

# OVERVIEW

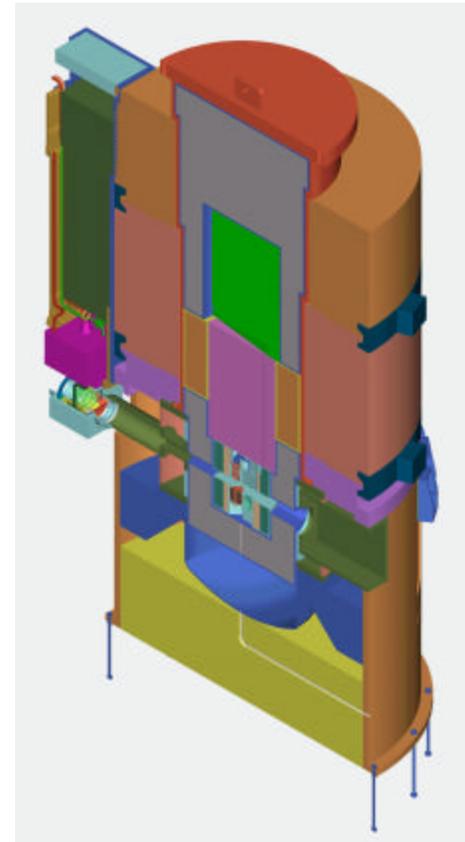
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WBS 1.6.3 Reflector Assemblies

WBS 1.6.4 Vessel Systems

Rick Allen



# Reflector/Vessel

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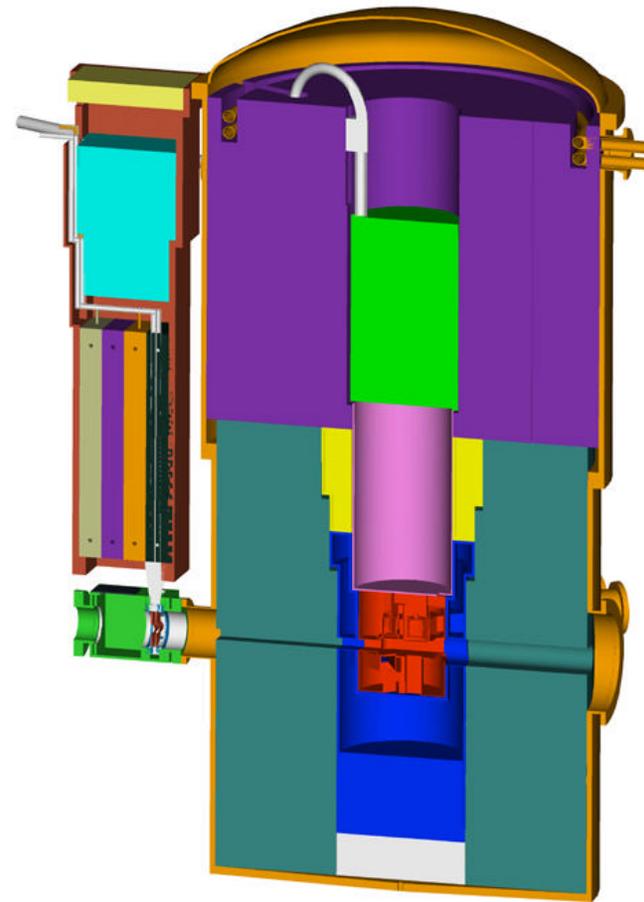


- Function of Reflector Assemblies
  - Provide reflector within one meter of target center.
  - Provide actively cooled shielding outside one meter.
  - Provide mounting surfaces for moderators and decoupler material.
  
- Function of Vessel Systems
  - Maintain inert environment around moderators.
  - Contain spills of Hg, H<sub>2</sub>, or water.
  - Provide passive shielding inside shutter radius.
  - Support and locate vessel inserts.

# Reflector/Vessel History



- Pre-insert design
- Simple tank with circular ports
- Inner, middle, and outer reflector plugs
- Crossed beam geometry
- Lead reflector
- Recycled lead shielding in outer plugs (pipe-cooled)
- Between heats steel for upper plugs.
- Remove PBW/Harp separately



# Reflector/Vessel History

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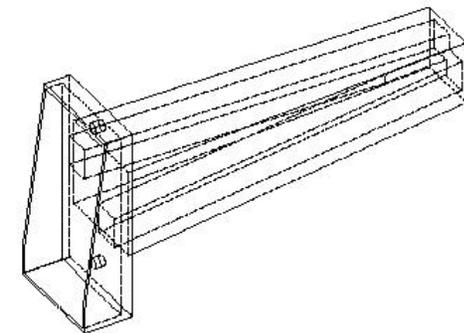
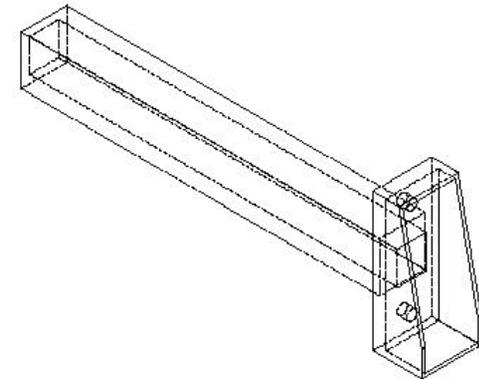


- April 1999 meeting with ANL Instruments Group
  - Uncrossed beams
  - Beryllium reflector
  - Vessel inserts
  - Multi-channel inserts
- July 1999 cost estimate used “baseline” design
- Project Change Requests (PCR) for beryllium reflector and vessel inserts approved by project management February '00.

