FRAMATOME ANP

June 27, 2002
NRC:02:029

Proj 675

Document Control Desk
ATTN: Chief, Planning, Program and Management Support Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Clarification of Exposure Limit Applicable to Framatome ANP BWR Fuel

Ref.: 1. EMF-85-74 Revision 0 Supplement 1 and Supplement 2 (P)(A), RODEX2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model, February 1998.

The exposure limits for Framatome ANP BWR fuel are defined in the Reference 1 report. Specifically, the NRC safety evaluation report states:

- *The RODEX2A code described in Reference 1 is acceptable for application to BWR designs up to rod-average burnups of 62 GWd/MTU.*

- *The fuel rod, assembly, and fuel channel growth models and analysis methods for the ATRIUM 9 and 10 fuel designs described in Reference 2 are acceptable up to assembly average burnups of 54 GWd/MTU.*

These exposure limits were developed for ATRIUM 9 and 10 fuel assemblies and full length fuel rods. A question was raised recently whether the rod-average burnup limit applies to part length fuel rods. Framatome has developed a position, described below, concerning the relationship of the full length fuel rod limit relative to part length fuel rods.

A comparison of the axial burnup distribution in a part length fuel rod and a full length fuel rod for an ATRIUM-10 assembly exposure of 52.0 GWd/MTU is shown in Table 1 and in Figure 1. These data represent a typical high burnup equilibrium cycle. The nodal exposures for the part length fuel rod are similar to, but in this specific case slightly less than, the nodal exposures for a full length fuel rod. Although this comparison is typical, it is feasible, depending on the location of the part length fuel rod, that nodal exposures could be slightly higher than in the full length fuel rod.

The rod average exposure of the full length fuel rod is 55.7 GWd/MTU. The rod average exposure of the part length fuel rod is 64.8 GWd/MTU for the active length of the rod. The average exposure for the part length rod is higher because its active length is purposely located where the power (and thus exposure) is highest. If the nodal exposures in the full length fuel rod are averaged only over the axial elevations where the part length fuel rod has fuel, then the average for the full length rod is higher than that of the part length fuel rod, or 66.6 GWd/MTU.

Since the exposures in the part length fuel rod are typically less than in the full length fuel rod, we believe it is reasonable not to apply the same rod average exposure limit to the part length fuel rod as to the full length fuel rod. A high exposure part length fuel rod is never the limiting

Framatome ANP, Inc.

2101 Horn Rapids Road
Richland, WA 99352

Tel: (509) 375-8100
Fax: (509) 375-8402

D045

rod relative to any of the mechanical or safety analyses criteria. Therefore, it is not necessary to apply a specific exposure limit to a part length fuel rod.

Framatome ANP requests NRC concurrence with the above position. A response would be appreciated by September 30, 2002.

