August 2015
Revision 15B

NAC-STC

NAC Storage Transport Cask

SAFETY ANALYSIS REPORT

WVDP Vitrified Waste and High Burnup Fuel Amendment Application

RAI Response Supplement Package

Non-Proprietary Version

Docket No. 71-9235

NAC INTERNATIONAL

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August 12, 2015

U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

Attn: Document Control Desk

Subject: Submission of Supplemented Responses to NRC Request for Additional Information for NAC's Request for an Amendment of Certificate of Compliance (CoC) No. 9235 for the NAC-STC Cask

Docket No. 71-9235

References:

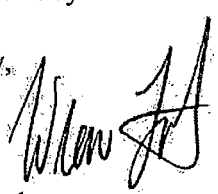
1. Model No. NAC-STC Package, U.S. Nuclear Regulatory Commission (NRC) Certificate of Compliance (CoC) No. 9235, Revision 13, May 28, 2014
2. Safety Analysis Report (SAR) for the NAC Storage Transport Cask (NAC-STC), Revision 17, NAC International, April 2011
3. ED20130164, Request for an Amendment of Certificate of Compliance (CoC) No. 9235 for the NAC-STC Cask to Incorporate West Valley Demonstration Project Vitrified High Level Waste and PWR 17x17 Uncanisterized High Burnup Fuel, November 26, 2013
4. NRC Letter, Application for the Revision of Certificate of Compliance No. 9235 for the Model NAC-STC (Revision 13A) – Supplemental Information Needed, February 12, 2014
5. ED20140028, NAC Responses to the NRC Request for Supplemental Information for NAC's Request for an Amendment of Certificate of Compliance (CoC) No. 9235 for the NAC-STC Cask to Incorporate West Valley Demonstration Project Vitrified High Level Waste and PWR 17x17 Uncanisterized High Burnup Fuel, April 24, 2014
6. NRC Letter, Application for Revising the Model No. NAC-STC Transport Package (TAC No. L24860), August 8, 2014
7. ED20140081, NAC Response to NRC Letter on Insufficient Information for NAC's Request for an Amendment of Certificate of Compliance (CoC) No. 9235 for the NAC-STC Cask to Incorporate PWR 17x17 Uncanisterized High Burnup Fuel, August 15, 2014
8. ED20140087, Submission of a Supplement in Response to NRC Letter on Insufficient Information for NAC's Request for an Amendment of Certificate of Compliance (CoC) No. 9235 for the NAC-STC Cask to Incorporate PWR 17x17 Uncanisterized High Burnup Fuel, August 29, 2014
9. NRC Letter, Request for Additional Information for Review of the Certificate of Compliance No. 9235, for the Model No. NAC-STC Packaging (TAC No. L24860), March 2, 2015
10. ED20150060, Submission of Responses to NRC Request for Additional Information for NAC's Request for an Amendment of Certificate of Compliance (CoC) No. 9235 for the NAC-STC Cask, June 5, 2015

NAC International (NAC) herewith submits supplemented responses to the Reference 10 submission. This supplemented submittal package includes one proprietary and one non-proprietary hard copy version of this package, which includes the Revision 15B changed pages (Enclosure 5) to the Reference 2, 3, 5, 8, and 10 SAR pages. Enclosure 1 includes the supplemented RAI responses and supporting documentation for this submittal. Enclosures 2 and 3 contain a detailed list of SAR and drawing changes, respectively. Enclosure 4 includes the proposed changes to Reference 1. All proprietary information is requested to be withheld from public disclosure, see attachment to this letter, via 10 CFR 2.390.

Consistent with NAC administrative practice, this proposed SAR revision is numbered to uniquely identify the applicable changed pages. Revision bars mark the SAR text changes on the Revision STC-15B pages. In order to better facilitate the review process, NAC is providing the Revision STC-15B changed pages with appropriate Reference 2 (SAR Revision 17), Reference 3 (Revision STC-13A), Reference 5 (Revision STC-14A), Reference 8 (Revision STC-14B), or Reference 10 (Revision STC-15A) backing pages, as appropriate. In accordance with NAC's administrative practices, upon final acceptance of this application, the STC-13A, -14A, -14B, -15A, and -15B changed pages will be reformatted and incorporated into the next revision of the NAC-STC SAR.

If you have any comments or questions, please contact me on my direct line at 678-328-1236.

Sincerely,



Wren Fowler
Director, Licensing
Engineering

Attachment

Enclosures:
Enclosure 1 – RAI Response Supplements and Supporting Documents for NAC-STC SAR, Revision 15B
Enclosure 2 – List of Changes, NAC-STC SAR, Revision 15B
Enclosure 3 – List of Drawing Changes, NAC-STC SAR, Revision 15B
Enclosure 4 – Proposed Changes for Certificate of Compliance Revision 13, NAC-STC SAR, Revision 15B
Enclosure 5 – SAR Page Changes and LOEP, NAC-STC SAR, Revision 15B

NAC INTERNATIONAL

NAC INTERNATIONAL
AFFIDAVIT PURSUANT TO 10 CFR 2.390

George Carver (Affiant), Vice President, Engineering and Licensing of NAC International, hereinafter referred to as NAC, at 3930 East Jones Bridge Road, Norcross, Georgia 30092, being duly sworn, deposes and says that:

1. Affiant has reviewed the information described in Item 2 and is personally familiar with the trade secrets and privileged information contained therein, and is authorized to request its withholding.

2. The information to be withheld includes the following NAC Proprietary Information that is being provided to support the technical review of NAC's Request for an Amendment of Certificate of Compliance (CoC) (No. 9235) for the NAC International STC System.

   - RAI Responses Supplemented marked as "NAC PROPRIETARY INFORMATION"
   - NAC-STC SAR, Revision 15B pages marked as "NAC PROPRIETARY INFORMATION"
   - 630087-2025, Revision 1

   NAC is the owner of the information contained in the above documents. Thus, all of the above identified information is considered NAC Proprietary Information.

3. NAC makes this application for withholding of proprietary information based upon the exemption from disclosure set forth in: the Freedom of Information Act ("FOIA"); 5 USC Sec. 552(b)(4) and the Trade Secrets Act; 18 USC Sec. 1905; and NRC Regulations 10 CFR Part 9.17(a)(4), 2.390(a)(4), and 2.390(b)(1) for "trade secrets and commercial financial information obtained from a person, and privileged or confidential" (Exemption 4). The information for which exemption from disclosure is herein sought is all "confidential commercial information," and some portions may also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4.

4. Examples of categories of information that fit into the definition of proprietary information are:

   a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by competitors of NAC, without license from NAC, constitutes a competitive economic advantage over other companies.

   b. Information that, if used by a competitor, would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality or licensing of a similar product.

   c. Information that reveals cost or price information, production capacities, budget levels or commercial strategies of NAC, its customers, or its suppliers.

   d. Information that reveals aspects of past, present or future NAC customer-funded development plans and programs of potential commercial value to NAC.

   e. Information that discloses patentable subject matter for which it may be desirable to obtain patent protection.

   The information that is sought to be withheld is considered to be proprietary for the reasons set forth in Items 4.a, 4.b, and 4.d.

5. The information to be withheld is being transmitted to the NRC in confidence.

6. The information sought to be withheld, including that compiled from many sources, is of a sort customarily held in confidence by NAC, and is, in fact, so held. This information has, to the best of my knowledge and belief, consistently been held in confidence by NAC. No public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements, which provide for maintenance of the information in confidence. Its initial designation as proprietary information and the subsequent steps taken to prevent its unauthorized disclosure are as set forth in Items 7 and 8 following.

7. Initial approval of proprietary treatment of a document/information is made by the Vice President, Engineering, the Project Manager, the Licensing Specialist, or the Director, Licensing – the persons most likely to know the value and sensitivity of the information in relation to industry knowledge. Access to proprietary documents within NAC is limited via "controlled distribution" to individuals on a "need to know" basis. The procedure for external release of NAC proprietary documents typically requires the approval of the Project Manager based on a review of the documents for technical content, competitive effect and accuracy of the proprietary designation. Disclosures of proprietary documents outside of NAC are limited to regulatory agencies, customers and potential customers and their agents, suppliers, licensees and contractors with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

8. NAC has invested a significant amount of time and money in the research, development, engineering and analytical costs to develop the information that is sought to be withheld as proprietary. This information is considered to be proprietary because it contains detailed descriptions of analytical approaches, methodologies, technical data and/or evaluation results not available elsewhere. The precise value of the expertise required to develop the proprietary information is difficult to quantify, but it is clearly substantial.