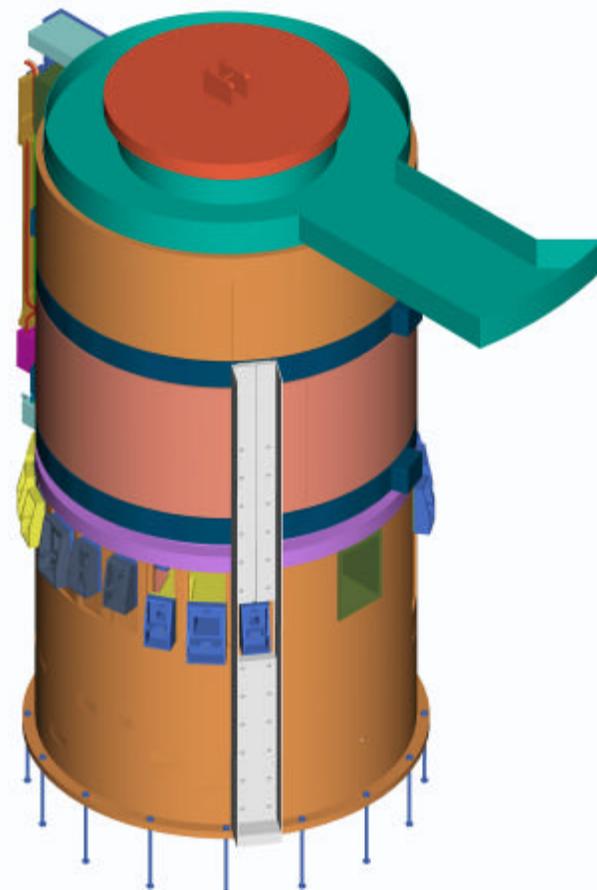
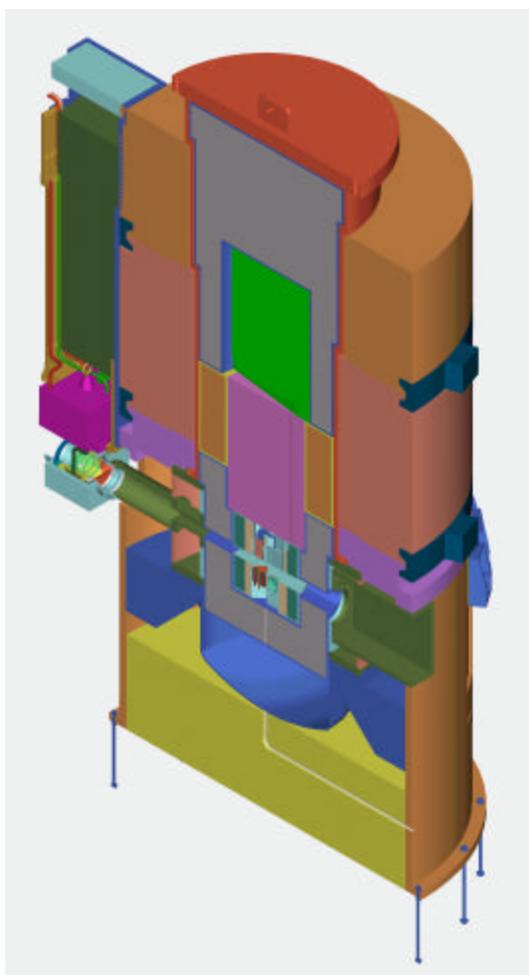
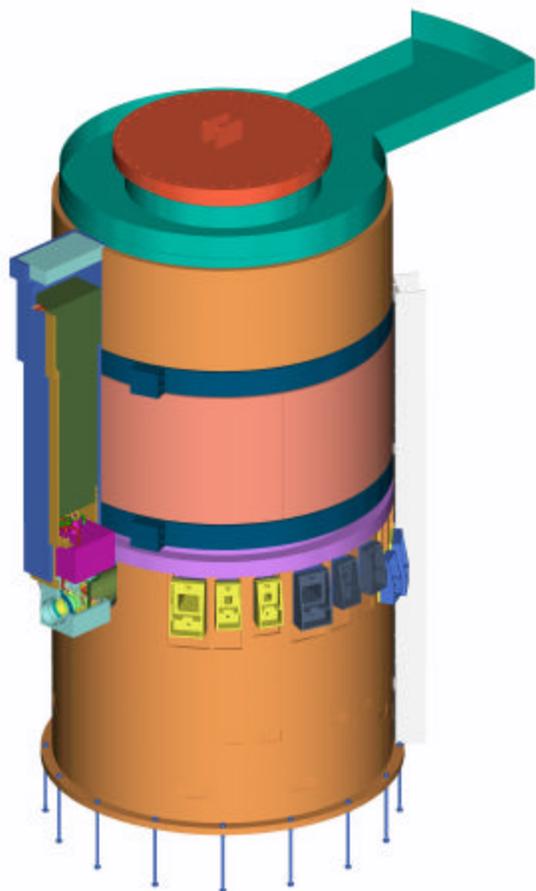
# Reflector/Vessel History



- Vessel inserts forced redesign of vessel
  - Multi-channel inserts – rectangular ports
  - Vessel flange locates vessel insert
  - Vessel insert guides shutter insert
  - Increased loads on vessel ports
  - Increased stability requirements

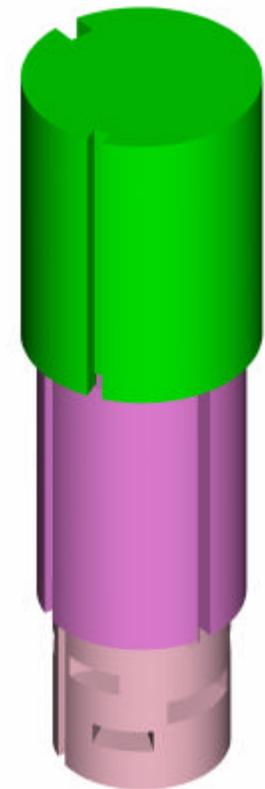
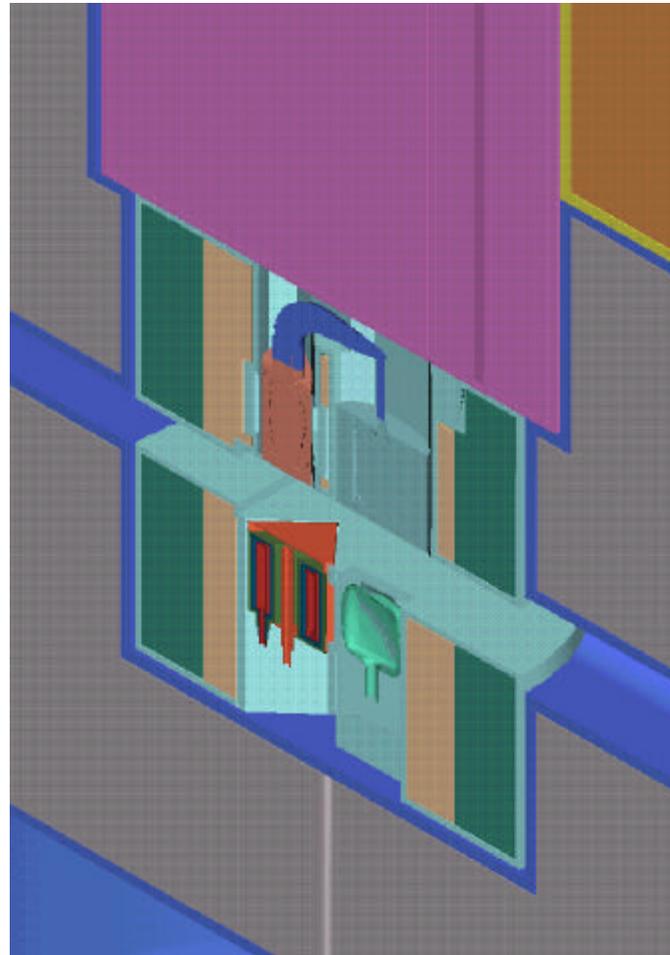


