

August 12, 2004

Dr. Jay Kunze, Dean  
Idaho State University  
College of Engineering  
Box 8063  
Pocatello, ID 83209

SUBJECT: NRC INSPECTION REPORT NO. 50-284/2004-202

Dear Dr. Kunze:

This letter refers to the inspection conducted on July 19-22, 2004, at your Idaho State University Reactor Laboratory. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, no noncompliance of NRC requirements or safety concerns were identified. No response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/reading-rm/adams.html>.

Should you have any questions concerning this letter, please contact Craig Bassett at 404-562-4712.

Sincerely,

**/RA/**

Patrick M. Madden, Section Chief  
Research and Test Reactors Section  
New, Research and Test Reactors Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Docket No. 50-284  
License No. R-110

Enclosure: NRC Inspection Report No. 50-284/2004-202  
cc w/encl: Please see next page

Idaho State University

Docket No. 50-284

cc:

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**U. S. NUCLEAR REGULATORY COMMISSION**  
**OFFICE OF NUCLEAR REACTOR REGULATION**

Docket No: 50-284

License No: R-110

Report No: 50-284/2004-202

Licensee: Idaho State University

Facility: Idaho State University Reactor Laboratory

Location: Pocatello, ID 83209

Dates: July 19-22, 2004

Inspector: Craig Bassett

Approved by: Patrick M. Madden, Section Chief  
Research and Test Reactors Section  
New, Research and Test Reactors Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

Idaho State University  
Report No: 50-284/2004-202

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the licensee's Class II Aerojet General Nucleonics (AGN) AGN-201 research reactor safety programs including: organization and staffing, review and audit and design change functions, radiation control, procedures, transportation of radioactive materials, operator requalification, reactor operations, maintenance, and surveillance, fuel movement, experiments, and emergency preparedness since the last NRC inspection. The licensee's programs were directed toward the protection of public and facility worker health and safety and were in compliance with NRC requirements. No safety concerns or violations of regulatory requirements were identified.

### Organization and Staffing

- The licensee's organization and staffing remain in compliance with the requirements specified in the Technical Specifications.

### Review and Audit Functions and Design Control

- Review, audit, and oversight functions required by Technical Specifications Section 6.4 were acceptably completed by the Reactor Safety Committee.
- No changes had been made at the facility since the last NRC inspection but the 50.59 process for design change at the facility was in place and would be followed as required if changes were initiated.

### Radiation Protection Program

- Surveys were being completed and documented acceptably.
- Postings met the regulatory requirements.
- Personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels, and NRC's regulatory limits.
- Radiation monitoring equipment was being maintained and calibrated as required.
- The Radiation Protection and ALARA Programs satisfied regulatory requirements.
- Radiation protection training was being conducted as required.

### Environmental Protection

- The environmental protection program satisfied NRC requirements.

### Procedures

- Facility procedures were acceptable and satisfied Technical Specification requirements for being revised by the licensee and reviewed and approved by the RSC.
- Procedural compliance was observed and found to be acceptable.

### Transportation of Radioactive Materials

- The licensee had not shipped any radioactive material from the reactor facility under the reactor license.

### Operator Requalification

- Operator requalification was conducted as required by the Operator Requalification Program. Medical examinations were being completed as required.

### Reactor Operations, Maintenance, and Surveillance

- Reactor operations were conducted in accordance with Technical Specification requirements and applicable procedures.
- The program for surveillance verifications and calibrations was being implemented in accordance with Technical Specification requirements.
- Maintenance was being completed in accordance with Technical Specification and procedural requirements.

### Fuel Movement

- No fuel inspections were required or completed.

### Experiments

- The program for the control of experiments satisfied regulatory and Technical Specifications Section 6.7 requirements.

### Emergency Preparedness

- The Emergency Plan and Implementing Procedures were being reviewed biennially and updated as needed.
- Emergency response facilities and equipment were being maintained as required and responders were knowledgeable of proper actions to take in case of an emergency.
- Memoranda of Understanding with various support organizations were being maintained and updated as required.
- Annual drills were being conducted and critiques were being held as required by the Emergency Plan and training for off-site and staff personnel was being completed as required.

## REPORT DETAILS

### Summary of Plant Status

The licensee's five watt (5w) Aerojet General Nucleonics (AGN) 201M was not operated during this inspection. However, a review of the applicable records indicated that the reactor continued to be operated at various power levels up to 4.7w in support of classes, and for physics experiments, reactor surveillances, and operator training.

