Proposed NRC position on Screening of CASS Reactor Vessel Internal Components

The NRC staff requires licensees/applicants to consider embrittlement from both thermal aging and neutron irradiation. The staff would consider screening for susceptibility to embrittlement based on fluence and ferrite content (measured or calculated from Hull's equation and summarized in Tables A, B, and C shown below) to be conservative.

Table A Screening for Components with < 0.45 dpa neutron exposure

Molybdenum (wt. %)	Casting Method	Susceptibility	Delta ferrite %
High 2.0-3.0% (CF-8M)	static	TE	> 14%
		No	≤ 14%
	centrifugal	TE	> 20%
		No	≤ 20%
Low 0.5% max (CF-3 and CF-8)	static	TE	> 20%
		No	≤ 20%
	centrifugal	No	All

Table B Screening for Components with 0.45 dpa ≤ neutron exposure ≤ 1.5 dpa

Molybdenum (wt. %)	Casting Method	Susceptibility	Delta ferrite %
High 2.0-3.0% (CF-8M)	static	TE + IE	> 10%
		No	≤ 10%
	centrifugal	TE + IE	> 15%
		No	≤ 15%
Low 0.5% max (CF-3 and CF-8)	static	TE + IE	> 15%
		No	≤ 15%
	centrifugal	No	All

Table C Screening for Components with > 1.5 dpa neutron exposure

Molybdenum (wt. %)	Casting Method	Susceptibility	Delta ferrite %
High 2.0-3.0% (CF-8M)	static	TE + IE	> 10%
		IE	≤ 10%
	centrifugal	TE + IE	> 15%
		IE	≤ 15%
Low 0.5% max (CF-3 and CF-8)	static	TE + IE	> 15%
		IE	≤ 15%
	centrifugal	IE	All