



August 2026

Target Assembly Verification Plan & Status

Aaron Jacques

Second Target Station



U.S. DEPARTMENT
of **ENERGY**

ORNL IS MANAGED BY UT-BATTELLE LLC
FOR THE US DEPARTMENT OF ENERGY



Charge Question #2

Has the design been shown to meet the requirements?

Verifications increase confidence and reduce risk as the project progresses

- Requirements are verified across the project life to reduce risk
- Many requirements have several verifications from design to installation
- Most requirements are verified at FDR & fabrication readiness (PRR)
- Many requirements cannot be (\$) verified with physical hardware (seismic)

Integrated system test – In core vessel !Not S.03.02 scope!

- Leak test
- Rotation test
- Maintenance demonstration
- Installation validation

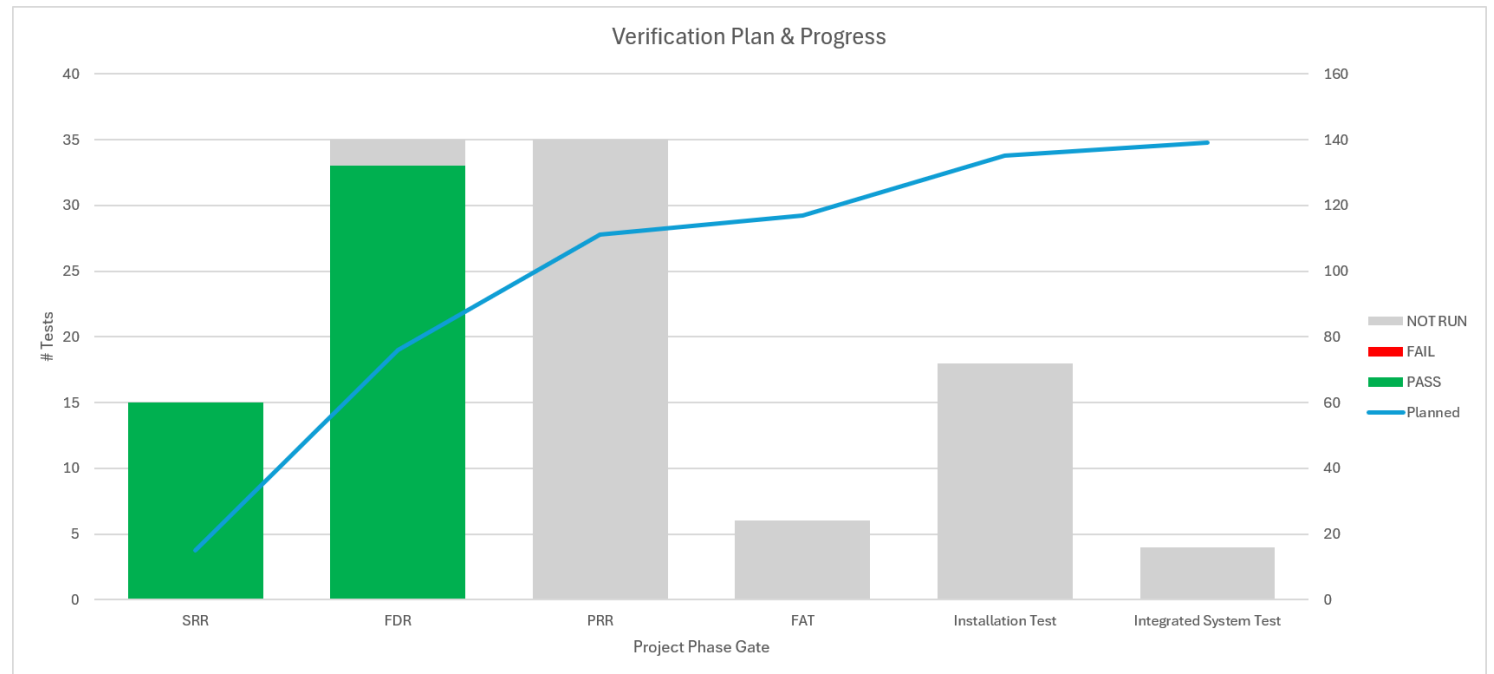
FAT = occurs at fabricator

- FAI (dimensional inspections)
- Leak test
- Hold points, etc.

Installation testing occurs at MUTS

- Leak testing
- Flow testing, blowdown, etc.
- Rotation test
- Maintenance plan

Talk by L. Bearden on MUTS testing



The Target Assembly Approach to requirements & verification

- Requirements were constructed to provide clarity
- Clear requirements guide the work
 - Clear requirements provide a clear “finish line” for the design
 - Clarity can go beyond the intended scope (\$\$) of the project
- Verification was intentionally strict
 - Requirement-by-requirement verification was performed and treated as hard thresholds. Near misses were not rounded into passes. The near misses are captured for clarity.
- Not all “failures” are equal
 - Localized technical shortfalls
 - Maintainability/replacement time issues
 - Transport/disposal issues

Near miss on a conservative requirement

Arguably a project GOAL with an overzealous deployment

Waste and transport agreements cannot be firmly negotiated (verified) 10+ years in advance

S.03.02 - Target Assembly Verification Plan & Status

[illegible]

Notes

ID	Text	Evaluated as
1449	All items.... Replacement and <u>disposal</u> path	Fail

Drive Requirements

ID	Text	Evaluated as
11214	Disposal Site	Pass
10214	Transportation in 3-60B	Fail

Segment Requirements

ID	Text	Evaluated as
11214	Disposal Site	Pass
10222	Transportation in 3-60B	Fail

The 3-60B “no sources of neutron radiation” needs to be clarified with Energy Solutions

