



*Center for Excellence in
Nuclear Technology, Engineering, and Research*

1 July 2002

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

To whom it may concern:

Enclosed is the annual operating Report for the University of Utah TRIGA Nuclear Reactor, License No. R-126, Docket number 50-407, for the period of 1 July 2001 through 30 June 2002. This report fulfills the requirements of the TRIGA technical specifications (TTS) 6.10(5).

If there are any further questions or concerns regarding this report, please contact me at (801) 581-8499

Respectfully,

David M. Slaughter
Reactor Administrator

AD 20
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**The University of Utah TRIGA Reactor
Annual Operating Report
for the period
1 July 2001 through 30 June 2002**

A. NARRATIVE.

1. Operating Experience.

The University of Utah Center for Excellence in Nuclear Technology, Engineering, and Research (CENTER) TRIGA Reactor, License No. R-126 Docket No. 50-407, was critical 45,222 hours and generated 3172.433 kilowatt-hours of thermal energy during this reporting year. The reactor was used for educational demonstrations, laboratory experiments, systems tests, power measurements and sample irradiations.

2. Changes in Facility Design.

The documents supporting a forthcoming application to upgrade licensed power from 100 kW to 1.1 MW, are being internally reviewed before submission to the NRC. No facilities changes have occurred.

3. Surveillance Tests.

Documentation of all surveillance activities is retained and stored by the facility

a. Control Rod Worths

Table 1. Summary of control rod worth, SDM, and ER

Core Configuration	#24	#24
	8/06/01	4/11/02
	Dollars (\$)	Dollars (\$)
Safety Rod	2.23	2.697
Shim-Safety Rod	1.56	1.643
Regulating Rod	0.25	0.283
Excess Reactivity	1.013	0.791
Shutdown Margin	0.791	1.131

b. Control Rod Inspection.

The Biennial Control Rod Inspection was performed during December 2001. The control rods were sequentially removed from the reactor core for visual inspection. Each control rod was found to be in good condition with no noticeable deterioration or corrosion having occurred since the last inspection. Rod drop times were measured on 8/06/01, and 4/11/02. All rod drop times were less than 1.0 seconds.

c. Reactor Power Level Instrumentation.

Calorimetric power calibrations were performed on 8/16/01, and 4/19/01 with the following results:

Date	Measured % Power	Calculated Power Level
8/16/01	91.0 kW	89.6 kW
4/19/01	89.3 kW	86.9 kW

d. Fuel Inspection

The Biennial Fuel Inspection was performed during December 2001. Each fuel element was visually inspected while keeping it submerged for shielding. No deterioration or excessive corrosion of in-core fuel elements was observed since the previous inspection. Pool water is sampled and analyzed periodically for evidence of fission product activity indicative of defective or deteriorating fuel. Analyses of pool water following full-power reactor operations lasting several hours have not shown any indication of fission product leakage.

e. Fuel Temperature Calibration.

Fuel temperature circuits were calibrated on 8/17/01 and 4/19/02. The circuit were calibrated to less than a 2°C error over the range 20°C to 400°C.

f. Reactor Safety Committee Audits.

Rian B. Smith audited the maintenance and operational activities of the facility and radiation safety for the period 1 Jul. 2001 through 31 Dec. 2001.

James M. Byrne audited the maintenance and operational activities of the facility for the period 1 Jan. 2001 through 30 Jun. 2001.

Rian B. Smith audited radiation safety and ALARA practices at the facility for the period 1 Jul. 2001 through 31 Dec. 2001.

Rian B. Smith audited radiation safety and ALARA practices at the facility for the period 1 Jan. 2001 through 30 Jun. 2001.

No significant deviations from normal operating practices were identified by these audits.

g. Environmental Surveys

Rian B. Smith reported to the RSC a maximum total exposure of 39 millirem per quarter to environmental dosimeters located at various positions surrounding CENTER for the period 16 Apr. 2001 through 15 Apr. 2002*. The average quarterly exposure for the six environmental monitoring stations was 30.51 millirem.

*The dosimetry report for 16 Apr. ~ 30 Jun. 2002 are not included in this report. The data during this period will be included in the next year's annual report.

B. ENERGY OUTPUT.

The reactor was critical for 45.222 hours and produced 0.132 megawatt-days (3172.433 kilowatt-hours) of energy during this reporting period. Since initial criticality, the reactor has been operated for a total of 3102.207 hours with an accumulated total energy output of 8.157 megawatt-days (195774.449 kilowatt-hours).

