BSC

Calculation/Analysis Change Notice

Complete only applicable items.

3. Document Identifier:	4. Rev.:	5. CACN:
000-00C-MGR0-03600-000	00A	002

6. Title:
Nuclear Criticality Calculations for Canister-Based Facilities – Commercial SNF

7. Reason for Change:
Typographical errors were noted subsequent to the issue of CACN 001. These errors are identified in the extent of condition description of CR 11857.

8. Supersedes Change Notice: ☐ Yes If, Yes, CACN No.: _____ ☒ No

9. Change Impact:

Inputs Changed:	☐ Yes	☒ No	Results Impacted:	☐ Yes	☒ No
Assumptions Changed:	☐ Yes	☒ No	Design Impacted:	☐ Yes	☒ No

10. Description of Change:
Table 21 has a description of footnotes a and b below the table, but the body of the table includes no references to the footnotes. The corrections are as follows:

1) The source for Table 21 is changed to Table 1 of *Dimension and Material Specification for Use in Criticality Analyses* (Ref. 2.2.1)
2) Footnotes a and b are deleted from Table 21 because the footnote information is given in the calculation referenced as the source for Table 21.
3) Reference 2.2.15 is changed to "Not used."
4) Reference 2.2.20 is deleted.
5) The DIRS should not have included DIRS reference numbers 162015 (Ref. 2.2.15) and 179928 (Ref. 2.2.20).

All corrections to the document are indicated with change bars on the attached replacements for pages 20, 21, and 59.

The typographical errors in Table 21 and the corrections have no impact on the document assumptions, calculations, results, and conclusions.

11. REVIEWS AND APPROVAL

Printed Name	Signature	Date
11a. Originator: J. C. Ryman	J. C. Ryman	5/15/2008
11b. Checker: W. G. Rhoden	W. G. Rhoden	5/15/2008
11c. EGS: A. A. Alsaed	A. A. Alsaed	5/15/2008
11d. DEM: D. Beckman	T. Quinn for D. Beckman	5/15/2008
11e. Design Authority: B. E. Rusinko	B. E. Rusinko	5/15/08

2.2.5 Baum, E.M.; Knox, H.D.; and Miller, T.R. 2002. *Nuclides and Isotopes.* 16th edition. [Schenectady, New York]: Knolls Atomic Power Laboratory. TIC: 255130. (DIRS 175238).

2.2.6 DOE (U.S. Department of Energy) 2007. *Transportation, Aging, and Disposal Canister System Performance Specification.* WMO-TADCS-000001, Rev. 0. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: DOC.20070614.0007 (DIRS 181403).

2.2.7 ASTM A 887-89 (Re-approved 2004). 2004. *Standard Specification for Borated Stainless Steel Plate, Sheet, and Strip for Nuclear Application.* West Conshohocken, Pennsylvania: American Society for Testing and Materials. TIC: 258746 (DIRS 178058).

2.2.8 NRC (U.S. Nuclear Regulatory Commission) 2000. *Standard Review Plan for Spent Fuel Dry Storage Facilities.* NUREG-1567. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 247929 (DIRS 149756).

2.2.9 DOE (U.S. Department of Energy) 1987. Appendix 2A Physical Descriptions of LWR Fuel Assemblies. Volume 3 of Characteristics of Spent Fuel, High-Level Waste, and Other Radioactive Wastes Which May Require Long-Term Isolation DOE/RW-0184. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: HQX.19880405.0024 (DIRS 132333).

2.2.10 CRWMS M&O 1998. *Summary Report of Commercial Reactor Criticality Data for McGuire Unit 1.* B00000000-01717-5705-00063 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19980622.0079 (DIRS 106022).

2.2.11 Lide, D.R., ed. 2006. *CRC Handbook of Chemistry and Physics.* 87th Edition. Boca Raton, Florida: CRC Press. TIC: 258634 (DIRS 178081).

