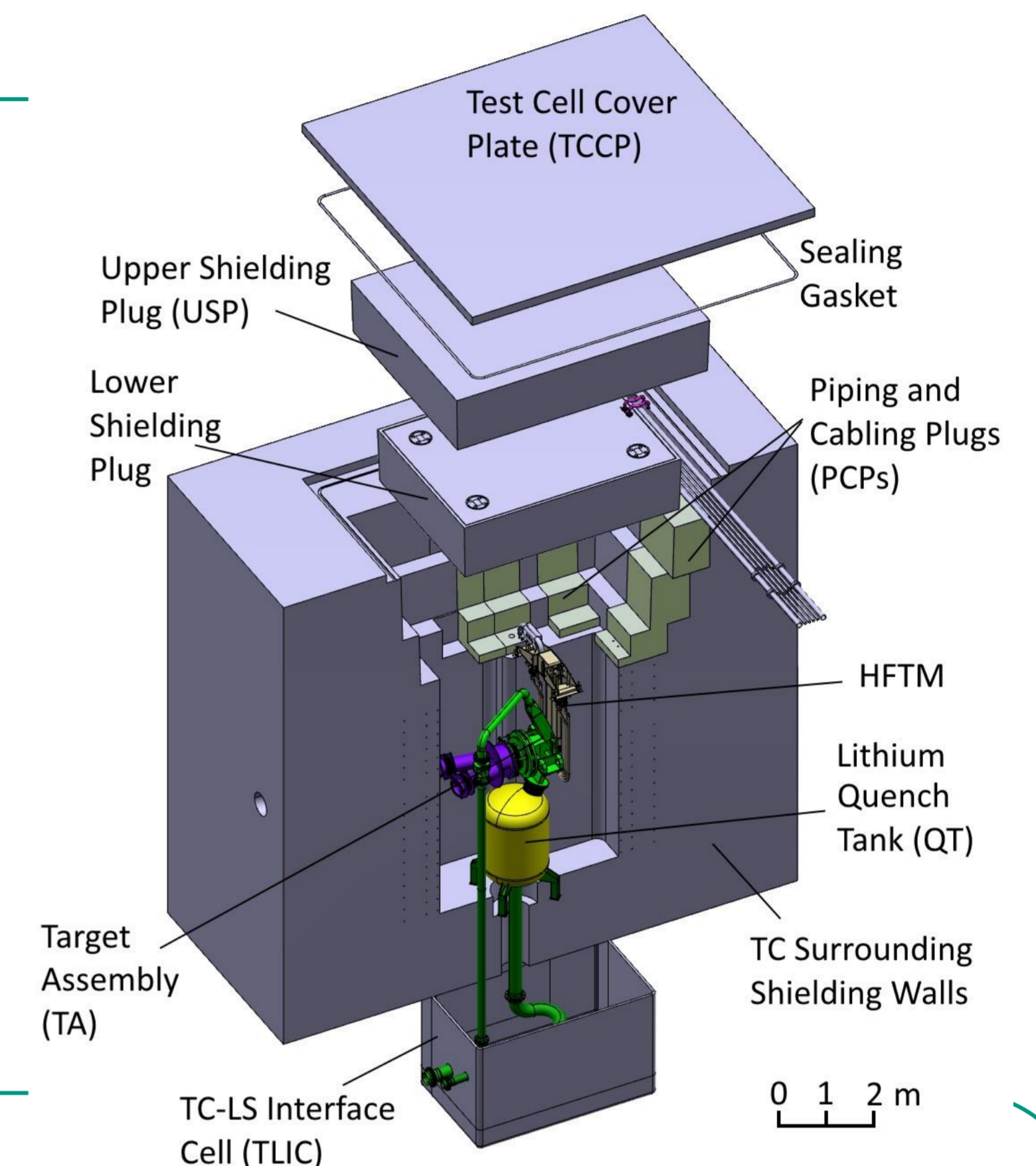
IFMIF-DONES Reference Test Cell Design

Major Features

- Monolithic concrete biological shielding walls
- Closed Liner covering internal TC surfaces attached to concrete
- Active cooling pipes embedded in concrete / attached to liner