#### 1. Organization and Staffing

##### a. Inspection Scope (Inspection Procedure [IP] 69001)

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of the Technical Specification (TS) Sections 6.1 and 6.2 were being met:

- organizational structure and staffing for the facility
- administrative controls and management responsibilities
- ANS 15.4, "Standards for Selection and Training for Personnel for Research Reactors," dated 1977
- TS for the Idaho State University (ISU) AGN-201M Reactor, Amendment No. 4, dated April 22, 1988
- ISU AGN-201M Procedure, "General Operating Rules," Revision (Rev) 4, dated October 7, 1994
- ISU AGN-201M Operating Procedure 1 (OP-1), "AGN-201 Operating Procedure No. 1," Rev 3, dated April 26, 1994
- ISU AGN-201M OP-2, "AGN-201 Operating Procedure No. 2," Rev 3, dated April 26, 1994

##### b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that management responsibilities and the organization at the facility had not changed since the previous NRC inspection in May 2003 (Inspection Report No. 50-284/2003-201). The inspector determined that the Reactor Administrator retained direct control and overall responsibility for management of the facility as specified in TS Section 6.1. The Reactor Administrator, currently the Dean of the College of Engineering, reported to the designated University Officer at ISU who was the University Vice President.

The licensee's operational organization consisted of the Reactor Administrator, the Reactor Supervisor, and a Senior Reactor Operator (SRO). There were no licensed Reactor Operators (ROs) at the facility at the time of the inspection but the licensee was planning to have a person working on reactor instrumentation qualify as soon as it was feasible. The inspector confirmed that the Reactor Administrator and Supervisor met the qualifications in TS Section 6.2. It was also noted that students were sometimes employed on a part-time basis at the facility.

Through review of records and logs and through discussions with licensee personnel, the inspector determined that the staffing at the facility was acceptable to support the current workload and ongoing activities. The staffing and organization were consistent with the requirements of the TS.

c. Conclusions

The licensee's organization and staffing remain in compliance with the requirements specified in the TS.

**2. Review and Audit and Design Change Functions**

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the audits and reviews stipulated in the requirements of the TS Section 6.4 were being completed and to verify that any modifications to the facility were being reviewed as required by 10 CFR 50.59:

- ISU Reactor Safety Committee (RSC) Charter, Rev 1, dated May 7, 1993
- TS duties specified for the RSC including audit and review functions
- Reactor Safety Committee meeting minutes from 2003 to date
- audits and reviews completed by the RSC since January 2003 to date
- reviews of changes made in accordance with 10 CFR 50.59

b. Observations and Findings

(1) Review and Audit Functions

The inspector reviewed the RSC's meeting minutes from January 2003 to the present. These meeting minutes showed that the committee, or a subcommittee thereof, met as required by the TS with a quorum being present. The inspector also noted that the RSC had considered the types of topics outlined by the TS. Review of the committee meeting minutes indicated that the RSC provided appropriate guidance and direction for reactor operations, and ensured suitable use and oversight of the reactor.

It was noted that RSC members completed audits of the radiation protection, emergency preparedness, and security programs and that the audits were generally completed within the time stipulated by TS. The inspector noted that the audits and the resulting findings were acceptable. If the findings contained recommendations for possible changes, the licensee responded and took corrective actions as necessary.

(2) Design Change

Through review of applicable records and interviews with licensee personnel, the inspector determined that no changes had been initiated and/or completed at the facility since the last NRC operations inspection. However, the inspector verified that changes or modifications to the facility would be analyzed by the staff, presented to and reviewed by the RSC, determined to be acceptable, and approved as required.

c. Conclusions

Audits and reviews were being conducted acceptably by the RSC according to the requirements specified in the TS. No changes had been made at the facility since the

last inspection but the process was in place so that changes or modifications would be reviewed and approved by the RSC as required.

### 3. Radiation Control

#### a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with the requirement stipulated in 10 CFR Part 20 and TS Sections 3.4, 4.4, and 6.9.1:

- health physics survey records for facility controlled areas
- radiological signs and posting throughout the facility
- dosimetry records for facility staff for 2002, 2003, and to date in 2004
- calibration and periodic check records for radiation monitoring instruments
- the ISU Radiation Protection Program and ALARA Policy
- ISU Radiation Safety Manual and Procedures, Rev 3, dated August 2000
- ISU AGN-201M Visitor Log and Register for Organized Groups and Tours
- ISU AGN-201M Reactor Annual Facility Operating Reports for 2001, 2002, and 2003
- ISU Technical Safety Office (TSO) Radiation Safety Procedure Number 1 (RPR 1), "Radiation User Personal Data," Rev 3, dated June 2000
- ISU TSO RPR 2, "Radiation Use Application," Rev 3, dated June 2000
- ISU TSO RPR 10, "Radionuclide Data," Rev 3, dated June 2000
- ISU TSO RPR 11, "Radioisotope Laboratory Safety Procedure," Rev 3, dated June 2000
- ISU TSO RPR 13, "Radioisotope Acquisition and Disposition," Rev 3, dated June 2000
- ISU TSO RPR 44, "Radiation Safety Training," Rev 3, dated June 2000
- ISU TSO RPR 61, "Calibration of the Radiation Monitoring Instruments," Rev 3, dated June 2000
- ISU AGN-201M Experimental Plan 8 (EP-8), "Health Physics Survey," Rev 1, dated January 31, 1990
- Memorandum of Understanding Between the Idaho State University, College of Engineering (AGN-201 and Special Nuclear Materials Licenses) and the ISU Radiation Safety Committee/Technical Safety Office, Rev 4, dated January 7, 2003

