

September 24, 2009

Dr. Howard D. Grimes
Vice President for Research
and Dean of the Graduate School
Washington State University
Pullman, WA 99164-1030

SUBJECT: WASHINGTON STATE UNIVERSITY, NRC ROUTINE INSPECTION REPORT NO.
50-027/2009-201

Dear Dr. Grimes:

On August 25-27, 2009, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at your Washington State University TRIGA research reactor in the Dodgen Research Facility (Inspection Report No. 50-027/2009-201). The enclosed report documents the inspection results, which were discussed on August 27, 2009, with members of your staff including Corey Hines, Reactor Supervisor and Donald Wall, Director of the Nuclear Radiation Center.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, and requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Craig Bassett at (404) 358-6515 or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

/RA/

Johnny H. Eads, Jr., Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-027
License No. R-76
Enclosure: NRC Inspection Report
cc w/encl: Please see next page

Washington State University

Docket No. 50-027

cc:

Chair, Reactor Safeguards Committee
Nuclear Radiation Center
Washington State University
P.O. Box 641300
Pullman, WA 99164 – 1300

Mr. Corey Hines
Reactor Supervisor, Nuclear Radiation Center
Washington State University
P.O. Box 641300
Pullman, WA 99164 – 1300

Dr. Jean Cloran
Radiation Safety Officer
Washington State University
P.O. Box 641302
Pullman, WA 99163-1302

Director
Division of Radiation Protection
Department of Health
7171 Cleanwater Lane, Bldg #5
P.O. Box 47827
Olympia, WA 98504-7827

Office of the Governor
Executive Policy Division
State Liaisons Officer
P.O. Box 43113
Olympia, WA 98504-3113

Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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

Docket No: 50-027

License No: R-76

Report No: 50-027/2009-201

Licensee: Washington State University

Facility: Dodgen Research Facility

Location: Pullman, WA

Dates: August 25-27, 2009

Inspector: Craig Bassett

Approved by: Johnny H. Eads, Jr., Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Washington State University
Dodgen Research Facility
Report No. 50-027/2009-201

The primary focus of this routine, announced inspection was the on-site review of selected aspects of the Washington State University (the licensee's) Class II research and test reactor safety program including: 1) organization and staffing, 2) review and audit and design change functions, 3) reactor operations, 4) operator requalification, 5) procedures, 6) fuel handling, 7) maintenance and surveillance, 8) experiments, and 9) emergency preparedness since the last U.S. Nuclear Regulatory Commission (NRC) inspection of these areas. The licensee's program was acceptably directed toward the protection of public health and safety and in compliance with NRC requirements. No violations or deviations were identified.

Organizational Structure and Staffing

- The operations organizational structure and responsibilities were consistent with Technical Specifications requirements.
- Shift staffing met the minimum requirements for reactor operations.

Review and Audit and Design Change Functions

- The review and audit program was generally being conducted acceptably by the Reactor Safeguards Committee.
- The design change program satisfied NRC requirements.

Operations

- Operational activities were consistent with applicable TS and procedural requirements.

Experiments

- Conduct and control of experiments and irradiations met the requirements specified in the TS, the applicable experiment and irradiation authorizations, and associated procedures.

Operator Licenses, Requalification, and Medical Activities

- Operator requalification was conducted as required by the Reactor Staff Requalification Program.
- A medical examination for each reactor operator with an active license was being completed every two years as required.

Fuel Handling

- Fuel handling activities and documentation were in compliance with the requirements specified in the facility Technical Specifications and procedures.

Maintenance and Surveillance

- Maintenance logs, records, performance, and reviews satisfied TS and procedure requirements.
- The program for tracking and completing surveillance checks and Limiting Conditions for Operation verifications satisfied TS requirements and licensee administrative controls.

Procedures

- Facility procedural review, revision, control, and implementation generally satisfied TS requirements.

Emergency Preparedness

- The Emergency Plan and Implementing Procedures were being reviewed and updated and were acceptable.
- Emergency response facilities and equipment were being maintained as required and responders were knowledgeable of proper actions to take in case of an emergency.
- Off-site support was acceptable and communications capabilities were adequate.
- Annual drills were being conducted and critiques were being held as required by the Emergency Plan.

REPORT DETAILS

Summary of Plant Status

The Washington State University (WSU, the licensee's) one megawatt (1 MW) TRIGA Conversion research and test reactor continued normal, routine operations. A review of the applicable records indicated that the reactor was operated as needed in support of education, operator training, irradiation of various materials, and, on occasion, experiments involving Boron Neutron Capture Therapy work. During the inspection, the reactor was operated at levels up to 1 MW as required and in accordance with applicable procedures to support ongoing irradiation activities.