Potential Issues

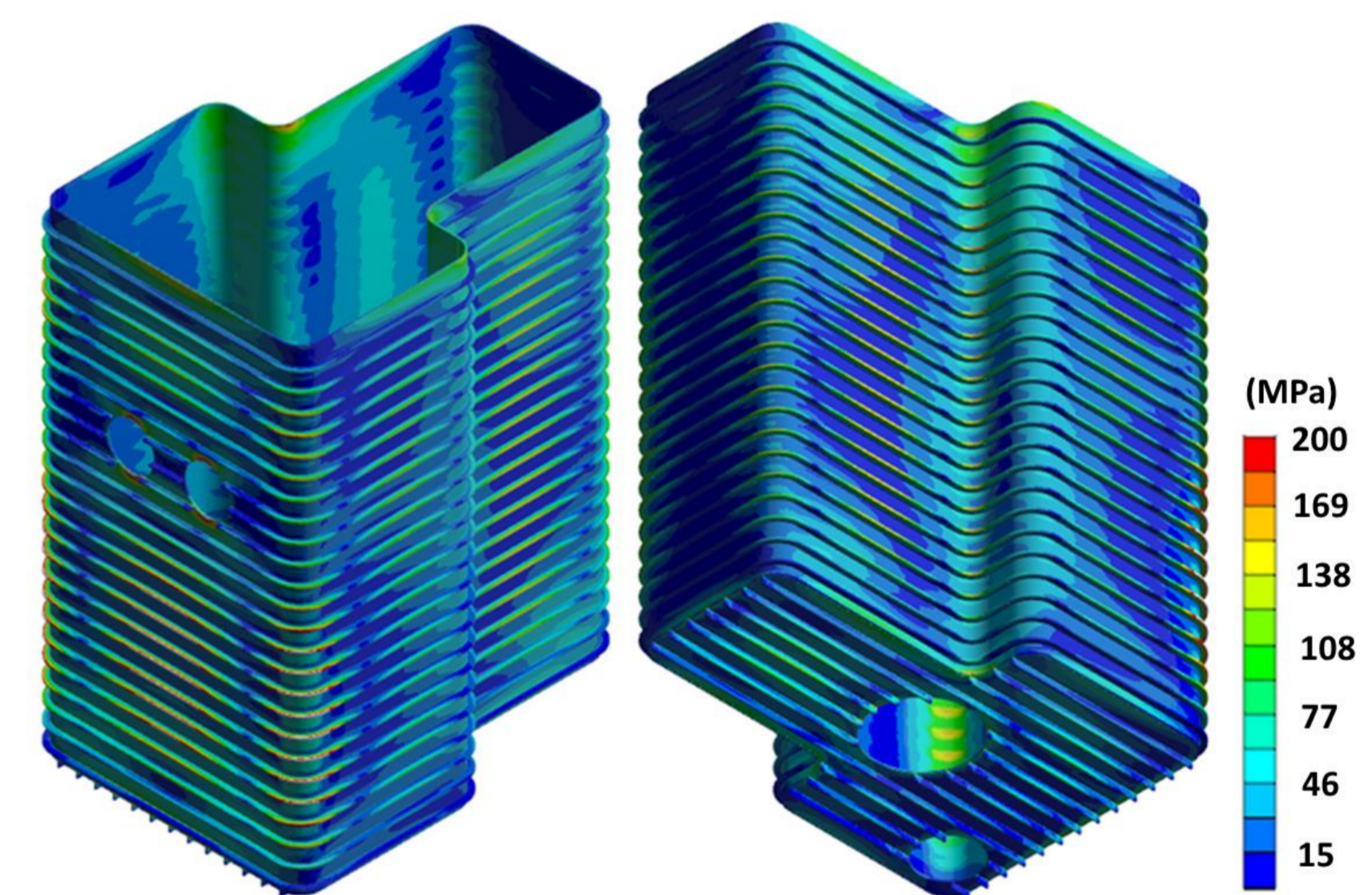
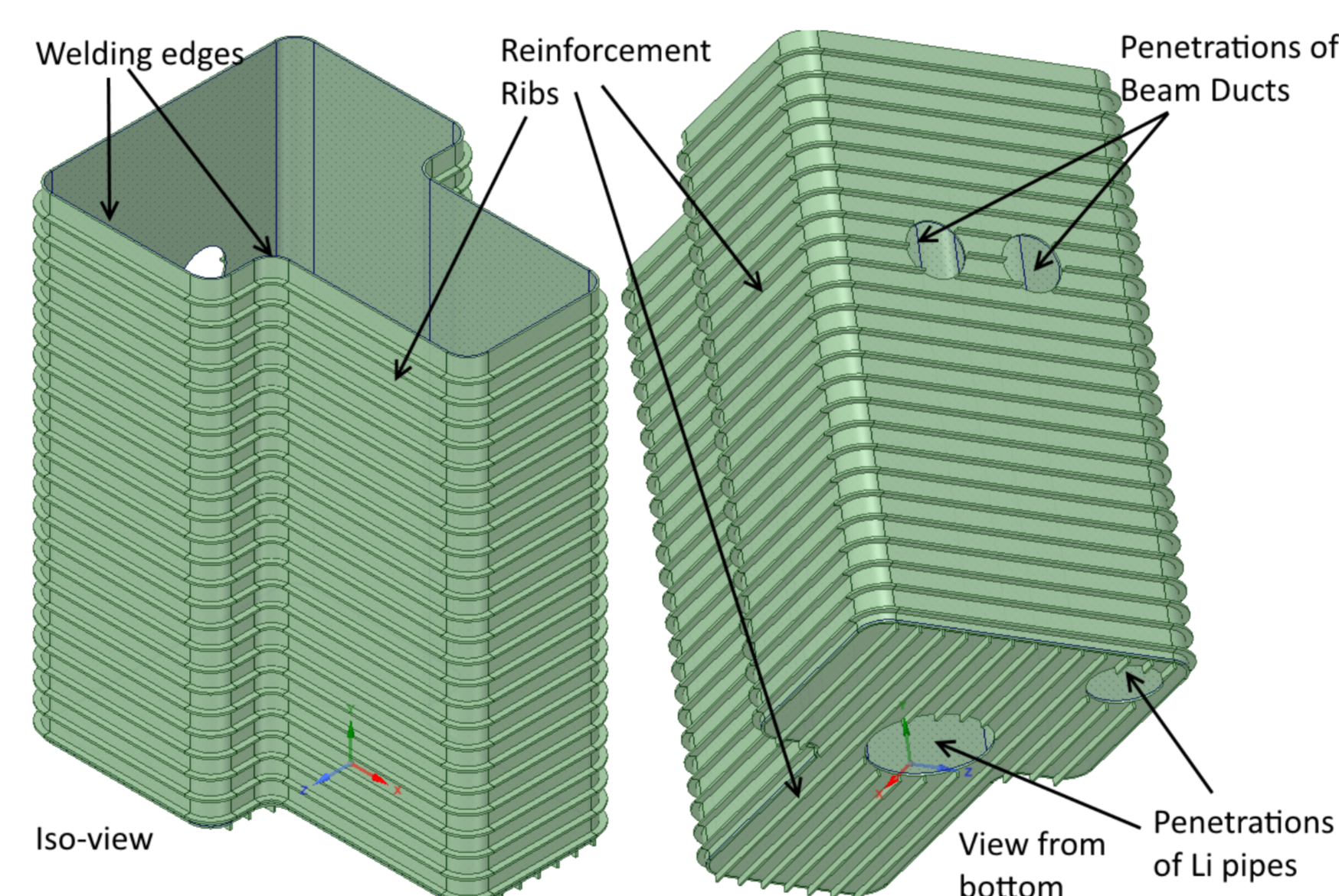
- Risks in TC leakage, loss of cooling, components degradation, etc. unavoidable
- Difficulties/infeasibility in maintenance of biological shielding, liner, cooling pipes