The inspector also toured the licensee's facility and observed the use of dosimetry and radiation monitoring equipment. Licensee personnel were interviewed as well.

#### b. Observations and Findings

##### (1) Surveys

Various periodic contamination surveys and the annual radiation survey were completed by the TSO and reactor staff personnel as required by TS and procedure. Results of the surveys were evaluated to ensure that they did not exceed established action levels. Corrective actions were taken and documented as required when contamination levels exceeded the licensee's limits.

(2) Postings and Notices

The inspector reviewed the postings at the entrances to the licensee's controlled areas. The postings were acceptable and indicated the radiation and contamination hazards present. Other postings also showed the industrial hygiene hazards present in the areas. The facility's radioactive material storage areas were noted to be properly posted. No unmarked radioactive material was detected in the facility.

Copies of current notices to workers required by 10 CFR Part 19 were posted on various bulletin boards in the facility, including copies of NRC Form 3, "Notice to Employees," Revision dated August 1999, in accordance with 10 CFR 19.11. Caution signs, postings and controls for entrance into radiation areas were as required in 10 CFR 20, Subpart J.

(3) Dosimetry

The licensee was supplied dosimetry by the ISU Technical Safety Office (TSO). The TSO used a National Voluntary Laboratory Accreditation Program accredited organization, Global Dosimetry Solutions, Inc., to process the whole body and extremity thermoluminescent dosimeters (TLDs) supplied to facility personnel. Through direct observation, the inspector determined that dosimetry was acceptably used by facility personnel. Exit frisking practices were also observed and determined to be in accordance with radiation protection requirements.

An examination of the records for the past two years, through April of 2004, showed that all whole body exposures were well within NRC limits and within licensee action levels. Extremity monitoring, accomplished through the use of finger ring TLDs, also showed low doses to the hands of staff members. The highest annual whole body exposure received by a single individual for 2002 was 44 millirem (mrem) deep dose equivalent (DDE). The highest annual extremity exposure for 2002 was 20 mrem shallow dose equivalent (SDE). The highest annual whole body exposure received by a single individual for 2003 was 36 mrem DDE and the highest annual extremity exposure for 2003 was 31 mrem SDE.

(4) Radiation Monitoring Equipment

Examination of selected survey meters indicated that the instruments had the acceptable up-to-date calibration sticker attached. The instrument calibration records indicated calibration of portable survey meters was typically completed by TSO personnel and/or a contractor. Calibration frequency met procedural requirements and records were maintained as required. Area Radiation Monitors and stack monitors were also being calibrated as required.

During the inspection the inspector observed the use of the calibration range maintained by the TSO. The calibration range appeared to be adequate. Proper precautions were used to maintain doses ALARA.

(5) Radiation Protection Program and ALARA Policy

The licensee's Radiation Protection Program was established in the Idaho State University Radiation Safety Manual, Revision 3, with approval by the Radiation

Safety Committee dated September 2000. The program included requirements that all personnel who worked with radioactive materials receive training in radiation protection, policies, procedures, requirements, and facilities. Completion of this training was verified by each person's supervisor and by TSO personnel. The program appeared to be acceptable and was being reviewed annually as required by the Radiation Safety Officer (RSO). The ALARA Policy was also outlined and established in the ISU Radiation Safety Manual. The ALARA Policy provided guidance for keeping doses as low as reasonably achievable and was consistent with the guidance in 10 CFR Part 20.

(6) Radiation Protection Training

The inspector reviewed the radiation worker (or rad worker) training given to reactor staff members, to those who were not on staff but who were authorized to use the experimental facilities of the reactor, and to student assistants working at the facility on a part-time basis. The inspector verified that rad worker training was given upon initial employment and annually thereafter. Training records showed that personnel were acceptably trained in radiation protection practices. The training program was acceptable.

