# Westinghouse PWR/BWR Fuel Packages

## Amendment Request Schedule Review

June 22, 2010

Westinghouse

## AGENDA

**Meeting between Westinghouse Electric Co., and the Nuclear Regulatory Commission**
**Executive Boulevard Building, Room 1B-13**

**June 22, 2010**
**2:00 pm – 3:30 pm**

| | |
|---|---|
| 2:00 | Introductions |
| 2:15 | Model Nos. MCC-3, MCC-4, and MCC-5 Renewal (Docket No. 71-9239) |
| 2:45 | Model Nos. Traveller STD and Traveller XL Amendments (Docket No. 71-9297) |

- Addition of CE16NFG Fuel
- Clamshell confinement modification
- Modification and addition of VVER Fuel

| | |
|---|---|
| 3:20 | Questions or Comments from the Public |
| 3:30 | Adjourn |

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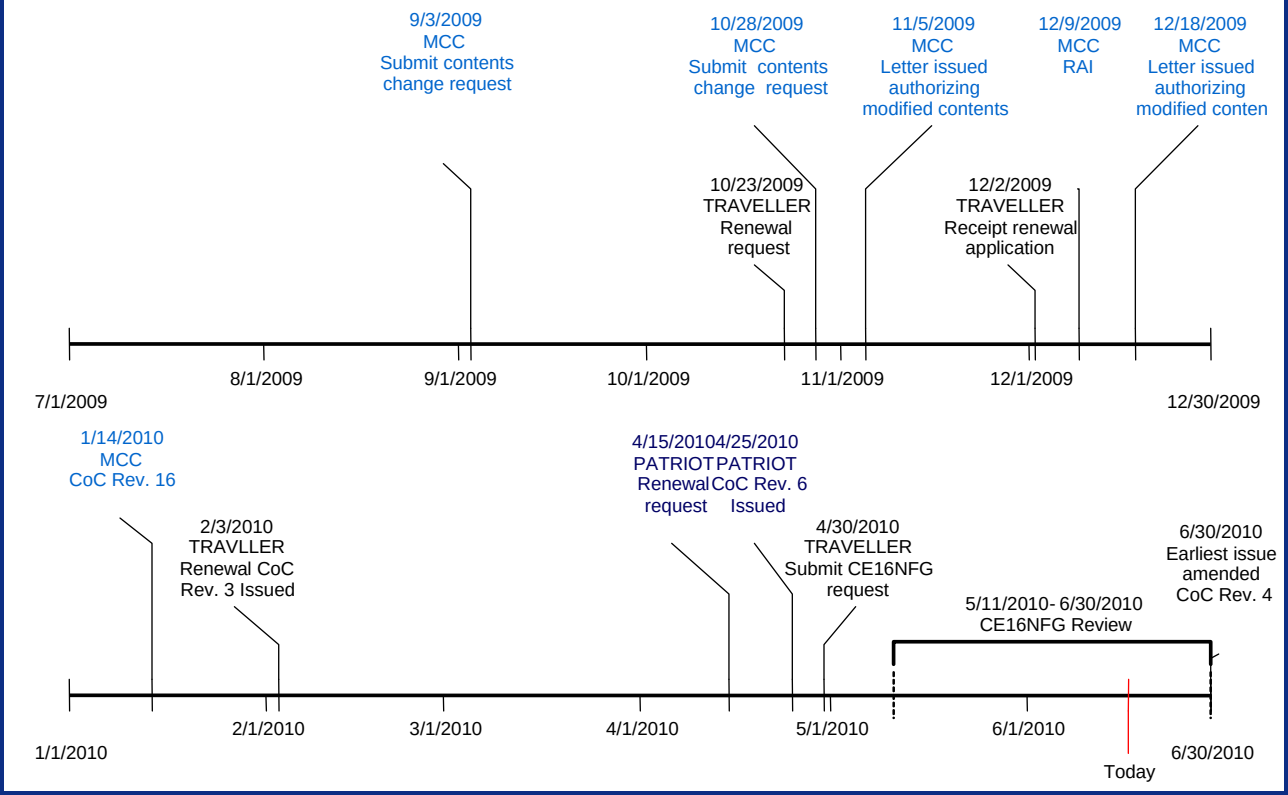
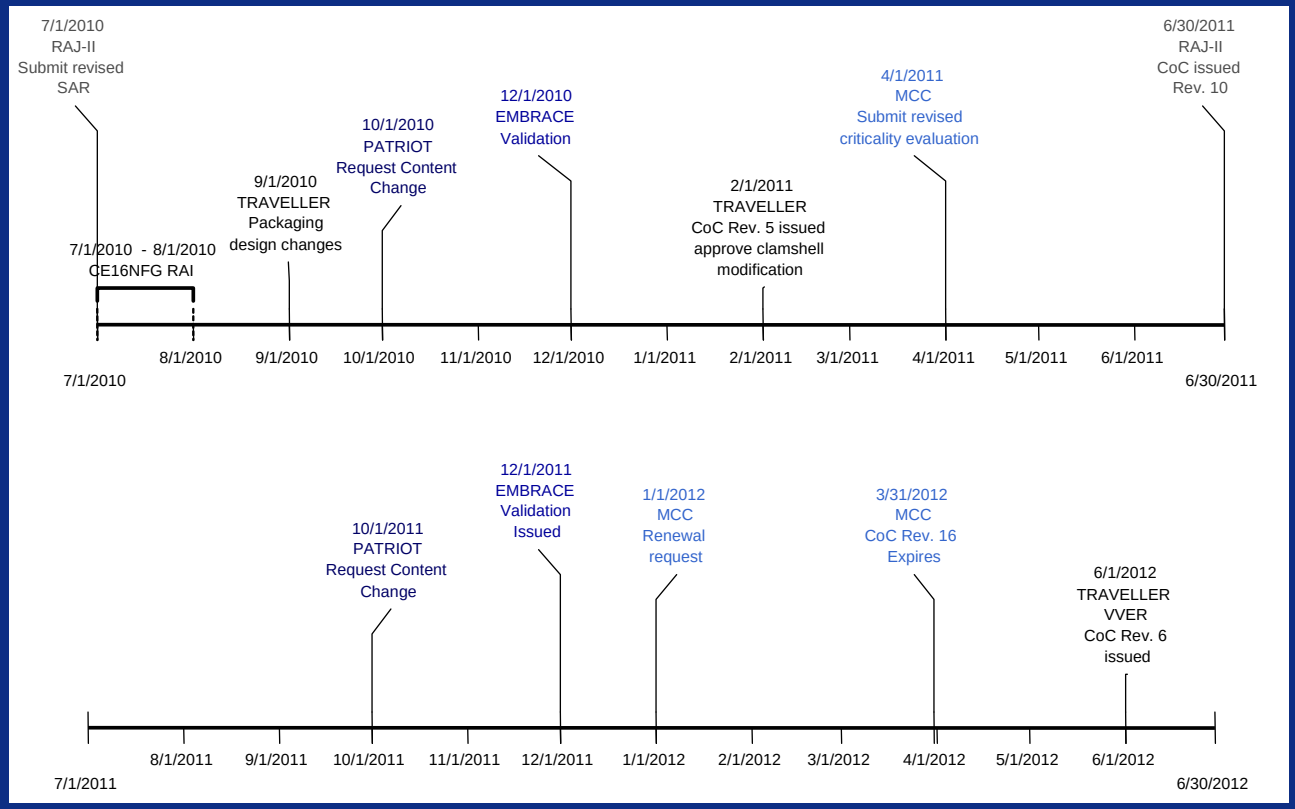
# Previous 12 months