# Current Configuration



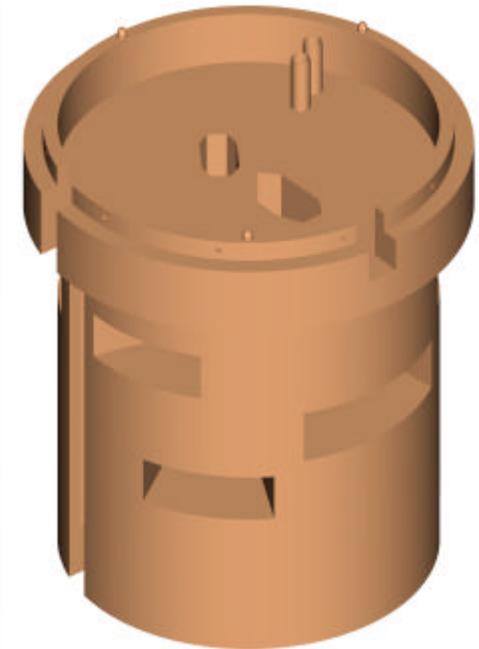
# Inner Reflector Plug

- Contains moderator vessels and associated piping
- Modular
- Replaceable within 30 day shutdown



# Lower Inner Reflector Plug

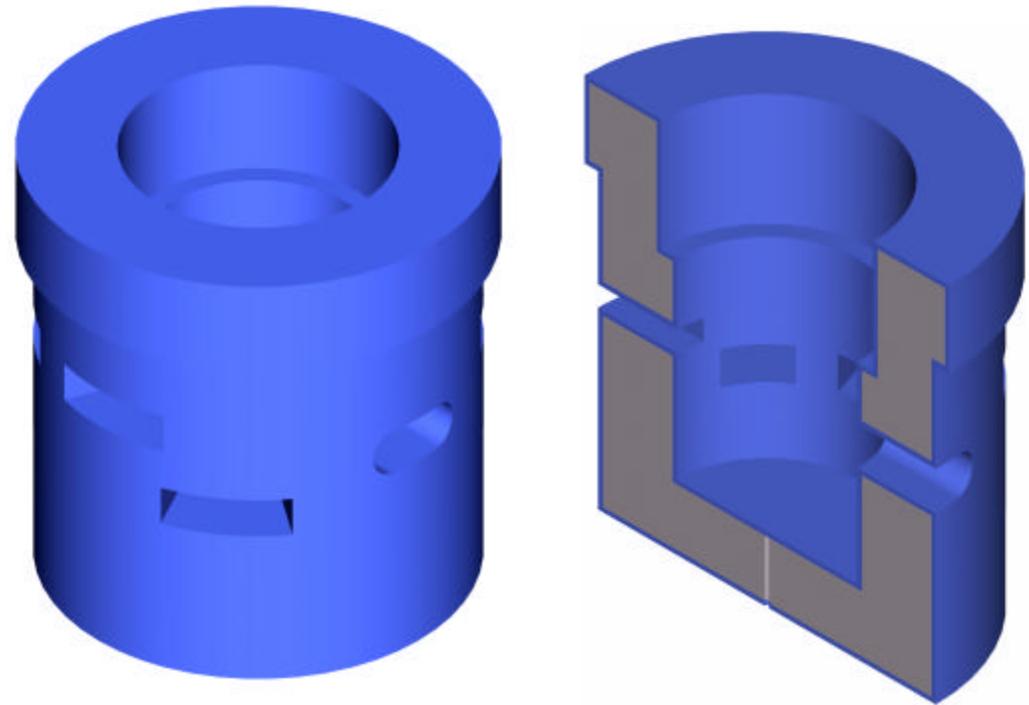
- Beryllium within 32 cm (12.6 inch) radius
- Steel-encased lead pins remainder
- Plug radius 19.5 inches.
- Plug height 46 inches.
- Locates and protects moderators



# Middle Reflector Plug

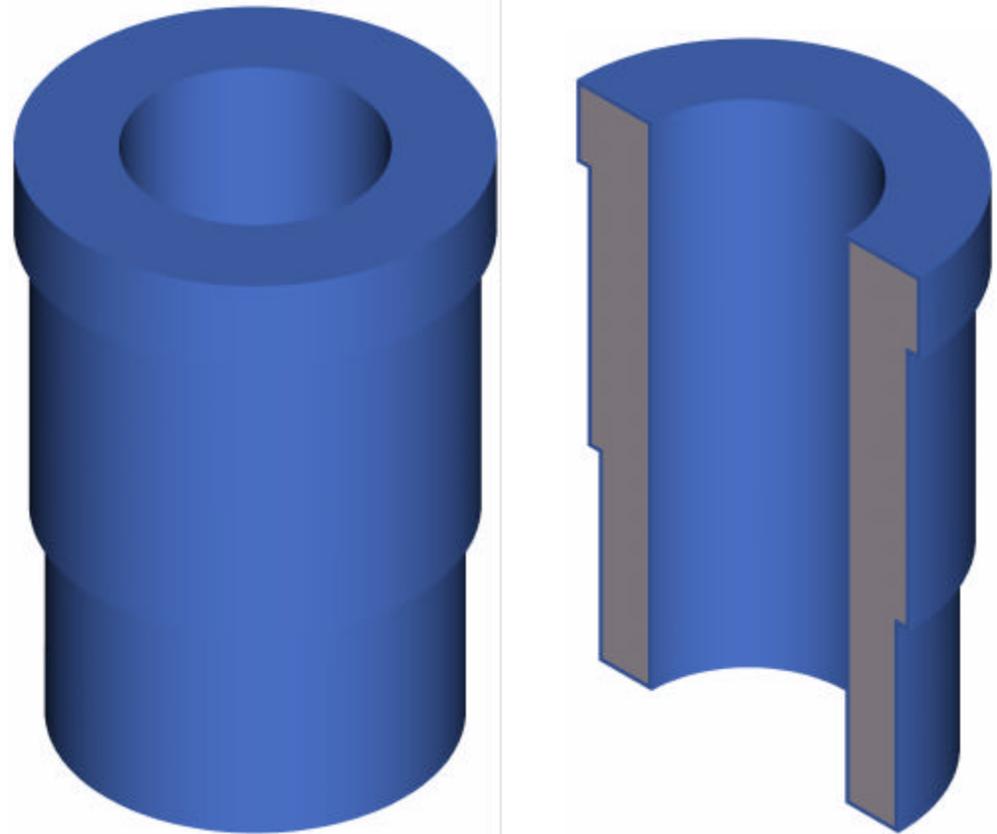


- 20 inch inner radius
- 37.5 inch outer radius
- Weight = ~80,000 lbs.
- Steel-encased lead pins
- Flood cooled