9. Public disclosure of the information to be withheld is likely to cause substantial harm to the competitive position of NAC, as the owner of the information, and reduce or eliminate the availability of profit-making opportunities. The proprietary information is part of NAC's comprehensive spent fuel storage and transport technology base, and its commercial value extends beyond the original development cost to include the development of the expertise to determine and apply the appropriate evaluation process. The value of this proprietary information and the competitive advantage that it provides to NAC would be lost if the information were disclosed to the public. Making such information available to other parties, including competitors, without their having to make similar investments of time, labor and money would provide competitors with an unfair advantage and deprive NAC of the opportunity to seek an adequate return on its large investment.

NAC INTERNATIONAL

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AFFIDAVIT PURSUANT TO 10 CFR 2.390

STATE OF GEORGIA, COUNTY OF GWINNETT

Mr. George Carver, being duly sworn, deposes and says:

That he has read the foregoing affidavit and the matters stated herein are true and correct to the best of his knowledge, information and belief.

Executed at Norcross, Georgia, this 12th day of August, 2015.

George Carver
Vice President, Engineering and Licensing
NAC International

Subscribed and sworn before me this 12th day of August, 2015.

Deborah R Chapman
Notary Public

DEBORAH R CHAPMAN NOTARY PUBLIC GWINNETT COUNTY, GEORGIA MY COMMISSION EXPIRES: 02-27-2017

Enclosure 1

RAI Response Supplements and Supporting Documents for

NAC-STC SAR, Revision 15B

August 2015

Enclosure 1 Sections:

1.1 RAI Response Supplements:

a. RAI St-2-3 – Revised Response Figure
b. RAIs Th-3-5 and Th-3-6B – Supporting Max/Min Temperature Table
c. RAIs Th-3-10 and Th-3-11 – Supporting Fire Accident Analysis

1.2 Supporting Documents:

a. Calculation 630087-2025, Revision 1

NAC INTERNATIONAL RESPONSE TO THE

UNITED STATES
NUCLEAR REGULATORY COMMISSION

REQUEST FOR ADDITIONAL INFORMATION SUPPLEMENT

August 2015

FOR REVIEW OF THE CERTIFICATE OF COMPLIANCE NO. 9235, STC TRANSPORATION PACKAGE

(CoC NO. 9235 DOCKET NO. 71-9235)

Table of Contents

NAC INTERNATIONAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

STRUCTURAL EVALUATION

NAC International Revised Response to Structural Evaluation RAI St-2-3:

Figures 2.12.6.12-5 and 2.12.6.12-9 have been revised and updated on SAR pages 2.12.6-14 and 2.12.6-20, which are being provided along with their respective backing pages, 2.12.6-13 and 2.12.6-19.

Figure 2.12.6.12-5:

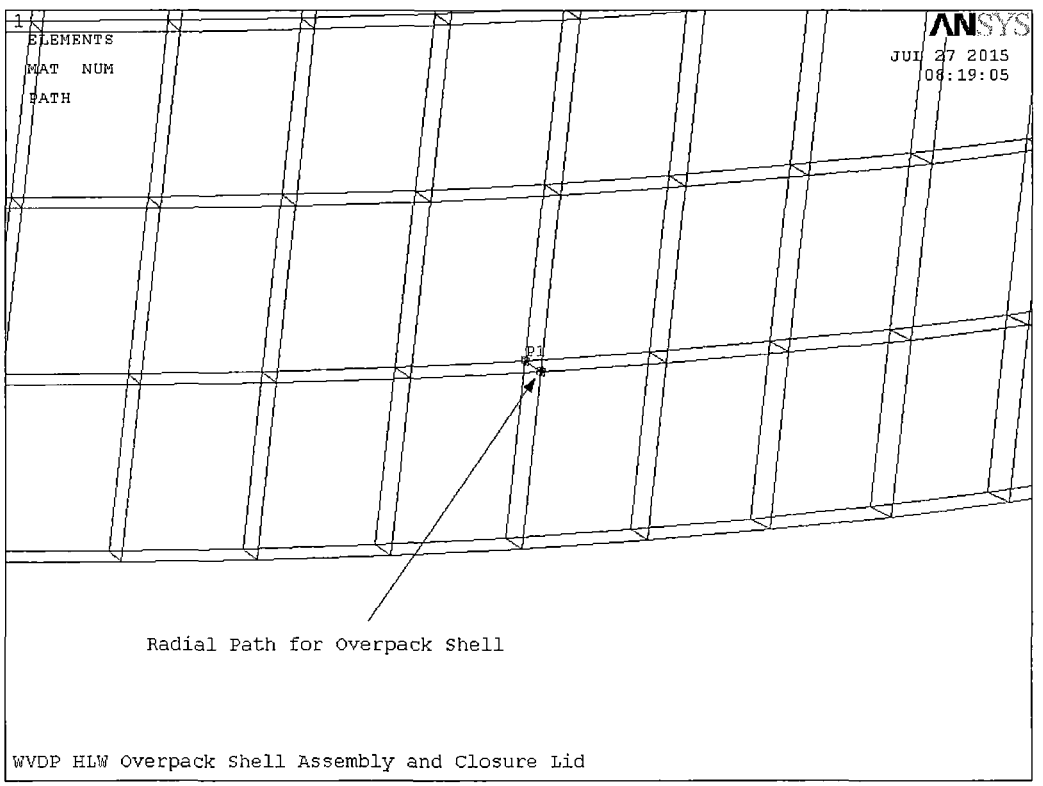
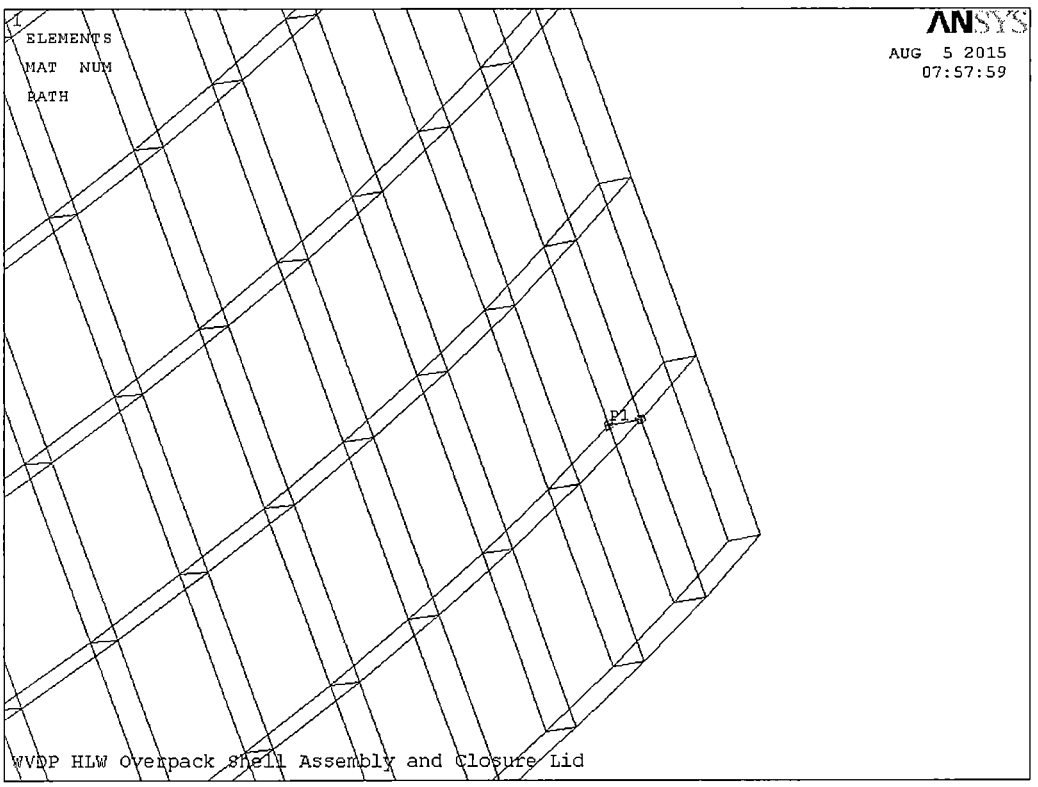


Figure 2.12.6-9:



