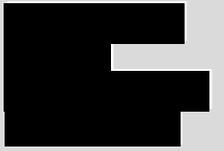
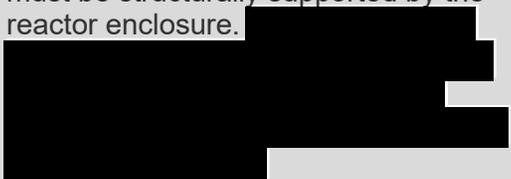


Enclosure 2
MSRR Codes and Service Conditions Redacted
(non-proprietary)

MSRR Codes and Service Conditions

Component	Code ¹	Design Pressure and Temperature	Service Lifetime	Thermal Cycles	Safety Classification and Justification for Code Assignment
<p>V-1002 and associated piping, piping supports, components, and flanges</p> <p>Material: Ni-201</p> <p>Ni-201 piping exits V-1002 and terminates in a Ni-201 isolation valve. After the valve, the piping switches to SS316H and is described by the following row.</p>	<p>Vessel: ASME Code Section VIII, Division 1</p> <p>Vessel Supports: ASME Section VIII, Division 2²</p> <p>Piping and Piping Supports⁴: ASME B31.3, 2020 Edition</p> <p>Custom Flanges: Appendix 2 of ASME Section VIII, Division 1, 2021 Edition³</p>		<p>20 years, only heated during sparging or transfer sessions:</p>		<p>SR. The fuel salt purification vessel, V-1002, will not be constructed to Section III because its nickel alloy fabrication material is not approved in Section III.</p> <ul style="list-style-type: none"> • The fuel salt purification vessel will be fully contained within the fuel storage enclosure, which will be a Section III vessel. • The Ni-201 vessel can withstand the fuel salt purification environment, but Section III alloys cannot. • The fuel salt purification vessel operates at low pressure when it is used and has few thermal and pressure cycles over the 20-year operating life. Technical specification limits on the number of cycles will be proposed in the operating license application. • The quality assurance requirements of ANS 15.8-1995 (R2005; R2013) provide appropriate assurance to address fabrication and material procurement controls. • The Section VIII working pressure limits provide an appropriate safety margin.

Component	Code ¹	Design Pressure and Temperature	Service Lifetime	Thermal Cycles	Safety Classification and Justification for Code Assignment
Components, piping, and supports between V-1002 and V-3002 Material: SS316H	⁴ Outer Pipe and supports per ASME Section III, Division 5, Class B, Elevated Temperature Service Inner pipe per ASME Section III, Division 5, Class A, Elevated Temperature Service		20 years, each transfer lasts for a few days		SR. Requirement for elevated temperature service and retention of radionuclides under normal conditions (the pipe itself) and accident conditions (the pipe is enclosed by another pipe).
T-1005 (fuel storage enclosure) Material: SS316 (specific grade awaits further analysis)	ASME Section III, Division 5, Class A, Service Temperature is TBD		20 years, a fuel salt spill will result in an initial temperature rise then fall over days		SR. Retain radionuclides in the event of a fuel salt spill.
V-1001, V-1004 Material: TBD	TBD	50 psig, 1202 °F	< 1 year	$\Delta T \sim 1100 \text{ }^\circ\text{F}$: 2 times over 20 years	SR. Currently undefined. The vessels are expected to be supplied by DOE. Retain radionuclides under normal and accident conditions. This equipment does not require separate enclosures.

Component	Code ¹	Design Pressure and Temperature	Service Lifetime	Thermal Cycles	Safety Classification and Justification for Code Assignment
V-3001, V-3002, V-3003, fuel salt portion of E-3001, fuel salt portion of P-3001, and all associated components, piping, and supports Material: SS316H	Vessels, piping, valves, and supports: ASME Section III, Division 5, Class A, Elevated Temperature Service	70 psig, 1202 °F 	20 years		SR. The reactor system boundary constitutes a fission product barrier under normal and accident conditions (except the MHA). Corrosion, temperature, and pressure must be controlled. The reactor system must be structurally supported by the reactor enclosure. 
RTMS Material: SS316H	ASME Section III, Division 5, Class A, Elevated Temperature Service	 1202 °F	20 years		SR. The RTMS contains the fuel salt in the event of an MHA. The RTMS provides structural support for Class A components.
V-3004 Material: SS316L	ASME Section III, Division 5, Class A, Low Temperature Service		20 years		SR. The reactor enclosure retains radionuclides under accident conditions. The reactor enclosure also provides structural support for the reactor system that must be maintained under accident conditions.
Coolant salt portion of E-3001 Material: SS316H	ASME Section III, Division 5, Class B, Elevated Temperature Service	 1202 °F	20 years		NSR. Coolant salt spills will not result in a radionuclide release greater than 10 mrem.