5.2.2 Neutron Sources

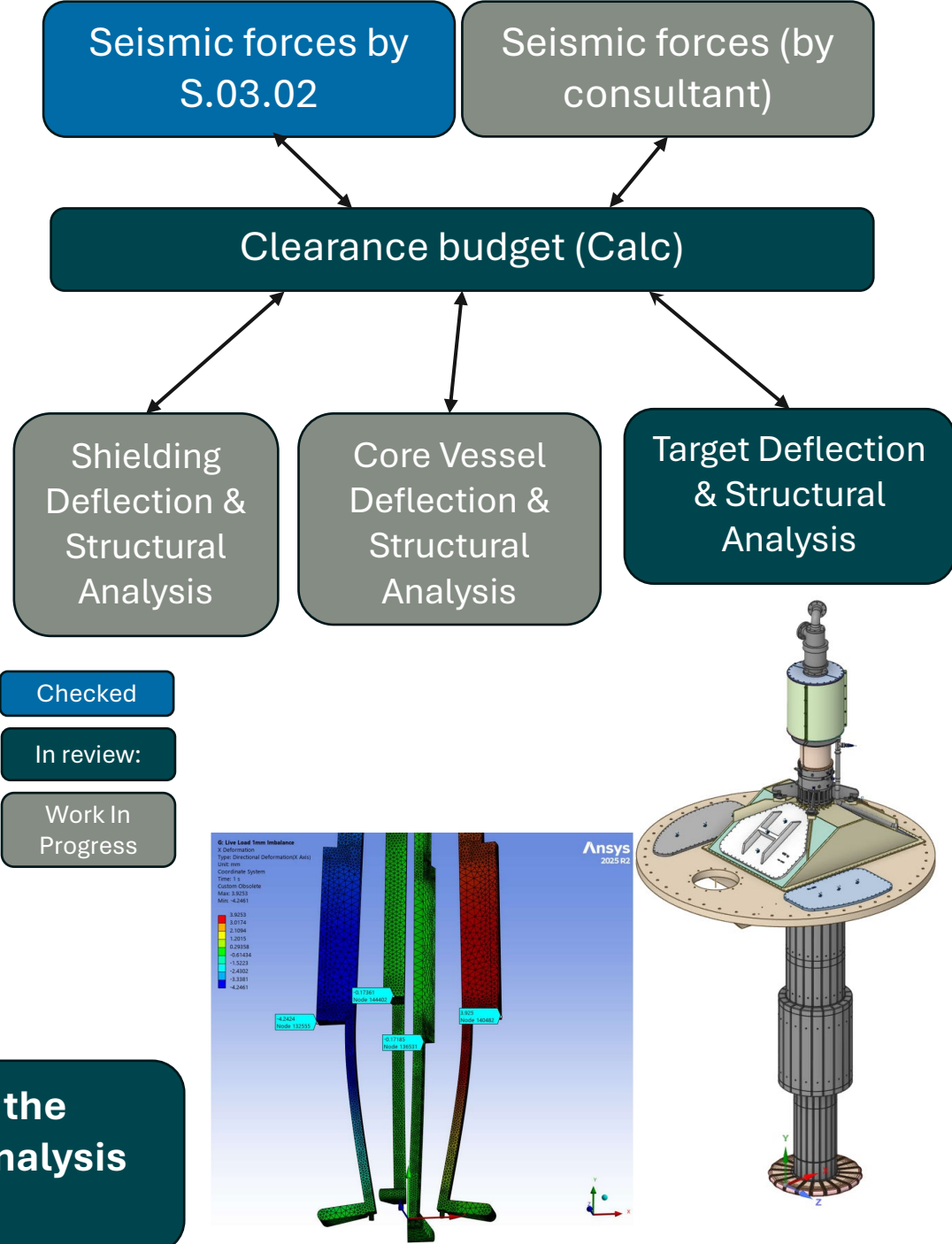
There are no sources of neutron radiation in the radioactive materials to be carried in the 3-60B cask.

Requirement cannot be fully retired at this phase of the project.
Transportation should be negotiated as early as possible.

Deflection

ID	Text	
10733	The outer profile of the target assembly (above the target) shall not deflect in the horizontal direction more than +/-3mm during normal operation and pressure testing operations	Pass
10732	The outer boundary of the target assembly at the foot elevation shall deflect <0.25mm horizontally during the worst case combination of:	Pass
10731	The outer boundary of the target assembly at the foot elevation shall deflect in the vertical direction < 3.65mm (down) and <0.55mm (up) during a seismic vertical force.	Pass
10713	The outer boundary of the target assembly at the foot elevation shall deflect in the horizontal direction <0.25mm beyond any imposed displacements between mounting flange and lower extremity.	Pass
10702	The outer boundary of the target assembly at the foot elevation shall not deflect in the vertical direction more than 3.25mm (down) or more than 0.25mm (up) during the worst case combination of:	Pass
10698	The target assembly shall be capable of maintaining structural integrity under a horizontal relative motion between base and lower extremity (snubber ring) of up to: 13mm.	Pass
10693	Any portion of the target assembly shall not deflect in the horizontal direction more than 5mm during a seismic lateral force; displacement is that beyond an +/- 11mm relative displacement between mounting flange and lower extremity.	Pass
10677	The lower extremity shall deflect in the vertical direction <2mm (down) and< 0.2mm (up) during the worst case combination of:	Pass
10676	The lower extremity (snubber) shall not deflect in the horizontal direction more than +/- 0.25mm during the worst case combination of:\	Pass
10674	The p withi	

The design meets the deflection requirements from the clearance budget. Final verification closure requires analysis review and project approved seismic guidance.