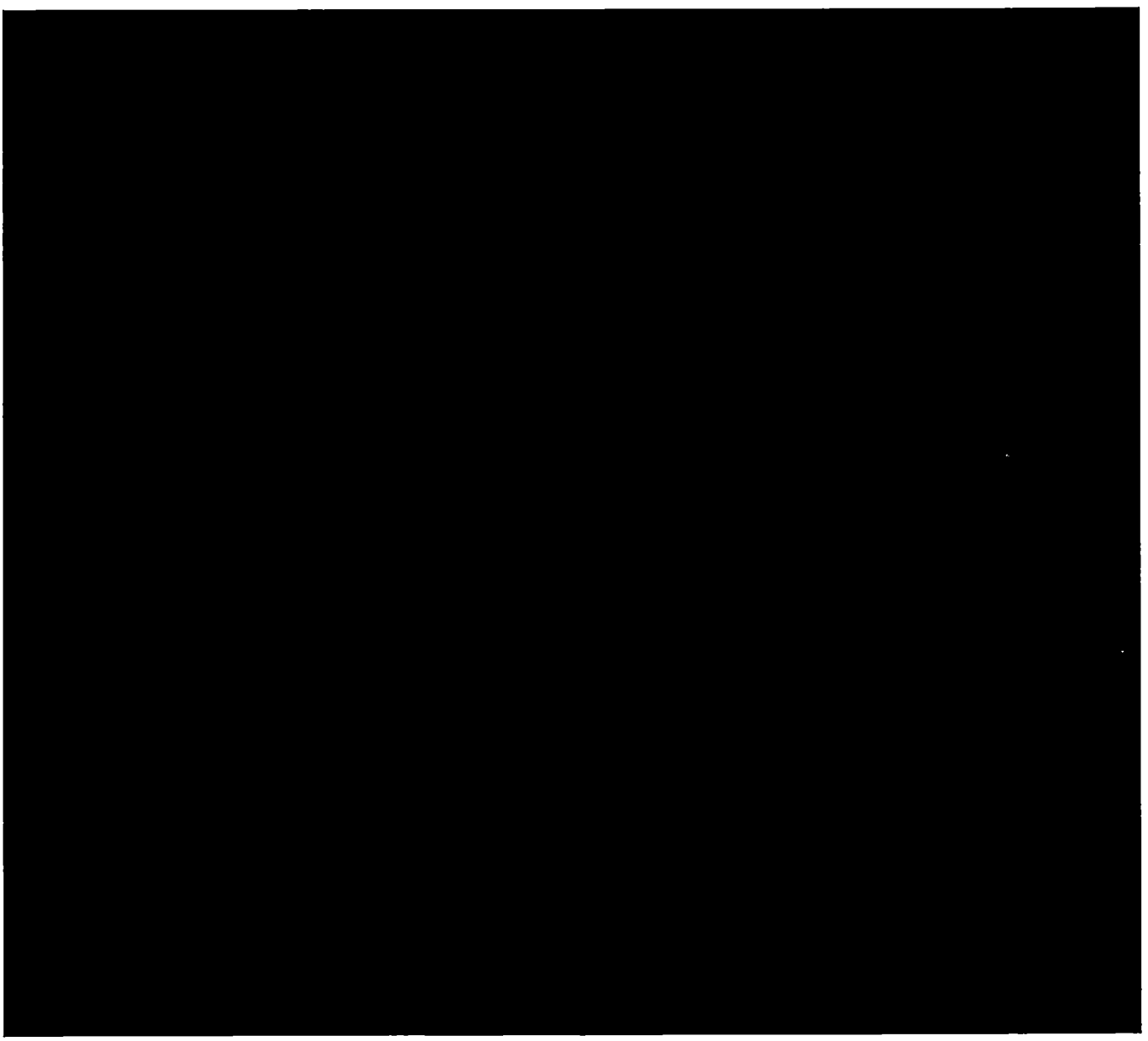
STC
Docket No: 71-9235
CoC No: 9235

NAC INTERNATIONAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

THERMAL EVALUATION

NAC International Revised Response to Thermal Evaluation RAIs Th-3-5 and Th-3-6B:

Supplemental Information for Sensitivity Analysis Results in SAR Section 3.8.4.6



NAC INTERNATIONAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

THERMAL EVALUATION

NAC International Response Supplement to Thermal Evaluation RAIs Th-3-10 and Th-3-11:

The thermal evaluation for the fire accident for STC-WVDP is presented in SAR Section 3.7.5, and the thermal evaluation for the fire accident for STC-HBU is presented in SAR Section 3.8.5. The fire analysis results were conservatively obtained by adding a temperature increase (ΔT) for the fire conditions using results from an analysis of directly loaded fuel with a heat load of 22.1 kW. As discussed in the NAC response to RAI Th-3-10, a fire transient analysis was performed to demonstrate that the ΔT method is conservative. This transient analysis is documented in Appendix R of NAC Calculation No. 423-3000, Rev. 2. Note that the calculation number was inadvertently listed as 423-3001 in the Response to RAI Th-3-10.

NAC Calculation 630087-2025, Revision 1
Withheld in its Entirety per 10 CFR 2.390

Enclosure 2

List of Changes

NAC-STC SAR, Revision 15B

August 2015

List of Changes, NAC-STC SAR, Revision 15B

Chapter 1

- Page 1-iii and 1-vii, modified List of Drawings as needed to reflect drawing revisions.

Chapter 2

- Page 2.12.6-14, replaced Figure 2.12.6.12-5.
- Page 2.12.6-20, replaced Figure 2.12.6.12-9.

Chapter 3

- No changes.

Chapter 4

- No changes.

Chapter 5

- No changes.

Chapter 6

- No changes.

Chapter 7

- No changes.

Chapter 8

- No changes.

Chapter 9

- No changes.

Enclosure 3

List of Drawing Changes

NAC-STC SAR, Revision 15B

August 2015

List of Drawing Changes, NAC-STC SAR, Revision 15B

Drawing 423-843, Sheet 1 of 1, Revision 4

1. Revised B.O.M., added Item 17 as follows, Name "TRANSPORT CASK ASSEMBLY – MPC-WVDP", Qty. "1" for Assy 92, Drawing No. "630087-501-99".
2. Added Assy 92 column with quantity from items 2-10.
3. Added Assy 92 callout "Transport Assembly-MPC-WVDP / Weight: 233,100#".
4. Zone F2, Added Item 17 balloon callout next to Item 16.

Drawing 423-843, Sheet 1 of 1, Revision 5

1. Revised title block and drawing to current standards.
2. Zone A6/A7, added Assembly 91 Title "TRANSPORT ASSEMBLY – STC HBU".
3. B.O.M., added Item 18 as follows, Name "CASK ASSEMBLY – STC-HBU", Assy 91 Qty. "1", Drawing No. "423-800-97".
4. B.O.M., added Assembly 91 with Items 2 & 3 QTY. "1", Items 4-7 QTY. "32", Items 8 and 9 QTY. "AR", Item 10 QTY. "4".

Drawing 423-875, Sheets 1 thru 2 of 2, Revision 11

Sheet 1:

1. Zone E7, revised dimension to "(8.78)," was "(8.8)".
2. Zone E8, added dimension "8.88 ± .03/TYP".

Sheet 2:

3. Zone E4, revised dimension to "8.2 + .1/-.2", was "(8.2)".

Drawing 423-878, Sheets 1 thru 2 of 2, Revision 3

Sheet 1:

1. Zone E7, revised dimension to "(8.73)/TYP," was "(8.7)/TYP".
2. Zone E1, added dimension "8.83 ± .03/TYP".

Sheet 2:

3. Zone E4, revised dimension to "8.2 + .1/-.2", was "(8.2)".
4. Zone B4, revised dimension to "(8.3)", was "(8.2)".

Drawing 630087-512, Sheet 1 of 1, Revision 1

1. Revised Note 3 of the drawing read: "DELETED;" was, "LIQUID PENETRANT EXAMINE ALL WELDS PER ASME CODE, SECTION V, ARTICLE 6, ACCEPTANCE PER ASME CODE, SECTION III, SUBSECTION NF, NF-5350."
2. Zone E6, changed size of weld between Item 1 and Item 6 to 3/32" double sided fillet, was 3/16" double sided fillet.
3. Zone D1/D2, changed weld size and quantity to 3/32" 1-6, was 3/16" 2-3.