Very truly yours,

James F. Mallay, Director
Regulatory Affairs

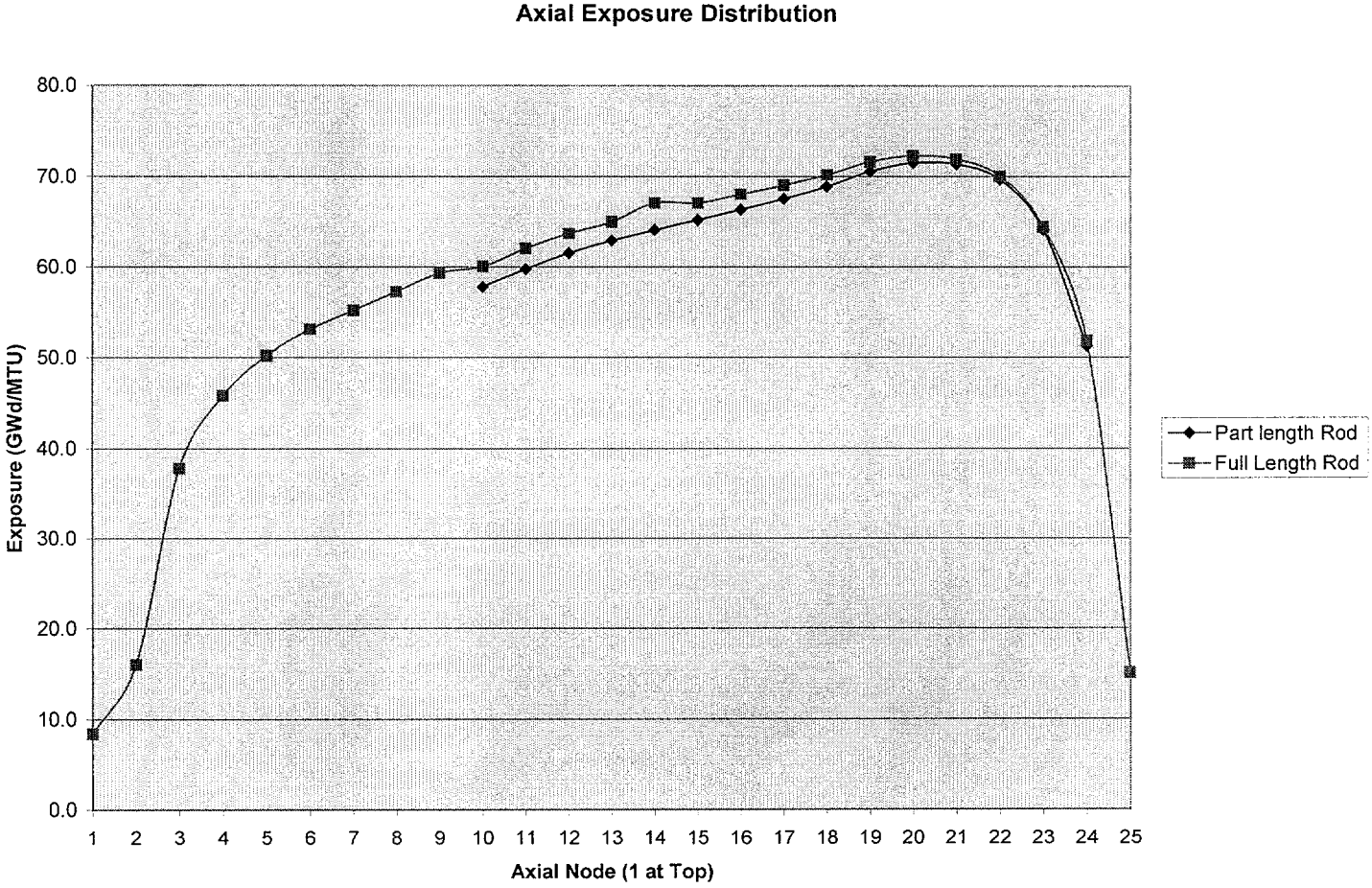
Attachments

cc: R. Caruso
J. Wermiel
Project 693

Table 1 Fuel Rod Axial Exposure Distribution - Bundle Average Exposure = 52.0 GWd/MTU

Node	Part length Rod (GWd/MTU)	Full Length Rod (GWd/MTU)
1	0.0	8.4
2	0.0	16.0
3	0.0	37.8
4	0.0	45.8
5	0.0	50.2
6	0.0	53.1
7	0.0	55.2
8	0.0	57.2
9	0.0	59.3
10	57.8	60.0
11	59.7	62.0
12	61.5	63.7
13	62.9	65.0
14	64.1	67.1
15	65.2	67.1
16	66.3	68.0
17	67.5	69.0
18	68.9	70.2
19	70.6	71.6
20	71.5	72.3
21	71.3	71.9
22	69.7	70.0
23	64.2	64.4
24	51.2	51.8
25	0.0	15.1
Average All Nodes	38.9	55.7
Average Nodes 10 to 24	64.8	66.3

Figure 1


Axial Exposure Distribution
Exposure (GWd/MTU)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Axial Node (1 at Top)
Part length Rod
Full Length Rod