(7) Facility Tours

At various times during the inspection, the inspector toured the Reactor Room, selected laboratories, and support areas. Control of radioactive material and control of access to radiation areas were acceptable.

c. Conclusions

The inspector determined that the Radiation Protection and ALARA Programs, as implemented by the licensee, satisfied regulatory requirements because: 1) surveys and associated checks were completed and documented acceptably to permit evaluation of the radiation hazards present; 2) postings met regulatory requirements; 3) personnel dosimetry was being worn as required and recorded doses were within the NRC's regulatory limits; 4) radiation survey and monitoring equipment was being maintained and calibrated as required; and 5) the radiation protection training program was acceptable.

**4. Environmental Protection**

a. Inspection Scope (IP 69001)

To determine that the licensee was complying with the requirement of the regulations and the TS, the inspector reviewed selected aspects of:

- airborne release records documented in the ISU AGN-201M Reactor Annual Facility Operating Reports for 2001, 2002, and 2003
- ISU TSO RPR 54, "Radioactive Waste Management," Rev 3, dated June 2000

b. Observations and Findings

The inspector reviewed the records documenting airborne releases to the environment for the past two years. The inspector determined that gaseous releases continued to be calculated as required by procedure and were adequately documented. The

releases were determined to be within the annual dose constraints of 10 CFR 20.1101 (d), 10 CFR Part 20, Appendix B concentrations, and TS limits. The inspector confirmed that there had been no liquid releases from the reactor facility during the past two years. Through observation of the facility, the inspector found no new potential release paths.

On-site gamma radiation monitoring was completed using various TLDs placed around the facility in accordance with the applicable procedures. The data indicated that there were no measurable doses above any regulatory limits.

c. Conclusions

The environmental protection program satisfied NRC requirements.

**5. Procedures and Procedural Compliance**

a. Inspection Scope (IP 69001)

To determine whether facility procedures met the requirements outlined in TS Sections 6.5 and 6.6, the inspector reviewed:

- ISU AGN-201M Reactor Facility Master Facility Log Nos. 1 and 2
- selected Operations Procedures and Radiation Protection Procedures
- selected maintenance and surveillance procedures
- selected forms and checklists
- ISU AGN-201M Procedure, "General Operating Rules," Rev 4, dated October 7, 1994
- ISU AGN-201M Operating Procedure 1 (OP-1), "AGN-201 Operating Procedure No. 1," Rev 3, dated April 26, 1994
- ISU AGN-201M Surveillance Procedure 6 (SP-6), "Seismic Displacement Interlock Calibration," Rev 0, dated January 31, 1990
- ISU AGN-201M Maintenance Procedure 1 (MP-1), "AGN-201 Rod Maintenance Procedure," Rev 5, dated June 15, 1994

b. Observations and Findings

The licensee's procedures were found to be acceptable for the current facility status and staffing level. It was noted that the procedures specified the responsibilities of the various members of the staff. The inspector determined that the procedures were being updated as needed and that substantive revisions to procedures, checklists, and forms were presented to the RSC for review and approval as required by TS.

The inspector did not observe reactor operations during this inspection. However, the inspector was able to observe the completion of the seismic displacement interlock surveillance. The activity was conducted in accordance with ISU AGN-201M Surveillance Procedure 6 (SP-6), "Seismic Displacement Interlock Calibration," Rev 0, dated January 31, 1990. In addition, portions of two other procedures, ISU AGN-201M Operating Procedure 1 (OP-1), "AGN-201 Operating Procedure No. 1," Rev 3, dated April 26, 1994, and ISU AGN-201M Maintenance Procedure 1 (MP-1), "AGN-201 Rod Maintenance Procedure," Rev 5, dated June 15, 1994, were also completed. The inspector noted that all work, verification activities, and radiological surveys were conducted and completed in accordance with the appropriate procedure. Also, the

activities were properly documented on the appropriate procedural forms and in facility logs as required.

c. Conclusions

Facility procedures and document reviews satisfied TS Sections 6.5 and 6.6 requirements. Procedural compliance was observed and found to be acceptable.

## 6. Transportation

a. Inspection Scope (IP 86740)

The inspector reviewed selected aspects of:

- radioactive materials transportation and transfer records
- ISU TSO RPR 13, "Radioisotope Acquisition and Disposition," Rev 3, dated June 2000
- ISU TSO RPR 14, "Shipment of Excepted Quantities of Radioisotopes," Rev 3, dated June 2000
- ISU TSO RPR 54, "Radioactive Waste Management," Rev 3, dated June 2000
- ISU TSO RPR 55, "Transportation of Radioactive Materials," Rev 3, dated June 2000

b. Observations and Findings

Through records review and discussions with licensee personnel, the inspector determined that the licensee had not shipped any radioactive material from the reactor facility under the reactor license. Such material typically were transferred to the ISU Broad Scope license and handled, shipped, and/or disposed of under that license. The records of such transfers had been completed and maintained as required.

c. Conclusions

No radioactive material was shipped from the reactor facility under the reactor license.