Enclosure 4

Proposed Changes for Certificate of Compliance Revision 13

NAC-STC SAR, Revision 15B

August 2015

CoC Sections (new)

Page 6 of 15
5.(a)(3) Drawings (Continued)

(ix) For the West Valley Demonstration Project High Level Waste overpack, the shell, overpack closure lid, spacers, transport insert and basket are constructed and assembled in accordance with the following NAC International Drawing Nos.:

630087-501, sheets 1-2, Rev. 1	630087-511, Rev. 1
630087-504, Rev. 0	630087-512, Rev. 1
630087-505, Rev. 0	630087-513, Rev. 1
630087-510, Rev. 1	630087-514, Rev. 0

Page 11 of 15
5.(b)(1) Contents – Type and Form of Material (Continued)

(vi) West Valley Demonstration Project (WVDP) High Level Waste (HLW) canisters containing HLW vitrified in borosilicate glass. An overpack may contain melter-evacuated HLW canisters partially filled with glass or HLW debris. The nominal height of a canister shall be ≤ 118 inches and the nominal width shall be ≤ 24 inches. The heat load shall be ≤ 0.300 kW per HLW canister. The maximum gross weight allowed per canister is 5,500 lbs. The following are the applicable design limits for the HLW:

WVDP HLW Canisters	
Earliest Transport Date:	4/1/2014
Maximum HLW Mass [kg]:	2200
Maximum Ci Content HLW	
Cs-137:	42000
Ba-137m:	40000
Sr-90:	23000
Y-90:	23000
Co-60:	0.2

Page 13 of 15
5.(b)(2) Maximum quantity of material per package (Continued)

(vii) For the contents described in 5.(b)(1)(vi): Up to 5 HLW canisters, including melter-evacuated HLW canisters partially filled with glass or HLW debris, may be transported in the WVDP HLW overpack. For an overpack loaded with less than 5 canisters, a transport insert shall be loaded in all empty basket cell locations.

The NAC-STC content weight shall be ≤ 45,800 lbs. in the WVDP HLW overpack configuration. The HLW overpack heat load shall be ≤ 1.5 kW. Top and bottom spacers are authorized for axially positioning the WVDP HLW overpack with the NAC-STC cask cavity.

CoC Sections (revised)

Page 1 of 15
5.(a)(2) Description

Revised 1st Full Paragraph

A steel, lead and polymer (NS4FR) shielded shipping cask for (a) directly loaded irradiated PWR fuel assemblies, (b) intact, damaged and/or the fuel debris of Yankee Class or Connecticut Yankee irradiated PWR fuel assemblies in a canister, (c) West Valley Demonstration Project (WVDP) High Level Waste (HLW) canisters in a HLW overpack, and (d) non-fissile, solid radioactive materials (referred to hereafter as Greater Than Class C (GTCC) as defined in 10 CFR Part 61) waste in a canister. The cask body is a right circular cylinder with an impact limiter at each end. The package has approximate dimensions as follows:

Page 4 of 15
5.(a)(2) Description (Continued)

New Last Full Paragraph

The WVDP-HLW overpack consists of three (3) principle components. These are the HLW Overpack shell, basket, and closure lid. The HLW Overpack consists of an annular right-circular shell closed at one end by a bottom plate. The shell is constructed of 3/8-inch rolled dual-certified Type 304/304L stainless steel plate. The edges of the rolled plates are joined with full penetration welds. The Type 304/304L stainless steel bottom plate is also attached to the shell by using a full penetration weld. The shell is constructed in accordance with ASME Code Section VIII, Division 2. The nominal inside and outside diameters of the HLW Overpack are 69.8 inches and 70.6 inches, respectively. The overall external length of the HLW Overpack is 126.5 inches, the inside depth is 124.5 inches and the bottom plate is 2.0-inch thick. The closure lid is a 4-inch thick Type 304/304L stainless steel plate or forging. It is joined to the HLW Overpack shell using a partial penetration weld. The basket has 5 cells that allows up to 5 HLW canisters, including melter-evacuated HLW canisters partially filled with glass or HLW debris, to be loaded. Empty cells shall have a transport insert loaded.

Page 4 of 15
5.(a)(3) Drawings

(i) The cask is constructed and assembled in accordance with the following Nuclear Assurance Corporation (now NAC International) Drawing Nos.:

423-800, sheets 1-3, Rev. 17P & 17NP
423-802, sheets 1-7, Rev. 21
423-803, sheets 1-2, Rev. 10
423-804, sheets 1-3, Rev. 9
423-805, sheets 1-2, Rev. 7
423-806, Rev. 8
423-807, sheets 1-3, Rev. 4
423-811, sheets 1-2, Rev. 11
423-812, Rev. 6
423-900, Rev. 7
423-209, Rev. 0
423-210, Rev. 0
423-901, Rev. 2

(ii) For the directly loaded configuration, the basket is constructed and assembled in accordance with the following Nuclear Assurance Corporation (now NAC International) Drawing Nos.:

423-870, Rev. 6
423-871, Rev. 5
423-872, Rev. 6
423-873, Rev. 2
423-874, Rev. 2
423-875, sheets 1-2, Rev. 11
423-878, sheets 1-2, Rev. 3
423-880, Rev. 1P & 0NP

Page 5 of 15
5.(a)(3) Drawings (Continued)

(v) The Balsa Impact Limiters are constructed and assembled in accordance with the following NAC International Drawing Nos.:

423-257, Rev. 2
423-258, Rev. 2
423-843, Rev. 5
423-859, Rev. 0

5.(b)(1) Contents

(1) Type and Form of Material

(i) Irradiated PWR fuel assemblies with uranium oxide pellets. Each fuel assembly may have a maximum burnup of 45 GWd/MTU[2]. The minimum fuel cool time is defined in the Fuel Cool Time Table, below. The maximum heat load per assembly is 850[2] watts. Prior to irradiation, the fuel assemblies must be within the following dimensions and specifications:

Assembly Type	14x14	15x15	16x16	17x17	17x17 (OFA)	Framatome-Cogema 17x17
Cladding Material	Zirconium Alloy	Zirconium Alloy	Zirconium Alloy	Zirconium Alloy	Zirconium Alloy	Zirconium Alloy
Maximum Initial Uranium Content (kg/assembly)	407	469	402.5	464	426	464
Maximum Initial Enrichment (wt% ^{235}U)	4.2	4.2	4.2	4.2	4.2	4.5
Minimum Initial Enrichment (wt% ^{235}U)	1.7	1.7	1.7	1.7	1.7	1.7
Assembly Cross- Section (inches)	7.76 to 8.11	8.20 to 8.54	8.10 to 8.14	8.43 to 8.54	8.43	8.425 to 8.518
Number of Fuel Rods per Assembly	176 to 179	204 to 216	236	264	264	264[1]
Fuel Rod OD (inch)	0.422 to 0.440	0.418 to 0.430	0.382	0.374 to 0.379	0.360	0.3714 to 0.3740
Minimum Cladding Thickness (inch)	0.023	0.024	0.025	0.023	0.023	0.0204
Pellet Diameter (inch)	0.344 to 0.377	0.358 to 0.390	0.325	0.3225 to 0.3232	0.3088	0.3224 to 0.3230
Maximum Active Fuel Length (inches)	146	144	137	144	144	144.25

Notes:

[1] - Fuel rod positions may also be occupied by solid poison shim rods or solid zirconium alloy or stainless steel fill rods.

[2] - For 17x17 PWR high burnup (HBU) fuel, a maximum assembly decay heat above 0.85 kW, up to 1.71 kW, and a burnup of 45 to 60 GWd/MTU is allowed provided the loading pattern meets the requirements of Configuration A, B or C, as shown in NAC International Drawing No. 423-800. The maximum time duration from the start of vacuum drying until the cask is placed in the horizontal orientation is limited to 48 hours. HBU fuel shipments are limited to a total duration of 3 months from the time cask loading is complete until the cask arrives at its final destination. The maximum allowed ambient temperature change during the 3-month shipment duration is limited to 75°F.