# Next 2 years

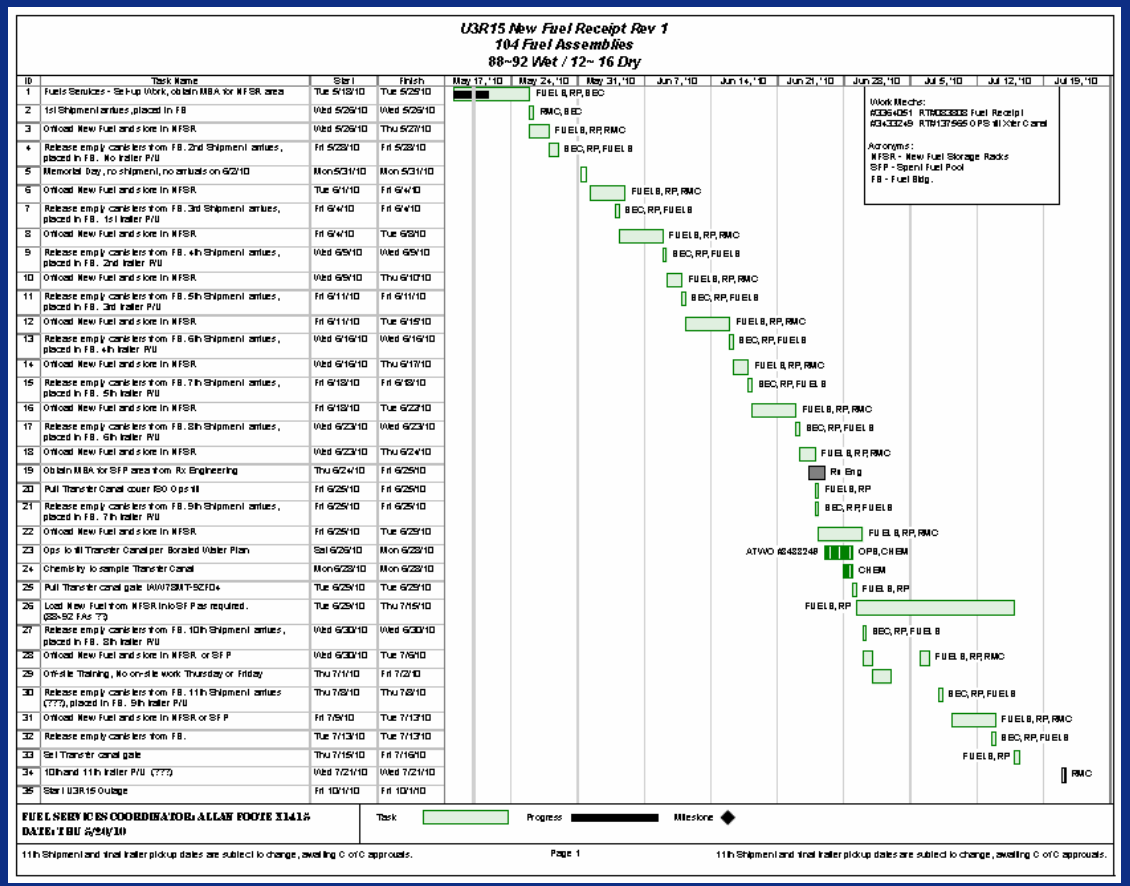

7/1/2010
RAJ-II
Submit revised
SAR
7/1/2010 - 8/1/2010
CE16NFG RAI
9/1/2010
TRAVELLER
Packaging
design changes
10/1/2010
PATRIOT
Request Content
Change
12/1/2010
EMBRACE
Validation
2/1/2011
TRAVELLER
CoC Rev. 5 issued
approve clamshell
modification
4/1/2011
MCC
Submit revised
criticality evaluation
6/30/2011
RAJ-II
CoC issued
Rev. 10
7/1/2010
8/1/2010
9/1/2010
10/1/2010
11/1/2010
12/1/2010
1/1/2011
2/1/2011
3/1/2011
4/1/2011
5/1/2011
6/1/2011
6/30/2011
10/1/2011
PATRIOT
Request Content
Change
12/1/2011
EMBRACE
Validation
Issued
1/1/2012
MCC
Renewal
request
3/31/2012
MCC
CoC Rev. 16
Expires
6/1/2012
TRAVELLER
VVER
CoC Rev. 6
issued
7/1/2011
8/1/2011
9/1/2011
10/1/2011
11/1/2011
12/1/2011
1/1/2012
2/1/2012
3/1/2012
4/1/2012
5/1/2012
6/1/2012
6/30/2012

# **Traveller**
# USA/9297/AF-96

# Design changes

- Add CE16NGF to approved contents (criticality- review in progress)
- Modification  to fuel container (clamshell) top end plate to allow handling fuel assemblies with core components (structural)
- New fuel container design for VVER fuel (structural, criticality)
- Additional technical justification for fuel spacer packaging component (structural)
- Change safety classification of package seal material (thermal)

