

U. S. NUCLEAR REGULATORY COMMISSION

REGION IV

Report No. 50-112/85-01

Docket No. 50-112

License No. R-53

Licensee: The University of Oklahoma  
College of Engineering  
Norman, Oklahoma

Facility Name: AGN-211 Research Reactor (100 W)

Inspection Conducted: April 30 - May 2, 1985

Inspector: J. E. Hyder  
J. E. Hyder  
Los Alamos National Laboratory  
Safety Assessment Group

June 5, 1985  
Date

Reviewed by: C. C. Thomas  
C. C. Thomas  
Los Alamos National Laboratory  
Safety Assessment Group

June 6, 1985  
Date

Approved by: G. L. Constable  
G. L. Constable  
US Nuclear Regulatory Commission  
Region IV

July 19, 1985  
Date

Inspection Summary

Inspection on April 30-May 2, 1985 [Report No. 50-112/85-01].

Areas Inspected: Routine, unannounced inspection of organization, logs, and records; review and audits; requalification training; procedures; surveillance activities; experiments; fuel-handling activities; radiation control; radwaste management; emergency planning; physical security; and nuclear materials safeguards. The inspection involved 18 inspector-hours onsite by one NRC contractor inspector.

Results: No items of noncompliance or deviations were identified during this inspection.

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## DETAILS

### 1. Persons Contacted

- \*C. Jensen, Reactor Director and Senior Reactor Operator (SRO)
- \*P. Skierkowski, Radiation Safety Officer (RSO)
- C. Terrell, Reactor Supervisor (Acting) and SRO
- \*M. Passow, Student/Trainee

\*Indicates those present at the exit interview.

### 2. Inspection History

Inspections conducted during September 1981, September 1982, and April 1983 resulted in numerous violations and open items. These are summarized below with details of the current status.

Inspection 81-01 conducted September 21-22, 1981.

- Violation 8101-01, failure to conduct a safety review. Closed by Inspection 82-01.
- Violation 8101-02, failure to fully implement operator requalification program. Repeated violation 8201-04. Closed by Inspection 83-01.
- Violation 8101-03, failure to complete sample irradiation forms properly. Closed during this inspection; see paragraph 10.
- Violation 8101-04, failure to follow procedures (failure to use extremity dosimeters). Closed by Inspection 82-01.
- Open Item 8101-01, Safety Review Committee (SRC) lack of response to audit findings. Closed during this inspection; see paragraph 6.
- Open Item 8101-02, concerned pool water radioactivity levels. Resolved by license renewal; see paragraph 4.
- Open Item 8101-03, inadequate surveillance procedure. Resolved by license renewal; see paragraphs 4.

Inspection 82-01, conducted September 13-15, 1982.

- Violation 8201-01, failure to conduct audit of equipment performance. Closed by Inspection 83-01.
- Violation 8201-02, failure to follow procedures and to maintain calibration records. Closed by Inspection 83-01.
- Violation 8201-03, failure to maintain records of test procedures and test results. Closed during this inspection; see paragraph 9.
- Violation 8201-04, failure to fully implement operator requalification program (repetitive violation). Closed by Inspection 83-01.
- Open Item 8201-05, failure to keep operating procedures up-to-date and technically correct. Closed during this inspection; see paragraph 8.

Inspection 83-01, conducted April 20-22, 1983.

- Violation 8301-01, failure to follow procedures. Resolved by license renewal; see paragraph 4.
- Open Item 8301-02, failure to inform RSC of control rod position indicator (RPI) malfunction. Closed by this inspection; see paragraph 6.

- Unresolved Item 8301-03, failure to notify NRC of RPI malfunction. The RPI failure was discovered during prestart-up check. The current Technical Specifications do not require a report for this type of event thus resolving this item.
- Open Item 8301-04, inadequate test procedures. Closed during this inspection; see paragraph 9.
- Open Item 8301-04, inadequate surveillance procedures (term "significantly" not being quantitative). Closed during this inspection; see paragraph 9.

### 3. General

Facility Operating License No. R-53 was renewed on November 14, 1983. In accordance with current practice, the entire license was restated to incorporate all changes and amendments made since the issuance of the original license.