5.(b)(1)(i) Contents – Type and Form of Material – Irradiated PWR fuel assemblies (Continued)

New Fuel Cool Time Tables

FUEL COOL TIME TABLE
(Configuration A 17x17 PWR HBU)
Minimum Fuel Cool Time in Years

Cobalt	Min Enr.	Burnup [GWd/MTU]															
[g/kg]	[wt. %]	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
0.4	2.9	4.0	4.0	4.0	4.3	4.9	5.6	6.3	7.0	7.8	8.7	-	-	-	-	-	-
	3.1	4.0	4.0	4.0	4.0	4.1	4.7	5.3	6.0	6.8	7.5	8.3	9.2	10.1	-	-	-
	3.3	4.0	4.0	4.0	4.0	4.0	4.1	4.5	5.1	5.8	6.5	7.2	8.0	8.9	-	-	-
	3.5	4.0	4.0	4.0	4.0	4.0	4.1	4.2	4.3	4.9	5.5	6.2	7.0	7.8	8.6	9.4	10.3
	3.7	4.0	4.0	4.0	4.0	4.0	4.0	4.2	4.3	4.4	4.7	5.3	6.0	6.7	7.5	8.3	9.1
	3.9	4.0	4.0	4.0	4.0	4.0	4.0	4.1	4.2	4.3	4.4	4.5	5.1	5.8	6.5	7.2	8.0
	4.1	4.0	4.0	4.0	4.0	4.0	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.9	5.6	6.3	7.0
	4.3	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.1	4.2	4.3	4.4	4.5	4.7	4.8	5.4	6.1
	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.9	5.2
	4.7	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.1	4.2	4.4	4.4	4.5	4.7	4.8	4.9
	4.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.8	4.9
0.8	2.9	6.4	6.9	7.4	8.0	8.6	9.1	9.8	10.4	11.1	11.8	-	-	-	-	-	-
	3.1	5.7	6.2	6.7	7.2	7.8	8.3	8.9	9.5	10.1	10.8	11.5	12.2	12.9	-	-	-
	3.3	5.1	5.6	6.0	6.5	7.0	7.6	8.1	8.7	9.3	9.9	10.6	11.2	11.9	-	-	-
	3.5	4.6	5.0	5.4	5.9	6.4	6.8	7.4	7.9	8.5	9.0	9.7	10.3	11.0	11.6	12.3	13.1
	3.7	4.1	4.5	4.9	5.3	5.7	6.2	6.7	7.2	7.7	8.3	8.8	9.4	10.1	10.7	11.4	12.0
	3.9	4.0	4.0	4.4	4.7	5.2	5.6	6.0	6.5	7.0	7.5	8.1	8.7	9.2	9.8	10.5	11.2
	4.1	4.0	4.0	4.0	4.3	4.6	5.0	5.5	5.9	6.4	6.9	7.4	7.9	8.5	9.0	9.6	10.3
	4.3	4.0	4.0	4.0	4.0	4.2	4.5	4.9	5.4	5.8	6.3	6.7	7.2	7.8	8.3	8.9	9.4
	4.5	4.0	4.0	4.0	4.0	4.0	4.1	4.5	4.9	5.3	5.7	6.1	6.6	7.1	7.6	8.1	8.7
	4.7	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.4	4.8	5.2	5.6	6.0	6.5	7.0	7.5	8.0
	4.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.3	4.7	5.1	5.5	5.9	6.4	6.9	7.4
1.2	2.9	8.9	9.4	9.9	10.4	11.0	11.5	12.0	12.6	13.3	13.8	-	-	-	-	-	-
	3.1	8.3	8.8	9.2	9.7	10.2	10.7	11.3	11.8	12.4	13.0	13.6	14.2	14.9	-	-	-
	3.3	7.7	8.1	8.6	9.0	9.5	10.0	10.5	11.1	11.6	12.1	12.7	13.3	13.9	-	-	-
	3.5	7.2	7.6	8.0	8.4	8.9	9.3	9.8	10.3	10.9	11.4	11.9	12.5	13.1	13.7	14.3	15.0
	3.7	6.7	7.0	7.4	7.9	8.3	8.7	9.2	9.6	10.1	10.7	11.2	11.7	12.3	12.9	13.5	14.0
	3.9	6.2	6.6	6.9	7.3	7.7	8.1	8.6	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.6	13.2
	4.1	5.8	6.1	6.5	6.8	7.2	7.6	8.0	8.4	8.9	9.3	9.8	10.3	10.8	11.3	11.9	12.4
	4.3	5.4	5.7	6.0	6.4	6.7	7.1	7.5	7.9	8.3	8.8	9.2	9.7	10.1	10.7	11.2	11.7
	4.5	5.0	5.3	5.6	6.0	6.3	6.7	7.0	7.4	7.8	8.2	8.6	9.1	9.5	10.0	10.5	11.0
	4.7	4.6	4.9	5.2	5.6	5.9	6.2	6.6	6.9	7.3	7.7	8.1	8.5	8.9	9.4	9.9	10.3
	4.9	4.3	4.6	4.9	5.2	5.5	5.8	6.2	6.5	6.9	7.2	7.6	8.0	8.4	8.8	9.3	9.7

FUEL COOL TIME TABLE
(Configuration B 17x17 PWR HBU)
Minimum Fuel Cool Time in Years

Cobalt	Min Enr.	Burnup [GWd/MTU]															
[g/kg]	[wt. %]	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
0.4	2.9	4.3	4.4	5.0	5.7	6.5	7.3	8.2	9.1	10.0	11.0	-	-	-	-	-	-
	3.1	4.2	4.3	4.4	4.8	5.5	6.2	7.0	7.9	8.8	9.7	10.7	11.7	12.7	-	-	-
	3.3	4.1	4.3	4.4	4.5	4.6	5.2	6.0	6.7	7.6	8.4	9.4	10.3	11.3	-	-	-
	3.5	4.1	4.2	4.3	4.4	4.5	4.7	5.0	5.7	6.5	7.3	8.2	9.0	10.0	11.0	11.9	13.0
	3.7	4.0	4.2	4.3	4.4	4.5	4.6	4.8	4.9	5.5	6.3	7.0	7.9	8.8	9.7	10.6	11.6
	3.9	4.0	4.1	4.2	4.3	4.5	4.6	4.7	4.8	5.0	5.3	6.1	6.8	7.6	8.5	9.4	10.3
	4.1	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.8	4.9	5.0	5.2	5.9	6.6	7.4	8.2	9.1
	4.3	4.0	4.0	4.1	4.3	4.4	4.5	4.6	4.7	4.9	5.0	5.2	5.3	5.7	6.4	7.2	8.0
	4.5	4.0	4.0	4.1	4.2	4.3	4.4	4.6	4.7	4.8	5.0	5.1	5.3	5.4	5.6	6.2	7.0
	4.7	4.0	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.8	4.9	5.0	5.2	5.4	5.6	5.7	6.1
	4.9	4.0	4.0	4.0	4.1	4.2	4.4	4.5	4.6	4.7	4.8	5.0	5.1	5.3	5.5	5.6	5.8
0.8	2.9	7.4	8.0	8.6	9.2	9.9	10.6	11.4	12.1	12.9	13.7	-	-	-	-	-	-
	3.1	6.6	7.2	7.8	8.4	9.0	9.7	10.4	11.1	11.8	12.6	13.4	14.2	15.1	-	-	-
	3.3	5.9	6.5	7.0	7.6	8.1	8.8	9.4	10.1	10.8	11.5	12.3	13.1	13.9	-	-	-
	3.5	5.3	5.8	6.3	6.8	7.4	8.0	8.6	9.2	9.9	10.6	11.3	12.0	12.8	13.6	14.4	15.3
	3.7	4.8	5.2	5.7	6.1	6.7	7.2	7.8	8.4	9.0	9.6	10.3	11.1	11.8	12.5	13.3	14.1
	3.9	4.3	4.7	5.1	5.6	6.0	6.5	7.0	7.6	8.2	8.8	9.4	10.1	10.8	11.5	12.3	13.1
	4.1	4.0	4.2	4.6	5.0	5.4	5.9	6.4	6.9	7.5	8.0	8.6	9.3	9.9	10.6	11.3	12.0
	4.3	4.0	4.0	4.2	4.5	4.9	5.3	5.8	6.3	6.8	7.3	7.9	8.5	9.1	9.7	10.4	11.1
	4.5	4.0	4.0	4.1	4.2	4.4	4.8	5.3	5.7	6.2	6.7	7.2	7.8	8.3	8.9	9.6	10.2
	4.7	4.0	4.0	4.1	4.2	4.3	4.4	4.8	5.2	5.6	6.1	6.6	7.1	7.6	8.2	8.8	9.4
	4.9	4.0	4.0	4.1	4.1	4.3	4.4	4.5	4.7	5.1	5.6	6.0	6.5	7.0	7.5	8.1	8.6
1.2	2.9	9.8	10.4	11.0	11.6	12.1	12.8	13.5	14.1	14.8	15.6	-	-	-	-	-	-
	3.1	9.1	9.6	10.2	10.8	11.3	11.9	12.5	13.2	13.8	14.5	15.3	16.0	16.8	-	-	-
	3.3	8.5	9.0	9.5	10.0	10.6	11.1	11.7	12.3	12.9	13.6	14.2	15.0	15.7	-	-	-
	3.5	7.9	8.3	8.8	9.3	9.8	10.4	10.9	11.5	12.0	12.7	13.4	14.0	14.7	15.4	16.1	16.9
	3.7	7.3	7.8	8.2	8.7	9.1	9.6	10.2	10.7	11.3	11.9	12.5	13.1	13.8	14.4	15.2	15.9
	3.9	6.8	7.2	7.6	8.1	8.5	9.0	9.5	10.0	10.6	11.1	11.7	12.3	12.9	13.5	14.2	14.9
	4.1	6.3	6.7	7.1	7.5	8.0	8.4	8.9	9.4	9.9	10.4	11.0	11.5	12.1	12.7	13.3	14.0
	4.3	5.9	6.3	6.6	7.0	7.4	7.9	8.3	8.8	9.2	9.7	10.2	10.8	11.4	11.9	12.5	13.1
	4.5	5.5	5.9	6.2	6.6	6.9	7.4	7.8	8.2	8.7	9.1	9.6	10.1	10.7	11.2	11.7	12.3
	4.7	5.1	5.5	5.8	6.1	6.5	6.9	7.3	7.7	8.1	8.6	9.0	9.5	10.0	10.5	11.1	11.6
	4.9	4.8	5.1	5.4	5.8	6.1	6.5	6.8	7.2	7.6	8.0	8.5	8.9	9.4	9.9	10.4	10.9