# CE16NGF Impact on Utility Customer



**U3R15 New Fuel Receipt Rev 1**
**104 Fuel Assemblies**
**88~92 Wet / 12~ 16 Dry**

| ID | Task Name | Start | Finish |
|---|---|---|---|
| 1 | Fuels Services - Set-up Work, obtain MBA for NFSR area | Tue 5/18/10 | Tue 5/25/10 |
| 2 | 1st Shipment arrives, placed in FB | Wed 5/26/10 | Wed 5/26/10 |
| 3 | Offload New Fuel and store in NFSR | Wed 5/26/10 | Thu 5/27/10 |
| 4 | Release empty canisters from FB. 2nd Shipment arrives, placed in FB. No trailer P/U | Fri 5/28/10 | Fri 5/28/10 |
| 5 | Memorial Day, no shipment, no arrivals on 5/31/10 | Mon 5/31/10 | Mon 5/31/10 |
| 6 | Offload New Fuel and store in NFSR | Tue 6/1/10 | Fri 6/4/10 |
| 7 | Release empty canisters from FB. 3rd Shipment arrives, placed in FB. 1st trailer P/U | Fri 6/4/10 | Fri 6/4/10 |
| 8 | Offload New Fuel and store in NFSR | Fri 6/4/10 | Tue 6/8/10 |
| 9 | Release empty canisters from FB. 4th Shipment arrives, placed in FB. 2nd trailer P/U | Wed 6/5/10 | Wed 6/5/10 |
| 10 | Offload New Fuel and store in NFSR | Wed 6/5/10 | Thu 6/10/10 |
| 11 | Release empty canisters from FB. 5th Shipment arrives, placed in FB. 3rd trailer P/U | Fri 6/11/10 | Fri 6/11/10 |
| 12 | Offload New Fuel and store in NFSR | Fri 6/11/10 | Tue 6/15/10 |
| 13 | Release empty canisters from FB. 6th Shipment arrives, placed in FB. 4th trailer P/U | Wed 6/16/10 | Wed 6/16/10 |
| 14 | Offload New Fuel and store in NFSR | Wed 6/16/10 | Thu 6/17/10 |
| 15 | Release empty canisters from FB. 7th Shipment arrives, placed in FB. 5th trailer P/U | Fri 6/18/10 | Fri 6/18/10 |
| 16 | Offload New Fuel and store in NFSR | Fri 6/18/10 | Tue 6/22/10 |
| 17 | Release empty canisters from FB. 8th Shipment arrives, placed in FB. 6th trailer P/U | Wed 6/23/10 | Wed 6/23/10 |
| 18 | Offload New Fuel and store in NFSR | Wed 6/23/10 | Thu 6/24/10 |
| 19 | Obtain MBA for SFP area from Rx Engineering | Thu 6/24/10 | Fri 6/25/10 |
| 20 | Pull Transfer Canal cover ISO Ops fill | Fri 6/25/10 | Fri 6/25/10 |
| 21 | Release empty canisters from FB. 9th Shipment arrives, placed in FB. 7th trailer P/U | Fri 6/25/10 | Fri 6/25/10 |
| 22 | Offload New Fuel and store in NFSR | Fri 6/25/10 | Tue 6/29/10 |
| 23 | Ops to fill Transfer Canal per Borated Water Plan | Sat 6/26/10 | Mon 6/28/10 |
| 24 | Chemistry to sample Transfer Canal | Mon 6/28/10 | Mon 6/28/10 |
| 25 | Pull Transfer canal gate (AW78MT-SCFD4 | Tue 6/29/10 | Tue 6/29/10 |
| 26 | Load New Fuel from NFSR into SFP as required. (88-92 FAs TT) | Tue 6/29/10 | Thu 7/15/10 |
| 27 | Release empty canisters from FB. 10th Shipment arrives, placed in FB. 8th trailer P/U | Wed 6/30/10 | Wed 6/30/10 |
| 28 | Offload New Fuel and store in NFSR or SFP | Wed 6/30/10 | Tue 7/6/10 |
| 29 | Off-site Training, No on-site work Thursday or Friday | Thu 7/1/10 | Fri 7/2/10 |
| 30 | Release empty canisters from FB. 11th Shipment arrives (777), placed in FB. 9th trailer P/U | Thu 7/8/10 | Thu 7/8/10 |
| 31 | Offload New Fuel and store in NFSR or SFP | Fri 7/9/10 | Tue 7/13/10 |
| 32 | Release empty canisters from FB. | Tue 7/13/10 | Tue 7/13/10 |
| 33 | Set Transfer canal gate | Thu 7/15/10 | Fri 7/16/10 |
| 34 | 10th and 11th trailer P/U (777) | Wed 7/21/10 | Wed 7/21/10 |
| 35 | Start U3R15 Outage | Fri 10/1/10 | Fri 10/1/10 |

Work Packs:
60364051 RTM383808 Fuel Receipt
60433249 RTM137565 0 PS fill Xfer Canal

Acronyms:
NFSR - New Fuel Storage Racks
SFP - Spent Fuel Pool
FB - Fuel Bldg.

FUEL SERVICES COORDINATOR: ALLAN FOOTE X1415
DATE: THU 5/20/10

Task Progress Milestone

11th Shipment and final trailer pickup dates are subject to change, awaiting C of C approvals. Page 1 11th Shipment and final trailer pickup dates are subject to change, awaiting C of C approvals.

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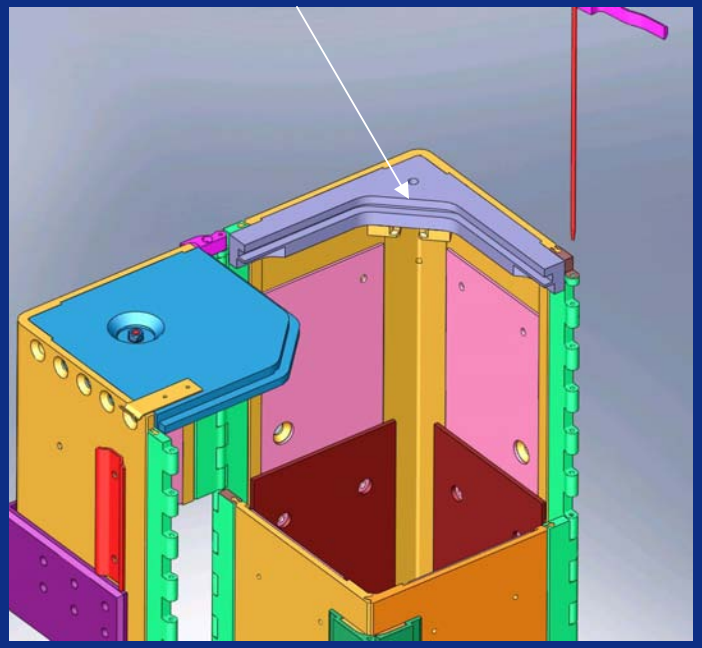
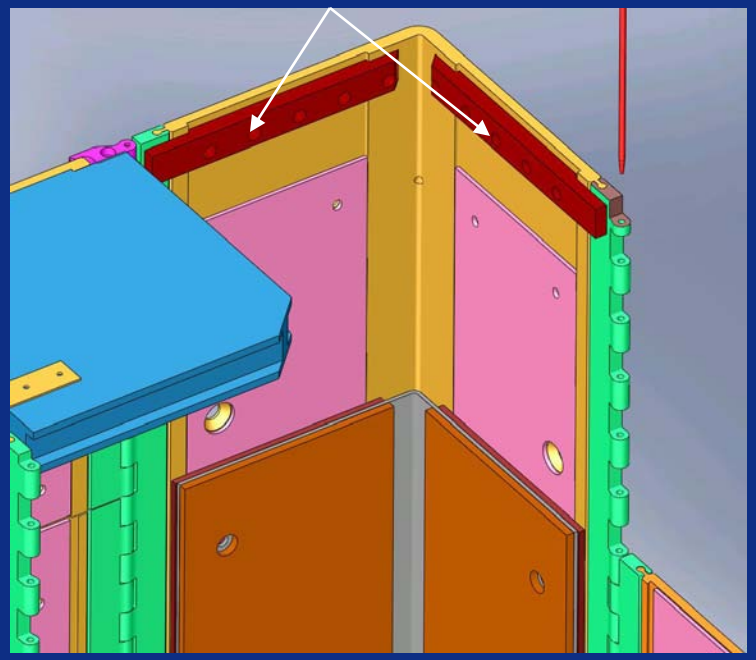
# Clamshell Top End Plate

