

PROPOSAL FOR CONVERSION
OF THE UNIVERSITY OF VIRGINIA
NON-POWER 2 MW_{th} UVAR RESEARCH REACTOR
FROM HEU TO LEU FUEL

Submitted to:

Director of the Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington D.C. 20555
Attn: Mr. Thomas E. Murley

Submitted by:

Robert U. Mulder
Director U. Va. Reactor Facility
Department of Nuclear Engineering
and
Engineering Physics
University of Virginia
22901

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UVAR LEU CONVERSION SCHEDULE

Milestones	Dates
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Availability of DOE conversion funds	September 86
Notification of UVAR LEU core availability	October 88 (expected)
Submittal to the NRC by VA. of an application to convert, with necessary documentation	September 88 *
Receipt of NRC's "Order to Convert"	A December 88?
Completion of shipping plans and scheduling	A December 88?
Completion of all HEU fuel shipments from site	A+1 January 89?
Expected UVAR reactor downtime	< 1 mo.
Receipt of LEU fuel for a complete UVAR core	A+2 February 89?
Loading of LEU fuel in UVAR core	A+2
Completion of initial LEU fuel operating parameter tests	A+3 March 89?
Report to NRC containing summary of new UVAR reactor operational conditions, comparisons with SAR predictions, and license/tech spec conditions	A+12 December 89?
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A = Date of NRC order to convert, expected by the end of 1988

* If the milestones indicated in this schedule can't be met, despite best efforts, the conversion of the UVAR will be delayed accordingly.

CONVERSION IMPLEMENTATION CONSIDERATIONS

A. Application by Virginia for NRC Authorization to Convert

Virginia will request NRC authorization to convert its UVAR reactor to LEU reactor fuel shortly after it is officially notified by DOE that a full core load is ready, or is expected to be ready within a month's time. According to the schedule presented in the updated conversion plan, the Virginia request should be sent to the NRC in September of 1988, based on the present informal information furnished by DOE that the VA LEU elements may be available in October of 1988.

The schedule dates are not firm, for many reasons. One reason is that Virginia is opting to increase the number of fuel plates in its elements from 18 curved to 22 flat. The on-going conversion study calculations have shown that this change would be beneficial from an economical standpoint, by providing longer-lived and smaller cores. No safety penalty will result from this change, which was initially proposed by the RERTR personnel at ANL, so the economic advantage will be described to DOE in seeking their approval. When approved by DOE, EG&G will be obliged to develop new fuel element specifications and plan drawings. Based on these specifications, a dummy fuel element is to be built by B&W for trial fitting into the UVAR grid plate, prior to B&W's loading of standard LEU plates into VA element structures.

Virginia wishes to receive NRC's order to convert on a date shortly before the scheduled shipments of its spent HEU fuel. The NRC has not committed itself to the time it will take for the study and evaluation of the licensee's conversion documentation. However, no more than several months is expected to be necessary for this.

Virginia wishes to ship all its HEU fuel from the Reactor Facility just prior to the receiving its LEU fuel. So that fuel may be shipped in January of 1989, notifications and preparations will be initiated shortly. Recent experience has shown that it is not always possible to guarantee spent fuel shipment dates, which depend on cask availability and concurrence from the shipper and NRC. DOE will be expected to provide the funding for spent fuel shipments, in separate from the funding provided for the conversion study.

The present schedule may be changed as necessary. A revised schedule will be sent to the NRC at yearly intervals, as required by law. However, as the various milestones in the conversion process draw near, the NRC will be informally updated the VA reactor staff.

B. Description and Analysis of Safety Factors

The licensee will include in its conversion authorization request to the NRC a description of those reactor safety factors significantly affected by the change from HEU to LEU fuel. These considerations are the subject of the conversion study being financed by DOE. Preliminary results indicate that there will not be significant safety effects associated with the fuel conversion. Necessary facility changes will also be described in the documentation.

The licensee intends to seek DOE concurrence to increase the number of plates in the Virginia fuel elements from 18 to 22. This change would result in a more useful UVAR core, without significantly affecting safety margins. The benefits would be smaller and longer running cores, requiring fewer fuel changes and shipments.