1. Organizational Structure 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 Sections 6.1-6.3 of Technical Specifications (TS), Amendment Number (No.) 20, dated September 30, 2008, were being met:

- Staff qualifications
- Management responsibilities
- Staffing requirements for the safe operation of the facility
- WSU Nuclear Radiation Center organizational structure and staffing
- WSU Nuclear Radiation Center Reactor Operating Log (O.1) sheets from January through August 2009
- WSU Nuclear Radiation Center Administrative Procedure, Section No. 1, entitled "Responsibilities and Authority of Reactor Operating Staff," (not dated)
- ANSI/ANS Standard 15.4, "Selection and Training of Personnel for Research Reactors," dated 1977

b. Observations and Findings

The inspector noted that the Nuclear Radiation Center organizational structure and the responsibilities of the reactor staff had not changed since the last inspection at the facility in July 2008. The reactor staff currently consisted of three full time employees, the Facility Director, a Reactor Supervisor, and an Engineering Technician. The Facility Director and Reactor Supervisor were Senior Reactor Operators (SROs) while the Engineering Technician was a Reactor Operator (RO). There were also four other individuals who assisted at times with operating and maintaining the reactor. They were all students and qualified ROs. Two of the students were part-time employees at the facility. The staffing was at a minimum level.

The inspector determined that the reactor operations staff met the training and experience requirements as stipulated in the TS and outlined in ANSI/ANS-15.4, "Selection and Training of Personnel for Research Reactors." In addition, the

operations log and associated records confirmed that shift staffing satisfied the minimum requirements for duty and on-call personnel.

c. Conclusions

The operations organizational structure and responsibilities were consistent with TS requirements. Shift staffing met the requirements for current operations.

2. Review and Audit and Design Control Functions

a. Inspection Scope (IP 69001)

In order to verify that the licensee had established and conducted reviews and audits as required in TS Section 6.5 and to determine whether modifications to the facility were consistent with Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59, the inspector reviewed selected aspects of:

- WSU Reactor Safeguards Committee (RSC) meeting minutes for 2007, 2008, and to date in 2009
- Safety review and audit records documented on WSU Nuclear Radiation Center forms entitled, "Reactor Safeguards Committee Facility Records Quarterly Audit," for the period from April 2007 through the present
- WSU Annual Report entitled "Annual Report on the Operation of the Washington State University TRIGA Reactor" for the periods from July 1, 2006 through June 30, 2007, dated August 13, 2007
- WSU Annual Report entitled "Annual Report on the Operation of the Washington State University TRIGA Reactor" for the periods from July 1, 2007 through June 30, 2008, dated August 22, 2007 (*sic*)
- WSU Nuclear Radiation Center Administrative Procedure, Section No. 3, entitled "Approval and Review of Facility Modifications and Special Tests or Experiments," (not dated)

b. Observations and Findings

(1) Review and Audit Functions

The RSC membership satisfied TS requirements and the Committee's procedural rules. The RSC, or a subcommittee thereof, was required to hold quarterly meetings each year. It was noted that only three committee meetings were held in 2007 and only one had been held to date in 2009. The licensee was informed that the issue of holding the required quarterly RSC meetings every year would be identified as an Inspector Follow-up Item (IFI) and would be reviewed during subsequent NRC inspections at the facility (IFI 2009-201-01).

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. Additionally, the annual review of the radiation protection program and the biennial reviews of the

standard operating procedures, the emergency plan, and the security plan had been conducted and acceptably documented.

Since the last inspection, audits of reactor facility records and reviews of operating abnormalities, changes to procedures, equipment changes, and proposed tests or experiments had generally been completed and documented. The inspector noted that audits were conducted during the meetings held by the RSC.

(2) Design Control Functions

Records and observations showed that changes made at the facility from 2007 to the present were acceptably reviewed in accordance with 10 CFR 50.59 and applicable administrative controls. Prior to implementing the changes, the licensee submitted them to the RSC and they were reviewed, determined to be acceptable, and approved as required. None of the changes constituted a safety question or required a change to the TS.

The latest modifications initiated by the licensee involved installing a new water conductivity monitoring system and installing a new transient rod. The licensee's facility modification procedure was followed and evaluations were completed as required. The licensee considered the criteria included in 10 CFR 50.59 and concluded that the changes were acceptable under the regulations. Although not required by procedure in these two instances, a review by the RSC of each change was requested and conducted, and the RSC approved the changes. The change review and approval process appeared to be acceptable.

c. Conclusions

The review and audit program was generally being completed acceptably by the RSC. The design change program satisfied NRC requirements.