## 7. Operator Licenses, Requalification, and Medical Activities

a. Inspection Scope (IP 69001)

To determine that operator requalification activities and training were conducted as required and that medical requirements were met, the inspector reviewed:

- active license status
- written examinations
- medical examination records
- documentation of training lectures and records of reactivity manipulations noted on the Idaho State University Nuclear Engineering Requalification Program Progress Checklist forms
- "Reactor Operator Requalification Program for the Idaho State University Reactor," Rev 2, dated April 26, 1994
- ISU AGN-201M Experimental Plan 2 (EP-2), "Operator Training," Rev 1, dated January 31, 1990

b. Observations and Findings

As noted above, there are currently two qualified SROs employed at the facility and their licenses were determined to be current. A review of the logs and records showed that the required lectures were being given as stipulated and training reviews had been documented. Examinations were generally being administered in accordance with the licensee's requalification and training program. It was noted that records of quarterly reactor operations, reactivity manipulations, and other licensed activities were being maintained. Records indicating the completion of annual console evaluations and supervisory evaluations were also maintained as required.

From discussions with the licensee the inspector noted that one operator had been removed from active status because he had not been able to complete four hours per quarter of reactor operation or related duties. The inspector verified that this individual had completed the required requalification training and had demonstrated competence as required by the program before being reinstated and resuming licensed activities.

The inspector also noted that operators were receiving the required biennial medical examinations as specified by the program.

c. Conclusions

The requalification/training program was up-to-date and medical examinations were being completed as required.

**8. Operations, Maintenance, and Surveillance Activities**

a. Inspection Scope (IP 69001)

To determine that reactor operations, maintenance activities and surveillance and Limiting Conditions for Operation (LCO) activities and verifications were being completed as required by TS Sections 3 & 4, the inspector reviewed:

- selected surveillance data sheets
- the previously used AGN-201 Surveillance Log
- selected maintenance forms, records, and procedures
- ISU AGN-201M Operations Log Form (ROL-101), Rev 3, dated April 26, 1994 including forms documenting Check Out, Prestart Data, Operational Data, and Reactor Shut Down
- ISU AGN-201M Reactor Facility Master Facility Log Nos. 1 and 2
- ISU AGN-201M OP-1, "AGN-201 Operating Procedure No. 1," Rev 3, dated April 26, 1994
- ISU AGN-201M OP-2, "AGN-201 Operating Procedure No. 2," Rev 3, dated April 26, 1994
- ISU AGN-201M Surveillance Procedure 1 (SP-1), "Channel 1 Calibration," Rev 0, dated January 31, 1990
- ISU AGN-201M SP-2, "Channel 2 Calibration," Rev 0, dated January 31, 1990
- ISU AGN-201M SP-3, "Channel 3 Calibration," Rev 0, dated January 31, 1990
- ISU AGN-201M SP-4, "Shield Water Level Calibration," Rev 0, dated January 31, 1990
- ISU AGN-201M SP-5, "Shield Water Temperature Calibration," Rev 0, dated January 31, 1990

- ISU AGN-201M SP-6, "Seismic Displacement Interlock Calibration," Rev 0, dated January 31, 1990
- ISU AGN-201M Maintenance Procedure 1 (MP-1), "AGN-201 Rod Maintenance Procedure," Rev 5, dated June 15, 1994
- ISU AGN-201M MP-2, "Open Core Tank," Rev 0, dated January 31, 1990
- ISU AGN-201M EP-1, "Reactor Demonstration," Rev 2, dated February 23, 1990
- ISU AGN-201M EP-3, "Reactor Control Rod Calibration," Rev 2, dated February 23, 1990
- ISU AGN-201M EP-4a, "Flux Determination in the Reactor Core by Use of a Counter," Rev 2, dated January 29, 2001
- ISU AGN-201M EP-5, "Power Calibration," Rev 1, dated January 31, 1990
- ISU AGN-201M EP-6, "Biological Sample Irradiation," Rev 1, dated January 31, 1990
- ISU AGN-201M EP-7, "Irradiation of Sample for Laboratory Analysis," Rev 1, dated January 31, 1990

b. Observations and Findings

(1) Operations and Maintenance

A review of operations logs and records indicated that staffing during reactor operations was acceptable and consistent with TS requirements. Reactor operations were conducted safely and in accordance with procedures. Logs also indicated that preventive maintenance activities were conducted as scheduled or as needed. Any problems found were addressed in accordance with the TS, applicable procedures, or equipment manuals. Maintenance activities ensured that equipment remained consistent with the Safety Analysis Report and TS requirements.