2.2.12 Gelest, Inc. 2004. *Gelest Silicone Fluids: Stable, Inert Media.* Morrisville, Pennsylvania: Gelest, Inc. TIC: 256122 (DIRS 169915).

2.2.13 CRWMS M&O 1999 *DOE SRS HLW Glass Chemical Composition.* BBA000000-01717-0210-00038 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990215.0397 (DIRS 102140).

2.2.14 Stout, R.B. and Leider, H.R., eds. 1991. *Preliminary Waste Form Characteristics Report* Version 1.0. Livermore, California: Lawrence Livermore National Laboratory. ACC: MOL.19940726.0118 (DIRS 102813).

2.2.15 Not used.

2.2.16 ASTM A 240/A 240M-06c. 2006. Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications West Conshohocken, Pennsylvania: American Society for Testing and Materials. TIC: 259153 (DIRS 179346).

2.2.17 Larsen, N.H.; Parkos, G.R.; and Raza, O. 1976. *Core Design and Operating Data for Cycles 1 and 2 of Quad Cities 1.* EPRI NP-240. Palo Alto, California: Electric Power Research Institute. TIC: 237267. (DIRS 146576).

2.2.18 BSC (Bechtel SAIC Company) 2005. *CSNF Assembly Type Sensitivity Evaluation for Pre- and Postclosure Criticality Analysis.* CAL-DSU-NU-000013 REV 00A. Las Vegas, Nevada: Bechtel SAIC Company. ACC: DOC.20050525.0006 (DIRS 175046).

2.2.19 MCNP V. 4B2LV.2002. WINDOWS 2000.STN: 10437-4B2LV-00.

It is noted that Reference 2.2.9 is "QA-NA" but is used as "direct input" based on the context of its use (i.e. "data" only). This reference is suitable for its intended use in this document because the data refers to fuel assembly characteristics that are representative of the broader CSNF assembly population.

It is also noted that References 2.2.12 and 2.2.17 are "inputs from outside sources". These references are suitable for their intended use in this document because the data is considered representative and the safety limits established in this document are considered insensitive to the exact values used.

2.3 DESIGN CONSTRAINTS

None.

2.4 DESIGN OUTPUTS

2.4.1 Preclosure Criticality Safety Analysis.

6.2.2.3.7 Tuff

Tuff, when modeled as a neutron reflector, is modeled 100% saturated and treated at full density (2.359 g/cm^3) in the TAD canister MCNP calculations. The specification for Tuff is detailed in Table 21.

Table 21. Tuff Material Specification

Element/Isotope	ZAID	100% Saturated Atom Density (a/b-cm)
Si	14000.50c	1.7281E-02
Al-27	13027.50c	3.3505E-03
Fe-54	26054.60c	1.1224E-05
Fe-56	26056.60c	1.7604E-04
Fe-57	26057.60c	4.0676E-06
Fe-58	26058.60c	5.3724E-07
Mg	12000.50c	4.3900E-05
Ca	20000.50c	1.2135E-04
Na-23	11023.50c	1.5460E-03
K	19000.50c	1.3958E-03
Ti	22000.50c	1.8746E-05
P-31	15031.50c	9.5885E-06
Mn-55	25055.50c	1.3431E-05
O-16	8016.50c	4.5507E-02
H-1	1001.50c	7.8665E-03
Density = 2.359 g/cm^3		

Source: Table 1 of *Dimension and Material Specification for Use in Criticality Analyses* (Ref. 2.2.1)

6.2.2.3.8 Titanium

Titanium, when modeled as a neutron reflector, is treated at full theoretical density (4.54 g/cm^3) in the TAD canister MCNP calculations. The specification for Titanium, based on the material data provided in *CRC Handbook of Chemistry and Physics* (Ref. 2.2.11), is detailed in Table 22.

Table 22. Titanium Material Specification

Element/ Isotope	ZAID	Wt%
^{22}Ti	22000.60c	100
Density: 4.54 g/cm^3		