**Shear lip interferes with nuclear power plant fuel tools**



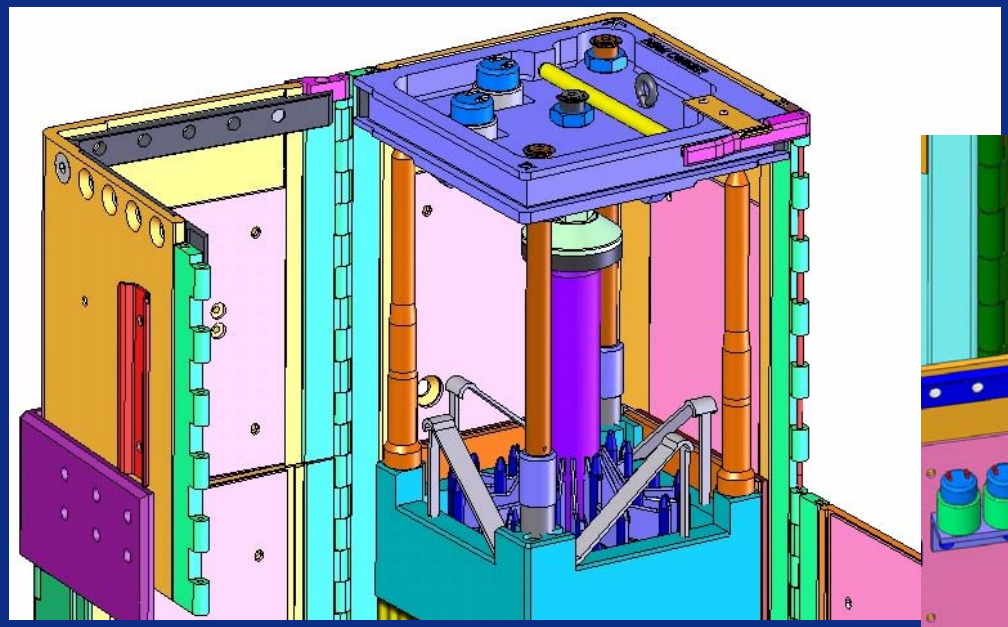
**Current Top Plate**

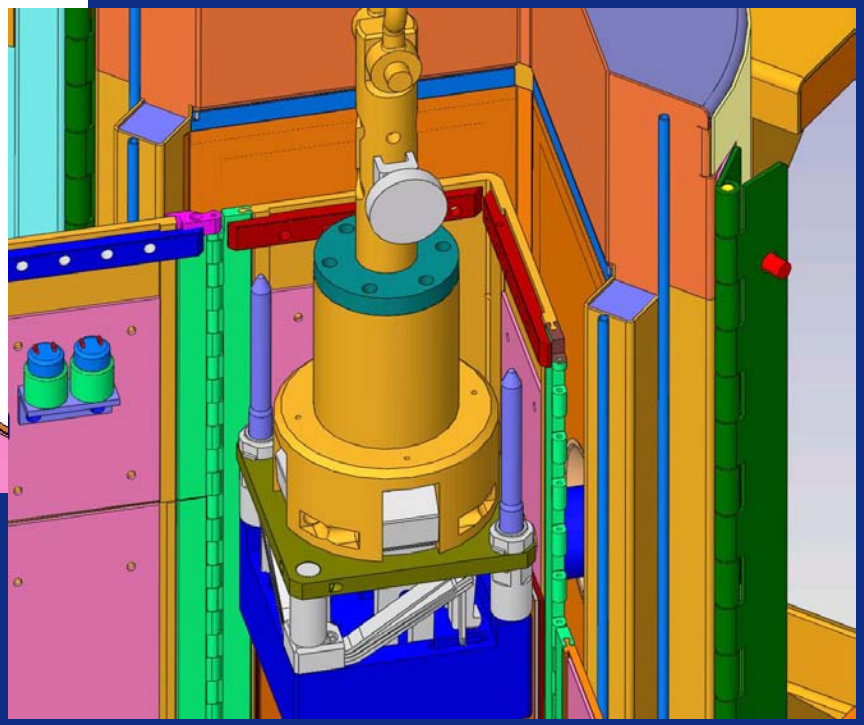
**New design has equal shear but increase envelope for all plant fuel tools**