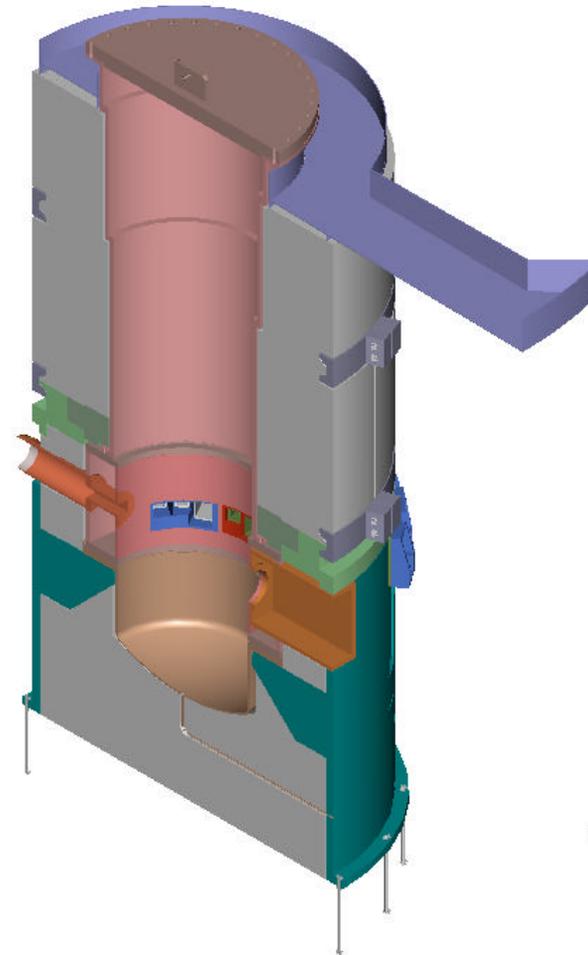
# Shielding

- Divided into segments
- Segment weight < 50 T
- Lower Portion
  - Pipe cooled lead
- Upper Portion
  - Uncooled steel



# Vessel

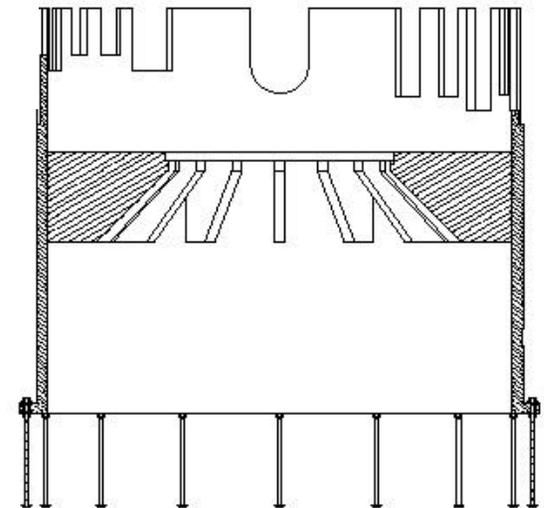
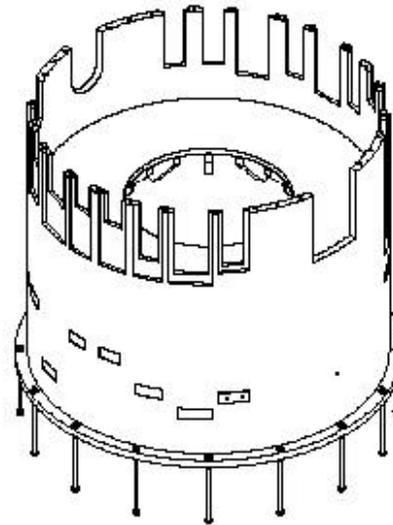
- Support Cylinder
- Vessel Bottom w/drain
- Center Section
  - Flood cooled steel
- Chimney
- Shielding
- Pipe Pan



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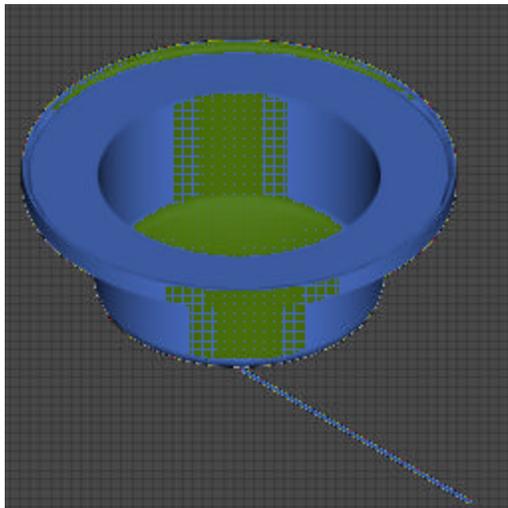
# Support Ring

- 88.5 inch outer radius
- 144 inches tall
- ~ 60 tons
- Tied directly to concrete foundation
- Shelf provides support for vessel
- “Fingers” support upper shield stack
- Facets for locating shutter inner guide rails

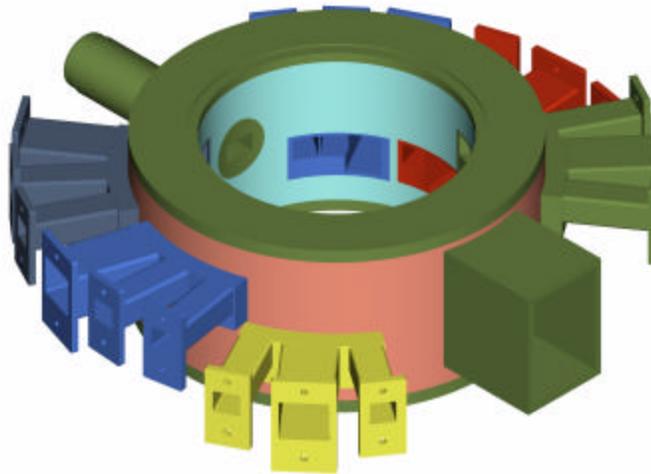


# Vessel

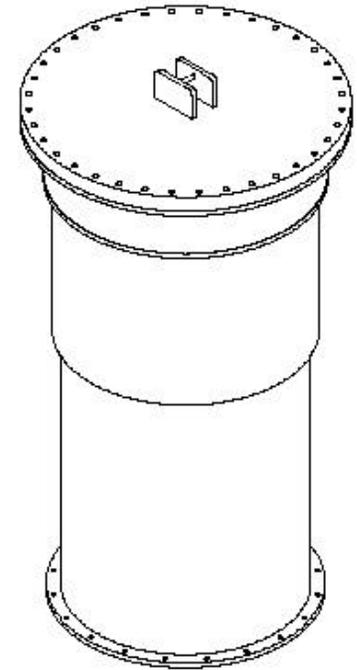
- Three components:
  - Collection volume
  - Center section with tubesets
  - Chimney/lid
- Designed to be assembled using 50 ton Bldg. Crane



