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June 30, 2004

*Docket 50-284*

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

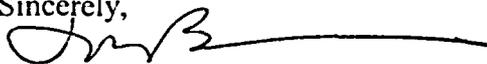
Subject: Transmittal of Annual Facility Operating Report for 2003

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 2003. Submission of this report satisfies the requirements of AGN Technical Specification 6.9.1.

Although we understand that all regulatory oversight of our non-power reactor facility has been transferred to the Office of Nuclear Reactor Regulation in Washington, D.C., we are submitting a copy of the Annual Report to the Region IV office in order to comply with the requirements of AGN Technical Specification the Region IV 6.9.1. Please note that we have submitted revision 5 to the Technical Specifications, which will eliminate this requirement, and we will cease submitting this report to the Region IV office once the new Technical Specifications have been approved.

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

Sincerely,  
  
John S. Bennion  
Reactor Manager/Supervisor

Cc: Mr. Daniel E. Hughes, Project Manager  
Non-Power Reactors and Decommissioning Project Directorate  
Operating Reactor Improvements Program  
Office of Nuclear Reactor Regulation

U.S. Nuclear Regulatory Commission  
Region IV  
611 Ryan Plaza Drive, Suite 1000  
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**Idaho State University  
AGN-201M Reactor Facility  
License R-110, Docket No. 50-284  
Annual Operating Report for 2003**

I. Narrative Summary

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

There were no changes in facility design, 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) Control element capsules (cladding) were inspected and found to be in good condition with no evidence of deterioration since last inspection.  
 (b) The control rod drive mechanisms were inspected and tested with satisfactory results.  
 (c) Ejection times were measured for all scrammable rods and found to be less than 130 milliseconds  
 (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  $0.034\% \Delta k/k \text{ s}^{-1}$  ( $\$0.046 \text{ s}^{-1}$ ) for all rods.  
 (e) The shutdown margin was determined to be greater than  $1.42\% \Delta k/k$  ( $\$1.92$ ) 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 4 watts for a total 52.4 hours thereby generating 0.93 watt-days (22.3 watt-hours) of thermal energy during this reporting period. A summary of monthly operations for 2003 is given in Table I.

Table I. Summary of Monthly Reactor Operations  
(1 January 2003 through 31 December 2003)

<u>Month</u>	<u>Hours</u>	<u>Energy (W-hr)</u>
January	0.0	0.00
February	0.9	0.04
March	2.0	0.65
April	0.0	0.00
May	11.6	1.10
June	3.8	0.30
July	0.0	0.00
August	0.0	0.00
September	1.5	0.05
October	15.4	5.24
November	7.7	0.34
<u>December</u>	<u>9.5</u>	<u>14.54</u>
Total	52.4 hr	22.26 W-hr

3. A. **Unscheduled Shutdowns and Corrective Actions Taken.**

None.

B. **Inadvertent Scrams and Action Taken.**

There were 17 inadvertent scrams during this reporting period. Table II summarizes the inadvertent scrams, their known or probable cause, and action taken. Most of the scrams (82.4%) were attributed to line-power fluctuations. One scram was the result of an operator error while switching to a higher range during power ascension.

Table II. Summary of Inadvertent Scrams  
 (1 January 2003 through 31 December 2003)

Date	Type	Cause	Action
5/6/03	Interlock Open	Attached Rod Drop Box	Restart.
6/5/03	Unannunciated	Suspected Power Surge	Terminated Run.
9/30/03	Channel 1 - Low	Suspected Power Surge	Restart.
9/30/03	Channel 2 - High	Suspected Power Surge	Restart.
9/30/03	Unannunciated	Suspected Power Surge	Restart.
9/30/03	Unannunciated	Suspected Power Surge	Terminated Run.
10/3/03	Channel 1 - Low	Suspected Power Surge	Terminated Run.
10/10/03	Unannunciated	Suspected Power Surge	Restart.
10/10/03	Channel 1 - Low	Lost Channel 1 Signal	Replaced Channel 1 Rate Meter. Restart.
10/10/03	Unannunciated	Suspected Power Surge	Restart.
10/10/03	Unannunciated	Suspected Power Surge	Restart.
10/31/03	Unannunciated	Suspected Power Surge	Restart.
10/31/03	Unannunciated	Suspected Power Surge	Restart.
11/13/03	Channel 1 - High	Operator Switching Error	Restart.
11/21/03	Channel 2 - High	Suspected Power Surge	Restart.
11/21/03	Unannunciated	Suspected Power Surge	Restart.
11/21/03	Channel 2 - High	Suspected Power Surge	Terminated Run.