**Top plate design change**

# Clamshell top end plate







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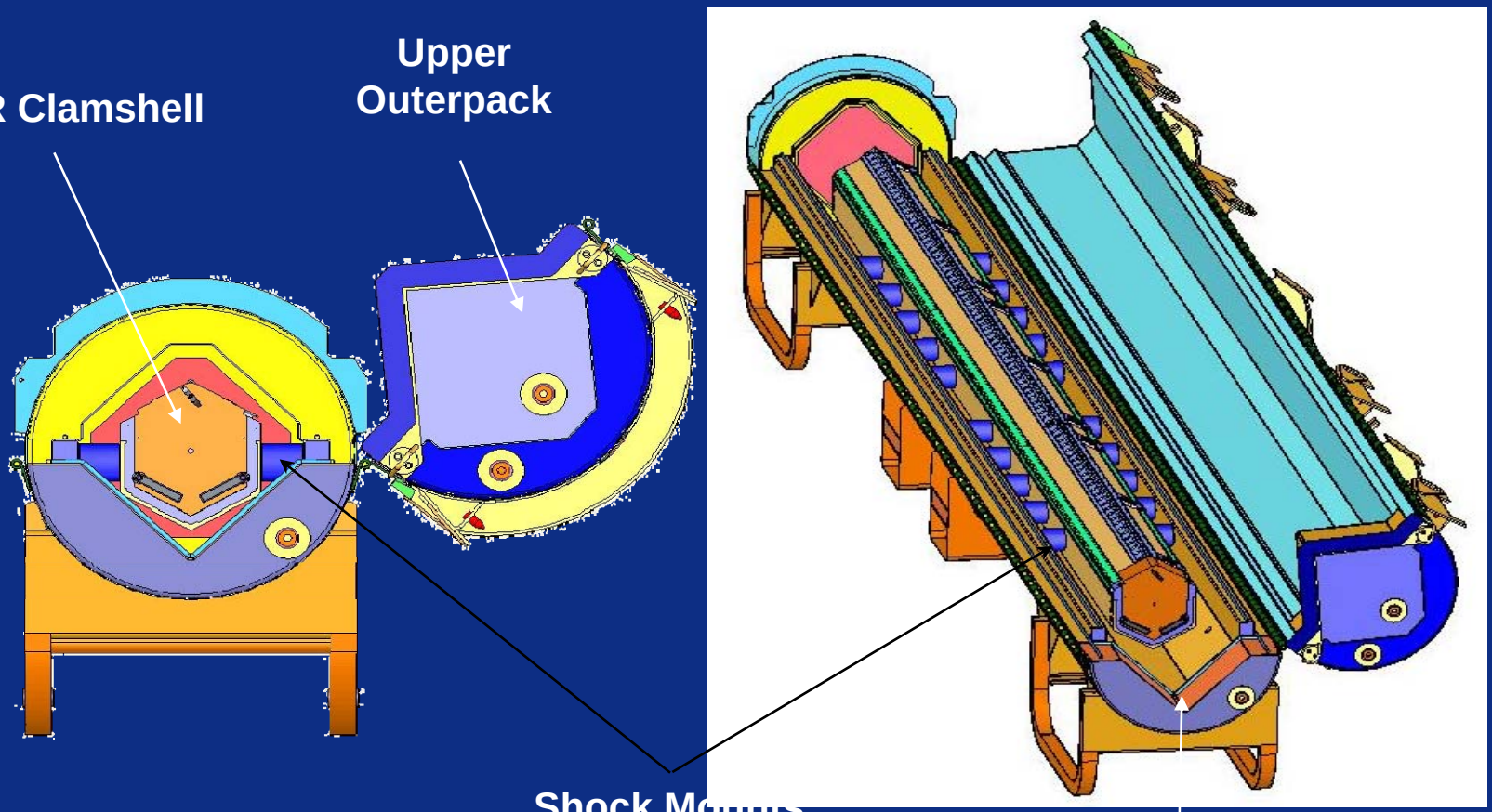
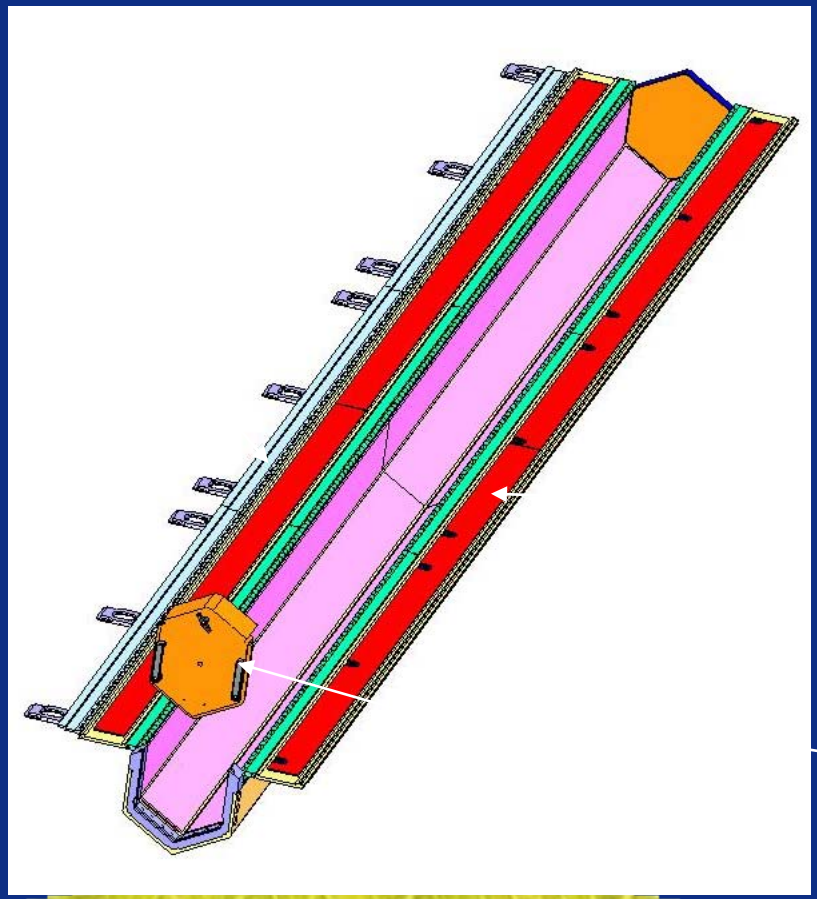
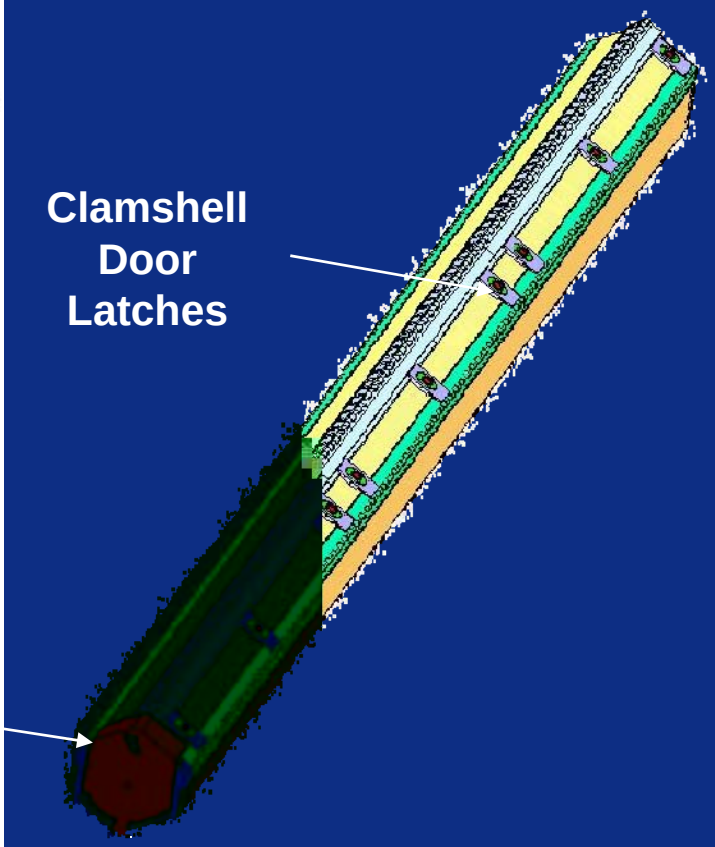
# Traveller VVER