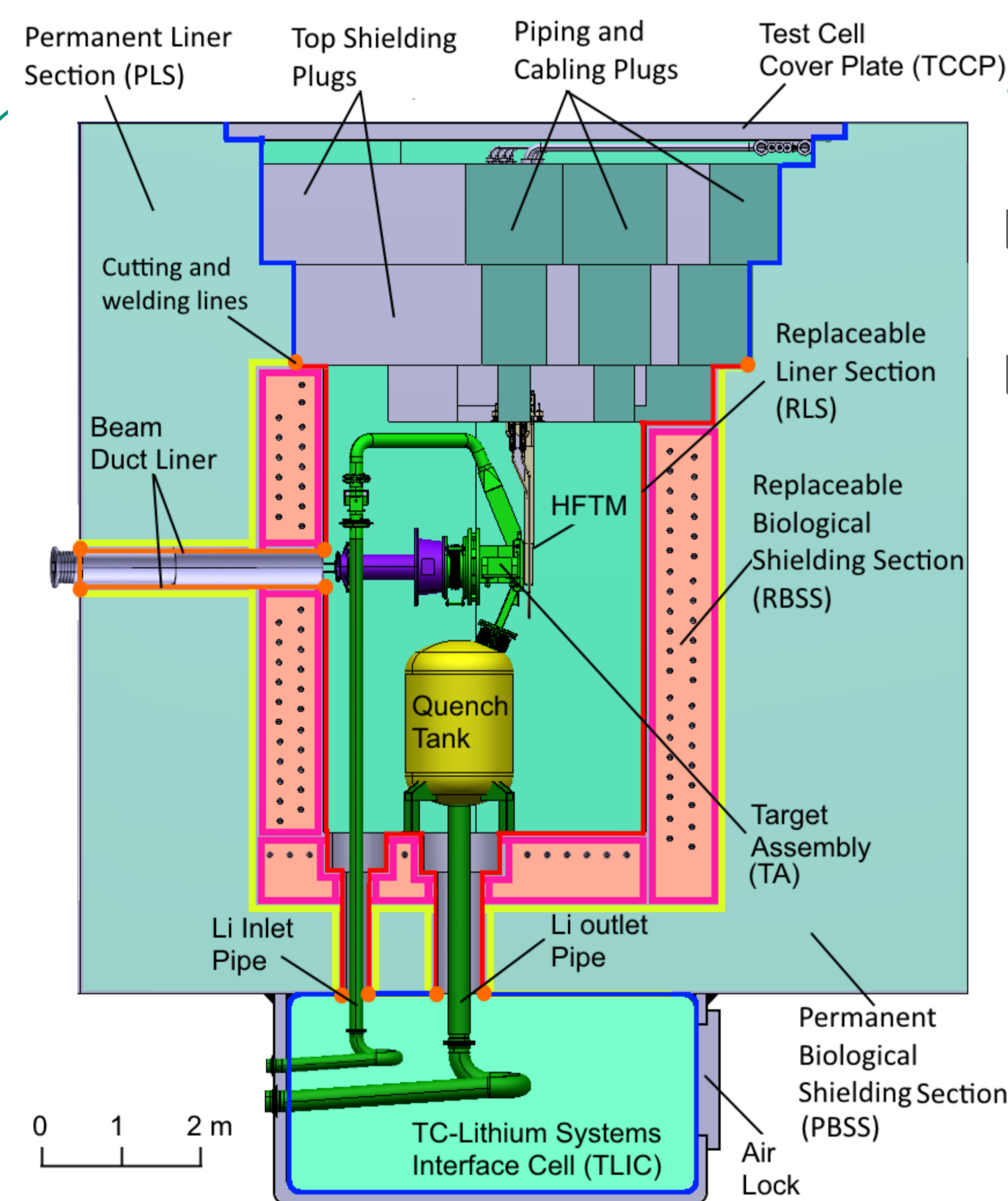
Proposal of Maintainable TC Concept

- Liner includes: **Removable Liner Section (RLS)**
Permanent Liner Section (PLS)
- Shielding walls includes **Removable Biological Shielding Section (RBSS)**
Permanent Biological Shielding Section (PBSS)

