

71-9239



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Your ref: Docket No. 71-9239
Our ref: LCPT-08-1

4 January 2008

Dear Mr. E. William Brach:

SUBJECT: Docket 71-9239, Model Nos. MCC-3, 4, 5 Packages, Approval for Shipment of Modified Fuel Assembly Contents

In accordance with Subpart D-Application for Package Approval, 10 CFR 71.31, Contents of application, Westinghouse Electric Company hereby submits an application for modification of the authorized contents as specified in existing Certificate of Compliance number 9239. This request is for authorization for a one-time shipment of a 15X15 (Type B) OFA fuel assembly that is modified by replacing fuel rods in locations O10 through O15 and N15 with solid stainless steel rods (see Figure 1).

The 17X17 OFA is the most reactive of the Type B fuel assemblies (15X15 and 17X17) and was used in the evaluation of the MCC package for the application. Replacing seven fuel rods with solid stainless steel rods results in a decrease in the reactivity of the 15X15 (Type B) OFA. This modification to a 15X15 (Type B) does not alter conclusions and assumptions in the MCC package assessments. An evaluation of the modified 15X15 (Type B) OFA with seven solid stainless steel rods is included as Enclosure 1.

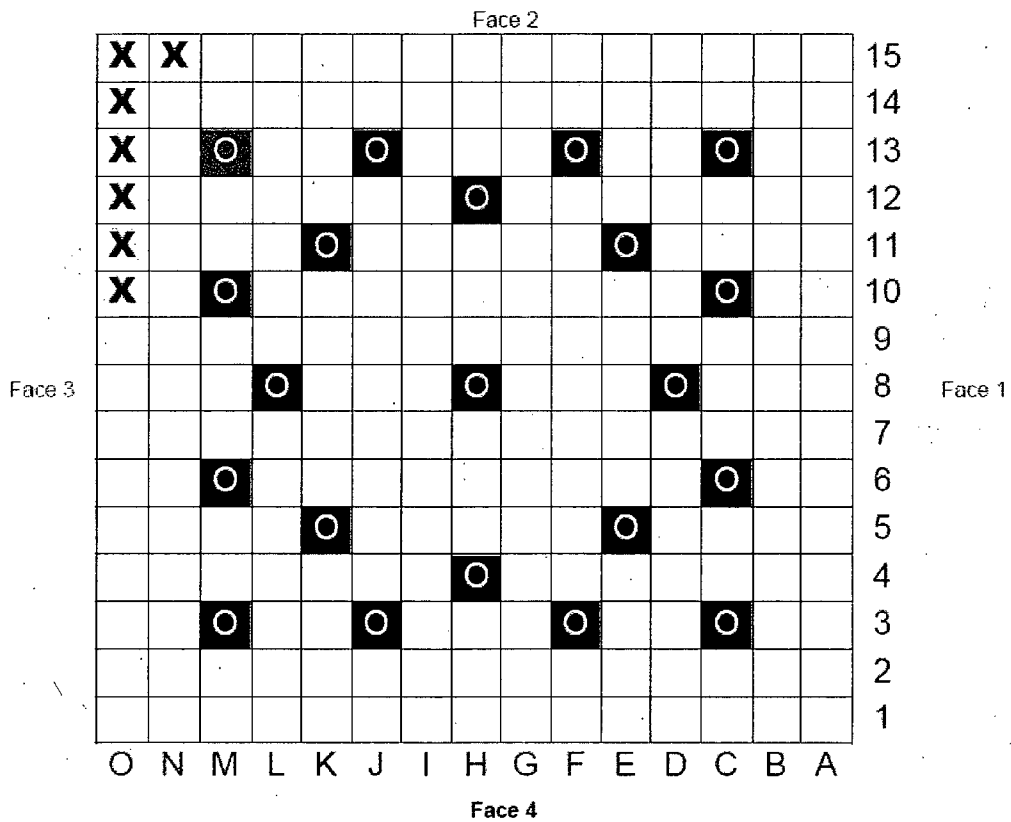
Westinghouse requests the one time approval of the modified fuel assembly in order to meet a scheduled ship date of 9 February 2008.

N145501



Figure 1: Fuel Assembly Orientation (from Top & Bottom View Perspective)

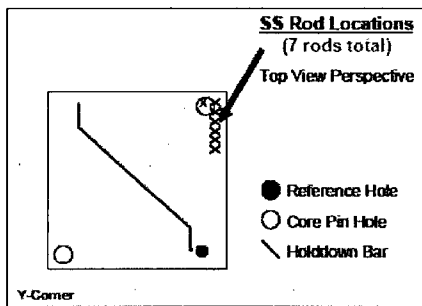
15x15 Loading Pattern
Bottom View Perspective

Reference: Mechanical Operating Procedure Sketch 730102-1, Final Assembly Area



"Y"-
Corner

-  Thimble tube location
-  Stainless steel rod location



Sincerely,

****Electronically approved***

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Licensing, Compliance and Package Technology