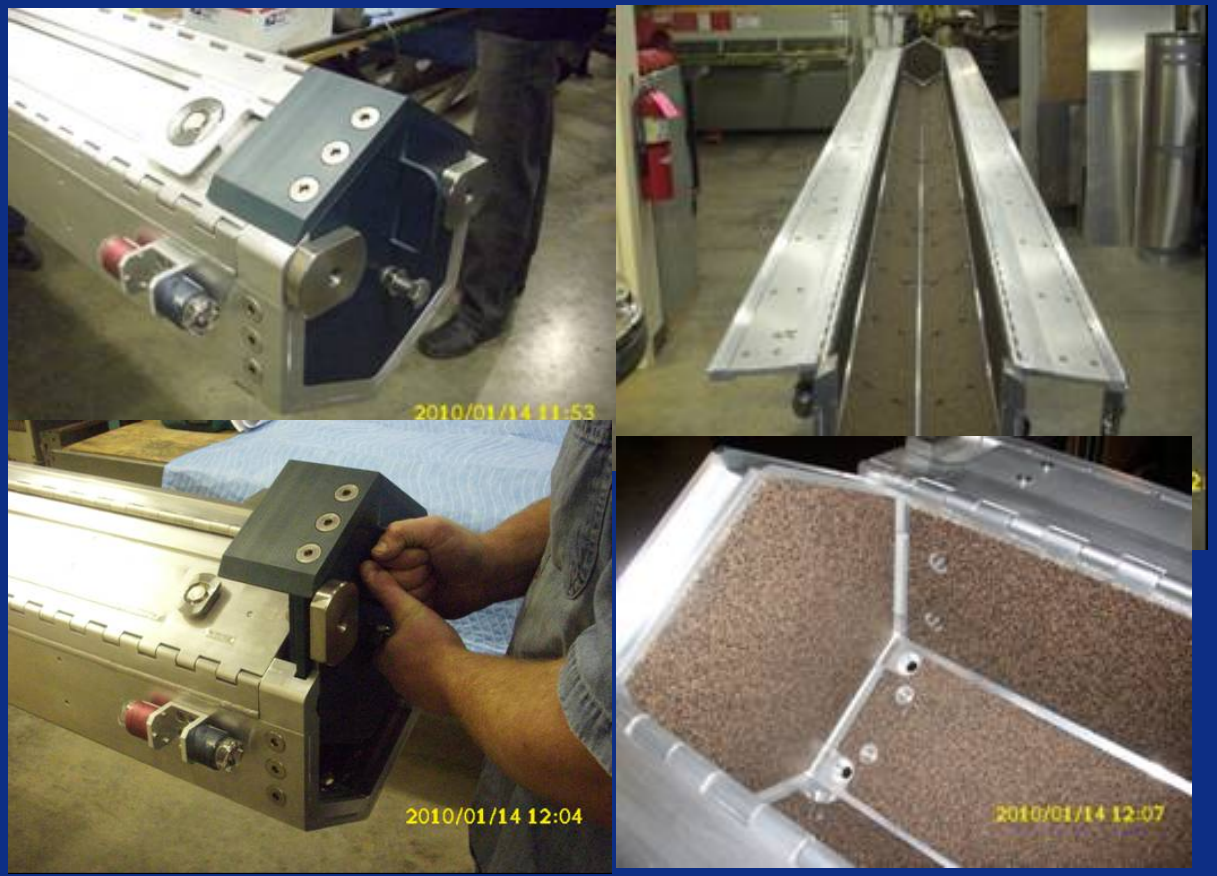


# VVER Clamshell

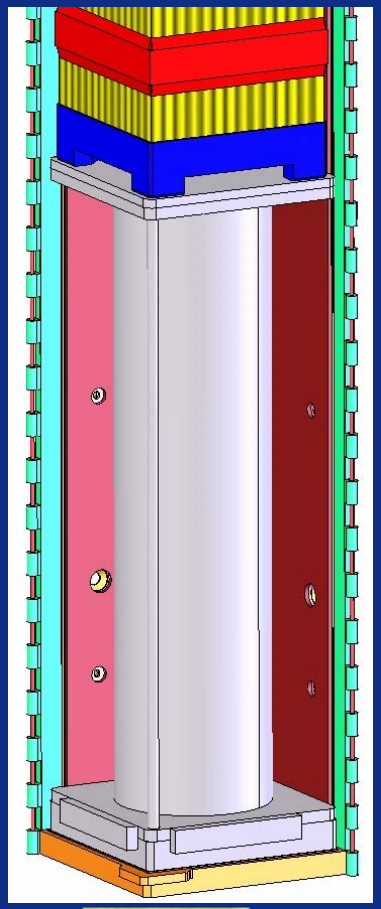


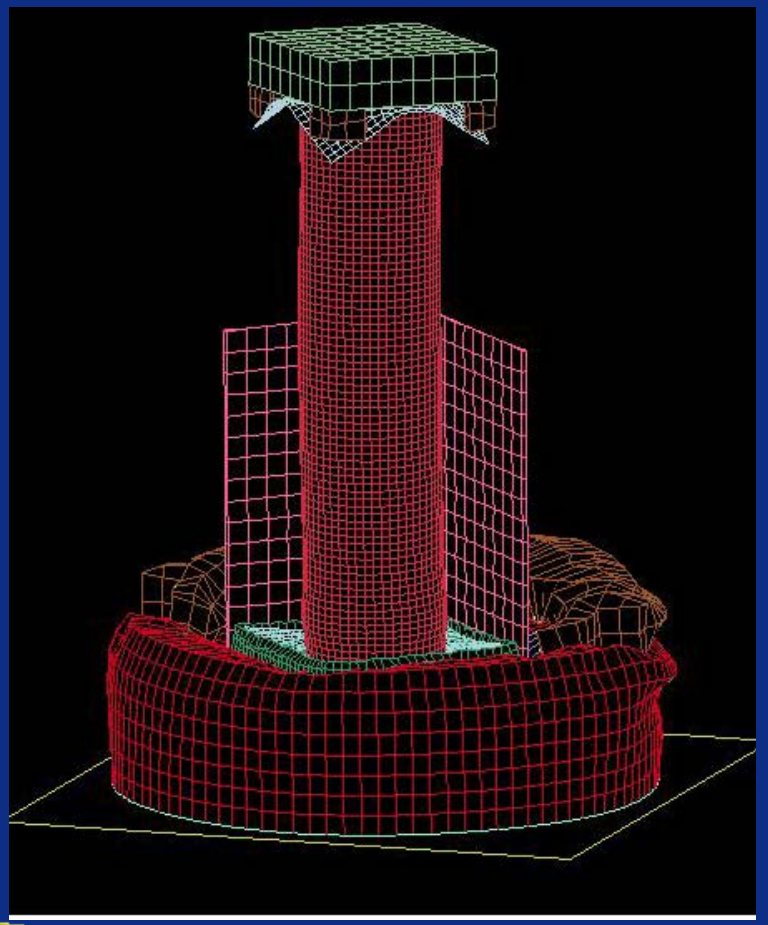


# VVER Development



# Fuel Assembly Spacer





# CoC Revision Strategy

- Rev. 3 – Current revision has been revalidated
- Rev. 4 – CE16NGF and CE16VA, does not to be revalidated (issue July 2010, Rev. 3 valid until June 2013)
- Rev. 5- Clamshell top plate, does not need to be revalidate (issue February 2011, Rev. 3 valid until June 2013)
- Rev. 6- VVER will be revalidated by June 2013 (issue June 2012, Rev. 3 valid until June 2013)

