

U. S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Reports No. 50-151/80-02; 50-356/80-02

Docket Nos. 50-151; 50-356

Licenses No. R-115; R-117

Licenses: University of Illinois  
214 Nuclear Engineering Laboratory  
Urbana, IL 61801

Facility Name: Illinois Advanced TRIGA Reactor  
Low Power Reactor Assembly (LOPRA)

Inspection At: Urbana, IL

Inspection Conducted: August 19-20, 1980

Inspector: *for W. L. Fisher*  
R. A. Paul  
Radiation Specialist

8/25/80

Approved By: *W. L. Fisher*  
W. L. Fisher, Chief  
Fuel Facility Projects and  
Radiation Support Section

8/25/80

Inspection Summary

Inspection on August 19-20, 1980 (Reports No. 50-151/80-02; 50-356/80-02)

Areas Inspected: Routine, announced inspection of radwaste management and radiation protection program, including: qualifications; audits; training; procedures; instruments and equipment; exposure control; posting, labeling, and control; surveys; notifications and reports; effluent releases; records and reports of effluents; effluent control instrumentation; solid radwaste; and receipt and transfer of material. The inspection involved 14 inspector-hours onsite by one NRC inspector.

Results: Of the fourteen areas inspected, no items of noncompliance or deviations were found in twelve areas. One apparent item of noncompliance was found in the remaining area (deficiency - failing to maintain required certification papers on specification 7A packaging, - paragraph 14).

## DETAILS

### 1. Persons Contacted

\*G. Beck, Reactor Supervisor  
H. Mandel, University Health Physicist  
\*C. Pohlod, Senior Reactor Operator  
\*J. Steerman, Reactor Health Physicist

\*Those persons attending the exit interview.

### 2. General

This inspection, which began with visual observation of facilities and equipment, posting, labeling, and access controls at 9:00 a.m. on August 19, 1980, was conducted to examine the routine radwaste management and radiation protection program. During the initial tour, no discrepancies from posted readings were noted. During additional tours, the inspector accompanied the health physicist on his routine rounds and observed him when inserting and removing samples from the reactor and noted that gloves and a ring badge were used. The reactor was critical during both days of the inspection.

### 3. Qualifications

The Nuclear Reactor Laboratory (NRL) staff consists of two senior reactor operators, one of whom is the Reactor Supervisor, one reactor operator, three student reactor operators, and a health physicist. The health physicist reports to the campus Health Physics Office, which is independent of the reactor operations organization.

No items of noncompliance were identified.

### 4. Licensee Audits

The inspector reviewed minutes of Nuclear Reactor Committee meetings held since September 1979. Membership and meeting frequencies were as required in Technical Specification 6.2. Items reviewed by the Committee included proposed experiments, the use of material to be included and the use of the Materials Research Laboratory.

No items of noncompliance were identified.

### 5. Training

All members of the reactor staff have received both radiation protection training and training under 10 CFR 19.12 as part of their licensing process. Other workers or experimenters using the facility receive training required by 10 CFR 19.12 through discussions with

the reactor health physicist and formal University courses. This training is documented by the reactor health physicist. Only personnel authorized by committee approval are allowed to use byproduct material and the reactor facilities.

No items of noncompliance were identified.

6. Radiation Protection Procedures

There have been no changes in the licensee's radiation protection procedures since the last inspection. Procedures required by Technical Specification 6.3.f are included in the "Rules and Regulations for Operation of the NRL."

No problems were noted.

7. Instruments and Equipment

a. Portable Survey Instruments

The licensee had on hand an adequate supply of operable and calibrated survey instruments capable of measuring beta, gamma, and neutron radiation. Calibration records were reviewed for the period since September 1979. The beta-gamma instruments are calibrated semiannually using a Ra-226 source; the neutron meter was calibrated semiannually using a PuBe source.

During tours the inspector examined several instruments stored in the NRL. Each had a current calibration sticker and was operable.

b. Area Radiation Monitors

The licensee has five operable area radiation monitors, satisfying Technical Specification requirement 3.4. Four other monitors are inoperable and no decision by the licensee has been made to either repair or replace them.

The last calibration, using Ra-226 sources in the reproducible geometry, was performed on July 23, 1979. The operability and alarm point of each monitor is checked daily. These checks were confirmed by a selective review of the Daily Health Physics Checklists for the period since August 1979.

c. Air Particulate Monitor

The reactor health physicist checks the trip point of the air particulate monitor and visually verifies the diversion of normal ventilation through charcoal filters weekly by "bugging"

the monitor with a Ra-226 source. A review of the Weekly Health Physics Checklists for the period since August 1979 verified the above.

The monitor's efficiency is checked periodically using a Tc-99 source. All records checked from September 1979 to July 1980 indicate that the efficiency has remained constant.

d. Gaseous Effluent Monitor

Using a known amount of Ar-41, the gaseous effluent monitor was calibrated in May 1979, and the relationship of  $1 \text{ E-9 } \mu\text{Ci/cc}$  of Ar-41 per count per minute was established. Concurrently, the monitor was tested with a Ra-226 source and the response noted. Since that time the monitor's response to the same source in a reproducible geometry has been checked semiannually. Records reviewed through August 1980 indicate that the response to the source has varied less than 10% from the original observation.

e. NMC Counter

The response of the NMC gas flow proportional counter, used for counting smears and evaporated pool water samples, is checked before each use with a Tc-99 source. Records show that voltage plateaus have not been checked since May 23, 1979.

