



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 13 TO

FACILITY OPERATING LICENSE NO. R-76

DOCKET NO. 50-27

THE WASHINGTON STATE UNIVERSITY

1.0 INTRODUCTION

In a letter dated April 19, 1990, and as supplemented by letters dated June 27, 1990, June 9, 1992, and August 11, 1992, Washington State University (WSU) requested a change in Facility Operating License No. R-76 and changes in Appendix A of the license, Technical Specifications and Bases for the Washington State University Modified TRIGA Reactor (TRIGA). The requested changes included (1) addition of Technical Specifications to control the use of sealed byproduct sources in the reactor pool, (2) correction of the description of the functions of the radiation monitoring instrumentation installed at the facility and the required surveillance activities for the instrumentation, and (3) updating the mailing address for reports to the NRC, correction of several typographical errors in the Technical Specifications and retyping the Technical Specifications.

2.0 EVALUATION

2.1 Use of Sealed Sources in the Reactor Pool

The licensee requested that a new Section 3.14 be added to the Technical Specifications to control the use of sealed sources of radioactive material in the reactor pool. The current sources are possessed by WSU under a license from the State of Washington. These Technical Specifications apply only when sources are in the reactor pool. The objectives of the Technical Specifications are to ensure that the sources do not constitute any type of significant hazard to the reactor, result in a significant environmental or personnel radiation hazard, or compromise the As Low As Reasonably Achievable (ALARA) criteria.

Technical Specification 3.14 proposed that sealed sources shall not be used or stored closer than five feet from the face of an operating reactor core. The specification of five feet from the operating reactor core is to prevent neutron activation of the encapsulation and the sealed sources contents.

The proposed specification also required that the storage and use of sources greater than 100 curies in the reactor pool shall be (1) treated as an experiment, (2) reviewed by the Reactor Safeguards Committee, and (3) controlled in accordance with written operating procedures. These Technical

Specifications ensure that the sources will be used in a controlled manner which has been reviewed and approved as any experiment in the reactor pool. Additionally, this proposed specification requires that (1) the reactor pool water be monitored monthly at an interval not to exceed six (6) weeks to detect potential significant sealed source leakage, and (2) if the water concentration of the isotope of interest exceeds one-third of the 10 CFR Part 20 Appendix B, Table II, Column 2 value, steps shall be taken to isolate the source and mitigate the problem. This monitoring program and isotope concentration action level ensure that action will be taken to correct sealed source leakage problems in an expedient manner and that regulatory release requirements will be satisfied, e.g., disposal to the sanitary sewerage system as authorized in 10 CFR 20.303.

A change to Technical Specification 6.10 (5) i. was also proposed relating to sealed sources. This change would require reporting in the annual report if specific activity of the released material after dilution is greater than 10 CFR Part 20 Appendix B limits. This change ensures reporting of potential releases beyond regulatory limits.

The licensee provided a safety analysis for the use of sealed sources in the WSU TRIGA reactor pool. This analysis considered three potential conditions: (1) contamination of the reactor pool water in the event of a sealed source failure, (2) contamination of the reactor core in the event of a sealed source failure, and (3) increased radiological hazard due to sealed sources in the event of a reactor accident.

- (1) For the contamination of the reactor pool water in the event of a sealed source failure, the licensee indicated that the sealed source radioactive material is not in a chemical form that is readily soluble in water. Further, the licensee indicated that the current sealed sources at WSU were designed and tested to ANSI Standard N542, and licensed by the State of Washington. The licensee also indicated that some of these sources (that are licensed by the State of Washington) have undergone impact, percussion, bending, and heat tests per 49 CFR Part 173 to verify that they meet applicable transportation standards. Further, the contamination of the reactor pool water in the event of a sealed source failure would be identified and dealt with in a timely manner in accordance with monthly monitoring and concentration limit of one-third of the 10 CFR Part 20 Appendix B, Table II, Column 2 value, as previously discussed. Because of these factors, the staff concludes that any potential effect of sealed source failure would not create a significant personnel or environmental radiological impact and any such failure would be dealt with in a manner consistent with 10 CFR Part 20 requirements.
- (2) For the potential contamination of the reactor core in the event of a sealed source failure, WSU indicated that the only potential hazard was the plate out of radioactive material on the reactor fuel elements. Because the considerations above acceptably demonstrated that any potential failure of a sealed source would be identified and controlled at relatively low levels (below one-third of the 10 CFR Part 20 Appendix

