FEB 20 1974

Docket No. 50-220

Niagara Mohawk Power Corporation
ATTN: Mr. Philip D. Raymond
Vice President - Engineering
300 Erie Boulevard West
Syracuse, New York 13202

Gentlemen:

A copy of the report of the Advisory Committee on Reactor Safeguards dated February 12, 1974, is enclosed for your information. The report reflects the Committee's review of the design and expected performance of General Electric 8 x 8 fuel bundles to be used in partial and full core reloads for boiling water reactors such as your Nine Mile Point Nuclear Station Unit 1.

You will be advised when we have completed our review of your request for operation with 8 x 8 fuel.

Sincerely,

/S/

Donald J. Skovholt
Assistant Director
for Operating Reactors
Directorate of Licensing

Enclosure:
ACRS Report

cc: See next page

RMDiggs
NDube
MJinks
BScharf (15)
SKari
SVarga
RBoyd
ECase

Distribution
Docket File
AEC PDR
Local PDR
RP Reading
Branch Reading
JRBuchanan, ORNL
TBAbernathy, DTIE
WMoore, L
DJSkovholt, L:OR
TJCarter, L:OR
~~ACRS (16)~~
RO (3)
OGC
VStello
JGallo
JSaltzman
FLIngram
HIMueller
JWagner, OC
WOMiller, DRA
PCollins, L:OLB
DLZiemann, L:ORB #2

OFFICE	L:ORB #2	L:ORB #2	L:ORB #2	L:OR		
SURNAME	RMDiggs:rwg	CJDeBevec	DLZiemann	DJSkovholt		
DATE	2/19/74	2/19/74	2/20/74	2/20/74		

Form AEC-318 (Rev. 9-53) AECM 0240 GPO C43 16 81465-1 520-284

cc w/enclosure:
J. Bruce MacDonald, Esquire
Deputy Commissioner and Counsel
New York State Department of
Commerce and Counsel to the
Atomic Energy Council
99 Washington Avenue
Albany, New York 12210

Arvin E. Upton, Esquire
LeBoeuf, Lamb, Leiby & MacRae
1757 N Street, N. W.
Washington, D. C. 20036

Anthony Z. Roisman, Esquire
Berlin, Roisman and Kessler
1712 N Street, N. W.
Washington, D. C. 20036

Mr. Donald I. Gleason, Chairman
County Office Building
46 East Bridge Street
Oswego, New York 13126

Mr. Robert P. Jones, Supervisor
Town of Scriba
R. D. #4
Oswego, New York 13126

Oswego City Library

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

February 12, 1974

Honorable Dixy Lee Ray
Chairman
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subject: REPORT ON GENERAL ELECTRIC 8X8 FUEL DESIGN FOR RELOAD USE

Dear Dr. Ray:

At its 166th meeting, February 7-9, 1974, the Advisory Committee on Reactor Safeguards completed a generic review of the design and expected performance of General Electric 8x8 fuel bundles to be employed in partial and full core reloads in boiling water reactors. These topics were discussed at the 165th ACRS meeting on January 10-12, 1974, and at Subcommittee meetings in Washington, D. C., on January 8, 1974, and in Denver, Colorado, on January 24, 1974. During its review the Committee had the benefit of discussions with representatives of the General Electric Company, the AEC Regulatory Staff, and of the documents listed below.

The General Electric 8x8 fuel assembly consists of 63 fuel rods plus one unfueled, water-filled, spacer-capture rod in a square 8x8 bundle array within a square channel box. The design of the fuel rods and fuel rod bundle in the 8x8 reload fuel assembly is, except for differences in the length of the fuel and gas plenum, the same as in the 8x8 fuel assembly used in the BWR/6 boiling water reactor concept referred to in the Committee's report of September 21, 1972. The 8x8 fuel bundles are interchangeable in General Electric boiling water reactors with the previously used 7x7 bundles.

In general, the thermal margins to fuel damage design bases are greater for 8x8 fuel than for 7x7 fuel. The design value of the linear heat generation rate for normal operation is 13.4 kw/ft for 8x8 fuel and 17.5 to 18.5 kw/ft for 7x7 fuel; specific power is slightly greater for the 8x8 fuel than for the 7x7 fuel. The General Electric Company believes the lower linear heat generation rate and slightly greater ratio of clad thickness to rod diameter should result in fewer failures in 8x8 fuel than in 7x7 fuel. Although the hydraulic resistance of 8x8 bundles is slightly greater than that of 7x7 bundles, the thermal-hydraulic performance of cores either partially or fully loaded with 8x8 assemblies is not degraded relative to cores loaded with 7x7 assemblies.

Since the U-235 enrichments for the individual fuel rods, the number and distribution of rods containing gadolinia, and the water-to-fuel ratio are similar in the 8x8 and 7x7 designs, the neutronic behavior of the two designs is not significantly different. The internally located water rod in the 8x8 design reduces rod-to-rod power peaking.

Since the neutronic and thermal-hydraulic characteristics of 8x8 and 7x7 fuel bundles are similar, their behavior under abnormal operational transients is expected to be comparable. The consequences of postulated control rod drop, fuel handling, and steam line break accidents are not expected to be significantly different for the two fuel designs.

The General Electric Company, several utility owner-operators of boiling water reactors, and the Regulatory Staff have performed analyses of the behavior of 8x8 fuel in several mixed and fully reloaded cores under transient and accident conditions. These analyses predict that, for boiling water reactors which have jet pumps, the peak clad temperatures during a postulated large-break LOCA using the Interim Acceptance Criteria are less for 8x8 than for 7x7 assemblies. However, for large postulated breaks in non-jet pump plants and for small and intermediate size breaks for all plants, the predicted peak clad temperatures are in the same range for both 8x8 and 7x7 fuel. Consequently, individual reviews by the Regulatory Staff of the expected performance of 8x8 reload fuel, including plant-specific system effects and any significant core fuel loading asymmetries, will be required for each reactor prior to operation with 8x8 fuel to determine limits on reactor operating conditions. The Committee wishes to be informed concerning the results of these reviews for the initial 8x8 fuel loadings in each of the several General Electric boiling water reactor product lines.