(2) Surveillance Activities

The inspector determined that selected daily, semiannual, annual, and biennial checks, tests, and/or calibrations for TS-required surveillance and LCO activities and verifications were completed as stipulated. Surveillance and LCO verifications reviewed were completed on schedule and in accordance with licensee procedures. All the recorded results were within the TS and procedurally prescribed parameters. The records and logs reviewed were generally complete and were being maintained as required.

(3) Deviation From AGN-201M Rod Maintenance Procedure (MP-1)

ISU AGN-201M Maintenance Procedure 1 (MP-1), "AGN-201 Rod Maintenance Procedure," Rev 5, dated June 15, 1994, requires in Section VI.6.d that the Reactor Supervisor and a certified RO/SRO shall verify proper installation of the rods and drive components.

On August 8, 2002, the licensee initiated maintenance on the reactor control rod drive system. The maintenance included removal of the dashpots, control rods (CRs), and control rod drive assemblies (CRDAs) as required by AGN-201M Rod Maintenance Procedure, MP-1. The project was conducted by the Reactor Supervisor, an SRO, and a graduate student on several different days. Following completion of the maintenance work, the CRDAs and CRs were reinstalled in the

reactor on September 12, 2002. However, the maintenance work and package were not completed at that time and the reactor remained in an inoperable condition until the installation of the CRDAs and the CRs could be independently verified by another SRO and final tests, including rod worth calculations, could be performed. Following the end of the Fall Semester, the maintenance work was resumed in order to complete various surveillance requirements before the end of the calendar year. But, at that point in time, there were no other licensed/certified SROs available to assist with the maintenance and surveillance activities.

Because several periodic surveillance requirements needed to be completed by the end of the year, the Reactor Supervisor conferred with a member of the RSC and it was decided to have a person who had been a licensed SRO in the past help out in this situation. The Reactor Supervisor then spoke with the previously-licensed SRO, who was also a member of the RSC, and asked him for assistance to verify the correct installation of the CRDAs and the CRs. This person, who had been licensed from December 1, 1993 until August 15, 1997, agreed to help and subsequently verified the installation. This was noted in the ISU AGN-201M Reactor Facility Master Facility Log No. 2 and in the MP-1 procedure and sign-off sheet. Once this was done, the remainder of the MP-1 procedure was completed.

The licensee concluded that, under the provisions of TS Section 6.6 no violation of the TS occurred. The TS indicates that "Temporary Procedures which do not change the intent of previously approved procedures and which do not involve any unreviewed safety question may be employed on approval by the Reactor Supervisor." When reviewing this event, the licensee assured the inspector that future maintenance activities would be scheduled so that independent reviews by qualified SROs could be accomplished as required. However, the licensee also indicated that, if changes in employment or other unforeseen circumstances were to render such reviews impossible, then an independent review by a previously-licensed SRO would again be sought to satisfy the intent of the procedure.

The inspector reviewed this situation and the accompanying documentation. The licensee was informed that, given these specific circumstances, the TS would allow for a temporary procedure change and that no violation occurred.

(4) Failure of the Cladding Capsule on a Scrammable Control Rod (Safety Rod No. 1, SR-1)

On May 25, 2004, the licensee initiated maintenance on the reactor CRD system as required by procedure MP-1. During the routine, scheduled inspection and maintenance, as SR-1 was being removed from the CRDA, it was discovered that the cladding of SR-1 had failed. Due to the failure, a small portion of the fuel contained within the CR was exposed. Upon recognizing the abnormal circumstance, the capsule was carefully removed from the CRDA and it was determined that the end cap had detached from the SR-1 cladding capsule and that it was resting on the armature plate of the CRDA. Approximately 1.5 centimeters (cm) of the 3.8-cm fuel disk was protruding from the end of the cladding capsule.

At this point the rod was secured in place while a radiation and contamination survey was performed. Removable contamination on the CR, measuring only fifty percent (50%) higher than normal background level, was detected. No

contamination was detected on the CRDA at distances greater than a few inches from the breach. No fuel material actually separated from the CR but merely protruded a short distance (1.5 cm) out of the end of the CR. The RSO was notified of the event and personnel from the TSO were sent to the facility to take additional surveys and air samples. The maximum dose rate measured on contact with the CR measured 22 millirem per hour (mrem/hr) and 0.9 mrem/hr at 30 cm. The air samples did not show any indication of airborne particulate activity or of Iodine-131.

In addition to the surveys and notification of the RSO, other immediate follow-up actions taken by the licensee included notification of the NRC Project Manager and the NRC Operations Center, the Idaho National Engineering and Environmental Laboratory (INEEL) Oversight Program, and the State of Idaho. The licensee subsequently notified other AGN facilities of the event and conducted a further review of the radiological surveys.

