

Technical Specifications
L-77 Research Reactor
Brigham Young University

Included in this document are the technical specifications and the basis for technical specifications. These basis, which provide technical support for the individual technical specifications, are included for information purposes only. They are not part of the technical specifications and do not constitute limitations or requirements to which the licensee must adhere.

1. Definitions

1.1. certified operators - A certified operator is an individual authorized by the chartering or licensing organization to carry out the duties and responsibilities associated with the position requiring the certification.

1.2. channel - A channel is the combination of sensor, line, amplifier, and output devices which are connected for the purpose of measuring the value of a parameter.

1.3. channel check - A channel check is a qualitative verification of acceptable performance by observation of channel behavior. This verification may include comparison of the channel with other independent channels or methods measuring the same variable.

1.4. channel calibration - Calibration is an adjustment of the channel such that its output corresponds with acceptable accuracy to known values of the parameter which the channel measures.

1.5. operable - Operable means a component or system is capable of performing its intended function.

1.6. operating - Operating means a component or system is performing its intended function.

1.7. reactor operating - The reactor is operating whenever it is not secured or shutdown.

1.8. reactor secured - A reactor is secured when:

1.8.1. It contains insufficient fissile material or moderator present in the reactor, adjacent experiments or control rods, to attain criticality under optimum available conditions of moderation and reflection.

1.9. research reactor - A research reactor is defined as a device designed to support a self-sustaining neutron chain reaction for research, development, educational, training, or experimental purposes, and which may have provisions for the production of radio-isotopes.

1.10. shall, should and may - The word "shall" is used to denote a requirement; the word "should" to denote a recommendation; and the word "may" to denote permission, neither a requirement nor a recommendation.

2. Safety Limits and Limiting Safety System Setting

Safety Limit - Not applicable. The reactor shall remain secured.

3. Limiting Conditions for Operation

Not applicable. The reactor shall remain secured.

4. Surveillance Requirements

Specified surveillance actions shall be performed in accordance with the following schedule.

4.1. Control and safety system.

4.2. Applicability: The reactor facility.

4.2.1. Objective: To maintain surveillance for potential exposure to radiation.

4.2.2. Specifications:

4.2.2.1. TLD dosimeters shall be checked by the commercial vendor quarterly. The report generated shall be reviewed by the Radiation Safety Officer quarterly.

4.2.2.2. Portable radiation survey instruments shall have a semiannual calibration.

4.2.3. Bases. Periodic quality assurance procedures should insure confidence that measurements and observations are correct.

4.3. Reactor Area.

4.3.1. Applicability. This specification pertains to the reactor facility.

4.3.2. Objective. To assure the radiation safety of the reactor area.

4.3.3. Specifications.

4.3.3.1. The fire alarm test frequency (NFPA 72d priority signaling systems) shall be on a biannual basis in accordance

with NFPA # 73E. Testing shall be performed by personnel from Physical Facilities.

4.3.3.2. The door locks and alarm systems shall be checked quarterly.

4.3.3.3. The shield water level shall be visually inspected annually. This requirement shall be void once the plutonium/beryllium source is removed from the reactor.

4.3.3.4. The RSO shall conduct an annual visual inspection of the reactor structure for water leakage. This requirement shall persist as long as the shield tank is filled with water. Any leakage, corrosion, or damage shall be corrected.

4.3.3.5. The Radiation Safety Officer or his designated representative shall make a radiation survey of the area semiannually.

4.3.3.6. Two TLD dosimeters shall be placed in the nuclear laboratory and one TLD dosimeter shall be placed immediately outside the nuclear facility in order to maintain a record of potential exposure levels inside and immediately adjacent to the facility.