This inspection, which began at 9:00 a.m. on April 30, 1985, was conducted to examine the overall operational program at the University of Oklahoma AGN-211P Research Reactor. The facility was toured shortly after arrival, and the conditions of the facility were found to be acceptable.

### 4. Current Facility Status

The license renewal of November 14, 1983, dropped the previous requirement for a pool water radioactivity scram and the calibration of the pool water monitor. The pool water monitor must be operating and indicating at the console only when the reactor is operated. The licensee has a surveillance procedure for checking the water monitor, and verification that it is working is part of the prestart-up check sheet.

This reactor is almost 30 yr old, and the original equipment is failing. As an example, one of the safety rod motors is beyond repair locally, and the manufacturer indicates that, because of changes in the design and materials of component construction, he cannot guarantee repair of the motor. The licensee is looking for a similar "off the shelf" unit for evaluation. When an acceptable motor is found, they plan to replace all four drive motors plus obtain at least one spare motor.

The current core configuration consists of 14 full elements and 2 half elements with a flux trap in the center. The rod worths, excess reactivity, and shut down margin were measured on February 12, 1985.

The values are as follows.

Safety Rod #1	0.82% $\Delta k/k$
Safety Rod #2	1.29% $\Delta k/k$
Coarse Control	1.49% $\Delta k/k$
Fine Control	0.42% $\Delta k/k$
Excess Reactivity at 20°C	0.55% $\Delta k/k$
Shutdown Margin (Safety Rods Only)	1.56% $\Delta k/k$

## 5. Organization, Logs, and Records

The facility organization was reviewed and verified to be consistent with the Technical Specifications. The minimum staffing requirements were verified to be present during reactor operation and fuel handling or refueling operations.

The reactor logs and records were reviewed to verify that

- a. required entries were made,
- b. significant problems or incidents were documented,
- c. the facility was being maintained properly, and
- d. records were available for inspection.

No items of noncompliance or deviations were identified during this part of the inspection.

## 6. Reviews and Audits

The licensee's review and audit program records were examined by the inspector to verify the following.

- a. Reviews of facility changes, operating and maintenance procedures, design changes, and unreviewed experiments had been conducted by a safety review committee as required by the Technical Specifications.
- b. The review committee and/or subcommittees were composed of qualified members, and quorum and frequency of meeting requirements had been met.

Audits are conducted by the members of the Reactor Safety Committee (RSC) who are not part of the reactor staff. Audit assignments are made at the RSC March meeting. Written audits are discussed at the RSC May meeting, and the reactor staff submits written responses to the audit findings at the September meeting.

Written procedures for auditing the following areas are used.

- Reactor Operations Log
- Irradiation and Experiment Logs
- Facilities Manual
- Reactor Surveillance Log
- Fuel Inventory and Inspection Log
- Maintenance and Design Changes
- Requalification Program
- Emergency and Security Plans

These audits are conducted annually and cover the period from April to April.

No items of noncompliance or deviations were identified in this portion of the inspection.

## 7. Requalification Training

The inspector reviewed procedures, logs, and training records and interviewed personnel to verify that the requalification training program was being carried out in conformance with the facility's approved plan and NRC regulations.

No items of noncompliance or deviations were identified in this section of the inspection.

#### 9. Procedures

The inspector reviewed the licensee's procedures to determine if procedures were issued, reviewed, changed or updated, and approved in accordance with Technical Specifications requirements.

This review also verified that

- a. procedure content was adequate to safely operate and maintain the facility,
- b. responsibilities were defined clearly, and
- c. required checklists and forms were used.

The inspector determined that the required procedures were available and that the contents of the procedures were adequate.

All procedures have been revised and updated since the date of the licensee renewal (November 14, 1983).

No items of noncompliance or deviations were identified in this portion of the inspection.

#### 9. Surveillance Activities

The inspector reviewed procedures, surveillance test schedules, and test records and discussed the surveillance program with responsible personnel to verify that

- a. when necessary, procedures were available and adequate to perform the tests,
- b. tests were completed within the required time schedule, and
- c. test records were available.

Most surveillance test are now on an annual schedule and usually are performed during the first calendar quarter to coincide with the reactor classroom schedule. Most surveillance procedures require that the operator "fill in" appropriate details during the individual test or evaluation.