8. Exposure Control

a. External Exposure

Film badges used for routine personal monitoring for reactor personnel and experimenters frequenting the facility are changed monthly. Ring badges are also available if needed and are used by the health physicist when removing samples from the reactor. Film badge records for CY's 1979 and 1980 to date were reviewed. The highest cumulative whole body doses recorded for 1979 and 1980 to date were 250 and 180 mrems, respectively. Extremity doses for both periods were less than 5% of the 10 CFR 20 quarterly limits. The highest exposures are received by the reactor health physicist, who removes irradiated samples from the reactor. The majority of annual doses to individuals were less than 100 mrems.

Self-reading pocket dosimeters are utilized for special jobs, visitors, and temporary employees. No calibration and draft checks for the dosimeters have been accomplished since the last inspection.

b. Internal

The licensee has no routine bioassay program and relies on airborne particulate and gaseous effluent monitors and pool water samples

(analyzed for tritium) to define any problems. Pool water samples are now analyzed annually, most recently in March 1980. The highest tritium activity from these March samples was  $6.8 \text{ E-5 } \mu\text{Ci/ml}$ .

The licensee does not have an approved (10 CFR 20.103.e) respiratory protection program and, therefore, is not authorized to take credit for the protection afforded by respiratory equipment in estimating exposure of individuals to airborne concentrations of radioactive material. Respiratory protection equipment is not used routinely but is available for emergency use.

No items of noncompliance or deviations were identified.

9. Posting and Labeling

The licensee's compliance with posting and labeling requirements specified in 10 CFR 19.11 and 10 CFR 20.203 was reviewed. No problems were noted.

10. Materials

No radioactive material was received under the NRL's license in CY 1979 or 1980 to date. Samples removed from the NRL for use in laboratories on the University campus are transferred to the Byproduct Material License (12-00330-05). Records of these transfers are maintained in the "Radioisotope Production Log," which was reviewed by the inspector for the period since February 1980.

No items of noncompliance were identified.

11. Surveys

a. Area Surveys

Although no scheduled routine area surveys of the NRL are performed by the reactor health physicist, area surveys are made by students periodically as part of their educational curriculum. Thermal column and beam port experiments are surveyed before and after any modification. The status of experimental and irradiation facilities is checked daily as part of the Health Physics Daily Checklist. The licensee uses the area monitors to indicate unexpected radiation levels. Contamination surveys have been made on four occasions since the last inspection in August 1979. Smears taken at twenty-six locations are counted on the NMC proportional counter.

The inspector reviewed smear and area surveys for CY's 1979 and 1980 to date. The highest contamination was consistently found around the sample loading/unloading area; radiation levels were comparable to postings noted during tours.

No problems were noted.

b. Air Samples

The continuous air particulate monitor (CAM) functions as an air sampler, also. Although not routinely counted, filters are changed every second day and are counted if the licensee suspects abnormal airborne concentrations which would be indicated by the CAM.

No problems were noted.

12. Notifications and Reports

A review of records and discussions with licensee representatives indicates that during 1979 and 1980 to date there were no problems regarding compliance with 10 CFR 19 or 10 CFR 20 notification and reporting requirements. The licensee's annual report, required by Technical Specification 6.7.f, was reviewed; no problems relating to radiation protection or radwaste were noted.

13. Radwaste Management

a. Gaseous Radwaste

The licensee's method of calculating gaseous effluent releases was detailed in a previous inspection report. Using rough data generated by the licensee, the inspector independently checked calculations for selected months; no discrepancies were found. According to the licensee's calculations, the average concentration released in CY 1979 was  $5 \text{ E-}8 \text{ } \mu\text{Ci/cc}$ . This corresponds to about 3% of the annual technical specification limit.

b. Liquid Radwaste

Water from potentially contaminated sources is collected in a 500-gallon holdup tank where it is recirculated and sampled before release to the sanitary sewer. To calculate the activity, a 200-milliliter sample is evaporated and counted on the NMC counter. During Cy 1979 there were 13 releases totaling 5550 gallons and about six microcuries. In 1980 to date there have been no releases.

Liquid samples are not analyzed for tritium. However, conservatively assuming that all liquid releases had the same tritium concentration as the pool water samples, less than one millicurie of tritium would have been released in 1979 and 1980 to date.

c. Solid Radwaste

Solid radwaste, primarily absorbent and filter paper, gloves, and activation analysis samples, is collected by the Radiation Safety Office for disposal via a licensed waste disposal facility. No

waste has been generated since August 1979. A review of the licensee's response to IE Bulletin 79-19 was performed during an inspection of the University broad license in March 1980.

14. Transfer of Radioactive Material

The licensee has not submitted a quality assurance program (10 CFR 71.51), because they have not shipped fuel and are not planning to ship fuel in the near future. The inspector informed the licensee that before any shipment of spent fuel they must submit a QA plan in accordance with 10 CFR 71.51.

The inspector reviewed the licensee's records of transfer of licensed material from September 1979 to date. Material is transferred to both on and off campus users. During the first six months of 1980 several shipments of irradiated Type A quantities of normal form radioactive materials were transferred to Argonne National Laboratory (ANL) in an ANL shipping container. Although the licensee maintains shipping papers on each shipment they do not maintain a complete certification and safety analyses demonstrating that the container meets specification 7A. This is in noncompliance with 49 CFR 173.395(a)(1).

No shipment of spent fuel reactor fuel has been made since the last inspection in August 1979.

15. Independent Measurements

Gamma and neutron surveys were made by the inspector and reactor health physicist in the reactor facility on August 20, 1980, while the reactor was operating at 500 watts. The highest radiation fields found were 8 mrems/hour neutron and 5 mR/hr gamma at the face of the north beam port. All other areas were less than 3 mrems/hour, neutron and gamma combined.

16. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on August 20, 1980.

The following matters were discussed.

- a. The purpose and scope of the inspection.
- b. The item of noncompliance (Paragraph 14).