Collection

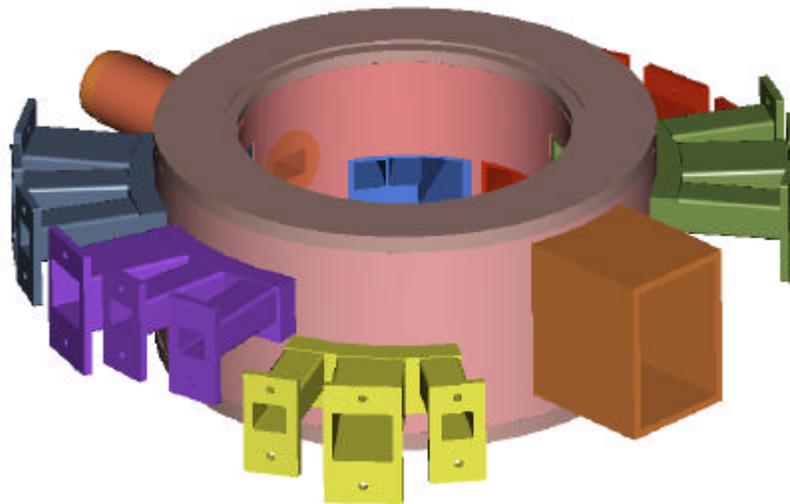
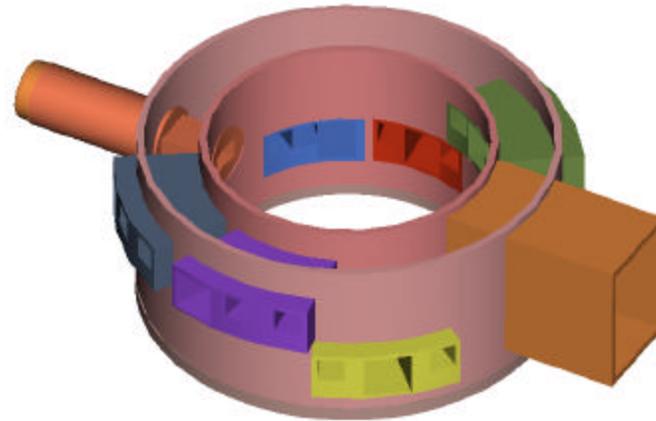
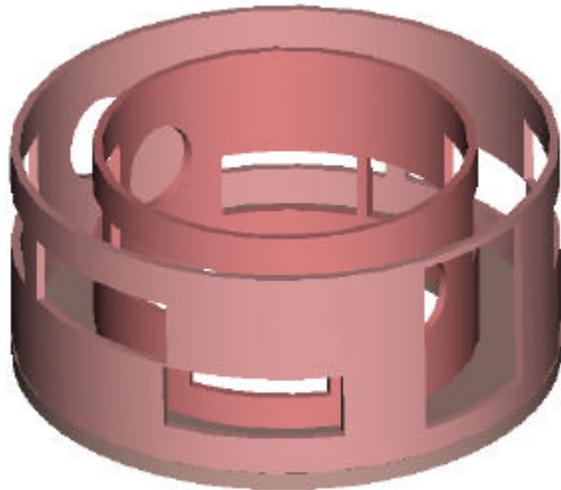


Center Section



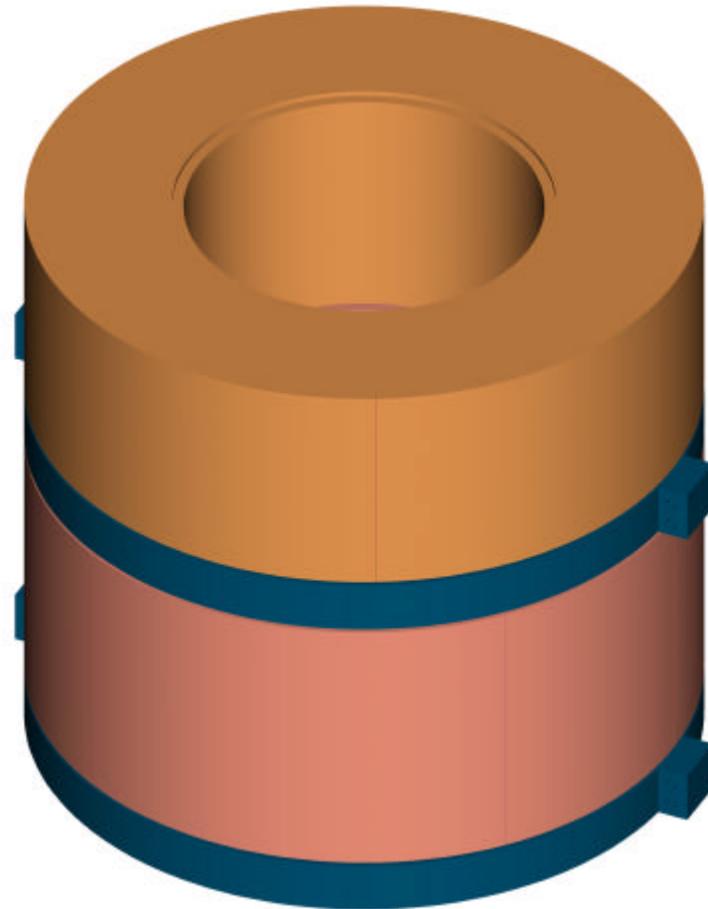
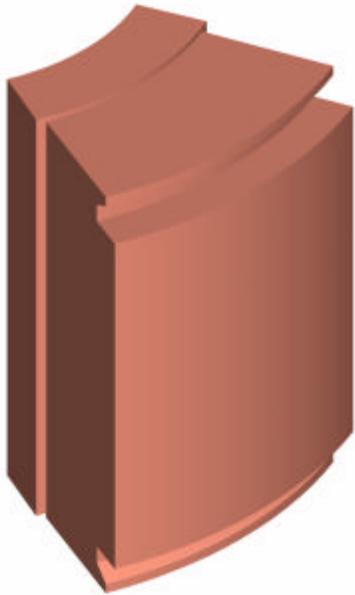
Chimney