B, Table II, Column 2 value) as required by Technical Specifications, the staff determined that the potential plate out of failed sealed source material poses minimal hazard to reactor fuel elements. Therefore, this potential hazard has also been acceptably controlled and analyzed to minimize the effect on reactor safety.

- (3) For the increased radiological hazard due to the allowable increase in sealed sources in the event of a reactor accident, the licensee provided estimates of the dose contributions due to the sealed sources. This analysis demonstrated that the contributions from the sealed sources would be less than two percent of the accident dose for the loss of coolant accident from the Safety Analysis. The staff finds that this would be the most limiting radiological dose contribution for the sealed sources during a potential reactor accident, since otherwise the sources would have shielding from the reactor pool water. The staff also concluded that this dose estimate is not a significant additional dose contribution to that for potential reactor accident analyses.

Based on the foregoing, the staff concludes that sealed sources can be stored and used safely in the reactor pool as required by the proposed Technical Specifications. The licensee has acceptably demonstrated that the presence of sources in the reactor pool will not significantly effect the public or licensee personnel health or safety, will not significantly effect environmental conditions, and will not violate regulatory requirements.

## 2.2 Corrections for the Facility Radiation Monitoring System and Surveillance Requirements

The licensee requested addition of the argon-41 radiation monitoring system and related surveillance requirements to Technical Specification 4.3.3. The changes also include the specification that all Technical Specification required radiation monitoring systems (the area radiation monitoring system, the argon-41 radiation monitoring system, and the continuous air radiation monitoring system) shall be verified to be operable at least monthly at an interval not to exceed 45 days. The licensee also proposed changes to Technical Specification 5.4 to clarify the function of the continuous air radiation monitoring system and the argon-41 radiation monitoring system. The staff concluded that these changes correct Technical Specifications, and acceptably ensure continued function of these systems.

## 2.3 Correction of Typographical Errors, Update of NRC Address and Retype of the Technical Specifications

The licensee has identified the following, three typographical errors in the Technical Specifications:

- (1) Technical Specification Table 3.2 left out the "Function" and "Number of operable in specified mode" for the manual scram channel. This information has been added, in addition to capitalization and punctuation corrections in this table.

- (2) In Technical Specification 3.5(2) reference is made to Section 1.3 as the location of the definition of PTR (Peak-to-Measured-Fuel Temperature Ratio). The actual section where PTR is defined is Section 1.4. Technical Specification 3.5(2) is corrected to reflect this.
- (3) Technical Specification 6.6 refers to the "RSO". The correct reference is "RSC" (Reactor Safeguards Committee). Technical Specification 6.6 is corrected to reflect this.

The address and point of contact for reportable events and other submissions to the NRC is given in Technical Specification 6.10. Technical Specification 6.10 is updated to the current NRC address and points of contact.

In order to update the Technical Specifications, the licensee also retyped the Technical Specifications.

The staff has determined that these changes are editorial or administrative in nature and have no impact on the safety of the reactor.

### 3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves changes in the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20 and changes in surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and there is no significant increase in individual or cumulative occupational radiation exposure. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Parts 51.22(c)(9). This amendment also involves changes in recordkeeping, reporting or administrative procedures or requirements. Accordingly, with respect to these items, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Parts 51.22(c)(10). Pursuant to 10 CFR Part 51.22(b), no Environmental Impact Statement or Environmental Assessment need be prepared in connection with the issuance of this amendment.

### 4.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously evaluated, or create the possibility of a new or different kind of accident from any accident previously evaluated, and does not involve a significant reduction in a margin of safety, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed activities, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or the health and safety of the public.

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Date: September 1, 1992