IDAHO STATE UNIVERSITY

College of Engineering

Campus Box 8060
Pocatello, Idaho
83209-8060

June 30, 2002

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

Subject: Transmittal of Annual Facility Operating Report for 2001

Dear Madam/Sir:

Enclosed please find a copy of the Annual Operating Report for the Idaho State University AGN-201M Reactor, License No. R-110, Docket No. 50-284, for calendar year 2001. Submission of this report satisfies the requirements of AGN Technical Specification 6.9.1. A copy of this report has also been submitted to the Region IV Administrator, as required by the aforementioned technical specifications.

If you have any questions concerning the report, please call me at (208) 282-3351.

Sincerely,

John S. Bennion
Reactor Manager/Supervisor

Cc: Mr. Marvin M. Mendonca, Project Manager
Non-Power Reactors and Decommissioning Project Directorate
Operating Reactor Improvements Program
Office of Nuclear Reactor Regulation

Phone: (208) 282-2902
FAX: (208) 282-4538
E-mail:
engineering@isu.edu

A020
A001

Idaho State University
AGN-201M Reactor Facility
License R-110, Docket No. 50-284
Annual Operating Report for Calendar Year 2001

1. Narrative Summary.

A. Changes in Facility Design, Performance Characteristics, and Operating Procedures:

There were no changes in facility performance characteristics, and operating procedures relating to reactor safety during the reporting period.

B. Results of Major Surveillance Tests and Inspections:

(1) Channel tests performed on all safety channels and scram interlocks were found to be satisfactory and within specifications.

(2) Power and period calibrations were performed with satisfactory results.

(3) The shield water tank was inspected and no leaks or excessive corrosion were observed.

(4) The seismic displacement interlock was tested satisfactorily.

(5) (a) The control rod drive mechanisms were inspected and tested with satisfactory results.

(b) Ejection times were measured for all scrammable rods and found to be less than 130 milliseconds.

(c) Control element capsules (cladding) were inspected and found to be in good condition with no evidence of deterioration since last inspection.

(d) The reactivity worths of all safety and control rods were measured, as well as the time required to drive each rod to its fully inserted position. Reactivity insertion rates were determined to be less than 0.039% $\Delta k/k\ s^{-1}$ ($0.052 s^{-1}) for each of the safety and control rods.

(e) The shutdown margin was determined to be greater than 1.60% $\Delta k/k$ ($2.17) with both the most reactive scrammable rod and the fine control rod fully inserted.

(f) All surveillances were within the appropriate Technical Specification requirements.

2. Operating History and Energy Output.

The reactor was operated at power levels up to approximately 4.5 watts for a total of 27.2 hours thereby generating 0.995 watt-days (23.9 watt-hours) of thermal energy during this reporting period. A summary of monthly operations for 2001 is given in Table I.

Table I. Summary of Monthly Reactor Operations
(1 January 2001 through 31 December 2001)

Month	Hours	Energy (W-hr)
January	0.0	0.00
February	9.1	3.43
March	7.3	5.69
April	0.0	0.00
May	0.0	0.00
June	4.5	11.0
July	0.0	0.00
August	1.7	1.28
September	0.7	0.13
October	2.5	1.43
November	0.4	0.73
December	0.9	0.18
Total	27.2 hr	23.9 W-hr

3. A. Unscheduled Shutdowns and Corrective Actions Taken.

None.

B. Inadvertent Scrams and Action Taken.

10/22/01: While performing the initial approach to critical procedure during reactor startup, the reactor scrammed at 15:17 due to a low-level trip on Channel No. 3. The scram was attributed to a line-power fluctuation and the reactor was restarted. The reactor again scrammed while inserting the Coarse Control Rod to increase power to 0.01 W due to a high-level trip on Channel No. 3. This scram was also attributed to a fluctuation in building power. The reactor was restarted, and operation continued normally without any additional problems.

12/18/01: While power was being stabilized at 1.0 W, the Channel No. 2 period circuits tripped at 9:20. The scram was attributed to a power fluctuation. The reactor was restarted and taken to 0.5 W. At 9:42, while raising the power to 2.0 W, a high-level trip occurred on Channel No. 2, which was attributed to drift in Channel No. 2. The amplifier balance setpoints were readjusted and the reactor was restarted without any further problems.

4. Safety-Related Corrective Maintenance

1/30/01: The Channel No. 2 amplifier was found to have blown a fuse. The fuse was replaced; however, one of the 6BW4 vacuum tubes was observed to arc violently when the amplifier was energized. The amplifier was taken to Royce Martin, an electronics technician, for repair. Mr. Martin found a frayed wire that may have caused a short circuit. He repaired the wire and replaced the 6BW4 tube in the amplifier power supply circuitry. The amplifier was returned to service on 2/2/01.

