

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-139/82-03

Docket No. 50-139 License No. R-73 Safeguards Group \_\_\_\_\_

Licensee: University of Washington  
Seattle, Washington 98195

Facility Name: Nuclear Engineering Laboratory Reactor

Inspection at: Seattle, Washington

Inspection conducted: July 7-9 and telephone conversations on July 23 and August 11, 1982

Inspectors: E. M. Garcia Sep 8 1982  
E. M. Garcia, Radiation Specialist Date Signed

Date Signed

Date Signed

Approved by: F. A. Wenslawski 9/8/82  
F. A. Wenslawski, Chief Date Signed  
Reactor Radiation Protection Section

Approved by: H. E. Book 9/8/82  
H. E. Book, Chief Date Signed  
Radiological Safety Branch

Summary:

Inspection on July 7-9, 23 and August 11, 1982 (Report No. 50-139/82-03)

Areas Inspected: Routine unannounced inspection by a regional based inspector of the radiation control program including posting and labeling, personnel monitoring, training of non-licensed personnel, instrument calibration; effluent monitoring; emergency planning including procedures, training, equipment, test and drills. The inspection included facility tours and a radiation survey. This inspection involved 16 hours onsite by one inspector.

Results: No items of noncompliance or deviations were identified.

RV Form 219 (2)

## DETAILS

### 1. Persons Contacted

- \*W. Chalk, Director, Nuclear Engineering Laboratory
- \*W. P. Miller, Associate Director for Reactor Operations, Reactor Supervisor
- \*D. Fry, Assistant Director for Facilities Engineering
  - M. O'Brien, University Radiation Safety Officer
  - B. Pankow, Radiation Technician
  - R. Hudson, Radiation Technician

\*Denotes the individuals present at the exit interview.

### 2. Radiation Control

#### a. Posting and Labeling

A copy of NRC Form-3 and a notice stating where copies of 10 CFR 19 and 20 were available were posted on a prominent bulletin board. The inspector toured the facility both when the reactor was operating and shut down. During reactor operation some places in the reactor room became radiation areas. Radiation area posting did not clearly identify all such areas although nearby areas were properly posted. After discussion with the licensee's representative, the entrances to the reactor room were posted with radiation areas signs. No high radiation areas were identified and none were posted. The need to avoid ambiguous posting of radiation areas was discussed at the exit interview.

No items of noncompliance or deviations were identified.

#### b. Personnel Monitoring

The personnel radiation dosimetry program is directed by the University's Radiation Safety Officer (RSO). X-ray, Beta and Gamma exposure of permanent staff and students is monitored by means of monthly film badges. Selected individuals are also monitored for neutron exposure with NTA film. For the fuel box gasket replacement job, individuals were provided with TLD finger rings for extremity dosimetry. Visitor's exposure is monitored with pocket ion chambers. Other than the pocket ion chambers, the dosimetry service is provided by R. S. Landauer Jr. and Company, a contractor. Review of the records indicate that the exposures reported in the annual report for the year 1981 are consistent with those recorded. No exposures above regulatory limits were noted.

Some limitations of the licensee's dosimetry records program were discussed. Among these, exposure records were only posted up to February 1982. According to the RSO this is due to limited clerical help and some delays in the processing of dosimeters. The requirement for completion of a Form NRC-4 prior to exposing an individual to more than 1.25 rem whole body in a quarter was discussed. No Form NRC-4 or equivalent had been prepared for the individual performing the fuel box gasket work. Had the total job dose been received during one quarter instead of two the requirements of 10 CFR 20.102(b) would not have been met. These limitations were discussed during the exit interview.

No items of noncompliance or deviations were noted.

c. Training

The inspector discussed with the RSO and the Reactor Supervisor the training provided to non-licensed individuals pursuant to 10 CFR 19.12. A two hour presentation consisting of video tapes entitled "The Biological Effects of Ionizing Radiation, An Overview, Basic Concepts and History, Acute Effects and Long Term Effects," and a question and answer period is the core training. Handouts based on the tapes and a copy of the article "The Biological Effects of Low-Level Ionizing Radiation" by A. C. Upton, Scientific American, February 1982, are provided to all participants. Females also receive a copy of the Appendix to Regulatory Guide 8.13, "Possible Health Risks To Children Of Women Who Are Exposed To Radiation During Pregnancy." The Reactor Supervisor has established a form on which individuals acknowledge the training they have received. The RSO stated that an additional one hour on "Radiation Safety Rules and Regulation" presentation was to be added to the current training program. The current training program does not include an examination. The instruction concerning prenatal radiation exposure are presented only to females and only in written form. Regulatory Guide 8.13 recommends that such instruction be given not only to the females but to supervisors and co-workers in both oral and written form. The inspector concluded that the training program marginally meets the requirements of 10 CFR 19.12.

No items of noncompliance or deviations were identified.

d. Instrument Calibration

Review of records indicate that the area radiation monitors and reactor room exhaust air monitor are calibrated on a quarterly basis. Technical Specifications require annual calibrations. Calibrations are performed pursuant to written procedures.

