

NUCLEAR REACTOR LABORATORY
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY

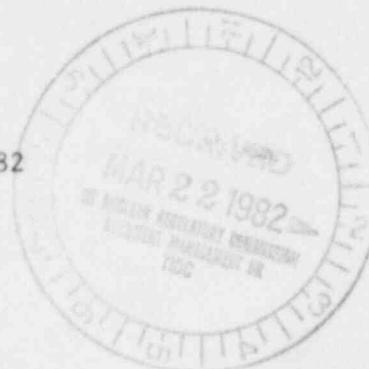


O. K. HARLING
 Director

138 Albany Street Cambridge, Mass. 02139
 (617) 253-4202

L. CLARK, JR
 Director of Reactor Operations

March 19, 1982



Mr. James R. Miller, Chief
 Standardization and Special Projects Branch
 Division of Licensing
 Nuclear Regulatory Commission
 Washington, D.C. 20555

Subject: Request for Waiver from Technical Specification 5.2-1,
 License No. R-37, Docket 50-20

Dear Mr. Miller:

Massachusetts Institute of Technology requests a limited and temporary waiver from Technical Specification 5.2-1, applicable to fuel to be used in the MIT Research Reactor, MITR-II.

The purpose of the waiver is to permit use in the near future of fuel that has been fabricated in accordance with present-day practices but that does not meet the Technical Specifications written in the early 1970's for the MITR-II.

Technical Specification 5.2-1 states that the fuel core shall be "clad by a layer of aluminum metal 0.015-~~0.005~~^{+0.015}" thick". This requires a minimum clad thickness of 0.010". It is requested that a waiver be granted from the tolerances on the nominal 0.015" clad thickness for three elements scheduled for use on March 30th.

Justification for the waiver is the experience that has been gained over the past decade by research and test reactors using uranium aluminide fuel such as that fabricated for the MITR-II. In particular, the U.S. Department of Energy's Advanced Test Reactor (ATR) in Idaho has utilized well

A020
 s
 /D

Mr. James R. Miller, Chief
Request for Waiver
March 19, 1982
page 2

over one thousand elements of this type, made by the same fabricator that produces the MITR fuel. Reference 1 describes ATR experience and states (p. 148) that the release of radioactive fission gas to the primary cooling water appears to be adequately prevented by cladding of uniform thickness (>0.2 mm, >0.008 in). This corresponds to the minimum nominal cladding permitted for ATR fuel, where the term "uniform" implies a provision for minor manufacturing deviations (e.g. scratches, indentations, etc.) from the uniform thickness. The ATR fabrication specifications establish 0.008 in. as a minimum criterion, but provide for limited penetration of UAl_x particles to a shallower depth. We wish to be able to utilize the same cladding criteria, particularly since irradiation conditions in the MITR are less stringent than those in the ATR, i.e. lower coolant temperatures, pressures, and flow rates, lower neutron flux and lower heat flux.

MIT Reactor experience with this type of fuel to date has been favorable. Sixty fuel elements have now been used to varying degrees in the MITR-II. Fourteen have attained average burnups of about 40% and have been permanently discharged from the reactor upon attaining the limit of 1.8×10^{21} fission/cc (less 15% allowed as an uncertainty factor) permitted by Technical Specification 3.11-2e. Cladding failure was experienced in one element at 1.3×10^{21} fission/cc, but was judged to be a manufacturing defect and is believed not to be related to the cladding thickness criteria.

It is our belief that, typically, research reactor technical specifications do not state the tolerances associated with fuel cladding thickness.

Fabrication records indicate that three of the elements scheduled for use in the near future could have a minimum cladding of 0.008" thick, or 0.002" less than allowed by the Technical Specification. Therefore, a waiver from

Ref. 1: Beeston, J.M., R.R. Hobbins, G.W. Gibson, and W.F. Francis,
"Development and Irradiation Performance of Uranium Aluminide Fuels
in Test Reactors", Nuclear Technology, Vol. 49 p. 136-149 (June 1980)

Mr. James R. Miller, Chief
Request for Waiver
March 19, 1982
page 3

the lower tolerance limit stated in Specification 5.2-1 is requested for these three elements.

There is no significant accident potential arising from adoption of the ATR tolerances on the cladding specification.

MIT plans to submit an application to the Commission for an amendment to Technical Specification 5.2-1 for the above purpose. Meanwhile, however, a waiver is requested so that the fuel may be used at the earliest possible date.

The Standing Subcommittee of the MIT Reactor Safeguards Committee has approved this waiver request.

We shall be happy to furnish any additional information that may be desired.

Sincerely,

Lincoln Clark, Jr.
Lincoln Clark, Jr.
Director of Reactor Operations

LC/sbs

cc: MITRSC
USNRC-NRR (3 signed and 19 copies)
USNRC-DMB

Middlesex ss March 19, 1982
Subscribed and Sworn to before me this 19th day
of March, 1982

Lincoln Clark, Jr.
(Signature)
Edward M. Dargan Notary Public
My commission expires Oct. 15 1982

