U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No:	50-197
License No:	R-80
Report No:	97-01
Licensee:	Cornell University
Facility:	Ward Center for Nuclear Sciences
Location:	Ithaca, New York
Dates:	March 11-15, 1997
Inspector:	Stephen W. Holmes, Radiation Specialist
Approved by:	John R. White, Chief Radiation Safety Branch Division of Reactor Safety

EXECUTIVE SUMMARY

The reactor was being maintained as required by the license. Inspections, surveys, records, and reports were as required by the license. The licensee committed to develop and implement a calibration procedure that would provide a full verification of the air exhaust monitor. The administrative responsibility for the reactor has been transferred from the Dean of the College of Engineering to the Vice President for Research and Advanced Studies. A search committee had been formed to hire a new center director.

Report Details

Summary of Plant Status

The reactor is fueled and operates as needed during the day, Monday through Friday, for teaching, research, and service requirements. Work continues on the Cold Neutron Beam installation.

I. Operations

O1 Conduct of Operations

O1.1 Reactor Staffing

a. Inspection Scope (Inspection Procedure 40755)

The inspector reviewed senior reactor licenses and operation logs.

The inspector interviewed senior reactor operators and management staff.

The inspector observed reactor operations.

b. Observations and Findings

The staff consisted of the Reactor Supervisor (RS) and three staff SROs. The RS and other SRO's satisfied the training and experience required by the Technical Specifications (TS). The RS and staff SROs filled the position of the Responsible Person on Duty during reactor operations as required. Shift staffing meet the minimum requirements of duty and on-call personnel.

c. Conclusions

Reactor operations staffing satisfied TS requirements.

O1.2 Control and Performance of Experiments

a. Inspection Scope (Inspection Procedure 40755)

The inspector reviewed approved experiment records and Ward Center Safety Committee (WCSC) minutes.

The inspector interviewed the University Radiation Safety Officer (URSO), the Acting Director (AD), and SROs.

The inspector observed an experimental operation and ongoing experimental setups.

b. Observations and Findings

Reviews of experiment requests were performed by the Center Director and controls and limitations were imposed as required by TS. Experiments or changes to routine experiments that had safety consideration were referred to the WCSC and reviewed as required by the TS. The WCSC minutes and the approved experiment forms did not formally document that all specific experiment limitations outlined in the TS had been addressed by the safety reviews. The AD stated that, in conjunction with an update of the approved type of experiments, the safety review documentation of the specific TS limitations would be addressed.

The observed experiment was constrained as required by the TS and experiment authorization. It was installed, performed, and removed as outlined in the experiment authorization and licensee's procedures. Engineering controls were installed as required to limit radiation exposures. Coordination between the SRO and experimenter were very good.

c. Conclusions

License control and performance of experiments met TS and regulatory requirements.

01.3 Reactor Operations and Fuel Handling

a. Inspection Scope (Inspection Procedure 40755)

The inspector reviewed reactor logs and reactor check-lists.

The inspector interviewed SROs and RS.

The inspector observed reactor check-out, start-up, operations and shutdown.

b. Observations and Findings

Reactor operations were performed in accordance with written procedures and TS. Checklist were used extensively. Information on operational status was recorded in log books and checklists as required by procedures and TS. Implementation of and adherence to the procedures was good. Operator turnover was adequate to insure safety.

Data recorded for fuel movement was clear, concise and relevant. Fuel movement, inspection, log keeping and recording followed the facility's procedures. The console radiation monitor and a second person were available during fuel handling, as required by licensee's procedure.

c. Conclusions

Reactor operations conformed to TS and licensee procedural requirements. Fuel handling, record maintenance and documentation were accomplished as required by TS and licensee procedures. No safety concerns were identified.

O2 Operational Status of Facilities and Equipment

a. Inspection Scope (Inspection Procedure 40755)

The inspector reviewed reactor logs and maintenance logs.

The inspector interviewed the AD, the Reactor Radiation Safety Officer (RRSO), and SROs.

The inspector observed reactor check-out, start-up, operations and shutdown and observed the facility and equipment during an unaccompanied tour.

b. Observations and Findings

Housekeeping was good with little extraneous clutter. The pool top floor was clear. Items stored on the cat walk were posted and identified. Malfunctioning equipment had been fixed or replaced with compensatory measures or equipment. All equipment and facilities observed by the inspector were operational. Experimental facilities on the bay floor were roped off and posted as needed. The reactor equipment room and the waste hold up tank rooms were well maintained for their use.

c. Conclusions

Reactor and support facilities were adequate for safe operations.

