

DOE/ER/75272--71

**CONVERSION OF THE UNIVERSITY OF MISSOURI-ROLLA  
REACTOR FROM HIGH-ENRICHED URANIUM TO  
LOW-ENRICHED URANIUM FUEL**

8/25/86 - 9/30/87

Lead Principal Investigator - Dr. Albert E. Bolon  
Co-Investigator - Dr. Milan Straka  
Award Number - DOE DE FG02 86ER75272 Straka 8/87

10/1/87 - 9/30/94

Lead Principal Investigator - Dr. Milan Straka  
Co-Investigator - Dr. Albert E. Bolon  
Award Number - DOE DE FG02 86ER75272 Straka 9/88

10/1/95-9/30/96

Lead Principal Investigator - Dr. Albert E. Bolon  
Co-Investigator - David W. Freeman  
Award Number - DOE DE FG02 86ER75272 Bolon 9/96

Nuclear Reactor Facility  
University of Missouri-Rolla  
1870 Miner Circle  
Rolla, Missouri 65409-0630

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

MASTER

## **DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

## **DISCLAIMER**

**Portions of this document may be illegible electronic image products. Images are produced from the best available original document.**

## Summary Report for Conversion of the UMR Reactor from HEU to LEU Fuel

The objectives of this project were to convert the UMR Reactor fuel from high-enriched uranium (HEU) to low-enriched uranium (LEU) fuel and to ship the HEU fuel back to the Department of Energy Savannah River Site. The actual core conversion was completed in the summer of 1992. The HEU fuel was offloaded to an onsite storage pit where it remained until July, 1996. In July, 1996, the HEU fuel was shipped to the DOE Savannah River Site. The objectives of the project have been achieved.

DOE provided the following funding for the project:

Date	Funding
8/86	\$77,439
10/87	\$78,621
10/95	\$65,000
Total	\$221,060

The above funding supported analyses performed to support the conversion. The analysis work included neutronics modeling and thermohydraulic studies. The analysis results were used to support licensing documents (e.g. Safety Analysis Report and Technical Specifications) required by the U.S. Nuclear Regulatory Commission for the conversion.

Additionally, the above funding supported the actual conversion and offsite shipping of the irradiated HEU fuel.

Several papers were published regarding the conversion project and are listed in the Attachment.

In retrospect, the conversion project required much more time and effort than originally thought. Several difficulties were encountered including the unavailability of a shipping cask for several years. We are grateful for the generous funding provided by DOE for this project but wish to point out that much of our efforts on the conversion project went unfunded. We are quite pleased that the project has been successfully completed and again wish to express our thanks for the funding received.

**ATTACHMENT**

**Conversion Project Papers**

1. Milan Straka, A.E. Bolon, Lorne Covington, "Study of the Reduced Enrichment Fuel Conversion at the University of Missouri-Rolla Reactor", International Annual Meeting on Reduced Enrichment for Research and Test Reactors, Buenos Aires, Argentina, September, 1987.
2. Milan Straka and Lorne Covington, "Study of Neutron Physics: Conversion of the University of Missouri-Rolla Reactor to Low Enriched Fuel", ANS Winter Meeting, Los Angeles, CA, November, 1987.
3. Lorne J. Covington, "Neutronics Study of the Conversion of the University of Missouri-Rolla Reactor to Low Enriched Uranium Fuel", M.S. Thesis, Rolla, MO, 1989.
4. Jeffery Joel Smith, "Determination of Characteristics of the University of Missouri-Rolla Reactor Highly-Enriched Uranium Fuel Using the ORIGIN2 Computer Code", M.S. Thesis, Rolla, MO, 1989.
5. Alice Ann Netzer, "Dose Rate Determination of the Highly-Enriched Uranium Fuel at the University of Missouri-Rolla Reactor in Preparation for Transportation", M.S. Thesis, Rolla, MO, 1991.
6. Ali A. Simpkins and A.E. Bolon, "Dose Rate Determination of UMR Fuel in Preparation for Transportation", ANS Annual Meeting, Boston, MA, June 9, 1992.
7. David W. Freeman and A.E. Bolon, "Recent Accomplishments at the University of Missouri-Rolla Reactor Facility", (Invited Paper), American Nuclear Society Summer Meeting, New Orleans, LA, June 19-23, 1994.
8. Michelle Lynn Hill, "Dose Rate Measurements of the Highly-Enriched Uranium Fuel at the University of Missouri-Rolla Reactor", M.S. Thesis, Rolla, MO, 1994.
9. Michelle L. Hill and A.E. Bolon, "Dose Rate Measurements of the Highly Enriched Uranium Fuel at the UMR Reactor", (Poster Session), Health Physics Society Annual Meeting, San Francisco, CA, June 29, 1994.
10. David Freeman, Hatem Khouaja, and A.E. Bolon, "Engineering Spent Fuel Shipments at the UMR Reactor Facility", ANS Meeting, Washington, D.C., November, 1996.