4.3.4. Basis: The fuel has been removed, and the power to the reactor has been cut. The only persons allowed unaccompanied access to the facility are the Radiation Safety Officer and the Facility Chief. Currently the building housing the reactor is occupied less than five hours per quarter. Under these conditions the rate of exposure would have to be in excess of 200 mrem/ hour in order to cause those individuals most heavily exposed, to accumulate more than 1.25 rem/quarter. The highest rate of exposure recorded by TLD monitors in the reactor facility during 1988 was 23 mrem/quarter. The radiation exposure instrument currently used in surveys is a Victoreen 470 ionization chamber. This instrument is capable of detecting exposures of as low as 0.1 mrem/hr which is approximately three orders of magnitude less than the exposure rate necessary to produce an overexposure to the most frequent occupant. Thus it is reasonable to suppose with the current static condition of the facility that first, no significant exposure can occur in the facility unless there is physical manipulation of the Pu/Be source, and second, if there were a change in status that change would be readily detectable well below the level at which serious exposure would be anticipated with the current monitoring system.

5. Design Features:

5.1. Reactor: The reactor is an L-77 research reactor. The fuel has been removed and shipped off site and the power to the reactor has been cut. The beam ports shall be locked except upon approval of RSC to conduct

measurements pursuant to decommissioning activities.

5.2. Reactor Facility: The reactor is located in the Nuclear Laboratory. This is a dedicated facility located on the southwest portion of the Brigham Young University campus. The building is of concrete and masonry construction. Unaccompanied access is limited to the Radiation Safety Officer and the Reactor Facility Chief or University Police. Any other access shall be under the supervision of the RSO or the Facility Chief. The doors shall remain locked and the alarm engaged whenever there are no occupants in the building.

5.3. Anticipated changes in configuration: Under the Possession Only License the major anticipated configuration change may be the removal of the plutonium/beryllium source. Until the source is removed, the shielding water shall be maintained at a level no less than one foot below the top edge of the shielding tank.

6. Administrative Controls:

6.1. Organization: (see figure 1)

6.1.1. President. The president is the Chief Administrative Officer responsible for the University. As such he shall have ultimate responsibility for the operation and management of the nuclear reactor.

6.1.2. Executive Vice President (EVP). The Executive Vice President reports directly to the President and shall have direct responsibility for the reactor.

6.1.3. Radiation Safety Officer. The Radiation Safety Officer (RSO) shall be appointed by the Executive Vice President with the advice of the Chairman of the Radiation Safety Committee. He shall be responsible to the EVP for the day-to-day administration of the radiation safety program and serves as the Secretary of the Radiation Safety Committee. He prepares the University's Radiation Safety Manual. The Radiation Safety Officer shall also be responsible for preparing, for the signature of the Chairman of the Radiation Safety Committee, reports of all reportable occurrences to the appropriate regulatory agency and for ensuring that appropriate follow up action is taken.

6.1.4. Training Requirements. At least one member of the Radiation Safety committee shall have a PhD in physics. The Radiation Safety Officer shall have a minimum of one year experience in working with radiation and radiation safety.

6.1.5. Radiation Safety Committee. The members of this committee shall be appointed by the Executive Vice President. This committee shall be composed of four members, to include: the Radiation Safety Officer, a faculty member from the Physics Department, a faculty member from the College of Biological Science, and a member from the

Campus Safety Office. The Radiation Safety Committee (RSC) shall meet quarterly. 3 of 4 members shall constitute a quorum. The minutes shall be recorded and sent to the committee members. The minutes shall be read and approved at the start of each meeting. The RSC reports directly to the Executive Vice President.

The Radiation Safety Committee shall have both review and audit functions with regard to the Reactor Facility. The RSC shall advise the Reactor Administrator as well as level one management on all matters pertaining to reactor facility safety.

6.1.5.1. Any changes in equipment, procedures, facilities or license including these technical specifications shall be reviewed by the RSC.

6.1.5.2. Audit Function: The records of safety surveys and deficiency reports shall be examined by the Radiation Safety Committee. Audits shall be performed on an annual basis.

