

July 2019

Revision 19A

MAGNASTOR®

(Modular Advanced Generation
Nuclear All-purpose STORage)

FINAL SAFETY ANALYSIS REPORT

CE16 Fuel Amendment

NON-PROPRIETARY VERSION

Docket No. 72-1031



Enclosure 1

**Excerpts from NAC Calculation
71160-6001 Revision 0,
NewGen Transfer and Storage Criticality Analysis**

for

MAGNASTOR[®] Technical Specifications, Amendment 8

(Docket No 72-1031)

NAC International

July 2019

CALCULATIONS WITHHELD IN THEIR ENTIRETY
PER 10 CFR 2.390

Enclosure 2

Proposed Changes

for

MAGNASTOR® Technical Specifications, Amendment 8

(Docket No 72-1031)

NAC International

July 2019

APPENDIX A

**PROPOSED TECHNICAL SPECIFICATIONS AND DESIGN FEATURES
FOR THE MAGNASTOR SYSTEM**

AMENDMENT 8

5.5

Radiation Protection Program

- 5.5.1 Each cask user shall ensure that the 10 CFR 50 radiation protection program appropriately addresses dry storage cask loading and unloading, and ISFSI operations, including transport of the loaded CONCRETE CASK outside of facilities governed by 10 CFR 50 as applicable. The radiation protection program shall include appropriate controls and monitoring for direct radiation and surface contamination, ensuring compliance with applicable regulations, and implementing actions to maintain personnel occupational exposures ALARA. The actions and criteria to be included in the program are provided as follows.
- 5.5.2 Each user shall perform a written evaluation of the TRANSFER CASK and associated operations, 30 days prior to first use, to verify that it meets public, occupational, and ALARA requirements (including shielding design and dose characteristics) in 10 CFR Part 20, and that it is consistent with the program elements of each user's radiation protection program. The evaluation should consider both normal operations and unanticipated occurrences, such as handling equipment malfunctions, during use of the transfer cask.
- 5.5.3 As part of the evaluation pursuant to 10 CFR 72.212(b)(5)(iii), the licensee shall perform an analysis to confirm that the dose limits of 10 CFR 72.104(a) will be satisfied under actual site conditions and ISFSI configuration, considering the number of casks to be deployed and the cask contents.
- 5.5.4 Each user shall establish limits on the surface contamination of the CONCRETE CASK, TSC and TRANSFER CASK, and procedures for the verification of meeting the established limits prior to removal of the components from the 10 CFR 50 structure. Surface contamination limits for the TSC prior to placement in STORAGE OPERATIONS shall meet the limits established in LCO 3.3.2.

5.6 Special Requirements for the First System Placed in Service

Deleted

(continued)

APPENDIX B

**PROPOSED APPROVED CONTENTS
FOR THE MAGNASTOR SYSTEM**

AMENDMENT 8

Table B2-3 Bounding PWR Fuel Assembly Loading Criteria

Assembly Type	No. of Fuel Rods	No. of Guide Tubes ¹	Geometry ²					
			Max Pitch (inch)	Min Clad OD (inch)	Min Clad Thick. (inch)	Max Pellet OD (inch)	Max Active Length (inch)	Max Load (MTU)
BW15H1	208	17	0.568	0.43	0.0265	0.3686	144.0	0.4858
BW15H2	208	17	0.568	0.43	0.025	0.3735	144.0	0.4988
BW15H3	208	17	0.568	0.428	0.023	0.3742	144.0	0.5006
BW15H4	208	17	0.568	0.414	0.022	0.3622	144.0	0.4690
BW17H1	264	25	0.502	0.377	0.022	0.3252	144.0	0.4799
CE14H1	176	5	0.58	0.44	0.026	0.3805	137.0	0.4167
CE16H1	236	5	0.5063	0.382	0.025	0.3255	150.0	0.4463
WE14H1	179	17	0.556	0.40	0.0162	0.3674	145.2	0.4188
WE15H1	204	21	0.563	0.422	0.0242	0.3669	144.0	0.4720
WE15H2	204	21	0.563	0.417	0.0265	0.357	144.0	0.4469
WE17H1	264	25	0.496	0.372	0.0205	0.3232	144.0	0.4740
WE17H2	264	25	0.496	0.36	0.0225	0.3088	144.0	0.4327

¹ Combined number of guide and instrument tubes.

² Assembly characteristics represent cold, unirradiated, nominal configurations.

Note: Amendment No. 2 removed the enrichment/soluble boron limits from this table, along with the note pertaining to them. This information is now presented in Table B2-4.

Enclosure 3

List of Changes

for

MAGNASTOR[®] FSAR, Revision 19A

(Docket No 72-1031)

NAC International

July 2019

List of Changes for the MAGNASTOR® FSAR, Revision 19A

Note: The List of Effective Pages and the Chapter Table of Contents, List of Figures, and List of Tables have been revised accordingly to reflect the list of changes detailed below.