The Regulatory Staff plans to use the results of recently conducted spray-cooling and reflooding tests of a Zircaloy-clad bundle to verify analytical models for 8x8 fuel. The Committee wishes to be kept informed.

Experience and information exist both on the performance of fuel rods and bundles whose designs bracket the dimensions of the 8x8 fuel and on the performance of cores containing mixtures of assemblies with different numbers and sizes of fuel rods. Although mechanical tests have been performed on 8x8 fuel assemblies and components to demonstrate their integrity, additional tests to verify spacer grid strength have been requested by the Regulatory Staff. This matter should be resolved in a manner satisfactory to the Regulatory Staff.

The General Electric Company has planned a program of both pre- and post-irradiation examinations to monitor the performance of 8x8 fuel assemblies. The Committee endorses a comprehensive surveillance program and wishes to be kept informed.

The Regulatory Staff is currently reviewing the treatment of uncertainties in the establishment and monitoring of operating limits for boiling water reactors. The Committee wishes to be kept informed.

Re-evaluation of core operating limits will be necessary as a result of the recently promulgated Acceptance Criteria for Emergency Core Cooling Systems. The Committee wishes to be kept informed.

The Committee believes that, with due regard to the above comments, including the individual reload reviews by the Regulatory Staff which will address specific plant features, the General Electric 8x8 fuel assemblies are acceptable for use in the reload of General Electric boiling water reactors.

Sincerely yours,

W. R. Stratton

W. R. Stratton
Chairman

References attached.

References

1. "Dresden 3 Nuclear Power Station, Second Reload License Submittal", General Electric Co., Nuclear Fuel Department, September 1973; and Supplement A, November 17, 1973, Supplement B, December 6, 1973; Supplement C, December 6, 1973; Supplement D, December 17, 1973; Supplement E, December 17, 1973; Supplement F, January 9, 1974; Supplement G, January 9, 1974; Supplement H, January 23, 1974.

2. "Nine Mile Point Unit 1 - Second Refueling", P. D. Raymond to A. Giambusso, September 14, 1973

"Nine Mile Point Unit 1 Safety Analysis for Type 5 and Type 6 Reload Fuel", Niagara Mohawk Power Corporation, October 15, 1973

"Nine Mile Point Unit 1, Part 1, Non-Proprietary Response and Part 2, Proprietary Response," January 15, 1974

3. "Monticello Nuclear Generating Plant, Permanent Plant Changes to Accommodate Equilibrium Core Scram Reactivity Insertion Characteristics", January 23, 1974

4. NEDO-20103, "General Design Information for General Electric Boiling Water Reactor Reload Fuel Commencing in Spring, '74", September 1973

5. H. E. Williamson and D. C. Ditmore, "Experience with BWR Fuel Through September 1971", NEDO-10505, May 1972

6. GEAP-4059, "Vibration of Fuel Rods in Parallel Flow", E. P. Quinn, July 1962

7. Letter, J. A. Hinds to V. Moore, February 4, 1974, "Proprietary Information, 8x8 Fuel Wear Tests"

Letter, J. A. Hinds to V. Moore, February 4, 1974, 8x8 Fuel Surveillance Program

8. NEDM-10735, "Densification Considerations in BWR Fuel Design and Performance", D. C. Ditmore and R. B. Elkins, December 1972, Supplement 2, "Response to AEC Questions, NEDM-10735 April 1973 (Proprietary), Supplement 2, "Response to AEC Questions, NEDM-10735 Supplement 1", May 1973 (Proprietary), Supplement 3, "Response to AEC Questions, NEDM-10735, Supplement 1, June 1973 (Proprietary), Supplement 4, "Responses to AEC Questions NEDM-10735", July 1973, (Proprietary), Supplement 5, "Densification Considerations in BWR Fuel", July 1973 (Proprietary), Supplements 6, 7, and 8, "Fuel Densification Effects on General Electric Boiling Water Reactor Fuel".

References (cont'd)

9. NEDO-20181, Supplement 1, December 3, 1973 (Proprietary); GEGAP-III, "A Model for the Prediction of Pellet Conductance in BWR Fuel Rods"

10. "Technical Report on Densification of General Electric Reactor Fuels", U. S. Atomic Energy Commission, August 23, 1973, and "Supplement 1 to the Technical Report on Densification of General Electric Reactor Fuels", December 14, 1973

11. "Sensitivity Study on BWR/6 Fuel Bundle Response to a Postulated LOCA", C. M. Moser and R. W. Griebe, December 1973

12. NEDE-10801, "Modeling the BWR/6 Loss-of-Coolant Accident" Core Spray and Bottom Flooding Heat Transfer Effectiveness", J. D. Duncan and J. E. Leonard, March 1973, and "Response to AEC Request for Additional Information on NEDE-10801", May 1973 (Proprietary)

13. NEDO-10993, "Core Spray and Bottom Flooding Effectiveness in the BWR/6", J. D. Duncan and J. E. Leonard, September 1973

14. "Core Thermal Analyses of a Stainless Steel Clad Heater Rod Bundle", C. M. Moser and R. W. Griebe, December 1973

15. "Status Report on the General Electric Company 8x8 Fuel Assembly", January 18, 1974, USAEC Regulatory Staff

16. "Technical Report on the General Electric Company 8x8 Fuel Assembly", February 5, 1974, USAEC Regulatory Staff