S.03.02.02 - Target Drive Verification Status

System Verification Plan and Report

Project Second Target Station
Item Target Drive
WBS S.03.02.02
Lead Aaron Jacques
Date 8/5/2026

Date	8/5/2026	6/2/2000	Reqmts Review			8/13/2026	7/1/2024	Final Design Review			8/13/2026	8/14/2026	Dwg release			8/14/2027	8/14/2026	Vendor			8/14/2027	8/14/2026	MUTS			8/14/2027	8/14/2026	In Core Vessel			8/14/2027		
ID	Name	SRR				FDR				PRR				FAT				Installation Test				Integrated System Test											
		ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date
11215	[S.03.02.02-11215] Disposal Site	-	-	-	-	11216	Analysis	PASSED	8/5/2026	11216	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10978	[S.03.02.02-10978] Material radiation damage	-	-	-	-	10972	Analysis	PASSED	7/24/2026	10972	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10960	[S.03.02.02-10960] Maximum Mass	-	-	-	-	10964	Analysis	PASSED	7/27/2026	10964	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10952	[S.03.02.02-10952] Lid Interface Vacuum leak rate	-	-	-	-	-	-	-	-	-	-	-	-	10966	Test	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10744	[S.03.02.02-10744] Allowance for adjustment	-	-	-	-	1997	Inspection	PASSED	7/24/2026	1997	Inspection	Not Run	-	11001	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10743	[S.03.02.02-10743] Drive positionine features	-	-	-	-	1997	Inspection	PASSED	7/24/2026	1997	Inspection	Not Run	-	11001	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10214	[S.03.02.02-10214] Transportation in 3-60B	-	-	-	-	10929	Analysis	FAILED	8/1/2026	10929	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3849	[S.03.02.02-3849] Vertical Lift	-	-	-	-	3901	Inspection	PASSED	7/24/2026	3901	Inspection	Not Run	-	-	-	-	-	10985	-	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
3847	[S.03.02.02-3847] Resurface Sealing Faces	-	-	-	-	3900	Inspection	PASSED	7/24/2026	3900	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3844	[S.03.02.02-3844] Long Reach Tooling	-	-	-	-	3899	Inspection	PASSED	7/24/2026	3899	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3726	[S.03.02.02-3726] Pressure Relief	-	-	-	-	3744	Inspection	PASSED	7/24/2026	3744	Inspection	Not Run	-	11004	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3724	[S.03.02.02-3724] Start-up Time	-	-	-	-	3746	Analysis	PASSED	7/24/2026	3746	Analysis	Not Run	-	10984	Demonstration	Not Run	-	10984	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
3585	[S.03.02.02-3585] Maximum Dimensions	-	-	-	-	3747	Inspection	PASSED	7/24/2026	3747	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3463	[S.03.02.02-3463] Segment Rotation Sensor	-	-	-	-	1971	Inspection	PASSED	7/24/2026	1971	Inspection	Not Run	-	3477	Demonstration	Not Run	-	3477	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
3461	[S.03.02.02-3461] Operational check of disconnect	-	-	-	-	1969	Inspection	PASSED	7/24/2026	1969	Inspection	Not Run	-	1970	Demonstration	Not Run	-	1970	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
3454	[S.03.02.02-3454] Segment Blow Down Level	-	-	-	-	3759	Inspection	PASSED	7/24/2026	3759	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3453	[S.03.02.02-3453] Segment Purge Port	-	-	-	-	3760	Inspection	PASSED	7/24/2026	3760	Inspection	Not Run	-	11006	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3199	[S.03.02.02-3199] Maintenance and Lifetime Criteria	-	-	-	-	3761	Closure	PASSED	7/24/2026	3761	Closure	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2998	[S.03.02.02-2998] Motor Assembly Replacement	-	-	-	-	3762	Analysis	FAILED	7/24/2026	3762	Analysis	Not Run	-	-	-	-	-	1975	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
1774	[S.03.02.02-1774] Cool Down time	-	-	-	-	2023	Analysis	PASSED	7/24/2026	2023	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1676	[S.03.02.02-1676] Rotation Angle Measurement	-	-	-	-	2022	Inspection	PASSED	7/24/2026	2022	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1670	[S.03.02.02-1670] Manual Rotation	-	-	-	-	2014	Inspection	PASSED	7/24/2026	2014	Inspection	Not Run	-	2015	Demonstration	Not Run	-	1977	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
1667	[S.03.02.02-1667] Lock Out Tag Out	-	-	-	-	2012	Inspection	PASSED	7/24/2026	2012	Inspection	Not Run	-	11005	Demonstration	Not Run	-	2013	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
1666	[S.03.02.02-1666] Drive Sourious Stop	-	-	-	-	2047	Analysis	PASSED	7/27/2026	2047	Analysis	Not Run	-	-	-	-	-	10988	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
1665	[S.03.02.02-1665] Segment Drain Ports	-	-	-	-	2010	Inspection	PASSED	7/24/2026	2010	Inspection	Not Run	-	11006	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1647	[S.03.02.02-1647] Drive Lift Points	-	-	-	-	2009	Inspection	PASSED	7/24/2026	2009	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1646	[S.03.02.02-1646] Max Component Height	-	-	-	-	2008	Inspection	PASSED	7/24/2026	2008	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1645	[S.03.02.02-1645] Process System Interface flanges	-	-	-	-	2007	Inspection	PASSED	7/24/2026	2007	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1644	[S.03.02.02-1644] Drive Pressure Drop	-	-	-	-	2065	Analysis	PASSED	7/26/2026	2065	Analysis	Not Run	-	-	-	-	-	10979	Test	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
1643	[S.03.02.02-1643] Target Drive - CV Interface	-	-	-	-	2006	Inspection	PASSED	7/25/2026	2006	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1642	[S.03.02.02-1642] Rotary Seal Leak Rate	-	-	-	-	11241	Inspection	PASSED	8/1/2026	11241	Inspection	Not Run	-	10987	Test	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1624	[S.03.02.02-1624] Instrumentation replacement time	-	-	-	-	1990	Analysis	PASSED	7/27/2026	1990	Analysis	Not Run	-	1991	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1622	[S.03.02.02-1622] Drive Bearing Replacement Time	-	-	-	-	1986	Analysis	FAILED	7/25/2026	1986	Analysis	Not Run	-	1987	Demonstration	Not Run	-	1987	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
1621	[S.03.02.02-1621] Secondary Cooling Flow	-	-	-	-	1984	Inspection	PARTLY	7/25/2026	1984	Inspection	Not Run	-	-	-	-	-	1985	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
1620	[S.03.02.02-1620] Crown Attachment	-	-	-	-	1983	Inspection	PASSED	7/25/2026	1983	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1619	[S.03.02.02-1619] Replaceable Segment Attachment	-	-	-	-	1982	Inspection	PASSED	7/25/2026	1982	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1616	[S.03.02.02-1616] Segment Water Isolation	-	-	-	-	1980	Inspection	PASSED	7/25/2026	1980	Inspection	Not Run	-	11006	Demonstration	Not Run	-	1981	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
1615	[S.03.02.02-1615] Drive Water Isolation	-	-	-	-	1979	Inspection	PASSED	7/25/2026	1979	Inspection	Not Run	-	-	-	-	-	11002	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
1611	[S.03.02.02-1611] Shaft Maintenance Support	-	-	-	-	1974	Inspection	PASSED	7/25/2026	1974	Inspection	Not Run	-	-	-	-	-	1975	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	
1610	[S.03.02.02-1610] Bearing Temperature Monitor	-	-	-	-	1973	Inspection	PASSED	7/25/2026	1973	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1485	[S.03.02.02-1485] Leak Test	1836	Closure	PASSED	5/15/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Notes