# MCC
## USA/9239/AF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# MCC Approval History

Original application for MCC submitted in 1991. - RCC packaging was converted to MCC by changing internal component (clamp arm changed from carbon steel to stainless steel design). RCC approved prior to September 6, 1983 and use would not have been allowed after October 2008.

Traveller introduced in 2005 as replacement for MCC in Europe and USA anticipating changes to use in USA allowed by NRC for packages previously approved without designation “-85”. MCC use in Europe no longer allowed by transitional arrangements with exception of Poland, Czech Republic, South Ukraine and Slovenia.

# MCC Renewal Strategy

Continued use of MCC in USA requires renewal in 2012 . Renewal strategy depends on NRC rules for use of previously approved packages as follows:

Long term approval – 2017 and beyond

– Revise MCC application - update codes, maintain assumptions for containment, follow current methodology to demonstrate maximum package reactivity

Short term approval– decertification prior to 2017

– Resubmit for renewal without any changes

– Submit amendments as needed using current application.

# Licensing Activity Since 2007 Renewal

- Renewed in 2007, CoC Rev. 15 expire March 2012
- Authorized One-Time Shipment 11/05/09
  - Inclusion of 16 SS rods
- Authorized One-Time Shipment 12/18/09
  - Inclusion of 7 SS rods
- Amendmed CoC 1/14/10 Rev. 16
  - Inclusion of 7 SS rods
  - Exclusion of 14x14 annular blanket limit

# NRC Comment

"The benchmark analysis needs to establish a bias adjustment that is applicable to the methodology used and the system being evaluated… The applicant should use the same methodology throughout the entire application."

RAI NRC Letter dated 12/08/2009

# MCC CSA Methodology Background

- Cross-section processing (AMPX codes)

  227 group library collapsed to 27 group from ENDF/B-V data

  > NITAWL-S self-shielded resonance cross-section corrections

  > XSDRNPMS energy and spatial weighting

- SCALE 4.4, KENO Va transport calculation
- Benchmark calculations for before and after 1994

  > Variation in bias and uncertainty

# State of Current Criticality Evaluation

- Access to 27 group library generated for criticality evaluation is no longer available.
- Original criticality analysis done with currently unsupported versions of codes
- Current amendments evaluated with current, supported codes with differences in:
  - Cross section processing
  - Determining bias and uncertainty
- No fuel rearrangement considered. Inconsistent with current approval application where considered credible for accident conditions.

# State of Current Criticality Evaluation

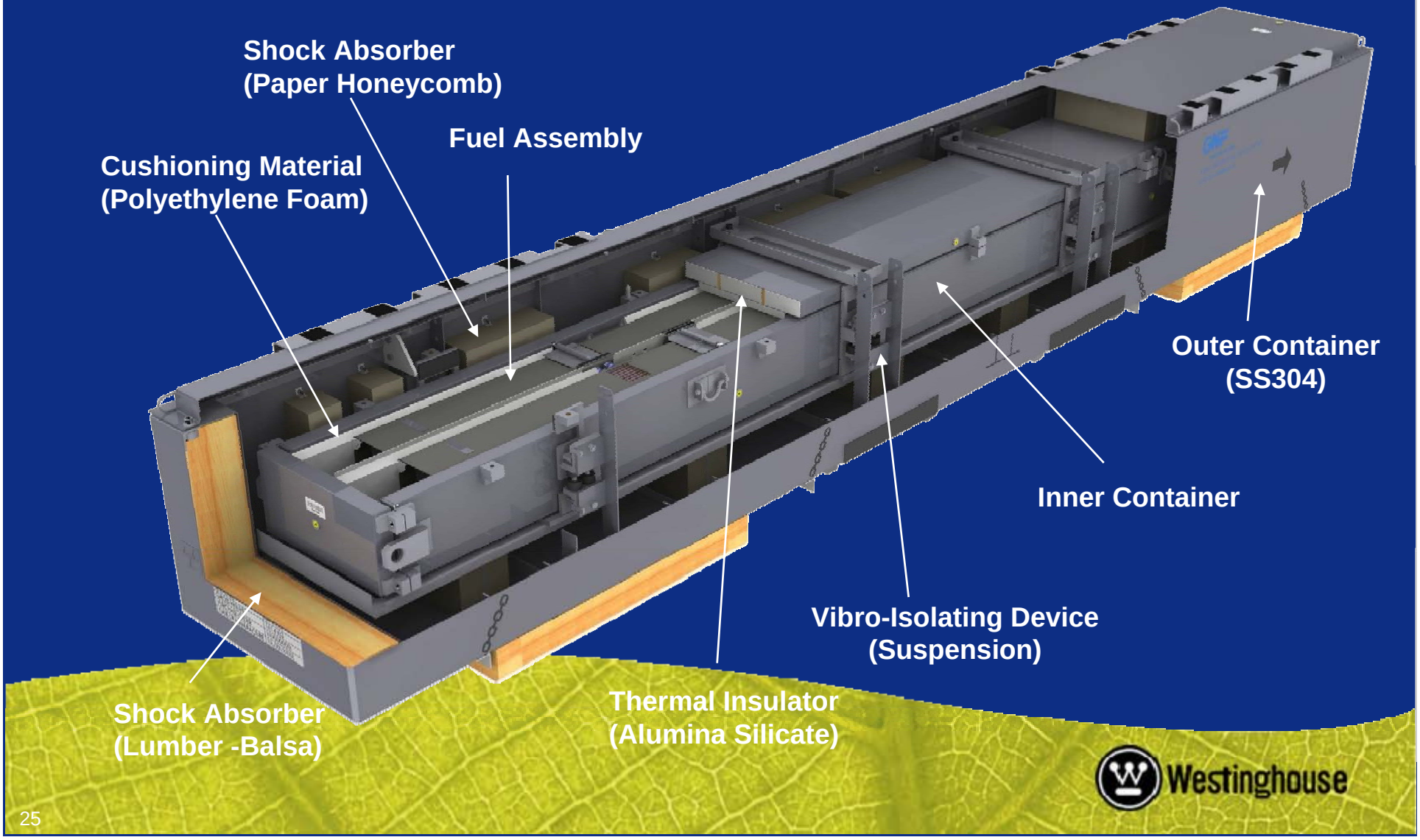
- Puncture testing not performed even though requirement existed during original approval. Application amended in response to NRCB 97-02 with the statement:
  - "Because of the localized nature of the puncture impact, a puncture following the 30-foot drop test will not change the ability of the package to maintain the subcriticality spacing of the fuel assemblies. Also, even with the damage from the 30-foot drop test, any single component (e.g. clamp frame or connection) destroyed by the subsequent puncture test will not change the effectiveness of the package because of the redundancy in the package design."