O3 Operations Procedures and Documentation

a. Inspection Scope (Inspection Procedure 40750)

The inspector reviewed operating procedures and updates, reactor operating records and logs, and safety committee minutes.

The inspector observed reactor check-out, start-up, power run, and shutdown.

b. Observations and Findings

Written procedures required by the TS were available and used by the staff. Implementation of and adherence to the procedures was good. Procedure changes had been reviewed and approved by the WCSC as required by TS.

Records of power level, operating periods, unusual events, calibration and maintenance procedures, installed experiments, and start-up and shut-down checks were being kept.

c. Conclusions

Facility procedures satisfied TS requirements. Reactor operating records and logs were being maintained as required by TS.

O5 Operator Training and Qualification Program

a. Inspection Scope (Inspection Procedure 40750)

The inspector reviewed requalification program records, NRC licenses, and training records.

The inspector interviewed SROs and RS.

b. Observations and Findings

All currently licensed SROs were successfully completing the emergency procedure and abnormal events training, reactivity manipulations, and participating in the ongoing training as required by the NRC-approved requalification plan. Review of records indicated that operator performance and competence evaluation had been performed as required. Past test questions covered the material prescribed by the program and demonstrated good technical depth. Required quarterly operation hours, as SROs, were being recorded.

c. Conclusions

The requalification program was being implemented adequately to ensure appropriate training of the licensed SROs. TS and NRC-approved requalification plan requirements were met.

O6 Organization and Administration

a. Inspection Scope (Inspection Procedure 40755)

The inspector reviewed organization and staffing and administrative controls.

The inspector interviewed various management and support staff.

b. Observations and Findings

Since the last inspection the administrative responsibility for the reactor had been transferred from the Dean of the College of Engineering to the Vice President for Research and Advanced Studies. The facility was renamed The Ward Center for Nuclear Sciences. Operational use of the facility and the basic safety functions and responsibilities of the Ward Director, Ward Safety Committee, and the URSO and staff are largely unchanged. A request for amendment of the TS, delineating this change and other minor administrative and functional changes had been submitted to the NRC.

Due to a phased-retirement, the Center Director had stepped down. The RS, who has previously served as AD, was appointed by the WCSC to function as such until the search committee locates and hires a new director.

c. Conclusions

Organizational and administrative controls remained consistent with license requirements and licensee commitments.

O7 Quality Assurance in Operations

a. Inspection Scope (Inspection Procedure 40755)

The inspector reviewed WCSC minutes, independent outside audit, and Annual reviews.

The inspector interviewed the AD.

b. Observations and Findings

The meeting schedule and membership satisfied TS requirements and the Committee's procedural rules. Review of the minutes indicated the committee was active in providing appropriate guidance, direction and oversight and ensured suitable use of the reactor. The minutes were clear, and sufficiently detailed for a record of the safety oversight of reactor operations.

The recent audit performed by AFRRI's TRIGA reactor staff was pertinent and technically suitable. Their recommendations were evaluated and implemented as appropriate. No safety concerns or violations of NRC requirements were identified.

c. Conclusions

The Ward Center Safety Committee performed it's duties as required by license, TS, and administrative criteria. Outside audits met regulatory requirements.

III. Maintenance

M1 Conduct of Maintenance

M1.1 Limiting Conditions for Operation and Surveillance

a. Inspection Scope (Inspection Procedure 40750

The inspector reviewed selected surveillance records, data sheets and tests, licensee procedures, and reactor logs, check-lists, and periodic reports.

The inspector interviewed SROs, the URSO and the RRSO.

b. Observations and Findings

Daily and other periodic checks, tests, and verifications were done to insure TS required limiting conditions for operation (LCO) were validated and that surveillances were completed as required. All surveillance and LCO verifications were completed on schedule or more frequently as required by TS and in accordance with licensee procedures. All were within TS and procedure parameters. Tracking and recording of the tests were good. Records were easily retrieved for review.

c. Conclusions

The licensee's program for surveillance and LCO confirmations was effective and satisfied TS requirements.