# Vessel Center Section



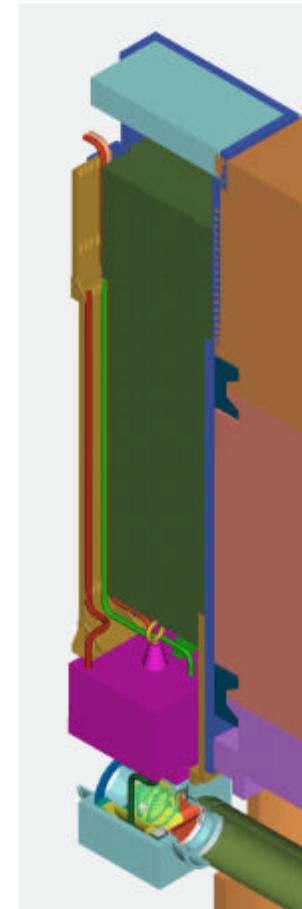
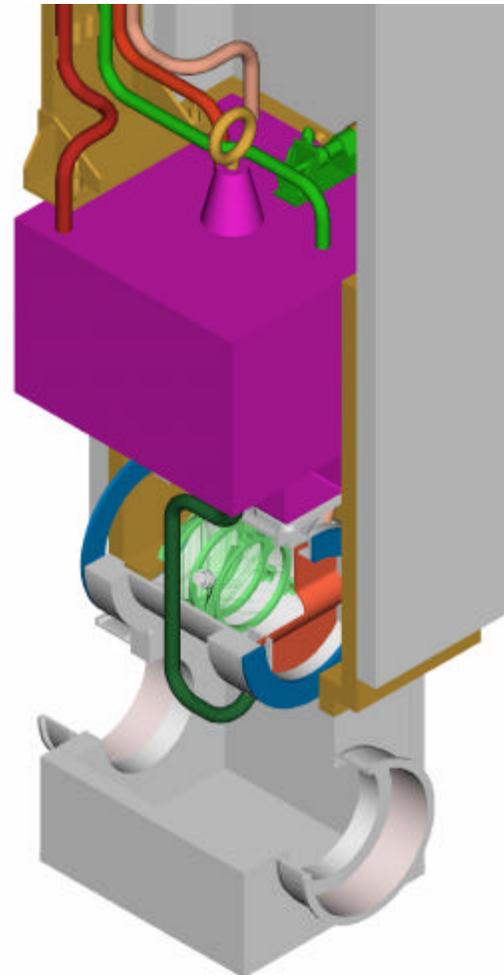
# Shield Stack

- Shielding under vessel tied to shield stack liner.
- Upper shielding supported by support ring

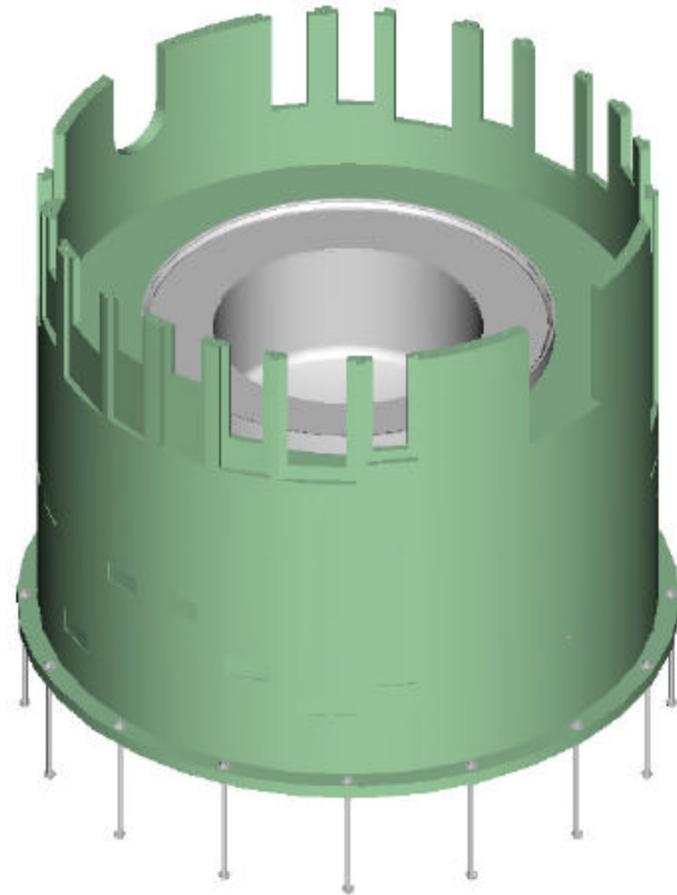
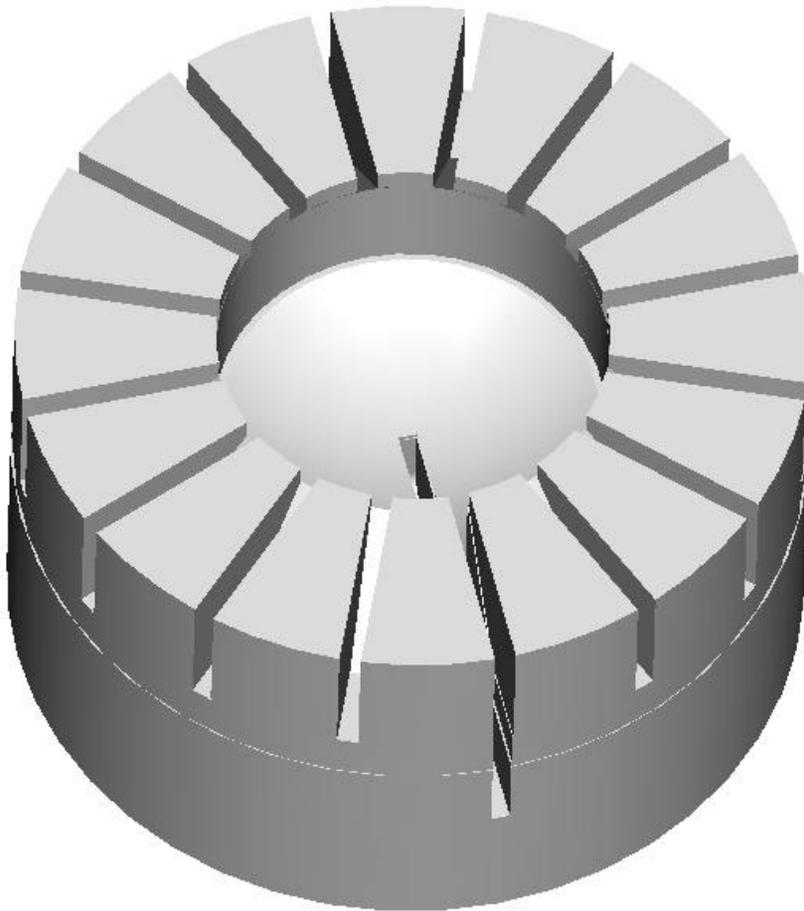