Component	Code ¹	Design Pressure and Temperature	Service Lifetime	Thermal Cycles	Safety Classification and Justification for Code Assignment
V-4008, V-4003, P-4001, E- 4002, and V-4005 Material: SS316H	Vessels: ASME Section VIII, Division 1 Vessel Supports: ASME Section VIII, Division 2 ²	██████████	20 years	██████████	NSR. Coolant salt spills will not result in a radionuclide release greater than 10 mrem.
V-4004 and associated components, piping, supports, and flanges Material: Ni-201 Ni-201 piping exits V-4004 to a Ni-201 isolation valve. After this valve, the piping is SS316H.	Vessel: ASME Section VIII, Division 1 Vessel Supports: ASME Section VIII, Division 2 ² Piping and Supports ⁴ : ASME B31.3 - 2020 Edition Custom Flanges: Appendix 2 of ASME Section VIII, Division 1 ³	██████████	20 years, only heated during sparging or transfer sessions: ██████████ ██████████	██████████ ██████████	NSR. Coolant salt spills will not result in a radionuclide release greater than 10 mrem. The coolant salt purification vessel will be used as a lead test specimen for V-1002. See Appendix B of RAI 1 response for more details.
Coolant salt piping, piping between V-1002 and V-4004, components, and supports Material: SS316H	⁴ ASME B31.3 – 2020 Edition supplemented by ASME Section III, Division 5, Class B, Elevated Temperature Service as needed	██████████	20 years	██████████ ██████████	NSR. Coolant salt spills will not result in a radionuclide release greater than 10 mrem.

Component	Code ¹	Design Pressure and Temperature	Service Lifetime	Thermal Cycles	Safety Classification and Justification for Code Assignment
T-4006 (coolant thermal management) Material: SS316H	Vessel: ASME Section VIII, Division 1 Vessel Supports: ASME Section VIII, Division 2 ²	[REDACTED]	20 years	[REDACTED]	NSR. Coolant salt spills will not result in a radionuclide release greater than 10 mrem.
V-6005A/B, CY-6001A/B, F-6001A/B, X-6002A/B, C-6006, components, piping, and associated supports Material: SS316L	Vessels: ASME Section VIII, Division 1 Vessel Supports: ASME Section VIII, Division 2 ² Piping and Supports ⁴ : ASME B31.3 - 2020 Edition	[REDACTED]	20 years	[REDACTED]	NSR. The functions performed by the off-gas system are not safety related. The off-gas system will not contain molten salt and service requirements for these components are mild. <ul style="list-style-type: none"> • The off-gas system will be fully enclosed within the Off-gas Cleanup Enclosure, which will be an ASME Section III component. • The design pressure and temperature are low, with the normal operating pressure and temperature being even lower. • The quality assurance requirements of ANS 15.8 provide appropriate assurance to address fabrication and material procurement controls. • The Section VIII limits on working pressure provide an appropriate safety margin.
T-6009 (off-gas system enclosure) Material: SS316L	ASME Section III, Division 1, Class MC	[REDACTED]	20 years	[REDACTED]	SR. Functional containment of radionuclides is provided by the enclosure which surrounds off-gas system components. The enclosure retains radionuclides under normal and accident conditions.

Component	Code ¹	Design Pressure and Temperature	Service Lifetime	Thermal Cycles	Safety Classification and Justification for Code Assignment
Piping and supports between C-8001 and storage bottles Material: TBD	ASME B31.3 - 2020 Edition	2000 psig, 100 °F (ambient)	20 years	None	NSR. Contains helium from V-7004.
V-7001, V-7002, components, piping, and associated supports Material: SS316L	Vessels and Supports: ASME Section III, Division 5, Class B, Low Temperature Service Piping and Supports: ASME Section III, Division 5	[REDACTED]	20 years	[REDACTED]	SR. The gas management components in the reactor enclosure are a fission product barrier and must retain integrity under normal and accident conditions (except the MHA). Portions of the associated piping between V-7001 and V-7002 constitute the RPS.
V-7004 Material: SS316L	Vessel: ASME Section VIII, Division 2 Vessel Supports: ASME Section VIII, Division 2 ²	[REDACTED]	20 years	[REDACTED]	NSR. Only contains helium contaminated with tritium and helium coming from the transport casks. A release of this gas into the systems pit will not result in a release exceeding 10 mrem.
V-7003 Material: SS316L	Vessel: ASME Section VIII, Division 1 Vessel Supports: ASME Section VIII, Division 2 ²	[REDACTED]	20 years	[REDACTED]	NSR. Clean helium.

¹ When ASME Code Section III Division 5 is applied, the 2017 Edition will be used. When ASME Code Section VIII is applied, the 2021 Edition will be used.

² Standard practice for supports under Section VIII is to use a combination of the design rules in paragraph 4.4.12 of Section VIII, Division 2, ASCE 15.7.10.5, and the methods described by Brownell & Young and Jawad & Farr (Process Equipment Design - Vessel Design, Lloyd E. Brownell and Edwin H Young, John Wiley & Sons, 2004 and Guidebook for the Design of ASME Section VIII Pressure Vessels, Third Edition, James R. Farr and Maan H. Jawad, ASME Press, 2006).

³ Appendix 2 of ASME Section VIII, Division 1 will be used to design custom flanges made from ASME SB-160 bar materials. Paragraph UG-14 of ASME Section VIII, Division 1 permits rod and bar material to be used for the construction of flanges.

⁴ Note that paragraph 321 of B31.3 provides basic design rules for piping supports. Additional guidance for the design of piping supports is provided in the Appendix of ASME B31.3 and nonmandatory Appendix G of ASME Section VIII, Division 1. Standard supports per MSS SP-58 are permitted per Table 326.1 of ASME B31.3. If supports have a design temperature above 800°F, the rules provided in ASME Code Section III, Division 5, Class B, elevated temperature service may be used for the design.