M2 Maintenance and Material Condition of Facilities and Equipment

a. Inspection Scope (Inspection Procedure 40755)

The inspector reviewed maintenance and reactor logs, WCSC records, and repair records.

The inspector observed facility and equipment during an unaccompanied tour.

b. Observations and Findings

Reactor maintenance records were kept in a bound logbook. The book had an index for each item/type of equipment on which maintenance was performed. The individual sheets contained the component name, a summary of the work, the post-maintenance checks performed, and cross references to the reactor logbook and page that documented the work. Maintenance was performed and documented consistent with the TS and licensee procedures. When appropriate, maintenance that could be a design change had been referred to the RS, the AD, or the WCSC as required. There was no formal documentation to indicate maintenance/changes had been referred to the WCSC under 10 CFR 50.59. The RS stated that this would be added to the worksheet.

The inspector reviewed those items that were referred to the WCSC for review as design changes. Most items did not need review by the full committee, however all items sent to the committee were evaluated as to unreviewed safety questions, TS requirements, and 10 CFR 50.59 analyses. The reviews were appropriately performed and focused on safety.

Control room and pool top equipment was operational. No missing or malfunctioning equipment was noted. The interior reactor structure appeared sound. No OHSA violations were observed.

c. Conclusions

Maintenance logs, records, performance, and reviews satisfied TS and procedure requirements. Facility condition was well maintained for its intended function and use.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 Radiation Protection Postings

a. Scope (Inspection Procedure 40750)

The inspector reviewed radiological signs and postings and routine radiation surveys.

The inspector observed the facility and equipment during an unaccompanied tour.

b. Observations and Findings

Postings at the reactor were appropriate for the hazards involved. Surveys by the inspector confirmed that the radiation signs and postings properly reflected the radiological conditions in the facility. Reactor facility and radioactive material storage areas were secured and properly posted. No unmarked or unsecured radioactive materials were evident. NRC Forms-3 were posted in appropriate areas in the facility as were current notices to workers required by 10 CFR 19.

c. Conclusions

Radiological postings satisfied regulatory requirements.

R1.2 Effluent Monitoring and Release

a. Scope (Inspection Procedure 40750)

The inspector reviewed annual reports, release records, counting and analyses results.

The inspector interviewed HP personnel and SROs.

b. Observations and Findings

Gaseous releases were tracked by an in-line air monitor in the reactor stack plenum. Releases were well within the 10 millirem/year dose and appendix B limits and Appendix B limits and was adequately documented. Liquid radioactive effluent discharges were infrequent and were analyzed by both reactor and Environmental Health and Safety (EHS) personnel before release. The RRSO and EHS evaluated the results before authorizing releases. Releases met regulatory requirements.

The gaseous limits were confirmed to meet the limits by use of the EPA Comply Code and the methodology used in the reactor's Updated Safety Analysis Report for determining doses to the public from gaseous releases.

c. Conclusions

Effluent monitoring satisfied license and regulatory requirements.

R1.3 Radiation Worker Training

a. Scope (Inspection Procedure 40750)

The inspector reviewed reactor training records, campus training records, training program content, and licensee procedures.

The inspector interviewed HP personnel, SROs, the AD, and the URSO.

b. Observations and Findings

Training is provided by the reactor staff through issuance of the Cornell University Radiation Laboratory Manual #3, discussions, facilities tours and attendance at the EHS radiation safety course. Refresher training is given yearly and additional training is provided as required, e.g., when key access is given. This is documented on approved University request forms. Review of the training records of a new reactor staff member and a randomly picked research staff member confirmed that the required retraining had been provided.

c. Conclusions

Radiation worker training met license requirements, conformed to licensee procedures, and satisfied 10 CFR 19.12 for instruction to workers.

R1.4 Radiation Protection Surveys

a. Scope (Inspection Procedure 40750)

The inspector reviewed HP surveillances/survey procedures and survey records.

The inspector observed radiation levels during an unaccompanied tour.