C. Necessary Changes in Reactor License, Tech. Specs. and Plans

Based on the results of the conversion study carried out by the licensee, proposed necessary changes in the facility license and the technical specifications will be indicated to the NRC at the moment of the conversion request.

Changes to other facility documents made necessary by the fuel conversion will also be described. The documents to be reviewed include the Physical Security Plan and the Emergency Plan.

Reactor operators will be active in the various aspects of the conversion study and document reviews. They will also participate in the loading of the new core and development and performance of the initial tests. It is expected that the SOP's will not suffer changes, since the information presently available indicates imperceptible variance in operating performance and characteristics between the two fuel types. Changes in procedures will be reviewed during regularly scheduled staff meetings and requalification meetings, as currently done.

D. Quantity of HEU to be Shipped Off-site

The Reactor Facility presently maintains a total of 42 curved plate HEU elements, and 8 curved HEU fuel plates. Thirty-six flat plate HEU elements, which were only used in the UVAR, were shipped off-site in September and October of 1987. These shipments were considered an initial step of the conversion process. The curved plate elements and extra individual plates contain 6568.2 gm of U-235. The license limits are 3.6 kg U-235 for the CAVALIER and 14.0 Kg U-235 for the UVAR.

Of the 42 curved plate elements, 16 elements were in the CAVALIER reactor ("irradiated fuel") and are presently stored in the Facility's fuel storage room. [The CAVALIER core was recently unloaded, in preparation for the reactor's dismantling (approval of the CAVALIER's dismantling plan is pending at the NRC)]. The irradiated CAVALIER elements will be maintained in dry storage by the Facility for possible use in the UVAR reactor, if the CAVALIER dismantling plan is approved by the NRC without changes. The UVAR license limit for U-235 will not be exceeded if CAVALIER HEU fuel is transferred to the UVAR license. A delay in the conversion schedule might result in CAVALIER fuel being needed for the UVAR. It is noted that the HEU fuel elements for the CAVALIER and UVAR are identical.

The other 26 curved plate elements are in the UVAR core. At the present time there are no elements in the UVAR pool's spent fuel racks. No spare fresh HEU fuel is kept in fuel storage and there is no Virginia fuel held by B&W. The licensee expects to continue UVAR reactor operation with the HEU curved plate fuel until the LEU fuel becomes available and arrangements for the complete removal of the HEU are finalized.

E. Interim Period for Possession of both LEU and HEU

The management of the University of Virginia Reactor Facility does not wish to simultaneously possess both LEU and HEU fuel during an interim period, and believes such an interim period is not needed. An early DOE idea, of a gradual phasing in of LEU fuel, has been definitely discarded. Upgrading of the security plan to accommodate possession of larger quantities of SNM will not be requested. Therefore, UVAR's conversion date will be contingent on the availability of replacement fuel, and a definite date for spent-fuel shipment.

F. Compliance with Physical Security Regulations

All of the UVAR fuel is in-core and consequently is "self-protecting". Therefore, no further methods, beyond those already in the Facility's NRC approved security plan, need to be proposed to maintain compliance with the relevant regulations, in particular those contained in 10 CFR 73.

G. Converted Reactor Operator Regualification

It is anticipated that the operating characteristics of the converted UVAR reactor will not differ significantly from that of the present reactor. Therefore, the SOP's may not change at all, and if they change, the change will not be appreciable. The operators will be made aware of any changes to SOP's during

scheduled reactor operator requalification meetings, and receive training as warranted.

H. Certification of Federal Government Funding

Federal Government funding for the conversion study of the UVAR reactor has been secured from DOE by the University of Virginia. In addition, DOE has paid for four HEU spent-fuel shipments made in September and October of 1987. We have been in informal verbal contact with EG&G regarding fuel plate and fuel element specifications and have been told that B&W has initiated manufacture of the standard LEU fuel plates. We expect to work with DOE in arranging for the shipment of the remaining spent HEU fuel, tentatively to be scheduled in January, 1989. DOE should assist in providing a suitable spent fuel cask and cover shipping costs.