

4.0 SURVEILLANCE REQUIREMENTS

4.1 Fuel

Applicability

This specification applies to the surveillance requirement for the fuel elements.

Objective

The objective is to assure that the dimensions of the fuel elements remain within acceptable limits.

Specifications

- a. The standard fuel elements shall be measured for length and bend at intervals separated by not more than 500 pulses of magnitude greater than \$1.00 of reactivity, but the intervals shall not exceed [12]-36 months. Fuel follower control rods shall be measured for bend at the same time interval.
- b. A fuel element indicating an elongation greater than 1/10 of an inch over its original length or a lateral bending greater than 1/16 of an inch over its original bending shall be considered to be damaged and shall not be used in the core for further operation.

A fuel follower control rod shall be considered to be damaged and shall not be used for further operation if it indicates a lateral bending greater than 1/16 of an inch over the fuel containing portion of the rod.
- c. Fuel elements in the B- and C-ring shall be measured for possible distortion in the event that there is indication that fuel temperatures greater than the limiting safety system setting on temperature may have been exceeded.

Basis

The most severe stresses induced in the fuel elements result from pulse operation of the reactor, during which differential expansion between the fuel and the cladding occurs and the pressure of the gases within the elements increases sharply. The above limits on the allowable distortion of a fuel element have been shown to correspond to strains that are considerably lower than the strain expected to cause rupture of a fuel element and have been successfully applied at other TRIGA installations. *The surveillance interval is selected based on the past history of more frequent, uneventful, inspections for over 20 years at this facility and experience at other TRIGA facilities with similar power level, fuel type, and operational modes. It is also designed to reduce the possibilities of mechanical failures as a result of handling elements, and to minimize potential radiation exposures to personnel.*

4.2 Control Rods

Applicability

This specification applies to the surveillance requirements for the control rods.

Objective

The objective is to assure the integrity of the control rods.

Specifications

- a. The reactivity worth of each control rod shall be determined [~~semi-~~annually, but at intervals not to exceed ~~eight~~ *eighteen* months.
- b. Control rod drop times shall be determined [~~semi-~~annually, but at intervals not to exceed ~~eight~~ *eighteen* months.
- c[~~d~~]. The control rods shall be visually inspected for deterioration at intervals not to exceed ~~two~~ *three* years.

Bases

The reactivity worth of the control rods is measured to assure that the required shutdown margin is available and to provide a means for determining the reactivity worths of experiments inserted in the core. The visual inspection of the control rods and measurement of their drop times are made to determine whether the control rods are capable of performing properly. *The surveillance intervals are selected based on the past history of more frequent, uneventful, inspections for over 20 years at this facility and experience at other TRIGA facilities with similar power level, fuel type, and operational modes. They are also designed to reduce the possibilities of mechanical failures as a result of handling control rods, and to minimize radiation exposures to personnel.*

4.3 Reactor Safety System

Applicability

This specification applies to the surveillance requirements for the measuring channels of the reactor safety system.

Objective

The objective is to assure that the safety system will remain operable and will prevent the fuel temperature safety limit from being exceeded.

Specifications

- a. A channel test of each of the reactor safety system channels shall be performed prior to each day's operation or prior to each operation extending more than one day.
- b. A channel check of the fuel element temperature measuring channel shall be performed daily whenever the reactor is in operation or when pulse operation is planned.
- c. A channel check of the power level measuring channels shall be performed daily whenever the reactor is in operation.
- d. A channel calibration by the calorimetric method shall be made of the power level monitoring channels ~~{semi-}~~ annually, but at intervals not to exceed ~~{eight}~~ *eighteen* months.
- e. A calibration of the temperature measuring channels shall be performed ~~[semi-]~~ annually, but at intervals not to exceed ~~[eight]~~ *eighteen* months. This calibration shall consist of introducing electric potentials in place of the thermocouple input to the channels.
- f. A verification of the original calibration of the temperature measuring channels shall be performed ~~[semi-]~~ annually, but at intervals not to exceed ~~{eight}~~ *eighteen* months. This verification shall consist of comparing the measured temperature in a reference core at a known power level with the temperature measured in the reference core during the initial startup of the reactor.

Basis

The daily tests and channel checks will assure that the safety channels are operable. The ~~[semi-]~~ annual calibrations and verifications will permit any long-term drift of the channels to be corrected. *The history of operations at this facility over the last 20 years has shown that annual checks will allow adequate correction for the very small amounts of drift observed.*

6.2 Review

- a. There shall be a Reactor Operations Committee which shall review reactor operations to assure that the facility is operated in a manner consistent with public safety and within the terms of the facility license.
- b. The responsibilities of the Committee include, but are not limited to the following:
 1. Review and approval of experiments utilizing the reactor facilities;
 2. Review and approval of all proposed changes to the facility, procedures, and Technical Specifications;
 3. Determination of whether a proposed change, test, or experiment would constitute an unreviewed safety question or a change in the Technical Specifications;
 4. Review of the operation and operational records of the facility;
 5. Review of abnormal performance of plant equipment and operating anomalies;
 6. Review of unusual or abnormal occurrences and incidents which are reportable under 10 CFR 20 and 10 CFR 50; and
 7. Approval of individuals for the supervision and operation of the reactor.
- c. The Committee shall be composed of at least five members, one of whom shall be a health physicist designated by the Office of Environmental Health and Safety of the University. The Committee shall be proficient in all areas of reactor operation and reactor safety. The membership of the Committee shall include at least two members who are not associated with the Department of Chemistry.
- d. The Committee shall have a written statement defining such matters as the authority of the Committee, the subjects within its purview, and other such administrative provisions as are required for effective functioning of the Committee. Minutes of all meeting of the Committee shall be kept.
- e. A quorum of the Committee shall consist of not less than a majority of the full Committee and shall include the chairman or his designee.
- f. The Committee shall meet at least ~~quarterly~~ semi-annually, at intervals not to exceed nine months.