3. Operations

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify compliance with TS Section 6.2 and the applicable procedures:

- Staffing for operations as recorded on the Reactor Log sheets
- Observation of selected operations activities on August 25, 26, and 27, 2009
- Scram Summary Log (S.1) entries from January 2008 through July 2009
- Pulsing Summary Log (S.2) entries from January 2007 through August 2009
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- Reactor Operating Log (O.1) sheets from January 2009 through August 2009, entitled "WSU Nuclear Radiation Center Reactor Log," NRC Form No. 22, latest form revision dated November 2008
- Selected entries on Reactor Start-Up Checkoff (O.3) forms entitled WSU Nuclear Radiation Center Form No. 34, "WSU Reactor Start-Up Checkoff," latest form revision dated May 28, 2008
- WSU Annual Report entitled "Annual Report on the Operation of the Washington State University TRIGA Reactor" for the periods from July 1, 2006 through June 30, 2007, dated August 13, 2007
- WSU Annual Report entitled "Annual Report on the Operation of the Washington State University TRIGA Reactor" for the periods from July 1, 2007 through June 30, 2008, dated August 22, 2007 (*sic*)
- WSU Nuclear Radiation Center Administrative Procedure, Section No. 1, entitled "Responsibilities and Authority of Reactor Operating Staff," (not dated)
- WSU Nuclear Radiation Center Standard Operating Procedure (SOP) No. 1, "Standard Procedure for Use of the Reactor," dated November 29, 2006
- WSU Nuclear Radiation Center SOP No. 4, "Standard Procedure for Startup, Operation, and Shutdown of the Reactor," dated September 30, 2005

b. Observations and Findings

Reactor operations were carried out following written procedures and in accordance with TS requirements. Information on the operational status of the facility was recorded in log books and on checklists as required by procedures and TS. Use of maintenance and repair logs satisfied procedural requirements. Operational problems and events noted in the operations log were reported, reviewed, and resolved as required by TS and administrative procedures. Scrams were identified in the logs and associated records, reported as required, and their cause(s) resolved before the resumption of operations under the authorization of an SRO.

The inspector verified that the date and log entries required to be made by the TS and procedure were logged and cross referenced with other logs and/or forms, as required, and that TS operational limits had not been exceeded. As noted above, shift staffing satisfied the minimum requirements for duty and on-call personnel.

c. Conclusions

The operational activities were found to be consistent with applicable TS and procedural requirements.

4. Experiments

a. Inspection Scope (IP 69001)

To verify compliance with the licensee's program for conducting experiments and irradiations as outlined in TS Sections 3.10 and 6.5.4 and in various procedures, the inspector reviewed selected aspects of:

- WSU Nuclear Radiation Center Irradiation Data Log sheets for the period from January 2009 to the present
- WSU Nuclear Radiation Center Reactor Operating Log (O.1) sheets from January 2009 to the present
- Experiment approvals documented on WSU Nuclear Radiation Center Form No. 2, entitled "Experiment Request Form," latest form revision dated December 1972, with the associated WSU Nuclear Radiation Center Form No. 4, entitled "Experiment Authorization Form," latest form revision dated August 1975
- Irradiation approvals documented on WSU Nuclear Radiation Center Form No. 1, entitled "Irradiation Request Form," (O.10) latest form revision dated April 15, 2003, with the associated WSU Nuclear Radiation Center Form No. 3, entitled "Irradiation Authorization Form," latest form revision dated September 2003

b. Observations and Findings

The licensee classified experiments as either being "operational" or "non-operational" experiments. Operational experiments were those which required reactor control manipulation to measure reactor parameters or characteristics. These were typically those experiments that included routine reactor operations and were covered by an SOP. Non-operational experiments were those which required the insertion of any apparatus, device, or material which was not a normal part of the core or experimental facilities into any of the facilities or in the beam line. These were generally those that were new or required special facilities or the modification of existing facilities. Operational experiments were usually approved by the Reactor Supervisor and the Facility Director after a review of the completed Experiment Request Form. Non-operational experiments were typically required to be reviewed and approved by the Reactor Safeguards Committee. It was noted that the experiments that were currently being conducted at the facility were classified as operational.

No new experiments or irradiation requests had been initiated, reviewed, or approved since the last inspection. The inspector verified that if a new experiment or irradiation were to be initiated, it would be reviewed and approved by the RSC and would be completed under the supervision of the Reactor Supervisor and in accordance with TS requirements.