In a letter to the NRC dated July 16, 2004, the licensee outlined further actions that were planned. The licensee anticipates replacing the SR-1 capsule by loading the fuel from the existing CR into a spare unit obtained from Oregon State University. Future actions planned by the licensee also include: 1) Having the cladding analyzed to determine the probable cause of failure, 2) Implementing a more aggressive CR capsule inspection frequency - semiannual visual inspection, and 3) Implementing a new CR drive logic circuit for all the safety rods so that they can be manually withdrawn from the reactor at shutdown.

The licensee was informed that the completion of the planned follow-up actions regarding the failure of the cladding capsule on SR-1 will be followed by the NRC as an Inspector Follow-up Item (IFI) and will be inspected during a future inspection (IFI 50-284/2004-201-01).

c. Conclusions

Reactor operations were conducted in accordance with TS requirements and applicable procedures. The maintenance program satisfied TS requirements. The program for surveillance and LCO verifications was also being carried out in accordance with TS requirements. One IFI was identified.

**9. Fuel Movement**

a. Inspection Scope (IP 69001)

No fuel inspection is required by TS.

b. Observations and Findings

The inspector determined that no reactor fuel inspection or movement had been completed in the period since the last inspection. The control and safety rods are inspected periodically but the contained fuel is not routinely inspected.

c. Conclusions

No fuel movements or inspections were required or conducted.

## 10. Experiments

### a. Inspection Scope (IP 69001)

In order to verify that experiments were being conducted in accordance with the guidelines stipulated in TS Section 6.7, the inspector reviewed:

- ISU AGN-201M Reactor Facility Master Facility Log Nos. 1 and 2
- ISU AGN-201M Operations Log Form (ROL-101), Rev 3, dated April 26, 1994 including forms documenting Check Out, Prestart Data, Operational Data, and Reactor Shut Down
- Rules and Procedures Governing Isotope Production and Disposition
- selected Isotope Production and Disposition (IPD) Forms
- ISU AGN-201M EP-1, "Reactor Demonstration," Rev 2, dated February 23, 1990
- ISU AGN-201M EP-3, "Reactor Control Rod Calibration," Rev 2, dated February 23, 1990
- ISU AGN-201M EP-4a, "Flux Determination in the Reactor Core by Use of a Counter," Rev 2, dated January 29, 2001
- ISU AGN-201M EP-5, "Power Calibration," Rev 1, dated January 31, 1990
- ISU AGN-201M EP-6, "Biological Sample Irradiation," Rev 1, dated January 31, 1990
- ISU AGN-201M EP-7, "Irradiation of Sample for Laboratory Analysis," Rev 1, dated January 31, 1990

### b. Observations and Findings

The inspector noted that all the experiments being conducted at the facility were well-established, "routine" procedures that had been in place for several years. No new experiments had been initiated, reviewed, or approved since the last inspection. The experiments that were conducted at the facility were completed under the cognizance of the Reactor Supervisor and/or the Reactor Administrator. The results of the experiments were documented in the operating log and on the applicable IPD forms. It was noted that the IPD log was generally being reviewed monthly by the Reactor Supervisor and that the various forms were filed/maintained as required by the "Instructions for Maintaining the Isotope Production and Disposition (IPD) Log," dated April 26, 1994.

### c. Conclusions

The license's program for the control of experiments satisfied regulatory and TS Section 6.7 requirements.

## 11. Emergency Preparedness

### a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- Emergency Plan and implementing procedures
- Emergency Locker Inventory Sheets
- emergency response supplies, equipment, and instrumentation

- Idaho State University Nuclear Reactor Laboratory Annual Emergency Personnel Training forms and records
- Memoranda of Understanding with offsite support agencies
- documentation of emergency drills and critiques
- Emergency Plan audit and audit responses

b. Observations and Findings

The current version of the Emergency Plan (E-Plan) approved for use at the facility was Rev 5 dated April 26, 1994. The plan and implementing procedures were being audited and reviewed biennially as required. Audits were appropriate and problems, if any, were addressed by the licensee. Memoranda of Understanding agreements with off-site response organizations (i.e., the Portneuf Medical Center, the City of Pocatello, and the Idaho State Police) were being maintained and updated as required.

Supplies, instrumentation, and equipment were being maintained and controlled as required in the E-Plan. Annual inspections and inventories of the equipment were being completed as well. The inspector and a licensee representative also conducted an inventory of the survey meters that were staged for use in an emergency.

Emergency drills had been conducted annually as required by the E-Plan. Critiques were written following the drills to identify any strengths and weaknesses noted during the exercise and to develop possible solutions to any problems identified. The results of these critiques were documented and filed. The last drill, held March 11, 2004, involved the discovery by Public Safety Department personnel of unsecured and unoccupied rooms within the reactor facility. The drill provided a practical, reasonable, and effective test of the participants.