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Enclosure 1 - Evaluations, Analysis and Detailed Calculations

The calculations documented in Table 6-2-1 of the Application for Approval of Packaging of Fissile Radioactive Material (MCC Shipping Containers), Package Identification Numbers USA/9239/AF, Revision 12, August 2006, were performed using a 227 energy group cross-sections processed by running a sequence of AMPX system codes. An evaluation of the unpackaged individual fuel assembly types (Appendix 6-2 of the application) was used to determine the most reactive contents to use in the evaluation of the package (Appendix 6-3 of the application). The 15X15 (Type B) OFA fuel assembly that is modified by replacing seven fuel rods with solid stainless steel rods is evaluated as an unpackaged individual fuel assembly as don in Appendix 6-2 of the application.

The current calculation methodology is SCALE 4.4 CSAS25 using the 44-group cross-sections. The 15X15 (Type B) OFA result reported in Table 6-2-1 of the application is validated using the current calculation method, and the relative difference of less than 0.01% is acceptable. Evaluation of the modified 15X15 (Type B) OFA with 7 stainless steel rods demonstrates that the reactivity of the fuel assembly is less than that for the 15X15 (Type B) OFA used for the evaluation in the application.

Table 1 - Comparison results for 15X15 (Type B) OFA

Case	KENO k_{eff}
Application for Approval, USA/9239/AF, Revision 12 (Table 6-2-1)	0.94672
15X15 (Type B) OFA- SCALE4.4 CSAS25 using 44 group library	0.9467
Modified 15X15 (Type B) OFA with 7 SS Rods – SCALE4.4 CSAS25 using 44 group library	0.9319

The input file for the 15X15 (Type B) OFA - SCALE4.4 CSAS25 using 44 group library is as follows:

```
#csas25
Adapted 15X15 OFA
44groupndf5 latticell
uo2      1 0.9650  293  92235 5  92238 95      end
zirc4    2 1      293 end
h2o      3 1      293  end
end comp
squarepitch 1.4300 0.9294 1 3 1.0719 2 0.9484 0 end
Adapted 15X15 OFA
READ PARAMETERS
      TME=6.0  RUN=YES  PLT=YES
```

GEN=900 NPG=300 NSK=005
XS1=YES NUB=YES
END PARAMETERS

READ GEOMETRY

UNIT 1

COM=" 15X15 OFA FUEL ROD "

CYLINDER	1	1	0.4647	30.0	0.0
CYLINDER	0	1	0.4742	30.0	0.0
CYLINDER	2	1	0.5359	30.0	0.0
CUBOID	3	1	4P0.7150	30.0	0.0

UNIT 2

COM=" 17X17 OFA GUIDE TUBE & INSTRUMENT TUBE "

CYLINDER	3	1	0.6337	30.0	0.0
CYLINDER	2	1	0.6769	30.0	0.0
CUBOID	3	1	4P0.7150	30.0	0.0

GLOBAL

UNIT 3

COM=" 17X17 OFA ASSEMBLY IN H2O "

ARRAY	1	-10.7251	-10.7251	0.0	
CUBOID	3	1	4P25.9651	30.0	0.0

END GEOM

READ ARRAY

ARA=1 NUX=15 NUY=15 NUZ=1 COM=" 15X15 OFA ASSEMBLY "

fill

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	2	1	1	2	1	1	1	2	1	1	2	1	1
1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
1	1	1	1	2	1	1	1	1	1	2	1	1	1	1
1	1	2	1	1	1	1	1	1	1	1	1	2	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	2	1	1	1	1	1	1	1	1	2	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	2	1	1	2	1	1	1	2	1	1	2	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

end fill

END ARRAY

read plot

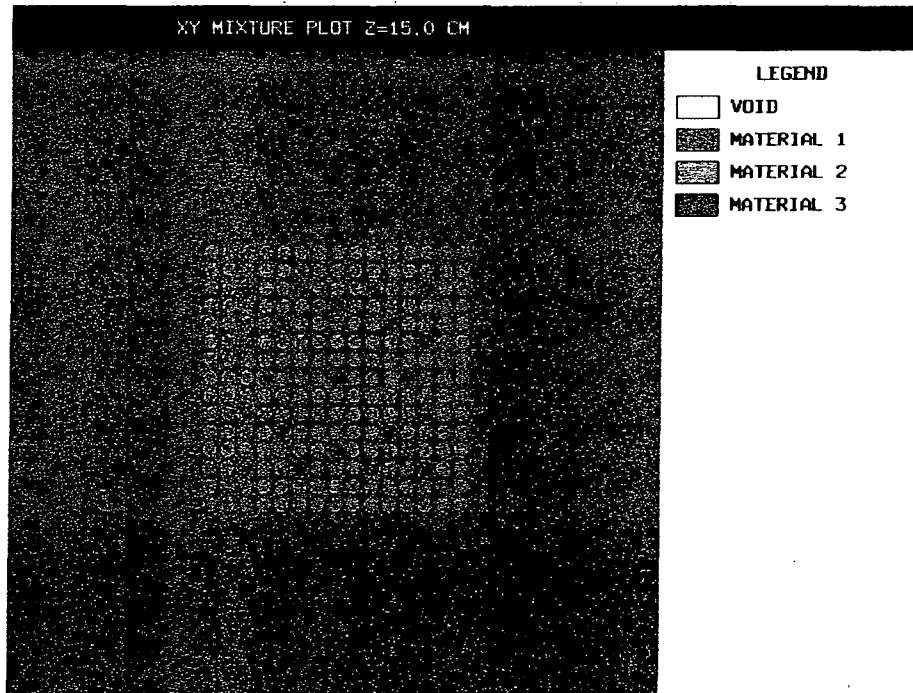
```
scr=yes
ttl='XY Mixture plot z=15.0 cm'
pic=mix
xul=-25.9651 yul= 25.9651 zul=15.0
xlr= 25.9651 ylr=-25.9651 zlr=15.0
nax=500
clr= -1 255 0 0 0 255 255 255 1 200 200 200
      2 255 255 0 3 135 206 235
end color
uax=1 vdn=-1
end
end plot

READ BOUNDS
  ALL=SPECULAR
END BOUNDS

end data
end
```