6.1.5.3. The RSC shall review surveillance performed in compliance with technical specifications.

6.2. Procedures: Procedures shall be adequate to assure both the safety and adequate security of the reactor. Substantive changes to the procedures shall be made only with approval of the RSC. Temporary changes to procedures which do not change their original intent may be made by the RSO. All such temporary changes shall be documented and submitted to subsequent review by the RSC. Procedures shall be in effect for the following items:

6.2.1. Emergency procedures.

6.2.2. Security.

6.2.3. Calibration.

6.2.4. Surveys.

6.2.5. Surveillance.

6.3. Required Actions:

6.3.1. Action to be taken in the event of an occurrence defined in Section 6.4.2.1.

tions 6.3.1.1. Corrective action shall be taken to return conditions to normal.

6.3.1.2. All such occurrences shall be promptly reported to the Level 2 authority or designated alternates.

prevent 6.3.1.3. All such occurrences including action taken to or reduce the probability of a recurrence shall be reviewed by the Radiation Safety Committee.

6.4. Reports. All written reports shall be sent within the prescribed interval to the NRC, Washington, D.C. 20555, Attention: Document Control Desk, with a copy to the Regional Administrator, Region IV.

6.4.1. Operating Reports. Routine annual reports covering the activities of the reactor facility during the previous calendar year shall be submitted to the appropriate NRC office by March 31 of the subsequent year. The following information shall be included in the report.

6.4.1.1. Tabulation of major preventive and corrective maintenance operations having safety significance.

6.4.1.2. Tabulation of major changes in the reactor facility procedures.

6.4.1.3. The results of any environmental surveys performed outside the facility.

facility 6.4.1.4. A summary of radiation exposures received by personnel and visitors in any one year including the dates and times of significant exposures (above 500 mRem).

6.4.1.5. A summary of any effluents or discharges from the reactor facility.

6.4.2. Special Reports.

types 6.4.2.1. Prompt Notification with Written Follow up. The of events listed below shall be reported as expeditiously as possible by telephone and confirmed by telegraph, mailgram, or facsimile transmission to the Director of NRC Region IV or his designated representative no later than the first work day following the event, with a written follow up report within two weeks to the Document Control Desk and the Regional Administrator. Information provided shall contain narrative material to provide completed explanation of the circumstances surrounding the event.

6.4.2.1.1. Unanticipated releases of radioactivity to the environment exceeding 500 times the limits specified for such materials in Appendix B, Table II of 10 CFR part 20.

6.4.2.1.2. Exposure of personnel exceeding the limits as stated in 10 CFR 20.403 (b) 1.

6.4.2.1.3. Damage to, or theft of, the sealed source.

6.4.3. Reports Within 30 Days. The types of events listed below shall be reported to the Document Control Desk and the NRC Region IV Administrator or his designated representative within 30 days of their occurrence.

6.4.3.1. Any change in the facility organization.

6.4.3.2. An observed inadequacy in the implementation of administrative or procedural controls such that the inadequacy causes or could have caused an unsafe condition with regards to reactor maintenance.

6.5. Records: Records of the following activities shall be maintained and retained for the period specified below. The records may be in the form of logs, data sheets, or other suitable forms. The required information may be contained in single, or multiple records, or a combination thereof.

6.5.1. Records to be Retained for a Period of at least five years.

6.5.1.1. Normal reactor facility operations.

6.5.1.2. Principal maintenance operations.

6.5.1.3. Reportable occurrences.

6.5.1.4. Surveillance activities required by the Technical Specifications.

6.5.1.5. Reactor facility radiation and contamination surveys where required by applicable regulations.

6.5.1.6. Special Nuclear Material inventories, receipts, and shipments.

6.5.1.7. Approved changes in operating procedures.

6.5.1.8. Records of meeting and audit reports of the Radiation Safety Committee.

6.5.1.9. Sealed source leak test results.

6.5.2. Records to be Retained for Five Years or for the Lifetime of the Reactor Facility whichever is Greater

(Note: Annual reports may be used where applicable as records in this section).

6.5.2.1. Gaseous and liquid radioactive effluents released to the environment.

6.4.2.2 As built drawings.

Figure 1
Organization Chart