# Patriot USA/9292/AF-85
# EMBRACE S/50/IF-96

# BWR Package Utilization

- Westinghouse will replace PATRIOT and EMBRACE with RAJ-II for BWR fuel transport
- PATRIOT and EMBRACE will be used for transferring BWR and PWR fuel rods
- Rod box packaging container will be used.
- Transition will occur start in 2012

# RAJ-II
# USA/9309/B(U)F-96

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# Record of Revisions

- Section 1
  - Include all package specifications (packaging and contents) – removed AREVA
- Section 2
  - General cleanup of lifting and tie-down calculations
  - 3D Impact Analysis
  - Lower Tie Plate and Cladding Impact Analysis
- Section 3
  - 3D Transient Fire Analysis
  - Thermal Test of Balsa Wood
- Section 4
  - Contents for reprocessed uranium ANST 996-04
  - Containment calculation based on ANSI 14.5
- Section 5
  - No technical changes
- Section 6
  - Complete revision for demonstration of maximum reactivity, maximum enrichment 5 wt%, BA rod patterns
  - CSI based on BA rods
  - Uncertainty analysis to quantify effect of material and fabrication tolerances
- Section 7
  - No technical changes
- Section 8
  - Clarification of visual inspection requirements based on lessons learned during fabrication.
  - Clarification of weld examination for lifting lugs and load tests (METI and KTA requirements.

# Approval Strategy

- Revision 8 of SAR includes fuel contents specifications for GNF and AREVA fuel
- Revision 9 of SAR includes fuel contents specification for GNF and Westinghouse fuel
- AREVA can use approval based on Revision 8 for one year after approval of  Revision 9
- AREVA may either request a different docket number for Revision 8 or add AREVA fuel by revision of new SAR.

**§71.19 Previously approved package.**

(a) A Type B package previously approved by NRC, but not designated as B(U), B(M), B(U)F, or B(M)F in the identification number of the NRC CoC, or Type AF packages approved by the NRC prior to September 6, 1983, may be used under the general license of §71.17 with the following additional conditions:

(1) Fabrication of the packaging was satisfactorily completed by August 31, 1986, as demonstrated by application of its model number in accordance with §71.85(c);

(2) A serial number that uniquely identifies each packaging which conforms to the approved design is assigned to, and legibly and durably marked on, the outside of each packaging; and

(3) Paragraph (a) of this section expires October 1, 2008.

(b) A Type B(U) package, a Type B(M) package, or a fissile material package, previously approved by the NRC but without the designation "- 85" in the identification number of the NRC CoC, may be used under the general license of §71.17 with the following additional conditions:

(1) Fabrication of the package is satisfactorily completed by April 1, 1999, as demonstrated by application of its model number in accordance with §71.85(c);

(2) A package used for a shipment to a location outside the United States is subject to multilateral approval as defined in DOT regulations at 49 CFR 173.403; and

(3) A serial number which uniquely identifies each packaging which conforms to the approved design is assigned to and legibly and durably marked on the outside of each packaging.

(c) A Type B(U) package, a Type B(M) package, or a fissile material package previously approved by the NRC with the designation "-85" in the identification number of the NRC CoC, may be used under the general license of §71.17 with the following additional conditions:

(1) Fabrication of the package must be satisfactorily completed by December 31, 2006, as demonstrated by application of its model number in accordance with §71.85(c); and

(2) After December 31, 2003, a package used for a shipment to a location outside the United States is subject to multilateral approval as defined in DOT regulations at 49 CFR 173.403.

(d) NRC will approve modifications to the design and authorized contents of a Type B package, or a fissile material

**§71.73 Hypothetical accident conditions.**

(a) *Test procedures.* Evaluation for hypothetical accident conditions is to be based on sequential application of the tests specified in this section, in the order indicated, to determine their cumulative effect on a package or array of packages.

An undamaged specimen may be used for the water immersion tests specified in paragraph (c)(6) of this section.

(b) *Test conditions.* With respect to the initial conditions for the tests, except for the water immersion tests, to demonstrate compliance with the requirements of this part during testing, the ambient air temperature before and after the tests must remain constant at that value between -29° C (-20° F) and +38° C (+100° F) which is most unfavorable for the feature

under consideration. The initial internal pressure within the containment system must be the maximum normal operating pressure, unless a lower internal pressure, consistent with the ambient temperature assumed to precede and follow the tests, is more unfavorable.

(c) *Tests.* Tests for hypothetical accident conditions must be conducted as follows:

(1) *Free Drop.* A free drop of the specimen through a distance of 9 m (30 ft) onto a flat, essentially unyielding, horizontal surface, striking the surface in a position for which maximum damage is expected.

(2) *Crush.* Subjection of the specimen to a dynamic crush test by positioning the specimen on a flat, essentially unyielding horizontal surface so as to suffer maximum damage by the drop of a 500-kg (1100- lb) mass from 9 m (30 ft) onto the specimen. The mass must consist of a solid mild steel plate 1 m (40 in) by 1 m (40 in) and must fall in a horizontal

attitude. The crush test is required only when the specimen has a mass not greater than 500 kg (1100 lb), an overall density not greater than 1000 kg/m 3 (62.4 lb/ft 3) based on external dimension, and radioactive contents greater than 1000

A2 not as special form radioactive material. For packages containing fissile material, the radioactive contents greater than 1000 A2 criterion does not apply.

(3) *Puncture.* A free drop of the specimen through a distance of 1 m (40 in) in a position for which maximum damage is expected, onto the upper end of a solid, vertical, cylindrical, mild steel bar mounted on an essentially unyielding, horizontal surface. The bar must be 15 cm (6 in) in diameter, with the top horizontal and its edge rounded to a radius of not more than 6 mm (0.25 in), and of a length as to cause maximum damage to the package, but not less than 20 cm (8 in)

long. The long axis of the bar must be vertical.