Chapter 1

- No changes

Chapter 2

- No changes

Chapter 3

- No changes

Chapter 4

- No changes

Chapter 5

- No changes

Chapter 6

- Page 6.1-8, revised Table 6.1.1-1 adding a foot note regarding the “Max Pellet OD (inch)” for CE16H1 fuel.
- Page 6.7.2-5, added a note to Table 6.7.2-3

Chapter 7

- No changes

Chapter 8

- No changes

Chapter 9

- No changes

Chapter 10

- No changes

Chapter 11

- No changes

Chapter 12

No changes

Chapter 13

- No changes

Chapter 14

- No changes

Chapter 15

- No changes

Enclosure 4

FSAR Changed Pages and LOEP

for

MAGNASTOR® FSAR, Revision 19A

(Docket No 72-1031)

NAC International

July 2019

July 2019

Revision 19A

MAGNASTOR[®]

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26 drawings (see Section 1.8)

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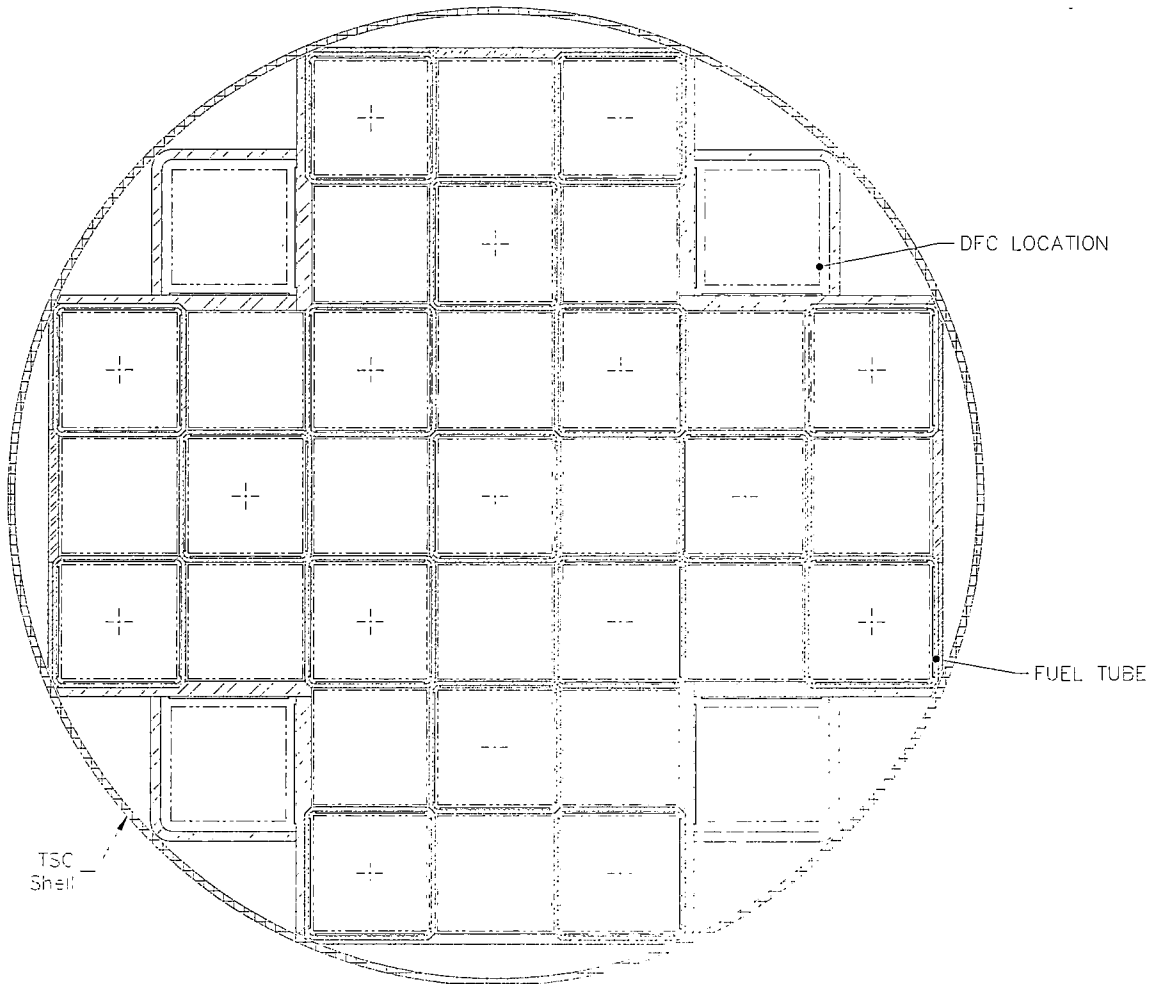
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Figure 6.1.1-2 PWR Damaged Fuel Basket Configuration