FUEL COOL TIME TABLE
(Configuration C 17x17 PWR HBU)
Minimum Fuel Cool Time in Years

Cobalt	Min Enr.	Burnup [GWd/MTU]															
[g/kg]	[wt. %]	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
0.4	2.9	7.1	8.0	9.1	10.3	11.6	12.9	14.2	15.6	17.0	18.4	-	-	-	-	-	-
	3.1	6.0	6.9	7.8	8.8	10.0	11.2	12.5	13.8	15.2	16.5	17.9	19.4	20.8	-	-	-
	3.3	5.2	5.8	6.7	7.5	8.5	9.7	10.9	12.1	13.4	14.8	16.1	17.5	18.9	-	-	-
	3.5	5.1	5.3	5.7	6.5	7.3	8.3	9.4	10.6	11.8	13.1	14.4	15.7	17.1	18.4	19.8	21.3
	3.7	5.1	5.3	5.4	5.6	6.3	7.1	8.0	9.1	10.2	11.5	12.7	14.0	15.3	16.7	18.0	19.4
	3.9	5.0	5.2	5.4	5.6	5.8	6.1	6.9	7.8	8.9	10.0	11.2	12.4	13.7	15.0	16.3	17.6
	4.1	5.0	5.1	5.3	5.5	5.7	5.9	6.0	6.8	7.6	8.6	9.7	10.9	12.1	13.4	14.6	15.9
	4.3	4.9	5.1	5.3	5.5	5.6	5.8	6.0	6.2	6.6	7.5	8.5	9.5	10.7	11.8	13.1	14.3
	4.5	4.9	5.0	5.2	5.4	5.6	5.8	5.9	6.1	6.4	6.7	7.3	8.3	9.3	10.4	11.6	12.8
	4.7	4.8	5.0	5.1	5.4	5.5	5.7	5.9	6.1	6.3	6.6	6.8	7.2	8.1	9.1	10.2	11.4
	4.9	4.8	4.9	5.1	5.3	5.5	5.7	5.8	6.0	6.2	6.5	6.7	7.0	7.3	8.0	9.0	10.0
0.8	2.9	10.6	11.4	12.2	13.1	14.0	15.1	16.2	17.4	18.6	19.8	-	-	-	-	-	-
	3.1	9.6	10.4	11.2	11.9	12.8	13.7	14.7	15.8	17.0	18.1	19.4	20.6	21.9	-	-	-
	3.3	8.8	9.4	10.2	10.9	11.7	12.5	13.4	14.4	15.5	16.6	17.7	19.0	20.2	-	-	-
	3.5	8.0	8.6	9.3	10.0	10.7	11.5	12.3	13.2	14.1	15.1	16.2	17.4	18.6	19.8	21.0	22.3
	3.7	7.5	7.8	8.5	9.1	9.8	10.5	11.3	12.0	12.9	13.8	14.8	15.9	17.1	18.2	19.4	20.6
	3.9	7.2	7.4	7.7	8.3	9.0	9.6	10.4	11.1	11.9	12.7	13.6	14.6	15.6	16.7	17.9	19.0
	4.1	6.9	7.1	7.3	7.6	8.2	8.8	9.5	10.2	10.9	11.7	12.5	13.4	14.3	15.4	16.4	17.6
	4.3	6.7	6.8	7.0	7.2	7.5	8.1	8.7	9.4	10.0	10.8	11.5	12.3	13.2	14.0	15.1	16.1
	4.5	6.4	6.6	6.7	6.9	7.1	7.4	8.0	8.6	9.2	9.9	10.6	11.4	12.1	13.0	13.8	14.9
	4.7	6.2	6.3	6.5	6.7	6.8	7.0	7.4	7.9	8.5	9.1	9.8	10.5	11.2	12.0	12.8	13.7
	4.9	5.9	6.1	6.3	6.4	6.6	6.8	6.9	7.3	7.8	8.4	9.0	9.7	10.4	11.1	11.8	12.6
1.2	2.9	12.9	13.6	14.3	15.1	15.9	16.7	17.7	18.7	19.8	20.9	-	-	-	-	-	-
	3.1	12.0	12.7	13.4	14.0	14.8	15.6	16.4	17.3	18.3	19.4	20.5	21.6	22.8	-	-	-
	3.3	11.4	11.8	12.5	13.1	13.8	14.6	15.3	16.1	17.0	17.9	19.0	20.1	21.2	-	-	-
	3.5	10.9	11.2	11.7	12.3	12.9	13.6	14.3	15.1	15.9	16.7	17.7	18.7	19.7	20.8	21.9	23.1
	3.7	10.5	10.8	11.1	11.5	12.1	12.8	13.4	14.1	14.9	15.6	16.5	17.4	18.3	19.4	20.5	21.6
	3.9	10.3	10.4	10.7	11.0	11.4	11.9	12.6	13.3	13.9	14.7	15.4	16.2	17.1	18.0	19.1	20.1
	4.1	10.0	10.1	10.3	10.6	10.8	11.2	11.8	12.4	13.1	13.8	14.5	15.2	16.0	16.9	17.8	18.8
	4.3	9.7	9.9	10.1	10.2	10.5	10.7	11.1	11.7	12.3	12.9	13.6	14.3	15.0	15.8	16.6	17.5
	4.5	9.5	9.7	9.8	10.0	10.1	10.4	10.6	11.0	11.6	12.1	12.8	13.5	14.1	14.9	15.6	16.4
	4.7	9.2	9.4	9.6	9.7	9.9	10.1	10.3	10.5	10.9	11.5	12.0	12.7	13.3	14.0	14.7	15.4
	4.9	9.0	9.2	9.4	9.5	9.7	9.8	10.0	10.2	10.4	10.8	11.4	11.9	12.6	13.2	13.8	14.5

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5.(b)(2) Maximum quantity of material per package

(i) For the contents described in Item 5.(b)(1)(i): PWR fuel with a burnup $\leq$ 45,000 MWd/MTU, 26 PWR fuel assemblies with a maximum total weight of 39,650 lbs. and a maximum decay heat not to exceed 22.1 kW per package. For 17x17 HBU fuel, the positioning of the fuel assemblies and shielded thermal shunts shall meet the requirements as shown in Configurations A, B or C of NAC International Drawing No. 423-800 and a maximum decay heat not to exceed 24 kW per package.