# Proton Beam Window

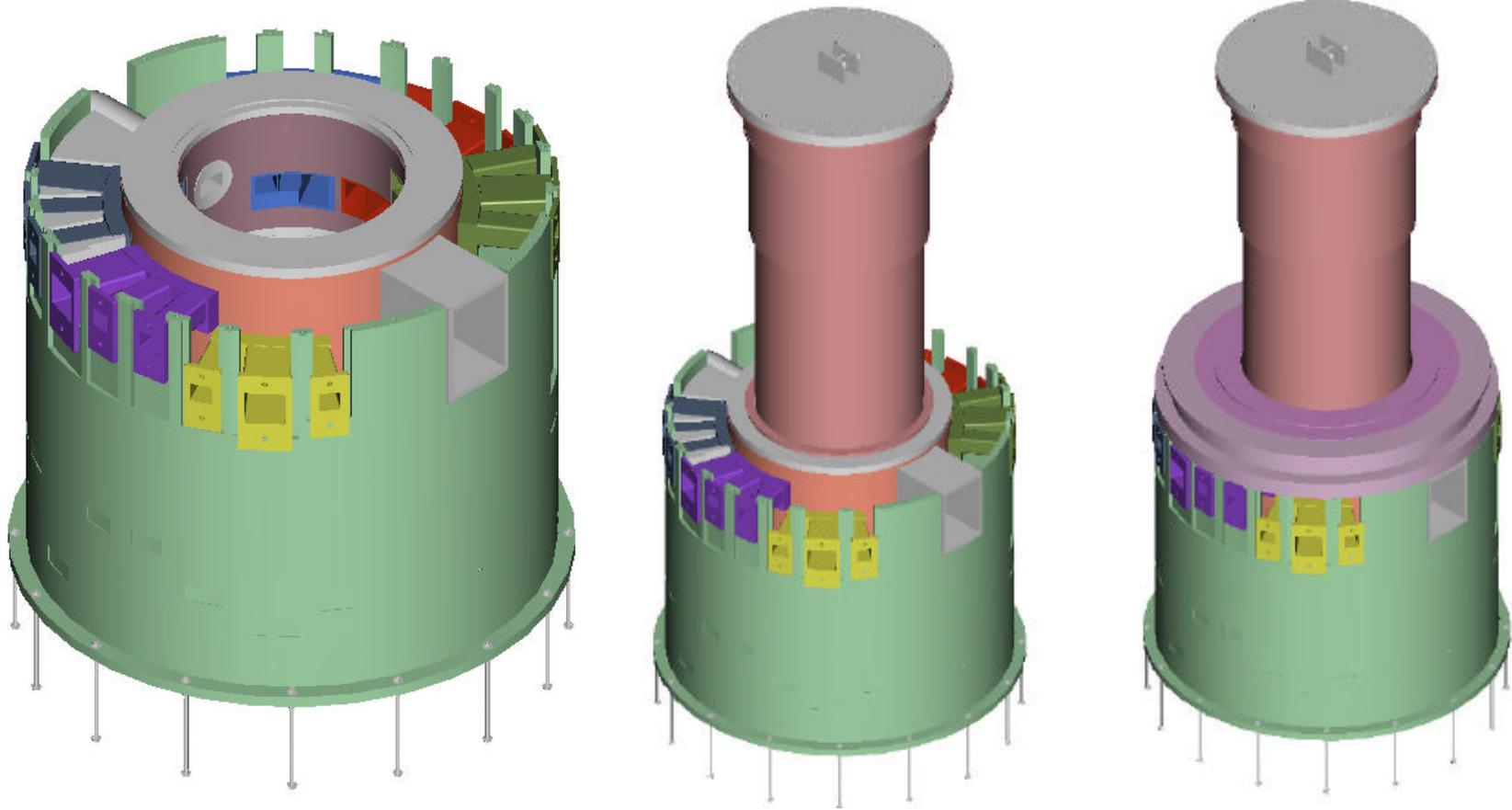
- Includes module containing HARP Assembly
- Coarse alignment by insert
- Fine alignment by guide shield