**Table 6.1.1-1 Bounding PWR Fuel Assembly Loading Criteria
(Assembly Description)**

Assembly Type	No. of Fuel Rods	No. of Guide Tubes ^a	Max Pitch (inch)	Min Clad OD (inch)	Min Clad Thick. (inch)	Max Pellet OD (inch)	Max Active Length (inch)	Max Load (MTU)
BW15H1	208	17	0.568	0.43	0.0265	0.3686	144.0	0.4858
BW15H2	208	17	0.568	0.43	0.025	0.3735	144.0	0.4988
BW15H3	208	17	0.568	0.428	0.023	0.3742	144.0	0.5006
BW15H4	208	17	0.568	0.414	0.022	0.3622	144.0	0.4690
BW17H1	264	25	0.502	0.377	0.022	0.3252	144.0	0.4799
CE14H1	176	5	0.58	0.44	0.026	0.3805	137.0	0.4167
CE16H1 ^b	236	5	0.5063	0.382	0.025	0.3255	150.0	0.4463
WE14H1	179	17	0.556	0.40	0.0162	0.3674	145.2	0.4188
WE15H1	204	21	0.563	0.422	0.0242	0.3669	144.0	0.4720
WE15H2	204	21	0.563	0.417	0.0265	0.357	144.0	0.4469
WE17H1	264	25	0.496	0.372	0.0205	0.3232	144.0	0.4740
WE17H2	264	25	0.496	0.36	0.0225	0.3088	144.0	0.4327

- Assembly characteristics represent cold, unirradiated, nominal configurations.

^a Combined number of guide and instrument tubes.

^b The baseline value for analysis of the CE16x16 assembly type Maximum Pellet Outside Diameter is 0.325 inch. The increase to 0.3255 inch was evaluated in section 6.7.2 and does not impact the safety conclusion of the system, i.e., $k_{eff} \leq 0.95$.

Table 6.7.2-3 PWR Lattice Parameter Reactivity Study (Increased Variance)

Fuel Pin Cell H/U	2	6	1	4	3	5	7	8
Pellet Dia.	Max	Min	Max	Max	Max	Min	Min	Min
GT/IT Thick & Dia.	Max	Max	Max	Min	Min	Max	Min	Min
	Min	Min	Max	Min	Max	Max	Max	Min
CE14H1	0.87036	0.85678	0.86976	0.86096	0.86053	0.85797	0.84877	0.84622
CE16H1 ^a	0.87710	0.86624	0.87895	0.87731	0.87844	0.86482	0.86418	0.86368
BW15H3	0.93513	0.92519	0.93561	0.92975	0.93121	0.92601	0.92338	0.92166
BW15H4	0.91969	0.91104	0.92021	0.91758	0.91814	0.91288	0.91180	0.91159
BW17H1	0.93191	0.92268	0.93276	0.93102	0.93121	0.92161	0.91947	0.92070
WE14H1	0.85469	0.84179	0.85598	0.82962	0.82905	0.84053	0.82110	0.81996
WE15H1	0.91628	0.90791	0.91798	0.90515	0.90695	0.90862	0.89507	0.89625
WE17H1	0.92739	0.91598	0.92807	0.92813	0.92763	0.91580	0.91562	0.91582
		Case 2 To Case 6 $\Delta k_{eff}/\sigma$	Case 2 To Case 1 $\Delta k_{eff}/\sigma$	Case 2 to Case 4 $\Delta k_{eff}/\sigma$	Case 2 to Case 3 $\Delta k_{eff}/\sigma$	Case 2 to Case 5 $\Delta k_{eff}/\sigma$	Case 2 to Case 7 $\Delta k_{eff}/\sigma$	Case 2 To Case 8 $\Delta k_{eff}/\sigma$
CE14H1		-13.0	-0.6	-8.9	-9.5	-11.9	-21.1	-23.0
CE16H1 ^a		-10.0	1.7	0.2	1.2	-11.3	-11.9	-12.4
BW15H3		-13.7	0.7	-7.4	-5.3	-12.5	-15.9	-18.3
BW15H4		-7.7	0.5	-1.9	-1.4	-6.1	-7.1	-7.3
BW17H1		-8.9	0.8	-0.9	-0.7	-9.6	-12.0	-10.7
WE14H1		-12.0	1.2	-23.3	-24.0	-13.3	-31.0	-31.7
WE15H1		-7.8	1.6	-10.5	-8.7	-7.0	-19.4	-18.8
WE17H1		-10.7	0.6	0.7	0.2	-10.7	-10.9	-10.7

^a The reactivity impact of a change in pellet diameter from 0.3255 inch (case 2) to 0.3245 inch (case 4) which brackets the evaluated nominal dimension of 0.325 inch. As documented, the change in reactivity between the evaluated values is not statistically resolvable and is not significant to demonstrating the criticality safety of the system.