ID	Text	Evaluated as	Comments
2998	The motor assembly shall be capable of replacement within 72 hours.	Failed	Estimated to take 90 hours (intent is met; within accuracy of estimate)
1622	The seal or drive bearing shall be capable of replacement within 72 hours.	Failed	Estimated to take 90 hours (intent is met; within accuracy of estimate)

Accept requirement as fulfilling the availability goal.

Replacement timeframes are acceptable to mee the “fast swap” intent met,

Evaluations of swap times are rough (unchecked) estimates

S.03.02.03 - Target Segment Verification Status

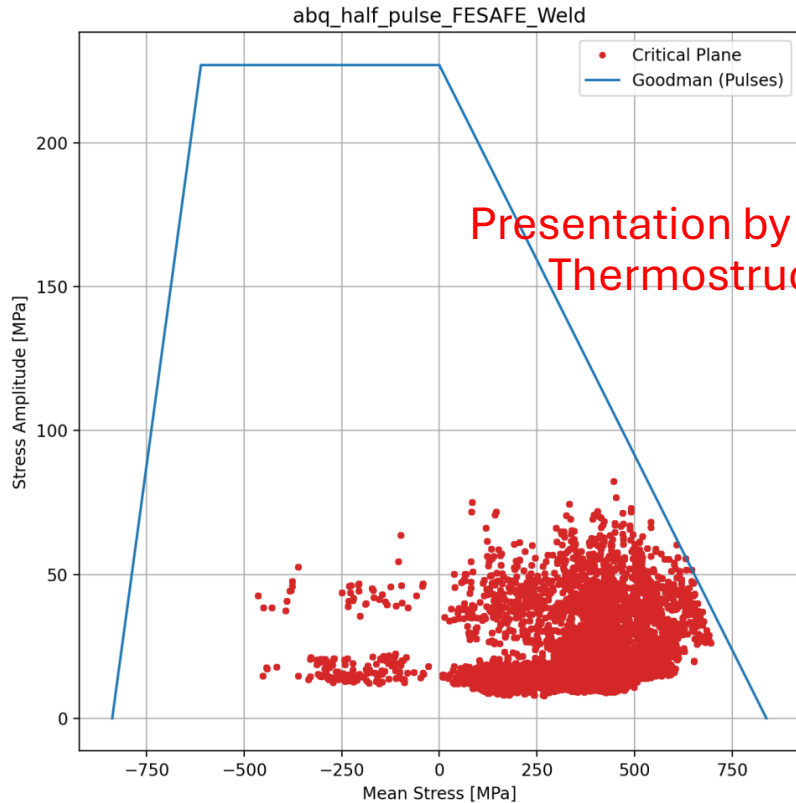
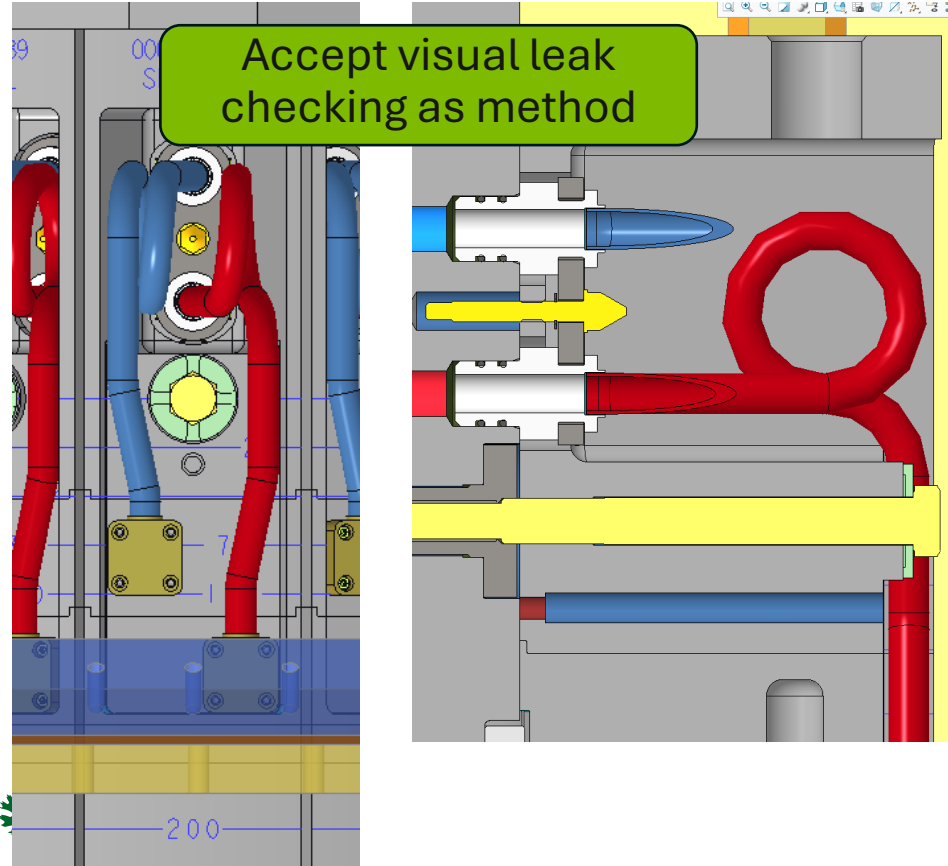
System Verification Plan and Report