C. EMERGENCY SHUTDOWNS AND INADVERTENT SCRAMS: none

D. MAJOR MAINTENNANCE.

CAM chart recorder gears off-line: gear shaft bushing replaced

Ventilation system fan belt worn: belt replaced and tension adjusted

Rustrak recorder impact needle (pointer) broke off: replaced with an inked chart recorder

E. CHANGES, TESTS AND EXPERIMENTS PURSUANT TO 10 CFR 50.59.

As of the end of the reporting period, the current membership of the Reactor Safety Committee (RSC) as designated by the Licensee is as follows:

James M. Byrne, Chair
David M. Slaughter, Reactor Administrator
Karen Langely, RSO of University of Utah
Melinda P. Krahenbuhl, Reactor Supervisor
Gary M. Sandquist, Secretary
Deter Gehmlich
James Thompson
Rian B. Smith

The RSC has reviewed and approved several CENTER procedures which were

modified to update and correct perceived deficiencies. The CENTER staff continues to review and update facility documentation to assure compliance with all applicable regulations

F. RADIOACTIVE EFFLUENTS.

1. Liquid Waste - Total Activity Released: none

2. Gaseous Waste - Total Estimated Activity Released: 39.497 μ Ci.

The TRIGA Reactor was operated for 45,222 hours at power levels up to approximately 90 kW. At this power level argon-41 production is substantially below MPC values for unrestricted areas. The minimum detectable concentration of Ar-41 for the stack monitor has been found to be one-third of 10 CFR 20 appendix B limits for release to unrestricted areas. The average annual calculated concentration of Ar-41 generated during operations is estimated at 1.758×10^{-10} μ Ci/ml which is less than 0.5 % of the DAC for this radionuclide. The total amount of Ar-41 released was estimated at 39.497 μ Ci. No phosphorus-32 was released from CENTER during this period. The total amount of all gaseous radioactivity released was estimated at 39.497 μ Ci. A monthly summary of gaseous releases is given in Table I

Table I.

Summary of Monthly Gaseous Radioactive Effluent
1 July 2001 through 30 June 2002

Month	Ar-41 (μ Ci)	Estimated Release P-32 and all others	Total (μ Ci)
July	5.107	0	5.107
August	3.610	0	3.610
September	0.004	0	0.004
October	0.008	0	0.008
November	0	0	0
December	27.33	0	27.33
January	0	0	0
February	0	0	0
March	0	0	0
April	3.440	0	3.440
May	0	0	0
June	0	0	0
Total Activity of gaseous effluent (μ Ci):		39.497 μ Ci	

3. Solid Waste - Total Activity: None

No solid waste material was sent to the Radiological Health Department for disposal during the period of 1 July 2001 through 30 June 2002.

G. RADIATION EXPOSURES.

Personnel with duties in the reactor laboratory on either a regular or occasional basis have been issued a OSL (since Nov. 1999, collected bimonthly) dosimeter by the University of Utah Radiological Health Department. The duty category and monitoring period of personnel are summarized below:

Table II.

Summary of Monitored Personnel
1 July 2001 through 30 June 2002

Name	Monitoring Period	Duty Category
David M. Slaughter	5/1/01-6/30/02	regular
Gary M. Sandquist	5/1/01-6/30/02	regular
Melinda Krahenbuhl	5/1/01-6/30/02	regular
Dong-ok Choe	5/1/01-6/30/02	regular
Justin L. Wilde	5/1/01-6/30/02	regular
Brenda Shelkey	5/1/01-6/30/02	regular
Aja A. Marcheson	5/1/01-4/30/02	regular/terminated
Heidi A. Walk	5/1/01-6/30/02	regular
Michael LeBaron	5/1/01-6/30/02	regular
Dimitre Assenov	5/1/01-6/30/02	regular
Ashley J. Pingree	5/1/01-10/31/01	regular/terminated
John D. Bess	5/1/01-6/30/02	regular
Jennifer L. Killpack	5/1/01-6/30/02	regular
Ward Chapman	5/1/02-6/30/02	regular
James R. Parry	7/1/01-6/30/02	regular

Measured Doses

5/1/01-4/30/02 Doses: <10 mrem average; 3 mrem highest measured.

*This measured doses does not include May 2002 and June 2002 because of the late arrival. We will include the results for the months in the next year's annual report.

Dose Equivalent Limit

Maximum Permissible Dose Equivalent = 5000mrem/year (1250/quarter).
Minimum Detectable Dose per Monthly Badge = 10 mrem.

Of the 383 visitors to the facility under the DOE Reactor Sharing Program for the reporting year, no visitor received a measurable dose. Therefore, the average maximum doses are all within NRC guidelines. A summary of whole body exposures is presented in Table III.

Table III

Summary of Whole Body Exposures 1 July 2001 through 30 June 2002

Estimated whole body exposure range (rem):	Number of individuals in each range:
No Measurable Dose	
Less than 0.10	13
0.10 to 0.25	0
0.25 to 0.50	0
0.50 to 0.75	0
0.75 to 1.00	0
1.00 to 2.00	0
2.00 to 3.00	0
3.00 to 4.00	0
4.00 to 5.00	0
Greater than 5 rem	0

H. LABORATORY SURVEYS

Monthly surveys of the facility were conducted by the University of Utah Radiological Health Department during the reporting period. The surveys have not indicated any unusual radiation levels over previous years. Records of surveys are retained by the facility.

I. ENVIRONMENTAL STUDIES

Environmental monitoring conducted by the University of Utah Radiological Health Department indicated no unusual dose rates in the areas surrounding the Merrill Engineering Building, which houses the reactor facility.

Prepared by: [Signature] Date: 6/28/02

Submitted by: [Signature] Date: 6/28/02
Reactor Supervisor

Approved by: [Signature] Date: 7/1/02
Reactor Administrator