Training for the reactor staff and for response organization personnel was conducted and documented as required. Through records review and interviews with various personnel, emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency.

The inspector visited the Pocatello Fire Department and interviewed the Captain and the Operations Chief. As noted above, the Fire Department personnel were determined to be well trained, properly equipped, and knowledgeable of the actions to take in case of an emergency at the reactor facility. There appeared to be a good working relationship between the licensee and this support organization.

c. Conclusions

The emergency preparedness program was being carried out in accordance with the Emergency Plan.

## **12. Follow-up on Previously Identified Items**

a. Inspection Scope (IP 92701)

The inspector reviewed the licensee's actions taken in response to a previously identified Unresolved Item (URI).

b. Observation and Findings

(Closed) URI 50-284/2003-201-01 - Determine if the licensee was performing an acceptable secondary calibration of the neutron meters.

During an inspection in May of 2003, the TSO staff indicated to the inspector that they believed they were doing a response check rather than an actual calibration of their neutron meters. The inspector reviewed their "response check" procedure, the manufacturers' recommendations for calibration, and the "response check" results since 1997. The inspector determined that, provided an adequate initial cross calibration had been performed between the factory calibrated meters and their neutron source, they were doing an acceptable secondary calibration of the meters.

Although the TSO staff found some documentation indicating that they were doing an acceptable secondary calibration, it was insufficient for the inspector to determine if an adequate initial cross calibration had been performed. As a result of the inspection, the Assistant RSO stated the staff would attempt to locate more documentation of the potential cross calibrations. Also, the TSO staff indicated that the meters were going to be sent to a certified laboratory/contractor to have the laboratory/contractor perform and document a new cross calibration to insure the meters would be properly calibrated in the future.

During this inspection, the inspector reviewed the documentation of the actions taken by the TSO. On October 16, 2003, the NP-2 meter had been sent to the INEEL for calibration. Subsequently, on November 21, 2003, TSO personnel conducted a baseline meter response at the Idaho Accelerator Facility. These results were reviewed by the inspector. Following these actions, TSO personnel then began conducting and recording semiannual calibration checks in accordance with a new procedure developed for this purpose. These actions appeared to be appropriate and acceptable. This item is considered closed.

c. Conclusions

One previously identified Unresolved Item was reviewed and closed.

**13. Exit Meeting Summary**

The inspection scope and results were summarized on July 22, 2004, with licensee representatives. The inspector discussed the findings for each area reviewed. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection.

## PARTIAL LIST OF PERSONS CONTACTED

### Licensee Personnel

J. Bennion, Reactor Administrator  
T. Gansauge, Reactor Supervisor  
J. Kunze, Dean, College of Engineering

### Radiation Safety Office Personnel

M. Balzer, Office Manager, TSO  
T. Gesell, Radiation Safety Officer, TSO

### Other Personnel

R. Bowser, Training Coordinator, Pocatello Fire Department  
R. Grow, Operations Chief, Pocatello Fire Department  
F. Just, Chairman, Reactor Safety Committee

## INSPECTION PROCEDURES USED

IP 69001: Class II Non-Power Reactors  
IP 86740: Inspection of Transportation Activities

## ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

50-284/2004-201-01 IFI Follow-up on completion of the planned future actions regarding the failure of the cladding capsule on SR-1.

### Closed

50-284/2003-201-01 URI Determine if the licensee was performing an acceptable secondary calibration of the neutron meters.

## LIST OF ACRONYMS USED

ALARA	As low as reasonably achievable
AGN	Aerojet General Nucleonics (research reactor)
CFR	Code of Federal Regulations
cm	centimeter
CRDA	Control rod drive assembly
CR	Control rod
DDE	Deep dose equivalent
EP	Experiment Plan
E-Plan	Emergency Plan
IDP	Isotope Production and Disposition
IFI	Inspector Follow-up Item
INEEL	Idaho National Engineering and Environmental Laboratory

IPD	Isotope Production and Disposition
ISU	Idaho State University
IP	Inspection Procedure
HP	Health physics
LCO	Limiting Conditions for Operation
MP	Maintenance Procedure
mrem	millirem
mrem/hr	millirem per hour
NRC	Nuclear Regulatory Commission
RO	Reactor operator
RSO	Radiation Safety Officer
RSC	Reactor Safety Committee
SDE	Shallow dose equivalent
SR	Safety rod
SRO	Senior reactor operator
TLD	Thermoluminescent dosimeter
TS	Technical Specifications
TSO	Technical Safety Office
URI	Unresolved Item