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5.(c) Criticality Safety Index (CSI):

(1) CSI=0.0 for contents described in 5.(b)(1)(i), 5.(b)(1)(ii), 5.(b)(1)(iii), 5.(b)(1)(iv) (i.e., Yankee Class and CY Fuel and GTCC Waste), and 5.(b)(1)(vi),

Enclosure 5

SAR Page Changes and LOEP

NAC-STC SAR, Revision 15B

August 2015

August 2015
Revision 15B

NAC-STC

NAC Storage Transport Cask

SAFETY ANALYSIS REPORT

Non-Proprietary Version

Docket No. 71-9235

NAC INTERNATIONAL

Atlanta Corporate Headquarters: 3950 East Jones Bridge Road, Norcross, Georgia 30092 USA
Phone 770-447-1144, Fax 770-447-1797, www.nacintl.com

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423-803, sheets 1-2	Rev 10	Lid Assembly – Inner, NAC-STC Cask
423-804, sheets 1-3	Rev 9	Details - Inner Lid, NAC-STC Cask
423-805, sheets 1-2	Rev 7	Lid Assembly – Outer, NAC-STC Cask
423-806	Rev 8	Port Coverplate Assy – Inner Lid, NAC-STC Cask
423-807, sheets 1-3	Rev 4	Assembly, Port Cover, NAC-STC Cask
423-209	Rev 0	Impact Limiter Assy – Upper, NAC-STC Cask
423-210	Rev 0	Impact Limiter Assy – Lower, NAC-STC Cask
423-257	Rev 2	Balsa Impact Limiter, Upper, NAC-STC Cask
423-258	Rev 2	Balsa Impact Limiter, Lower, NAC-STC Cask
423-811, sheets 1-2	Rev 11	Details – NAC-STC Cask
423-812	Rev 6	Nameplates – NAC-STC Cask
423-843	Rev 5	Transport Assembly, Balsa Impact Limiters, NAC-STC
423-859	Rev 0	Attachment Hardware, Balsa Limiters, NAC-STC
423-870	Rev 6	Fuel Basket Assembly, PWR, 26 Element, NAC-STC Cask
423-871	Rev 5	Bottom Weldment, Fuel Basket, PWR, 26 Element, NAC-STC Cask
423-872	Rev 6	Top Weldment, Fuel Basket, PWR, 26 Element, NAC-STC Cask
423-873	Rev 2	Support Disk and Misc. Basket Details, PWR, 26 Element, NAC-STC Cask
423-874	Rev 2	Heat Transfer Disk, Fuel Basket, PWR, 26 Element, NAC-STC Cask
423-875, sheets 1-2	Rev 11	Tube, NAC-STC Cask
423-878, sheets 1-2	Rev 3	Alternate Tube Assembly, NAC-STC Cask
423-880	Rev 1P(1)	Shielded Thermal Shunt Assembly, NAC-STC Cask
423-880	Rev 0NP(1)	Shielded Thermal Shunt Assembly, NAC-STC Cask
423-900	Rev 7	Package Assembly Transportation, NAC-STC Cask
423-901	Rev 2	Transportation Package Concept, NAC-STC Cask
455-800, sheets 1-2	Rev 2	Assembly, Transport Cask, MPC-Yankee
455-801, sheets 1-2	Rev 4	Assembly, Transport Cask, NAC-MPC
455-820, sheets 1-2	Rev 3	Spacers, Transport Cask, MPC-Yankee

(1) Proprietary and Non-proprietary drawing versions are only included in their respective SAR versions.

List of Drawings (continued)

Drawing Number	Revision No.	Title
455-870	Rev 5	Canister Shell, MPC-Yankee
455-871, sheets 1-2	Rev 8	Details, Canister, MPC-Yankee
455-871, sheets 1-3	Rev 7P2	Details, Canister, MPC-Yankee
455-872, sheets 1-2	Rev 12	Assembly, Transportable Storage Canister (TSC), MPC-Yankee
455-872, sheets 1-2	Rev 11P1	Assembly, Transportable Storage Canister (TSC), MPC-Yankee
455-873	Rev 4	Assembly, Drain Tube, Canister, MPC-Yankee
455-881, sheets 1-3	Rev 8	PWR Fuel Tube, MPC-Yankee
455-887, sheets 1-3	Rev 4	Basket Assembly, 24 GTCC Container, MPC-Yankee
455-888, sheets 1-2	Rev 8	Assembly, Transportable Storage Canister (TSC), 24 GTCC Container, MPC-Yankee
455-891, sheets 1-2	Rev 1	Bottom Weldment, Fuel Basket, MPC-Yankee
455-891, sheets 1-3	Rev 2P0	Bottom Weldment, Fuel Basket, MPC-Yankee
455-892, sheets 1-2	Rev 3	Top Weldment, Fuel Basket, MPC-Yankee
455-892, sheets 1-3	Rev 3P0	Top Weldment, Fuel Basket, MPC-Yankee
455-893	Rev 3	Support Disk and Misc. Basket Details, MPC-Yankee
455-894	Rev 2	Heat Transfer Disk, Fuel Basket, MPC-Yankee
455-895, sheets 1-2	Rev 5	Fuel Basket Assembly, MPC-Yankee
455-895, sheets 1-2	Rev 5P0	Fuel Basket Assembly, MPC-Yankee
455-919	Rev 2	Retainer, United Nuclear Test Assy, MPC-Yankee
414-801, sheets 1-2	Rev 2	Cask Assembly, NAC-STC, CY-MPC
414-820	Rev 0	Canister Spacer CY-MPC
414-870	Rev 3	Canister Shell, CY-MPC
414-871, sheets 1-2	Rev 6	Details, Canister CY-MPC
414-872, sheets 1-3	Rev 6	Assembly, Transportable Storage Canister (TSC), CY-MPC
414-873	Rev 2	Drain Tube Assembly, CY-MPC
414-874	Rev 0	Shim, Canister, CY-MPC
414-875	Rev 0	Spacer Shim, Canister, CY-MPC
414-881, sheets 1-2	Rev 4	Fuel Tube, Transportable Storage Canister (TSC), CY-MPC
414-882, sheets 1-2	Rev 4	Oversize Fuel Tube, Transportable Storage Canister (TSC), CY-MPC
414-887, sheets 1-4	Rev 4	Basket Assembly, GTCC, CY-MPC

List of Drawings (Continued)

Drawing Number	Revision No.	Title
MPC-WVDP System Components		
630087-501, sheets 1-2	1	Transport Cask Assembly, MPC-WVDP
630087-504	0	Transport Spacer, Bottom, MPC-WVDP
630087-505	0	Transport Spacer, Top, MPC-WVDP
630087-510	1	HLW Overpack Assembly, MPC-WVDP
630087-511	1	Shell, HLW Overpack, MPC-WVDP
630087-512	1	Basket, HLW Overpack, MPC-WVDP
630087-513, sheets 1-3	1	Closure Lid, HLW Overpack, MPC-WVDP
630087-514	0	Transport Insert, HLW Overpack, MPC-WVDP

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R1-223895

Security-Related Information Figure Withheld Under 10 CFR 2.390.

NAC INTERNATIONAL

TRANSPORT ASSEMBLY,
BALSA IMPACT LIMITERS,
NAC-STC

PROJECT 423 DRAWING 843 REV 5

R-229027

Security-Related Information Figure Withheld Under 10 CFR 2.390.

UNLESS OTHERWISE STATED	GROUP	NAME	DATE
			7-14-15
			7-14-15
			7-14-15
			7-14-15
			7-15-15
			7-15-15

423-870

LICENSE

NAC INTERNATIONAL

TUBE,
NAC-STC CASK

PROJECT 423 | DRAWING 875 | REV 11 | SH 1 OF 2

Security-Related Information Figure Withheld Under 10 CFR 2.390.

NAC INTERNATIONAL

TUBE,
NAC-STC CASK

PROJECT 423 | DRAWING 875 | REV 11

SHT 2 OF 2

R-229029

Security-Related Information Figure Withheld Under 10 CFR 2.390.

UNLESS OTHERWISE STATED	GROUP	NAME	DATE
	PREPARED	V. Gilchrist	7-14-15
	CHECKED	[illegible]	7-14-15
	ISSUED/RELEASED	[illegible]	7-14-15
	ENGINEERING	[illegible]	7-14-15
	APPROVED	[illegible]	7-14-15
	QUALITY	Ray W. Pass	7-15-15

NAC INTERNATIONAL

ALTERNATE TUBE ASSEMBLY, NAC-STC CASK

PROJECT 423 | DRAWING 878 | REV 3 | SHT 1 OF 2

PART ASSEMBLY 423-870

DRAWING TYPE LICENSE

Security-Related Information Figure Withheld Under 10 CFR 2.390.

NAC INTERNATIONAL

ALTERNATE TUBE ASSEMBLY, NAC-STC CASK

423 | 878 | 3

R-22092

Security-Related Information Figure Withheld Under 10 CFR 2.390.

NAC INTERNATIONAL

BASKET,
HLW OVERPACK,
MPC-WVDP

630087 | 512

Side Drop Model

For the side drop, the HLW Overpack end drop model was modified to include the inner liner of the NAC-STC cask for a more realistic representation of the interaction between the HLW Overpack Shell assembly and the NAC-STC cask. Interaction between the HLW Overpack assembly and NAC-STC inner liner was accomplished using three-dimensional surface-to-surface contact elements (CONTA170 and CONTA174). All contact elements are assigned a stiffness ratio of 1, unless otherwise noted. Note that the 170/174 contact pair calculates the gap stiffness based on the stiffness of the underlying solid elements. The side drop model is shown in Figure 2.12.6.12-4.