6/25/01: The smoke detector in the reactor room, which is connected to the building's fire alarm system, was replaced as part of the university's preventative maintenance program.

6/26/01: A routine inspection of the safety and control rods was performed to closely examine the control elements and pneumatic dashpots for any signs of deterioration. All control elements were found to be in good condition with no indication of degradation since the previous inspection. The dashpots were found in excellent condition, except for the rubber pads attached to the strike plate on the dashpots attached to the drive assemblies of safety rods 1 and 2. These pads had been displaced a few millimeters from their original positions as a result of normal operation. The pads were removed, cleaned, and then reattached using new adhesive and returned to service.

8/8/01: The Channel No. 1 detector was removed for cleaning and installation of a new detector stop that also serves as a cover to prevent loose debris from the movable concrete block shield from falling into the annular gap between the guide tube and the detector extension tube. The accumulation of debris and grit between the detector extension and guide tubes can inhibit free travel of the detector when released from its start-up position at higher power levels and cause the detector to stick in the startup position. The detector was reinstalled with improved movement.

5. Modifications.

A. Changes in Facility Design.

There were no changes to the facility design to the extent that changed a description of the facility in the application for license and amendments thereto during 2001.

B. Changes to Procedures.

None.

C. Experiments.

No new or untried experiments or tests were performed during 2001.

D. Reactor Safety Committee.

As of the end of the reporting period, membership of the Reactor Safety Committee (RSC) consisted of the following individuals:

Frank H. Just - Chair
Jay F. Kunze - Dean, College of Engineering and Reactor Administrator
John S. Bennion - Reactor Manager/Supervisor
Thomas F. Gesell - Radiation Safety Officer
Robert Boston
Richard R. Brey
Todd Gansauge
Chad Pope
Michael E. Vaughan

6. Summary of Changes Reportable under 10 CFR 50.59.

None.

7. Radioactive Effluents.

A. Liquid Waste - Total Activity Released: None.

B. Gaseous Waste - Total Estimated Activity Released: 0.52 μCi (Ar-41).

The AGN-201 Reactor was operated for 27.2 hours at power levels up to approximately 4.5 watts. At this power level Ar-41 production is negligible and substantially below the effluent concentration limit given in 10 CFR 20 Appendix B, Table 2. The total activity of Ar-41 released to the environment was conservatively estimated at 0.52 μCi. This activity corresponds to the total activity of all gaseous radioactive effluent from the facility. A monthly summary of gaseous releases is given in Table II.

C. Solid Waste - Total Activity: None.

Table II. Summary of Monthly Gaseous Radioactive Effluent Releases
(1 January 2001 through 31 December 2001)

Month	Ar-41 (μCi)
January	0.000
February	0.075
March	0.124
April	0.000
May	0.000
June	0.241
July	0.000
August	0.028
September	0.003
October	0.031
November	0.016
December	0.004
Total activity:	0.522 μCi

9. Radiation Exposures.

Personnel radiation exposures are reviewed quarterly by the Radiation Safety Officer. Annual reports of ionizing radiation doses are provided by the Radiation Safety Officer to all monitored personnel as required under the provisions of 10 CFR 19.

Personnel with duties in the reactor laboratory on either a regular or occasional basis have been issued radiation dosimeters by the Idaho State University Technical Safety Office. The duty category and monitoring period of personnel are summarized in Table III:

Table III. Personnel Monitored for Exposure to Ionizing Radiation

Name	Monitoring Period	Duty Category
John S. Bennion	1/1/01 - 12/31/01	Regular
Thomas Collens	1/1/01 - 5/31/01	Occasional
Todd Gansauge	1/1/01 - 12/31/01	Regular
Jay F. Kunze	1/1/01 - 12/31/01	Occasional
Scott O'Connor	9/1/01 - 12/31/01	Occasional
Miles Whiting	1/1/01 - 12/31/01	Occasional

Dose Equivalent summary for Reporting Period:

Measured Doses

1/1/01 - 12/31/01 Whole-Body Dose Equivalent: <100 mrem for all personnel.
Minimum Detectable Dose Equivalent per Quarterly Badge = 10 mrem.

None of the 139 visitors to the facility during year 2001 received a measurable dose. Therefore, the average and maximum doses are all well within NRC guidelines. A summary

of whole-body dose equivalent for facility personnel is presented in Table IV.

Table IV. Summary of Whole-Body Dose Equivalent
(1 January 2001 through 31 December 2001)

Estimated whole-body dose equivalent range (rem):	Number of individuals in each range:
No Measurable Dose	2
Less than 0.10	4
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
Total number of individuals reported:	6

Report prepared by: John S. Bennion, Reactor Manager/Supervisor