[redacted]

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DOCKET: 70 -157

LICENSEE: University of Texas at Austin
Austin, TX

SUBJECT: SAFETY EVALUATION REPORT - SUBMITTAL DATED MAY 3, 2004, SECOND AMENDMENT REQUEST TO MOVE [redacted] OF SPECIAL NUCLEAR MATERIAL FROM ORIGINAL SHIPPING CONTAINERS TO APPROVED STORAGE RACKS (TAC NO. L31843)

BACKGROUND

The Nuclear Regulatory Commission (NRC) issued Amendment Number 1 to the University of Texas at Austin's (UT's) Special Nuclear Material (SNM) License Number-180 on July 30, 2004, which authorized the receipt, possession and storage of SNM in Department of Transportation shipping containers on the [redacted] at UT. The NRC's current license review addresses the transfer of SNM from these shipping containers to storage racks in [redacted] of the reactor building. Subsequent to the issuance of Amendment 1, in a letter dated November 10, 2004, UT requested that the NRC cease review of the experimental use of SNM with the understanding that UT may submit another amendment request when an experimental plan has been developed. As a result, this evaluation only discusses the requested transfer of SNM to storage racks in [redacted] building.

DISCUSSION

NRC reviewed the original May 3, 2004, amendment request and the request for additional information responses provided by UT on July 8, 2004, which were used as a basis to issue Amendment Number 1. Based on this review and as the result of telephone conversations on August 19 and September 1, 2004, NRC issued a request for additional information dated September 8, 2004. In response to this request for additional information, UT submitted a safety analysis on November 10, 2004, for the storage racks in [redacted] building. NRC reviewed the November 10 submittal and issued an additional request for information dated January 7, 2005. In response to this second NRC request for additional information, UT submitted supplemental material on January 25, 2005.

Enclosure 2

[redacted]

The [redacted] slightly irradiated reactor fuel elements were initially planned to be stored in a 2x9 array, as stated in the November 10 submittal. However, based on its confirmatory calculations, the NRC raised a question about the results for the water-moderated, water-reflected case during the aforementioned telephone conversation on February 8, 2005. UT determined that the boundary conditions used for this case were incorrect (i.e., UT used vacuum instead of water boundary conditions). After analyzing the case with the water boundary conditions, UT determined that the array could be made critical if water moderated and water reflected; accordingly, the 2x9 array was discarded as a possible storage configuration. The February 10 submittal provided the currently planned storage configuration in which the fuel elements will be stored in a 1x9x2 array (i.e., a 1x9 array stacked on top of a 1x9 array). The calculated k_{eff} for the 1x9x2 array (water moderated and fully water reflected) is 0.72842. The actual k_{eff} in these conditions would be less than the calculation due to both the aluminum extensions on either end of the fuel elements increasing the vertical separation of elements and the storage racks increasing the horizontal separation of elements. No credit was taken for the structural supports or the extensions in UT's calculations. The k_{eff} would not increase significantly if more conservative calculations were performed where the water boundary condition (used to approximate full water reflection) was replaced by a vacuum boundary condition, and the 1x9x2 array was instead surrounded by at least 12 inches of water.

In addition to the calculations above, which showed that water moderation and water reflection are not a concern for the 1x9x2 array configuration, there are no probable means for water to be introduced [redacted] First, there is no sprinkler or fire suppression system in the room currently designated for the storage racks. Fire prevention is maintained by controlling the amount of flammable materials stored inside the room and a portable carbon dioxide fire extinguisher is provided in the room in the unlikely event a fire does occur. Second, there is no water service in the room, and no water pipes pass through the room. Third, the door to the room is not water tight and has louvers (approximately 2 feet by 2 feet) that would prevent the water depth in the room from exceeding 18 inches. Last, the room is located approximately 15 feet above the floor of the reactor building. Hence, it is highly unlikely for this room to flood in the unlikely event the reactor pool (containing 10,000 gallons of demineralized water) was to drain onto the floor of the reactor building or water was introduced into the room by some other means.

For the November 10 submittal, UT performed a calculation for four (number based on two individuals carrying the fuel) TRIGA elements in front of the 2x9 storage racks to determine the effects from possible interaction with other components in the room (other than TRIGA elements, all components were only small quantities of SNM). This calculation assumed the TRIGA elements were in a 1x4 array (each fuel element with a center-to-center separation of approximately 9 cm) approximately centered horizontally and touching the fuel elements in the 2x9 storage racks. This calculation also assumed air moderation and full water reflection and resulted in a k_{eff} of approximately 0.38. Without the TRIGA fuel elements and under the same moderation and reflector conditions, the result was approximately 0.35. Therefore, possible transfers of TRIGA elements near the storage racks would not interact significantly. On this basis, four TRIGA elements in front of the 1x9x2 storage racks would give similar results. [redacted] is located approximately 20 feet from the research reactor, and thus, there is no

interaction from the reactor with the storage racks. In addition, this room will have criticality monitoring in accordance with 10 CFR 70.24 and ANSI/ANS 8.3, "Criticality Accident Alarm System," with local and remote alarms.

Based on (1) the storage racks being subcritical when water moderated and fully water reflected, (2) not having any means to flood the area of the storage racks, (3) not having any water sources in the room and controlling the amount of flammable materials minimizing the need to introduce firefighting water, and (4) not having any interaction between the storage racks and existing areas containing special nuclear material, NRC concludes that the UT request for storage of the [redacted] slightly irradiated reactor fuel elements in a 1x9x2 array in Room 2.204 of the reactor building will provide reasonable assurance that a criticality accident will not occur and is acceptable.

DECOMMISSIONING

The SNM being stored at UT is considered a sealed source. Sealed sources are outside the scope of 10 CFR 70.25. Therefore, a decommissioning cost estimate is not required.

ENVIRONMENTAL REVIEW

The NRC staff has evaluated the impacts at UT of the receipt, possession and storage of [redacted] of ^{235}U that are contained in the sealed sources. An Environmental Assessment was prepared pursuant to NRC regulations 10 CFR Part 51 which implement the requirements of the National Environmental Policy Act of 1969. Based on its review, the staff concluded that the environmental impacts of the proposed action would not be significant and do not warrant the preparation of an Environmental Impact Statement. Accordingly, the Commission made a Finding of No Significant Impact which was published in the *Federal Register* on July 28, 2004 (69 FR 45089).

CONCLUSION

Based on the previous discussion, the staff concludes that there is reasonable assurance that the activities to be authorized by the issuance of an amended license to UT will not constitute an undue risk to the health and safety of the public, workers, and the environment. Approval of the amendment application is recommended.

NRC Region IV inspection staff has no objection to this proposed action.

PRINCIPAL CONTRIBUTOR

C. Hrabal