Portable instruments assigned to the reactor are calibrated in accordance with a short procedure entitled "Survey Meter Calibration." This procedure does not include many of the recommendations of American National Standards Institute (ANSI) publication N323-1978, "American National Standard Radiation Protection Instrumentation Test and Calibration." Instruments assigned to the reactor are supposed to be calibrated quarterly. Six instruments were selected by the inspector. Five had been calibrated within the previous three months. Review of records indicate that these instruments had been calibrated quarterly for the past year. The sixth, a Victoreen 470A ion chamber, had a sticker noting that it had been last calibrated more than six months earlier. The licensee stated that instrument was assigned to the Radiation Safety Office and that office calibrates their instruments on a semiannual schedule. The inspector identified and discussed the ANSI standard listed above and noted that the licensee's survey meter calibration procedure failed to incorporate many of the recommendations of that standard. This matter was discussed at the exit interview.

No items of noncompliance or deviations were identified.

3. Environmental Protection

a. Airborne Effluents

The principal airborne radionuclide released from the facility is argon-41 (Ar-41). The licensee monitors 100% of the airflow through the core to determine the Ar-41 released. A sodium iodide (NaI) scintillation detector and single channel analyzer (SCA) are used to monitor the Ar-41 gamma-rays. A procedure entitled "Calibration of A-41 Monitor" is used for annual calibrations. In the past year the licensee has calibrated the Ar-41 monitor four times using the above named procedure. The procedure is basically a means to assure proper window alignment for the Sodium-22 (Na-22) energy 1.274 MeV, which is similar to the Ar-41 energy of 1.293 MeV. The efficiency of the system in measuring Ar-41 is based on theoretical calculations based on literature references. After discussion with the inspector, the licensee agreed to collect a grab sample for analysis in an independent system and to compare the results with the monitor readings. On July 23, 1982 the licensee informed the inspector by phone that a preliminary grab sample was in agreement with the monitor readings. The grab sample indicates a 30% higher Ar-41 concentration than the monitor readings. The licensee stated their intent to collect further samples and to verify the flow rate of the system.

Review of the Argon-41 release records indicates that the amounts reported in the annual report for the year 1981 are comparable to those recorded. These releases are within the technical specification limits.

No items of noncompliance or deviations were identified.

b. Liquid Effluents

The inspector reviewed records of liquid releases. No release since the last inspection was noted, and the licensee stated none had been made.

No items of noncompliance or deviations were identified.

c. Solid Waste

Solid waste is transferred to the University, State of Washington, materials license prior to shipment. Since the last inspection, one transfer of 390 microcuries in 15 ft<sup>3</sup> has been made. Activity is determined by counting the shipping containers with a lithium drifted germanium detector (Ge(Li)) and a Multichannel Analyzer System (MCA). The shipping container is three feet from the detector.

No items of noncompliance or deviations were identified.

4. Emergency Preparedness

The inspector discussed with the licensee staff the facilities emergency preparedness program. Based on these discussions and review of available records it appears that the licensee is fulfilling the requirements of their current emergency plan. Tours and briefing have been provided to members of the University Police Department and the Seattle Police and Fire Departments. The smoke detectors, fire alarm boxes and fire horn were tested in late June and early July 1982. An annual drill and review of emergency procedures was conducted on November 25, 1981. The emergency locker contains adequate supplies. The Radiological Emergency Response Plans for the University Hospital and Harbor View Hospital, medical facilities associated with the University, were prepared by the University Radiation Safety Officer and contain provisions for accepting contaminated individuals from the reactor. Records of the tours, briefings and training, of the scenarios and critiques of drills, of the agreements with outside agencies and of the contents and maintenance of the emergency locker were minimal or nonexistent. The inspector discussed the need for improved records in this area.

No items of noncompliance or deviations were identified.

5. Transportation Activities

The licensee transfers possession of any material to be shipped to the University, State of Washington, Materials License prior to shipment. The inspector observed a shipment of activated material and did not note any violation of NRC or Department of Transportation regulations.

No items of noncompliance or deviations were noted.

6. Facility Tour and Radiation Safety

The inspector accompanied a radiation technician during a routine daily survey. The inspector took independent dose rate measurements using an NRC ion chamber. The NRC instrument used was Keithley Model 36100 Survey Meter Serial Number 11108 calibrated on December 7, 1981 and due for calibration on December 7, 1982. The licensee's measurements were comparable to those taken by the inspector.

The inspector reviewed selected survey records for the previous three months. Those records indicate comparable contamination and radiation levels to those observed during the inspection. Contamination and radiation levels were generally low and consistent with the use of the facility.

No items of noncompliance or deviations were identified.

7. Exit Interview

The inspector met with the individuals denoted in paragraph 1. The extent and findings of the inspection were presented. Specific areas discussed have been noted in the report. The licensee was informed that no items of noncompliance had been identified.