Project Second Target Station
Item Target Segment
WBS S.03.02.03
Lead Aaron Jacques
Date 8/5/2026

Date	8/5/2026	6/2/2000	Reqmts Review		8/13/2026	7/1/2024	Final Design Review		8/13/2026	8/14/2026	Dwg release		8/14/2027	8/14/2026	Vendor		8/14/2027	8/14/2026	MUTS		8/14/2027	8/14/2026	In Core Vessel		8/14/2027
		SRR				FDR				PRR				FAT				Installation Test				Integrated System Test			
ID	Name	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date
11214	[S.03.02.03-11214] Disposal Method	-	-	-	-	11217	Inspection	PASSED	8/5/2026	11217	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10959	[S.03.02.03-10959] Maximum Mass	-	-	-	-	10962	Analysis	PASSED	7/25/2026	10962	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10950	[S.03.02.03-10950] Segment Pin	-	-	-	-	10969	Inspection	PASSED	7/26/2026	10969	Inspection	Not Run	-	-	-	-	-	10982	Demonstration	Not Run	-	-	-	-	-
10949	[S.03.02.03-10949] Water Seal Leak Rate	-	-	-	-	-	-	-	-	-	-	-	-	10971	Test	Not Run	-	-	-	-	-	-	-	-	-
10759	[S.03.02.03-10759] Segment Foot - Horizontal	-	-	-	-	11188	Analysis	PASSED	7/31/2026	11188	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10757	[S.03.02.03-10757] Segment Mid Height - Radial	-	-	-	-	11191	Analysis	PASSED	7/31/2026	11191	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10756	[S.03.02.03-10756] Segment Mid Height - Radial	-	-	-	-	11185	Analysis	PASSED	7/31/2026	11185	Analysis	Not Run	-	-	-	-	-	10990	Test	Not Run	-	-	-	-	-
10755	[S.03.02.03-10755] Profile Tolerance - Segment Mid	-	-	-	-	-	-	-	-	10926	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10752	[S.03.02.03-10752] Segment foot - Vertical	-	-	-	-	11187	Analysis	PASSED	7/31/2026	11187	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10751	[S.03.02.03-10751] Segment Foot - Vertical	-	-	-	-	11189	Analysis	PASSED	7/31/2026	11189	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10750	[S.03.02.03-10750] Foot Profile	-	-	-	-	-	-	-	-	10926	Inspection	Not Run	-	10998	Inspection	Not Run	-	-	-	-	-	-	-	-	-
10222	[S.03.02.03-10222] Transporation in 3-60B	-	-	-	-	10924	Analysis	FAILED	8/1/2026	10924	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
3851	[S.03.02.03-3851] Seal Leak Check	-	-	-	-	3906	Inspection	FAILED	7/26/2026	3906	Inspection	Not Run	-	-	-	-	-	10995	Demonstration	Not Run	-	-	-	-	-
3850	[S.03.02.03-3850] Vertical Lift	-	-	-	-	3907	Inspection	PASSED	7/26/2026	3907	Inspection	Not Run	-	-	-	-	-	10982	Demonstration	Not Run	-	-	-	-	-
3848	[S.03.02.03-3848] Locating Features	-	-	-	-	3905	Inspection	PASSED	7/26/2026	3905	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
3728	[S.03.02.03-3728] Pin Dimension	-	-	-	-	3736	Inspection	PASSED	7/26/2026	3736	Inspection	Not Run	-	10994	Inspection	Not Run	-	-	-	-	-	-	-	-	-
3570	[S.03.02.03-3570] Maximum dimensions	-	-	-	-	3416	Inspection	PASSED	7/26/2026	3416	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
3466	[S.03.02.03-3466] Max Temperature without cooling	-	-	-	-	3475	Analysis	PASSED	7/24/2026	3475	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
3465	[S.03.02.03-3465] Hot contact	-	-	-	-	1946	Analysis	PASSED	7/24/2026	1946	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
3464	[S.03.02.03-3464] Water Tube Spacing	-	-	-	-	2079	Inspection	PASSED	7/24/2026	2079	Inspection	Not Run	-	10983	Inspection	Not Run	-	-	-	-	-	-	-	-	-
2301	[S.03.02.03-2301] Material Radiation Damage	-	-	-	-	10972	Analysis	PASSED	7/24/2026	10972	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1605	[S.03.02.03-1605] Segment Sourious Stop	-	-	-	-	2073	Analysis	PASSED	7/26/2026	2073	Analysis	Not Run	-	-	-	-	-	10988	Demonstration	Not Run	-	-	-	-	-
1604	[S.03.02.03-1604] Segment Zinlift	-	-	-	-	2072	Inspection	PASSED	7/27/2026	2072	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1602	[S.03.02.03-1602] Segment Pressure Drop	-	-	-	-	2071	Analysis	PASSED	7/26/2026	2071	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1600	[S.03.02.03-1600] Desien Loads and Acceptance	-	-	-	-	2069	Analysis	PASSED	7/26/2026	2069	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1598	[S.03.02.03-1598] Target Location	-	-	-	-	2067	Inspection	PASSED	7/26/2026	2067	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1597	[S.03.02.03-1597] Target Materials	-	-	-	-	2066	Inspection	PASSED	7/26/2026	2066	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1596	[S.03.02.03-1596] Target Geometry	-	-	-	-	1964	Analysis	PASSED	7/27/2026	1964	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1574	[S.03.02.03-1574] Segment Lifetime	-	-	-	-	1960	Analysis	FAILED	7/26/2026	1960	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1572	[S.03.02.03-1572] Segment Shear	-	-	-	-	1956	Demonstratio	PASSED	8/1/2026	1956	Demonstration	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1570	[S.03.02.03-1570] Maintenance Temperatures	-	-	-	-	1952	Analysis	PASSED	7/26/2026	1952	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1567	[S.03.02.03-1567] Prevent Boiling Flow	-	-	-	-	1950	Analysis	PASSED	7/26/2026	1950	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1504	[S.03.02.03-1504] Segment Replacement Time	-	-	-	-	1855	Analysis	PASSED	7/24/2026	1855	Analysis	Not Run	-	-	-	-	-	10997	Demonstration	Not Run	-	-	-	-	-
1501	[S.03.02.03-1501] Replaceable Gasket Interface	-	-	-	-	1854	Inspection	PASSED	7/26/2026	1854	Inspection	Not Run	-	-	-	-	-	10996	Demonstration	Not Run	-	-	-	-	-