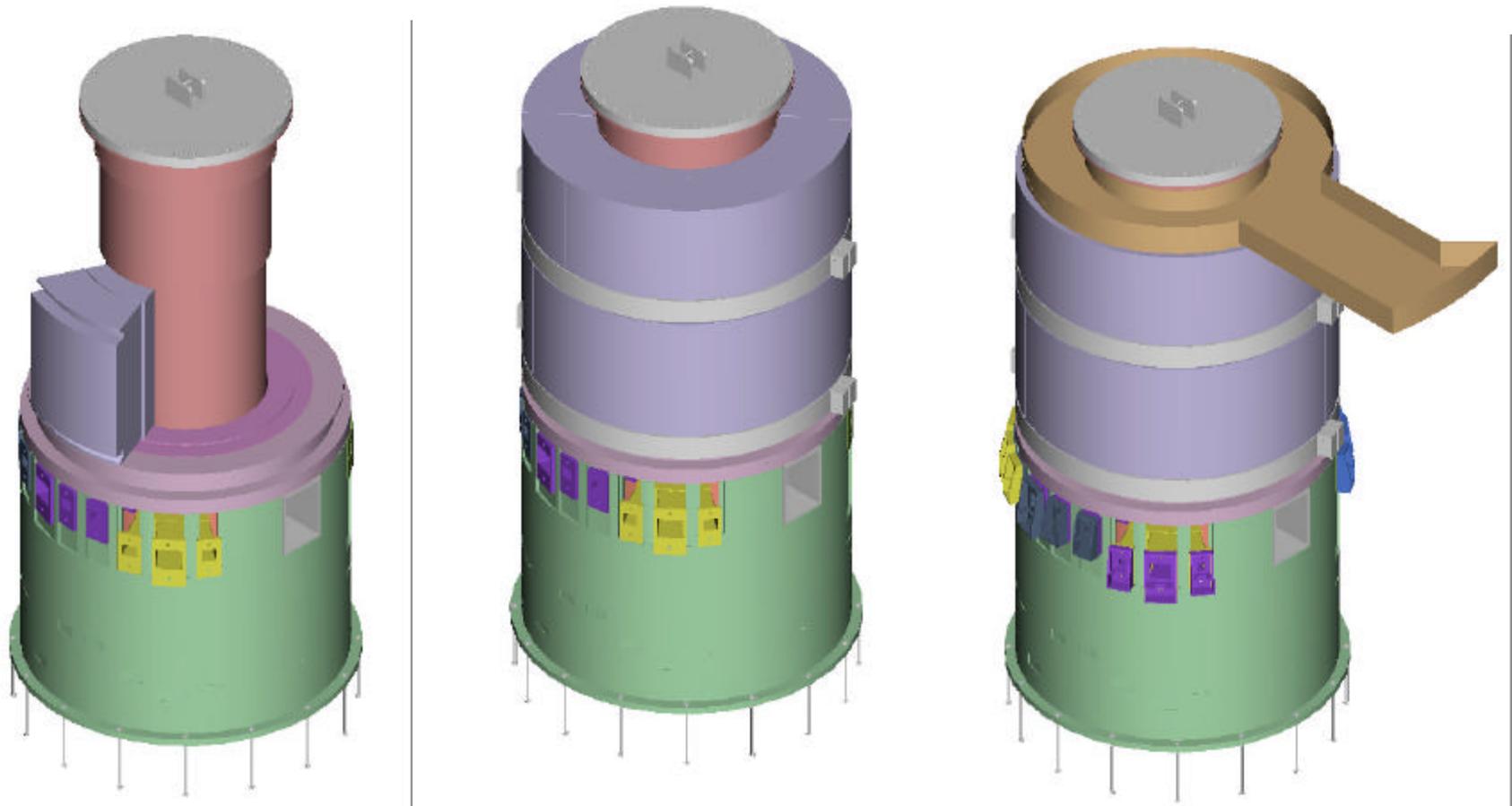
# Vessel Assembly



# Vessel Assembly

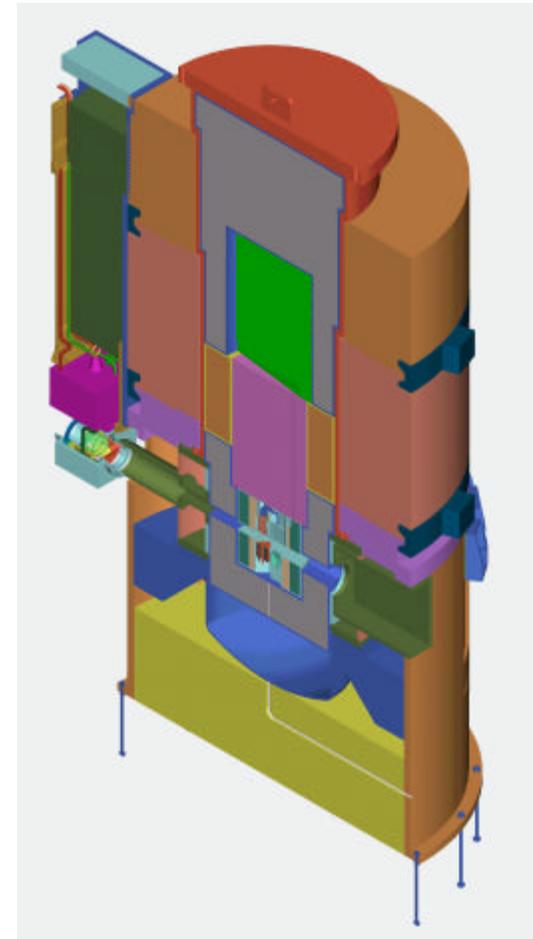


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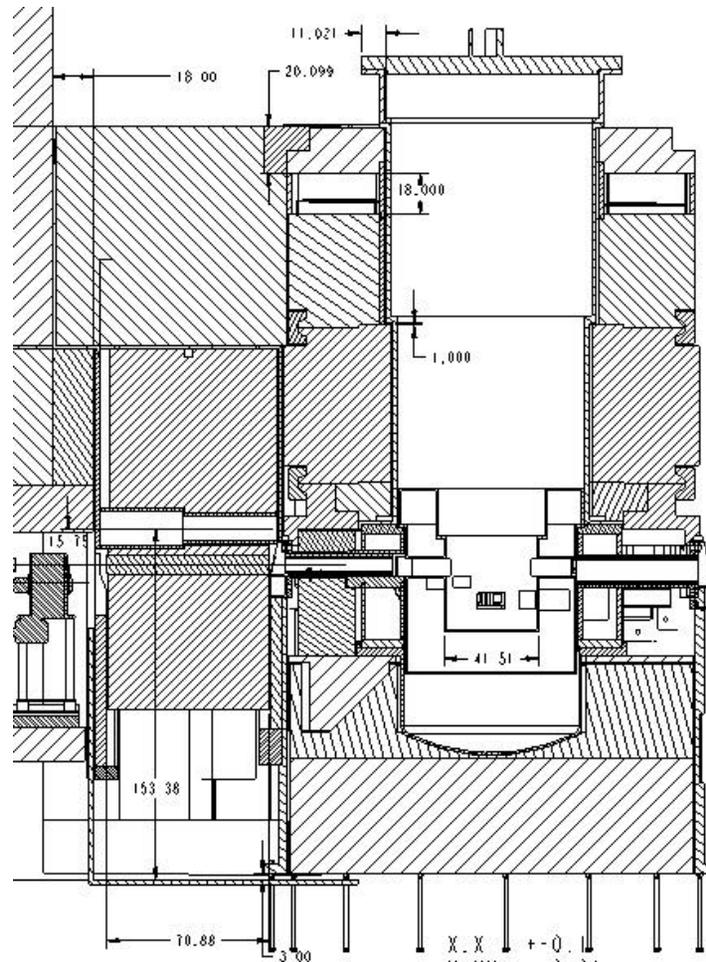


# Vessel Assembly

- “Modular” design
  - Components < 50 tons
- Support ring and shield stack monolithic and tied to concrete foundation.
- Vessel supported by support ring.
- External shield loads carried by support ring independent of vessel.



# Vessel Assembly



# END



WBS 1.6.3 Reflector  
Assemblies

WBS 1.6.4 Vessel Systems

Rick Allen