Boundary conditions were applied to enforce symmetry at the cut boundary of the model. All nodes on the outer surface of the NAC-STC inner liner were fixed in all degrees of freedom. An equivalent acceleration of 16.5 g was applied in the lateral direction in accordance with Table 2.6.7.4.2-3.

For the side drop condition, the loads from the HLW Overpack contents weight are transferred through distributed pressure loads into the HLW Overpack assembly wall. The HLW Overpack assembly wall is backed by the NAC-STC inner shell. Since the HLW Overpack wall and the inner shell have different radii, a gap exists between the two surfaces. This results in the load passing only through regions in which the HLW Overpack shell deflects enough to contact the inner shell. This load pattern is reflected in the side drop analysis.

Figure 2.12.6.12-4 HLW Overpack Assembly and NAC-STC Inner Liner – Side Drop Model

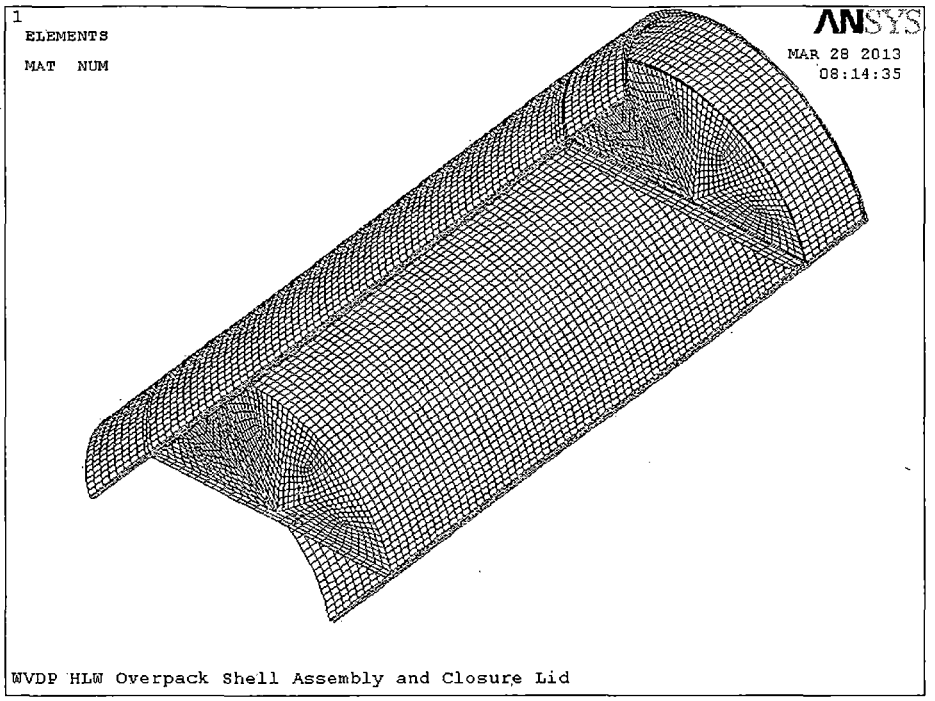

Figure 2.12.6.12-5 HLW Overpack Assembly– Side Drop Model

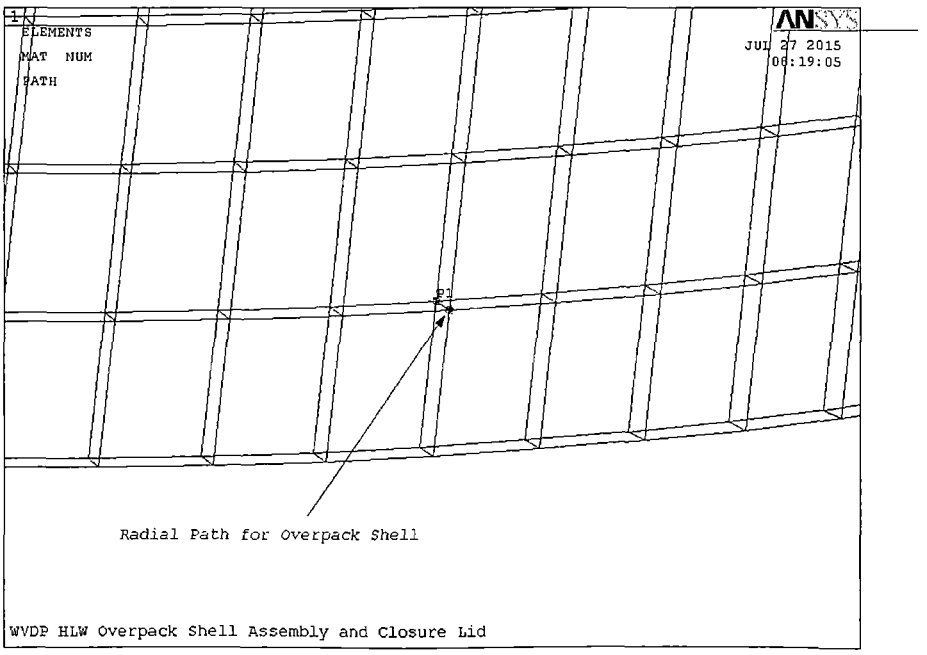

Figure 2.12.6.12-7 Localized Stress Distribution at Shell to Bottom Plate

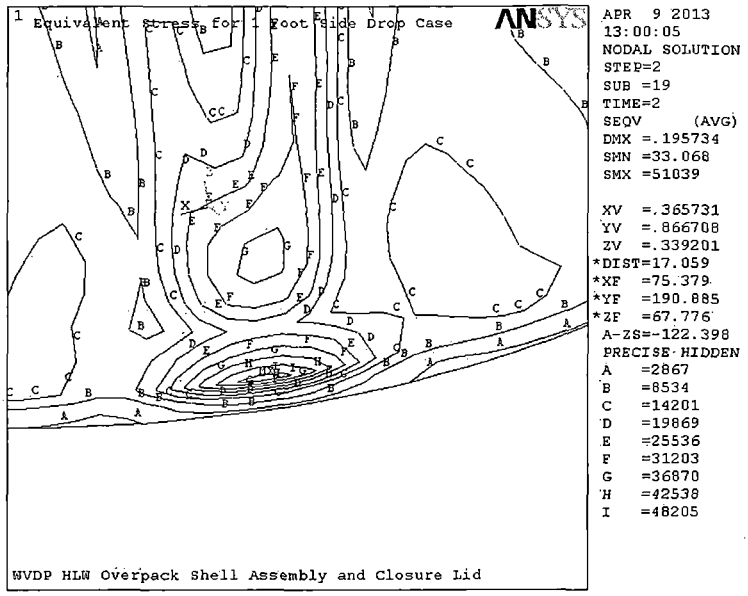

Figure 2.12.6.12-8 Localized Stress Distribution at Shell to Bottom Plate

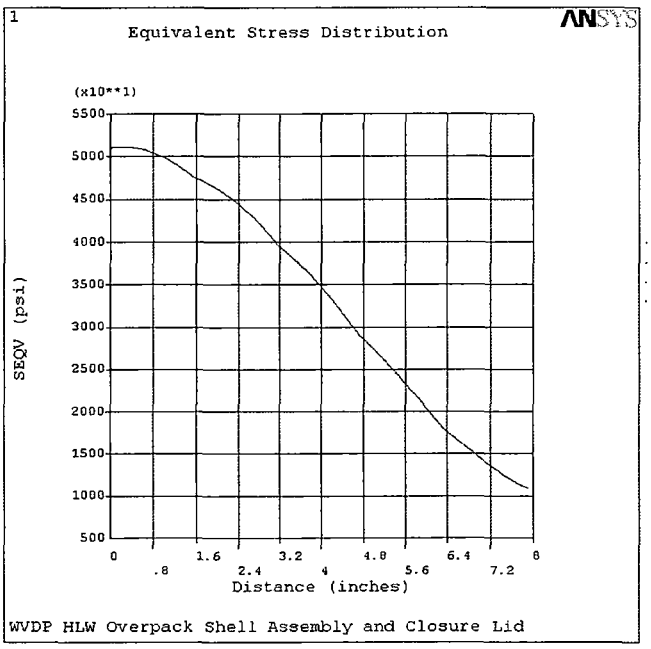

Figure 2.12.6.12-9 Path for Linearized Stress