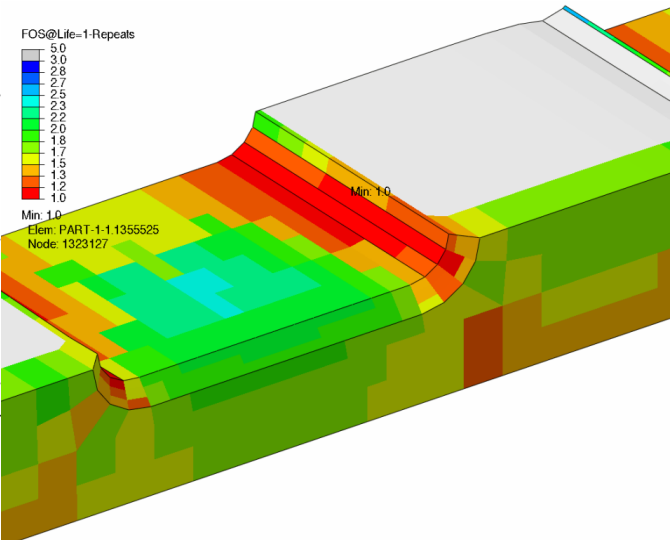
Notes

ID	Text	Evaluated as	Comments
3851	The sealing surface between the segment and the drive shall have a method of leak testing.	Fail	Remove requirement or add feature
1574	Segment Fatigue margin shall be equal to or greater than 1 for a 10~year operational life for all materials with the following load combinations:	Fail	Weld fatigue margin is 0.92 at 10 year life (meets the intent of a 10 year target), weld quality improved by HIP



Accept fatigue life as-is

Presentation by J. Tipton “Segment Thermostructural Analysis”



S.03.02.04 - Target Shaft Verification Status & Plan

System Verification Plan and Report

Project Second Target Station
Item Target Shaft
WBS S.03.02.04
Lead Aaron Jacques
Date 8/5/2026

Date		8/5/2026	6/2/2000	Reqmts Review		8/13/2026	7/1/2024	Final Design Review		8/13/2026	8/14/2026	Dwg release		8/14/2027	8/14/2026	Vendor		8/14/2027	8/14/2026	MUTS		8/14/2027	8/14/2026	In Core Vessel		8/14/2027
			SRR				FDR				PRR				FAT				Installation Test				Integrated System Test			
ID	Name		ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date
10961	[S.03.02.04-10961] Maximum Mass	-	-	-	-	-	10967	Analysis	PASSED	7/26/2026	10967	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10957	[S.03.02.04-10957] Welded construction	-	-	-	-	-	10968	Inspection	PASSED	7/26/2026	10968	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10951	[S.03.02.04-10951] Pocket Clearance	-	-	-	-	-	10965	Inspection	PASSED	7/26/2026	10965	Inspection	Not Run	-	-	-	-	-	-	10982	Demonstration	Not Run	-	-	-	-
10795	[S.03.02.04-10795] Snubber vertical installation	-	-	-	-	-	10919	Inspection	PASSED	7/24/2026	10919	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	10999	-	Not Run
10794	[S.03.02.04-10794] Vertical snubber clearance	-	-	-	-	-	10918	Inspection	PASSED	7/24/2026	10918	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10758	[S.03.02.04-10758] Structural integrity during seismic	-	-	-	-	-	11264	Analysis	Not Run	-	11264	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10749	[S.03.02.04-10749] Shaft runout	-	-	-	-	-	2049	Inspection	PASSED	7/24/2026	2049	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10748	[S.03.02.04-10748] Vertical Shaft Deflection - Normal	-	-	-	-	-	11240	Analysis	PASSED	8/1/2026	11240	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10747	[S.03.02.04-10747] Horizontal Shaft Deflection -	-	-	-	-	-	11246	Analysis	PASSED	8/1/2026	11246	Analysis	Not Run	-	-	-	-	-	-	10993	Test	Not Run	-	-	-	-
10746	[S.03.02.04-10746] Snubber horizontal installation	-	-	-	-	-	10919	Inspection	PASSED	7/24/2026	10919	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10745	[S.03.02.04-10745] Snubber adjustment	-	-	-	-	-	10919	Inspection	PASSED	7/24/2026	10919	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10742	[S.03.02.04-10742] Radial snubber clearance	-	-	-	-	-	10918	Inspection	PASSED	7/24/2026	10918	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10238	[S.03.02.04-10238] Maximum dimensions	-	-	-	-	-	3427	Inspection	PASSED	7/26/2026	3427	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
10230	[S.03.02.04-10230] Transportation in 3-60B	-	-	-	-	-	10923	Analysis	FAILED	8/5/2026	10923	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
7092	[S.03.02.04-7092] Lower Shaft Load-Bearing Integrity	-	-	-	-	-	11249	Analysis	PASSED	8/1/2026	11249	Analysis	Not Run	-	-	-	-	-	-	11000	-	Not Run	-	-	-	-
3845	[S.03.02.04-3845] Segment Guiding	-	-	-	-	-	3910	Inspection	PASSED	7/26/2026	3910	Inspection	Not Run	-	-	-	-	-	-	10982	Demonstration	Not Run	-	-	-	-
2088	[S.03.02.04-2088] Shaft Diameter	-	-	-	-	-	3005	Inspection	PASSED	7/27/2026	3005	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
2029	[S.03.02.04-2029] Material Radiation Damage	-	-	-	-	-	10972	Analysis	PASSED	7/24/2026	10972	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1694	[S.03.02.04-1694] Shaft Spurious Stop	-	-	-	-	-	2077	Analysis	PASSED	7/26/2026	2077	Analysis	Not Run	-	-	-	-	-	-	10988	Demonstration	Not Run	-	-	-	-
1693	[S.03.02.04-1693] Drive Segment Connection	-	-	-	-	-	2077	Analysis	PASSED	7/26/2026	2077	Analysis	Not Run	-	-	-	-	-	-	10988	Demonstration	Not Run	-	-	-	-
1692	[S.03.02.04-1692] Shaft Lifting Interface	-	-	-	-	-	2046	Inspection	PASSED	7/26/2026	2046	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1691	[S.03.02.04-1691] Shaft Pressure Drop	-	-	-	-	-	2044	Analysis	PASSED	7/26/2026	2044	Analysis	Not Run	-	-	-	-	-	-	10979	Test	Not Run	-	-	-	-
1687	[S.03.02.04-1687] Design Loads and Acceptance	-	-	-	-	-	2041	Analysis	PASSED	7/26/2026	2041	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1677	[S.03.02.04-1677] Shaft Lifetime	-	-	-	-	-	2030	Analysis	PASSED	7/26/2026	2030	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-
1500	[S.03.02.04-1500] Robust Interfaces	-	-	-	-	-	1822	Inspection	PASSED	7/24/2026	1822	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-