Preliminary FEM Analysis of RLS

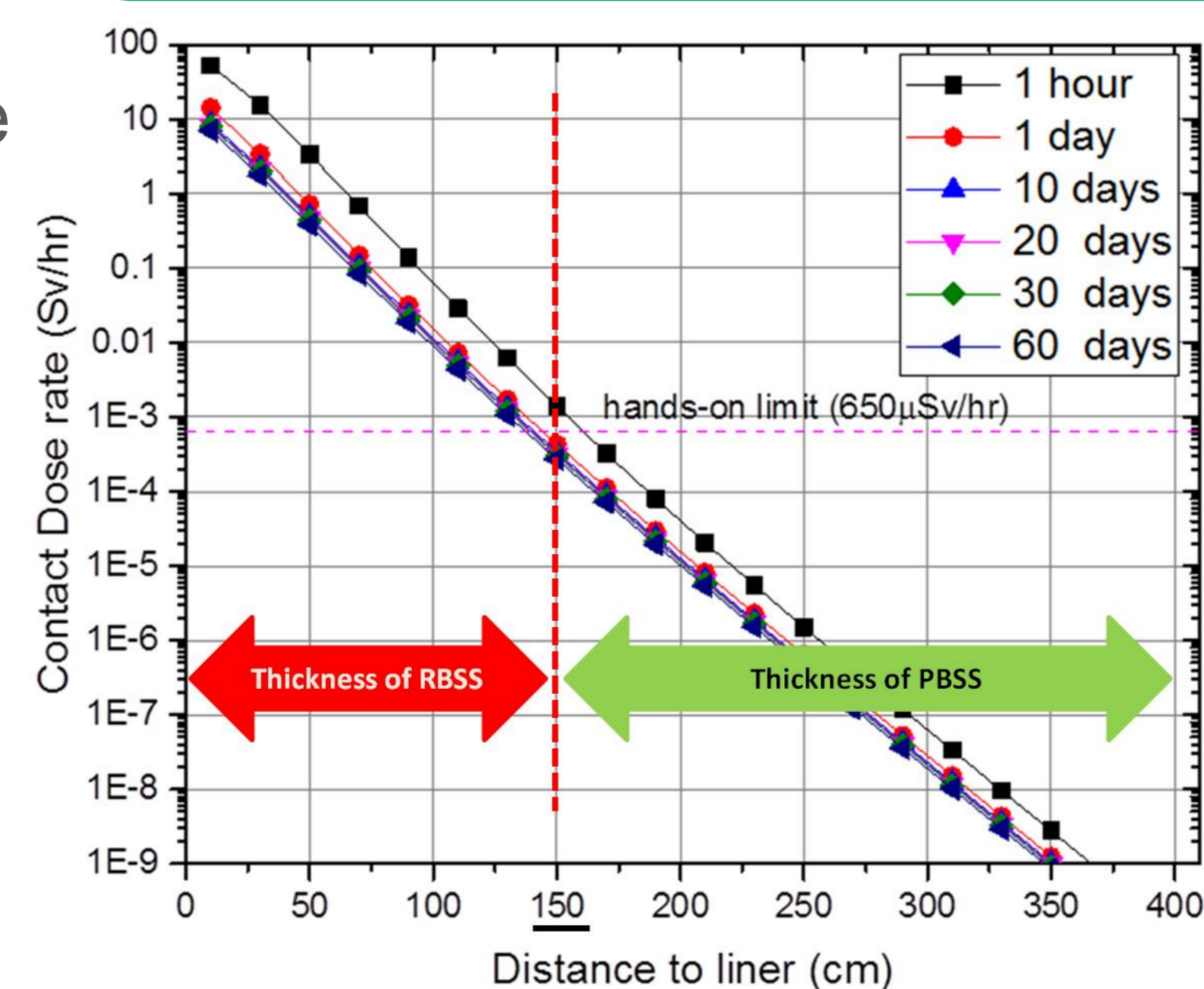


FEM Results of RLS under 1 bar pressure difference



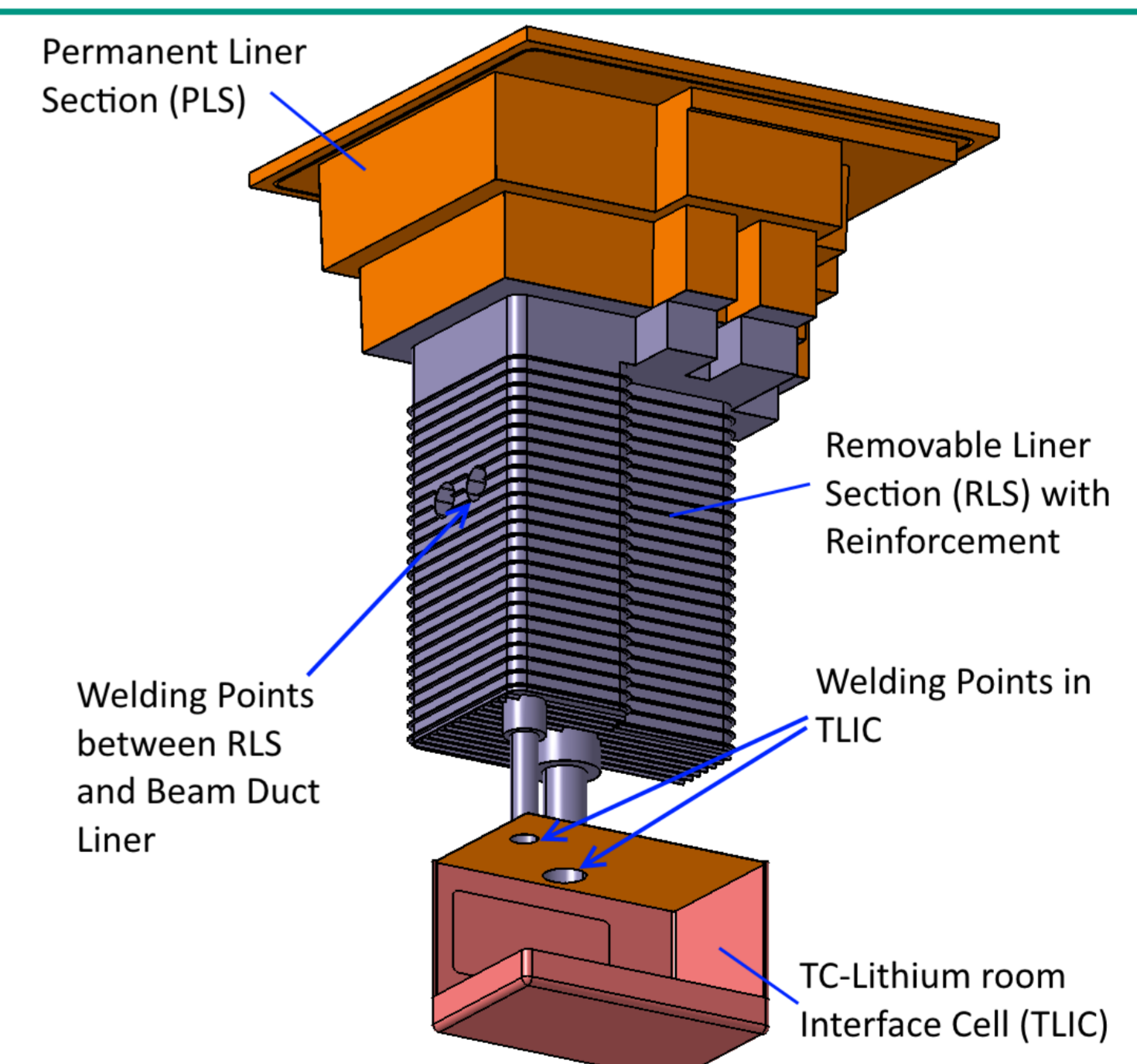
- RLS and RBSS
 - Receive intense neutron irradiation
 - High active level (hands-on impossible)
 - Active cooling required
 - Removable for emergency maintenance
 - Re-welding between RLS and PLS required during maintenance
- PLS and PBSS
 - Receive less neutron irradiation
 - Low level activity
 - No active cooling required
 - Permanent, integrated with facility civil structures

Separation of RBSS and PBSS



Activation of Biological Shielding after 30 Years Operation

Maintenance of RLS



RLS detachment from TLIC and Beam Duct Liner (before RLS being removed)

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