No items of noncompliance or deviations were identified during this part of the inspection.

#### 10. Experiments

All existing experiments (experimental procedures) that were not part of (necessary for) routine reactor operations and maintenance were cancelled by the RSC at the request (suggestion) of the Reactor Director. All experiments now are reviewed and approved on a case-by-case basis. The researcher describes the experiment and the proposed procedures. The proposal then is reviewed by the Reactor Supervisor and/or Reactor Director, who specify limitations and/or changes in procedures. (The reviewer may not be the



experimenter.) The proposal then is reviewed by the RSO for problems/limitations for reasons of radiation safety. Finally, the proposal is submitted to the chairman of the RSC for committee review and approval. The committee may approve additional restrictions. The current experimental form was approved by the RSC on September 26, 1984.

The current "Irradiation Form" also was approved by the RSC on September 26, 1984. This form requires the requestor to identify what is to be irradiated and what he expects to be produced. This then is reviewed and approved by the Reactor Supervisor or Reactor Director and by the RSO, who specify any radiation safety requirement. All Irradiation Forms submitted since the last inspection (Inspection 83-01, 4/20-22/83) have been completed properly.

No items of noncompliance or deviations were identified in this portion of the inspection.

#### 11. Fuel Handling Activities

The facility fuel handling program was reviewed by the inspector. The review included verifying approved procedures for fuel handling and their technical adequacy in the areas of radiation protection, criticality safety, and Technical Specifications. The inspector determined by records review and discussions with personnel that fuel-handling operations and startup tests were carried out in conformance with the licensee's procedures.

No items of noncompliance or deviations were identified in this part of the inspection.

#### 12. Transportation (Fuel Shipping)

There have been no fuel shipments since the last operational inspection.

#### 13. Radiation Control

The inspector reviewed records, interviewed personnel, and made observations and independent surveys to verify that radiation controls were being carried out in accordance with the license and NRC regulations. The areas covered were

- a. posting and labeling of restricted areas and radioactive materials,
- b. control of irradiated samples,
- c. calibration of radiation-detection instruments,
- d. required periodic radiation and contamination surveys,
- e. exposure records of personnel, and
- f. personnel training.

No items of noncompliance or deviations were identified during this portion of the inspection.

#### 14. Radwaste Management

No liquid radioactive waste has been generated at this facility. A limited quantity of solid radioactive waste in the form of wipes, gloves, and so on are collected and transferred periodically to the Radiation Safety Office under the University's Broad License.

No items of noncompliance or deviations were identified during this part of the inspection.

#### 15. Emergency Planning

The licensee revised its emergency plan for the AGN-211 reactor on September 8, 1983, to incorporate changes requested by the NRC. This plan was approved by the NRC on June 13, 1984. The licensee requested by letter dated July 24, 1984, that full implementation not be required until November 30, 1984 (approximately 120 days after the beginning of the fall school term).

This Emergency Plan was implemented fully by late November 1984, and the Emergency Notification List was updated in April 1985. One evacuation drill has been conducted. The licensee is planning a more realistic emergency exercise after the next University Police and Norman Fire Department training sessions.

The inspectors determined that commitments made in the plan, such as an annual review and update, annual drills, procedures, training, emergency equipment, and testing of alarms, had been conducted.

No items of noncompliance or deviations were identified during this portion of the inspection.

#### 16. Physical Security

The inspectors reviewed the implementation of the licensee's physical security program through visual examination, review of records, and discussions with appropriate facility personnel. The review indicated that the physical security plan was well implemented, responsibilities and response requirements were defined clearly and understood, and appropriate test procedures were being used.

No items of noncompliance or deviations were identified in this part of the inspection.

#### 17. Nuclear Materials Safeguards

The inspectors reviewed the accountability procedures and practices records and materials status reports for the past 2 yr. The procedures, practices, and records were found to be well implemented, responsibilities and response requirements were defined clearly and understood, and appropriate test procedures were being used.

No items of noncompliance or deviations were found in this section of the inspection.

#### 18. Exit Interview

The inspector met with licensee representatives (listed in paragraph 1) at the conclusion of the inspection on May 2, 1985, and summarized the scope and findings of the inspection as indicated in the previous paragraphs.