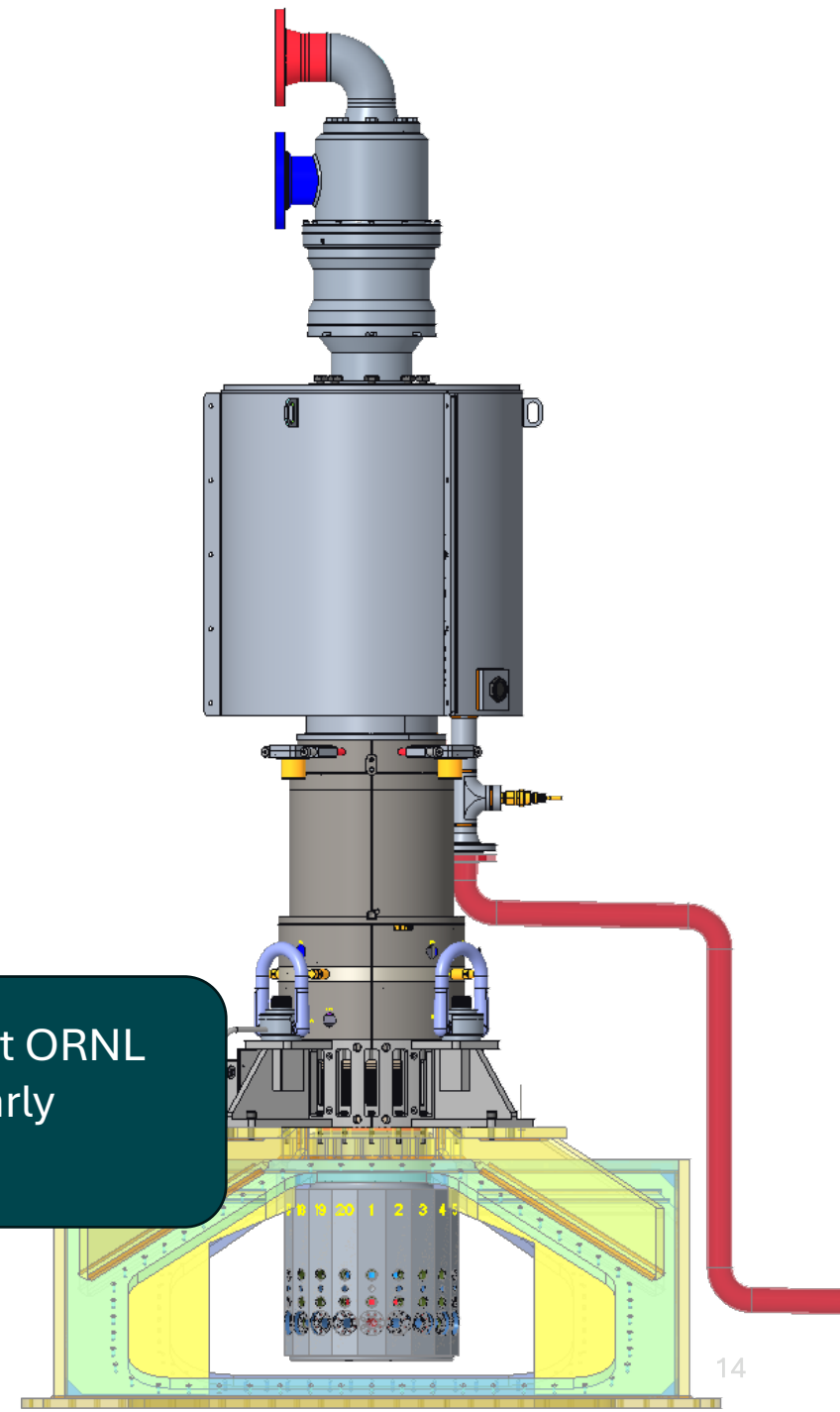
Not fully incorporated into structural analysis