A cross section plot of the input file is reproduced below:

Figure 1 Plot of 15x15OFA Uncontained Assembly



The input file for the 15X15 (Type B) OFA with 7 stainless steel dummy fuel rods in positions O-10, O-11, O-12, O-13, O-14, O-15, and N-15 is as follows:

```
#csas25
Adapted 15X15 OFA with 7 SS rods
44groupndf5 latticecell
uo2      1 0.9650  293 92235 5  92238 95  end
zirc4    2 1      293 end
h2o      3 1      293 end
ss304    4 1      293 end
end comp
squarepitch 1.4300 0.9294 1 3 1.0719 2 0.9484 0 end
Adapted 15X15 OFA with 7 SS rods
READ PARAMETERS
  TME=6.0  RUN=YES  PLT=YES
  GEN=900  NPG=300  NSK=005
  XS1=YES  NUB=YES
END PARAMETERS

READ GEOMETRY

UNIT 1
COM=" 15X15 OFA FUEL ROD "
CYLINDER  1 1  0.4647  30.0  0.0
CYLINDER  0 1  0.4742  30.0  0.0
CYLINDER  2 1  0.5359  30.0  0.0
CUBOID    3 1  4P0.7150  30.0  0.0

UNIT 2
COM=" 17X17 OFA GUIDE TUBE & INSTRUMENT TUBE "
CYLINDER  3 1  0.6337  30.0  0.0
CYLINDER  2 1  0.6769  30.0  0.0
CUBOID    3 1  4P0.7150  30.0  0.0

UNIT 3
COM=" 15X15 OFA SS ROD "
CYLINDER  4 1  0.5359  30.0  0.0
CUBOID    3 1  4P0.7150  30.0  0.0

GLOBAL
UNIT 4
COM=" 17X17 OFA ASSEMBLY IN H2O "
ARRAY  1' -10.7251 -10.7251 0.0
CUBOID  3 1  4P25.9651  30.0  0.0
END GEOM

READ ARRAY
ARA=1 NUX=15 NUY=15 NUZ=1 COM=" 15X15 OFA ASSEMBLY "
fill
  3 3 1 1 1 1 1 1 1 1 1 1 1 1 1
  3 1 1 1 1 1 1 1 1 1 1 1 1 1 1
  3 1 2 1 1 2 1 1 1 2 1 1 2 1 1
  3 1 1 1 1 1 1 2 1 1 1 1 1 1 1
  3 1 1 1 2 1 1 1 1 1 2 1 1 1 1
  3 1 2 1 1 1 1 1 1 1 1 1 2 1 1
  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
  1 1 1 2 1 1 1 2 1 1 1 2 1 1 1
  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
  1 1 2 1 1 1 1 1 1 1 1 1 2 1 1
  1 1 1 1 2 1 1 1 1 1 2 1 1 1 1
  1 1 1 1 1 1 1 2 1 1 1 1 1 1 1
  1 1 2 1 1 2 1 1 1 2 1 1 2 1 1
```

```
      1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
      1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
end fill  
END ARRAY  
  
read plot  
scr=yes  
ttl='XY Mixture plot z=15.0 cm'  
pic=mix  
xul=-25.9651 yul= 25.9651 zul=15.0  
xlr= 25.9651 ylr=-25.9651 zlr=15.0  
nax=500  
clr= -1 255 0 0 0 255 255 255 1 200 200 200  
      2 255 255 0 3 135 206 235 4 92 172 238  
end color  
uax=1 vdn=-1  
end  
end plot  
  
READ BOUNDS  
ALL=SPECULAR  
END BOUNDS  
  
end data  
end
```

Figure 2 Cross Section Plot of 15x15OFA Assembly with 7 SS Rods