The inspector interviewed HP personnel, SROs, the RRSO, and the URSO.

b. Observations and Findings

Contamination and radiation area surveys were performed by reactor and university staffs as required by licensee procedures. Results were evaluated and corrective actions taken and documented when readings/results exceeded set action levels. The survey sheets used by the staff provided an excellent assessment of radiological conditions due to a sizable number of data points. Surveys by the reactor staff had been formalized as previously committed to by the licensee.

c. Conclusions

Surveys were performed and documented in a manner appropriate and sufficient to evaluate, as required by 10 CFR 20, the radiation hazards that might exist.

R1.5 Personnel Dosimetry

a. Scope (Inspection Procedure 40750)

The inspector reviewed dosimetry records and licensee procedures.

The inspector observed the issuance of dosimetry.

The inspector interviewed RRSO and the URSO.

b. Observations and Findings

The licensee used a National Voluntary Laboratory Accreditation Program-accredited vendor to process personnel thermoluminescent dosimetry. The Ward Center for Nuclear Sciences maintained their own staff's personnel dosimetry records. The RS and the URSO both reviewed the exposure reports. Atypical readings or those exceeding the University action levels were reported to the appropriate supervisor. All personnel exposures were within NRC limits, with most showing no exposure above background. Self-reading pocket dosimeters were used on a daily basis by the reactor staff. This was ensured by an interlock which requires a pocket chamber to be inserted in an entrance device before the elevator door to the reactor will open.

c. Conclusions

Dose limits were in conformance with licensee limits and 10 CFR 20. The dosimetry program was conducted in accordance with 10 CFR 20.1501, 20.1502, and licensee procedures.

R2 Status of RP&C Facilities and Equipment

a. Scope (Inspection Procedure 40750)

The inspector reviewed counting equipment calibration and status, periodic checks, and calibration procedures.

The inspector interviewed HP personnel, SROs, and a manufacturer representative.

The inspector observed portable meter calibration.

b. Observations and Findings

The calibration of the portable survey meters, and university and some reactor counting lab instruments was performed in-house by EHS staff. Procedures were consistent with American National Standards Institute or the manufacturers' recommendations. Calibration sources were traceable to the National Institutes of Standards and Technology. The use of detailed forms for these calibrations, and computer tracking of calibration due dates was excellent.

The in-place radiation and air monitors and some reactor counting lab instruments were calibrated by the reactor staff using generally accepted techniques. Calibration of the air monitor was based on a 1972 experiment using a plenum simulator to duplicate the detector geometry in the actual plenum and then compared to a fixed geometry sealed radiation source. Air plenum air flow had been measured and was lower, thus more conservative, than the number used in the release calculations. The RRSO stated that a full verification of the air monitor calibration would be performed. This matter will be reviewed in a future inspection (Inspector Followup Item 97001-01). All instruments checked were in calibration. Calibration records were in order.

c. Conclusions

RP&C equipment was being maintained and calibrated according to industry and equipment manufacturer standards. Calibration satisfied TS and licensee requirements.

R3 RP&C Procedures and Documentation

a. Scope (Inspection Procedure 40750)

The inspector reviewed Radiation Safety Program documentation and various HP procedures.

The inspector interviewed HP personnel and the Radiation Safety Officer.

b. Observations and Findings

The Radiation Safety Program (RSP), with some specific differences, covers both the reactor and the campus. The Ward Center for Nuclear Sciences had a written RSP outlining those items which comprise the program which differ from the campus program, and which are in addition to the campus program. The RSP had been implemented and reviewed along with the periodic review of the campus RSP.

Reviewed records indicate that the URSO or his designee reviewed and approved RSP changes, experiments, and radiation protection events.

c. Conclusions

The RSP satisfied the requirements of 10 CFR 20.1101. The URSO or the RRSO provided the oversight and review as required by TS and licensee procedures.

R6 RP&C Organization and Administration

a. Scope (Inspection Procedure 40750)

The inspector interviewed HP personnel, the URSO, the RRSO, the AD, and the Vice President for Research and Advanced Studies.

The inspector reviewed RSP documentation and the TS.

b. Observations and Findings

The routine day-to-day health physics (HP) surveys and activities involving radiation safety were performed by the reactor staff. This included personnel dosimetry, surveys, worker training, and waste transfer. With one HP tech in EHS normally tasked, when needed, to reactor support under direction of the URSO, the University HP staff also performed surveys, evaluated personnel exposures, provided worker training, and handled radioactive waste disposal. One reactor staff member has been appointed the URSO's designee (reactor radiation safety officer) for HP operations at the reactor. No lapse in coordination between the staffs was noted.

c. Conclusions

The HP staffing met regulatory requirements and licensee commitments.