Future Verifications

Reqmts Review			8/13/2026	7/1/2024	Final Design Review			8/13/2026	8/14/2026	Dwg release			8/14/2027	8/14/2026	Vendor			8/14/2027	8/14/2026	MUTS			8/14/2027	8/14/2026	In Core Vessel			8/14/2027
SRR			FDR			PRR			FAT			Installation Test			Integrated System Test													
Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date	ID	Method	STATUS	Date						
-	-	-	10967	Analysis	PASSED	7/26/2026	10967	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	10968	Inspection	PASSED	7/26/2026	10968	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	10965	Inspection	PASSED	7/26/2026	10965	Inspection	Not Run	-	-	-	-	-	10982	Demonstration	Not Run	-	-	-	-	-						
-	-	-	10919	Inspection	PASSED	7/24/2026	10919	Inspection	Not Run	-	-	-	-	-	-	-	-	-	10999	-	Not Run	-						
-	-	-	10918	Inspection	PASSED	7/24/2026	10918	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	2049	Inspection	PASSED	7/24/2026	2049	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	11240	Analysis	PASSED	8/1/2026	11240	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	11246	Analysis	PASSED	8/1/2026	11246	Analysis	Not Run	-	-	-	-	-	10993	Test	Not Run	-	-	-	-	-						
-	-	-	10919	Inspection	PASSED	7/24/2026	10919	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	10919	Inspection	PASSED	7/24/2026	10919	Inspection	Not Run	-	-	-	-	-	-	-	-	-	10999	-	Not Run	-						
-	-	-	10918	Inspection	PASSED	7/24/2026	10918	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	3427	Inspection	PASSED	7/26/2026	3427	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	10923	Analysis	Not Run	-	10923	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	11249	Analysis	PASSED	8/1/2026	11249	Analysis	Not Run	-	-	-	-	-	11000	-	Not Run	-	-	-	-	-						
-	-	-	3910	Inspection	PASSED	7/26/2026	3910	Inspection	Not Run	-	-	-	-	-	10982	Demonstration	Not Run	-	-	-	-	-						
-	-	-	3005	Inspection	PASSED	7/27/2026	3005	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	10972	Analysis	PASSED	7/24/2026	10972	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	2077	Analysis	PASSED	7/26/2026	2077	Analysis	Not Run	-	-	-	-	-	10988	Demonstration	Not Run	-	-	-	-	-						
-	-	-	2077	Analysis	PASSED	7/26/2026	2077	Analysis	Not Run	-	-	-	-	-	10988	Demonstration	Not Run	-	-	-	-	-						
-	-	-	2046	Inspection	PASSED	7/26/2026	2046	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	2044	Analysis	PASSED	7/26/2026	2044	Analysis	Not Run	-	2045	Test	Not Run	-	10979	Test	Not Run	-	-	-	-	-						
-	-	-	2041	Analysis	PASSED	7/26/2026	2041	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	2030	Analysis	PASSED	7/26/2026	2030	Analysis	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						
-	-	-	1822	Inspection	PASSED	7/24/2026	1822	Inspection	Not Run	-	-	-	-	-	-	-	-	-	-	-	-	-						

Factory Acceptance Testing - Drive

- Dimensional inspection of all fabricated components (all items on the Acceptance Criteria List)
 - Weight accurate mass & inertia suspended below drive (or other emulator designed by shop)
 - Vacuum enclosure for leak testing (does not need to enclose weight emulator)
 - Water skid to flow water
 - Bearing gas present
 - Simple control system by shop
 - Check ACL items
 - Check for leaks & workmanship
 - Rotate the system; ramp to full speed
 - Check vacuum leak rates
 - Check Water leak rates
 - Perform basic maintenance on drive
- Ensure no workmanship issues arrive at ORNL
 - Ensure any design issues are caught early (somewhere they can be fixed)



Factory Acceptance Testing - Segment

- Dimensional inspection of all fabricated components (all items on the Acceptance Criteria List)
- Leak Testing (visual & leak down)

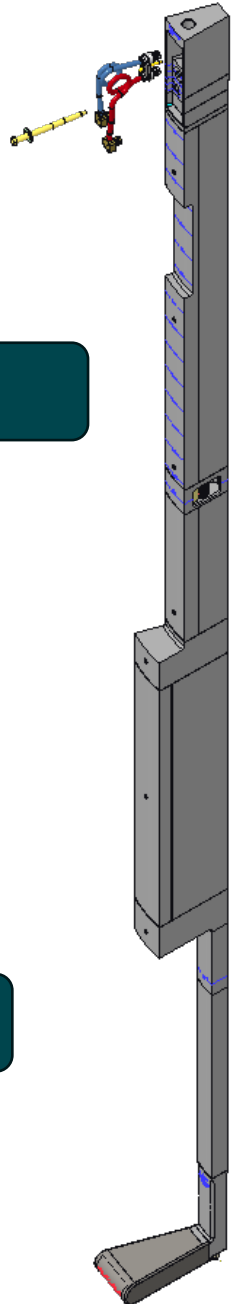
- Ensure no workmanship issues arrive at ORNL

Factory Acceptance Testing - Foot

- Dimensional inspection of all fabricated components (all items on the Acceptance Criteria List)
- Measure items (welds, bonds & geometry) at hold points.
- First Article Destructive testing before production run

- Catch vendor process or design issues before significant investment

Presentation by A. Jacques “Target Manufacturing Plan”



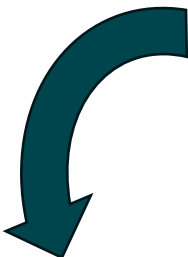
Factory Acceptance Testing – Lower Shaft

- Dimensional inspection of all fabricated components (all items on the Acceptance Criteria List)
 - Leak Testing
- Ensure no workmanship issues arrive at ORNL



Summary of FDR verifications

The design meets the requirements



	Assembly	Drive	Segment	Shaft
Pass	33	36	28	23
Fail	1	3	3	1
Not Run	1	0	0	1



Issue type	Item	Meaning	Significance
Localized technical shortfall	Weld fatigue 0.92 vs 1.0	Small local miss against strict criterion	Important, but bounded
Maintainability	Replacement time > requirement	Serviceability/availability issue	Not mission-function failure
Transport/disposal	3-60B / disposal path	Programmatic or acceptance-path issue	Real, but not operating-performance issue
Not-yet-run planned tests	FAT / MUTS / integrated tests	Scheduled later-phase verification	Expected at this stage



OAK RIDGE

National Laboratory



U.S. DEPARTMENT
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