4. **Safety-Related Corrective Maintenance**

4/28/03: The Fine Control Rod (FCR) was removed and lubricated with graphite powder to correct a minor binding problem that was observed following reinstallation of the control rods during the annual control rod maintenance and inspection. The graphite lubricant eliminated the binding problem.

5/16/03: A blown 3-A fuse was found in the Channel No. 2 amplifier and replaced.

5/19/03: The GBW4 tube in the Channel No. 2 amplifier was replaced.

6/6/03: The Channel No. 1 Rate Meter was replaced by a spare unit after the signal from the startup

channel amplifier was lost causing a scram during operation. The calibration and setpoints were verified and the reactor was restarted.

7/28/03: The existing building fire alarm system wiring was removed in preparation for replacing the system with a new system that was compatible with the campus-wide fire alarm and security systems. The facility remained shutdown until the new system was certified for operation and placed in service.

9/30/03: The new fire alarm system installation was certified for return to service.

10/10/03: The Channel No. 1 Rate Meter was replaced by a spare unit after the signal from the startup channel amplifier was lost. The unit's calibration and setpoints were verified and the reactor was returned to service.

10/28/03: The N reference cell in the Channel No. 2 amplifier was replaced. The amplifier could then be balanced satisfactorily and was returned to service.

12/2/03: The N reference cell in the Channel No. 2 amplifier was replaced. The amplifier could then be balanced satisfactorily and was returned to service.

## 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 2003.

### B. Changes to Procedures.

None.

### C. Experiments.

No new or untried experiments or tests were performed during 2003.

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

## 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: 0.49  $\mu\text{Ci}$ .

The AGN-201 Reactor was operated for 52.4 hours at power levels up to approximately 4 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 0.49  $\mu\text{Ci}$ . 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 IV.

Table IV. Summary of Monthly Gaseous Radioactive Effluent Releases  
(1 January 2003 through 31 December 2003)

<u>Month</u>	<u>Ar-41 (<math>\mu\text{Ci}</math>)</u>
January	0.000
February	0.001
March	0.014
April	0.000
May	0.024
June	0.007
July	0.000
August	0.000
September	0.001
October	0.114
November	0.007
<u>December</u>	<u>0.318</u>
Total activity:	0.486 $\mu\text{Ci}$

C. Solid Waste - Total Activity: None.

8. Environmental radiation surveys, performed at the facility boundary while the reactor was operating at 50% of full licensed power (2.5 watts), measured a maximum combined neutron and gamma dose equivalent rate of less than 0.5 mrem  $\text{hr}^{-1}$  at the outside walls of the building proximal to the reactor.

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 V:

Table V. Personnel Monitored for Exposure to Ionizing Radiation

Name	Monitoring Period	Duty Category
John S. Bennion	1/1/03 - 12/31/03	Regular
Todd C. Gansauge	1/1/03 - 12/31/03	Regular
Jay F. Kunze	1/1/03 - 12/31/03	Regular
Kenyon Hart	1/1/03 - 12/31/03	Occasional
Alan Stephens	1/1/03 - 12/31/03	Occasional
Miles Whiting	1/1/03 - 12/31/03	Occasional
Larry Babb	2/1/03 - 12/31/03	Occasional
Kevin Boes	2/1/03 - 12/31/03	Occasional
Ben Chase	2/1/03 - 12/31/03	Occasional
RaNae Isaak	2/1/03 - 12/31/03	Occasional
Ryan Marlow	2/1/03 - 12/31/03	Occasional
Natalie Schmidt	2/1/03 - 12/31/03	Occasional
Bill Skerjanc	2/1/03 - 12/31/03	Occasional
Scott Lucas	9/1/03 - 12/31/03	Occasional

Dose Equivalent summary for Reporting Period:

Measured Doses

1/1/2003 - 12/31/2003 Whole-Body Dose Equivalents: 10 mrem for most personnel.  
 Minimum Detectable Dose Equivalent per Monthly Badge = 10 mrem.

None of the 255 visitors to the facility during 2003 received a measurable dose. Therefore, the average and maximum doses are all within NRC guidelines. A summary of whole-body exposures for facility personnel is presented in Table VI.

Table VI. Summary of Whole-Body Exposures  
 (1 January 2003 through 31 December 2003)

Estimated whole-body exposure range (rem):	Number of individuals in each range:
No Measurable Dose	10
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:	14

Report prepared by: John S. Bennion, Reactor Manager/Supervisor  
 June 28, 2004