R7 Quality Assurance in RP&C Activities

a. Inspection Scope (Inspection Procedure 40755)

The inspector reviewed committees' minutes, experiment request forms, and licensee procedures and safety manual.

The inspector interviewed the AD and the URSO.

b. Observations and Findings

The WCSC and the University Radiation Safety Committee jointly provide oversight to the reactor radiation safety program. The meeting schedule and membership satisfied TS and licensee requirements. Examination of records confirmed that the committees were reviewing reactor operation as required by TS. The committees also provided appropriate guidance, direction and oversight to the radiation safety program.

c. Conclusions

Oversight of the radiation safety program by both committees satisfied TS and licensee requirements.

R8 Radioactive Material Transfer/Disposal

a. Inspection Scope (Inspection Procedure 40755)

The inspector reviewed transfer checklists, shipping records, and disposal records.

The inspector interviewed HP personnel, SROs, and the RRSO.

b. Observations and Findings

Transfer of radioactive material from the reactor was performed by the reactor staff using a shipping checklist supplied by EHS. The checklist provided detailed requirements for proper shipping as required under 49 CFR 173 for limited quantity packages. Packages other then limited quantity were shipped by EHS. The reactor staff was knowledgeable and proficient in packaging and documenting transfers. Transfer documentation was adequate and on file.

Production of radioactive waste at the facility was minimal. The small amount produced was handled under the campus waste disposal program as outlined in Waste Disposal Section of the campus Radiation Safety Manual. Reactor solid waste was transferred to the campus license and liquid waste was released to the sanitary sewer after the URSO staff evaluated the waste analysis and authorized the release.

c. Conclusions

Radioactive waste was transferred and disposed of in accordance with licensee procedures, TS, 10 CFR 49 and 10 CFR 20 requirements.

P1 Conduct of EP Activities

a. Inspection Scope (Inspection Procedure 40755)

The inspector reviewed training records, EP Drill records, and Safety Committees' records.

The inspector interviewed the URSO and the RRSO.

The inspector observed the emergency response equipment.

b. Observations and Findings

Plan documentation and implementing procedures were current and available to users. Training had been provided to response personnel in conjunction with the campus EP training program. The last drill was held in September 1996. The drill frequency and content met the NRC-approved plan requirements. Emergency response personnel were able to acceptably respond to emergency conditions as required. The critique of the drill involved all personnel and recommendations had already been incorporated into implementing procedures.

c. Conclusions

Licensee's implementation of the EP program met the plan mandates and satisfied license and regulatory requirements.

V. Management Meetings

X1 Exit Meeting Summary (Inspection Procedure 30703)

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on March 14, 1997. The licensee acknowledged the inspection findings.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

N. Scott, Vice President for Research and Advanced Studies
H. Aderhold, Acting Director, Ward Center for Nuclear Sciences
L. Bullerwell, Radiological Safety Specialist
K. Cady, Chairman, Ward Center Safety Committee
P. Craven, Senior Reactor Operator/Research Technician
S. Lassell, Reactor Radiation Safety Officer/Senior Reactor Operator
T. McGiff, University Radiation Safety Officer

INSPECTION PROCEDURES USED

IP 40750: CLASS II NON-POWER REACTORS

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-157/97-01	IFI	Full calibration of effluent monitor to verify response of detector tube and confirm conversion factor of 920 cpm above background = 2.0×10^{-6} μCi/ml Ar-41.

Closed

None

LIST OF ACRONYMS USED

AFRRI	Armed Forces Radiobiology Research Institute
CFR	Code of Federal Regulations
EHS	Environmental Health and Safety
HP	Health Physics
LCO	Limiting Conditions for Operation
NAVLAP	National Voluntary Laboratory Accreditation Program
NRC	Nuclear Regulatory Commission
OHSA	Occupational Health and Safety Administration
RP	Radiation Protection
RRSO	Reactor Radiation Safety Officer
RSP	Radiation Safety Program
SRO	Senior Reactor Operators
TRIGA	Training, Research, Isotope, General Atomic
TS	Technical Specifications
URSO	University Radiation Safety Officer
WCSC	Ward Laboratory Safety Committee