The inspector reviewed the existing experiment and irradiation authorization documents, Irradiation Data Log sheets, and the Reactor Logbook, and interviewed staff members. The inspector verified that the approved experiments and irradiations that were completed were installed, constrained, conducted, and removed as required by the TS. The appropriate data was recorded and the radioactive material produced was handled and controlled as required.

c. Conclusions

The conduct and control of experiments and irradiations met the requirements specified in the TS, the experiment and irradiation authorizations, and applicable procedures.

5. Operator Licenses, Requalification, and Medical Activities

a. Inspection Scope (IP 69001)

The inspector reviewed the following in order to determine that operator training and requalification activities were conducted as required and that medical requirements were met:

- Biennial written examination records for 2007 through 2009
- Operator medical examination records from 2006 to the present
- Operator license status and effective dates of current operator licenses
- WSU NRC Reactor Staff Requalification Program, latest revision (Rev.) dated January 18, 2008
- Active duty status and Annual Reactor Operating Test results noted and maintained in the Requalification Schedule forms (A.3)
- Logs and records of reactivity manipulations maintained in the Quarterly RO/SRO Activity Report (O.15) Notebook and documented on forms entitled, "Quarterly Operational Hours for RO and SRO," latest form revision dated January 2000

b. Observations and Findings

As noted above, at the time of the inspection, there were two qualified SROs and five qualified ROs working at the facility. The inspector noted that all the licenses of the operators were current.

A review of the logs and records showed that the training and requalification program was being followed and that biennial written examinations had been completed as required. An annual operating test had been conducted for each operator by the Reactor Supervisor as required by the program as well. It was also verified that each operator had completed the required number of hours of reactor operations/reactivity manipulations each calendar quarter as required. Records of these reactor manipulations, other operational activities, and/or Reactor Supervisor activities were being maintained, as were records of the Annual Operations Tests. The program was up-to-date and training was current.

The inspector reviewed records documenting the completion of physical examinations for selected operators. It was noted that qualified operators were receiving biennial medical examinations as required.

c. Conclusions

The requalification and training program was up-to-date and acceptably maintained. A medical examination for each operator was being completed biennially as required.

6. Fuel Handling

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to ensure that the licensee was complying with TS Sections 4.4, 5.1, 5.2, and 6.9:

- Core Change Log (O.6)
- Core Reactivity Parameters Log (O.7)
- Fuel handling equipment and instrumentation
- Selected WSU Nuclear Radiation Center Reactor Log sheets from 2007 through the present
- WSU Special Nuclear Material Physical Inventory Log sheets from 2006 through the present
- WSU Nuclear Radiation Center Administrative Procedure, Section No. 9, entitled "Special Nuclear Material Accountability Plan," dated May 1989
- WSU Nuclear Radiation Center SOP No. 7, "Standard Procedure for Core Changes and Fuel Movement," dated March 6, 2008
- WSU Nuclear Radiation Center SOP No. 8, "Standard Procedure for Control Element Maintenance, Removal, and Replacement," dated February 17, 1995

b. Observations and Findings

Procedures for refueling, fuel movement, and TS required surveillances ensured controlled operations for Core 35-A, which was a mixed core of new 30/20 low-enriched uranium (LEU) fuel elements and standard 8.5/20 LEU fuel elements. A detailed plan for performing fuel movement was required to be developed prior to each fuel movement operation.

The inspector noted that the data recorded for fuel movements that had been conducted in the past were acceptable and were required to be cross referenced in the operations logs. Log entries, indicating fuel movements, were completed under the direct supervision of an SRO as required.

Through records review and interviews with licensee personnel, the inspector determined that various fuel movement operations had been conducted since the last NRC inspection in this area occurred at the facility in August 2007. The most significant fuel movement involved replacing all the previous high-enriched uranium (HEU) fuel elements at the facility with LEU elements and changing the core configuration from 34-A to 35-A in the September-October time period of 2008. The inspector verified that detailed plans had been completed for the core conversion activities as required. It was also noted that plans had been developed for HEU cluster disassembly and recent fuel element inspection

operations, as well as for instrumented fuel element modifications. All these plans had been reviewed and approved by the Facility Director as required.

c. Conclusions

The fuel handling activities and documentation were as required by facility TS and procedures.

7. Maintenance and Surveillance

a. Inspection Scope (IP 69001)

To verify compliance with TS Sections 3, 4, and 5, the inspector reviewed selected aspects of:

- Control Element Calibration Log (O.4)
- Control Element Inspection Log (O.5)
- Core Reactivity Parameters Log (O.7)
- Maintenance Log, Volume 1 (O.8), pages 105 - 116
- Preventative Maintenance Checklists (O.2) for 2008 and to date in 2009
- RSC meeting minutes for the past two years through the date of the inspection
- Power Calibration Log forms (also in O.2) for 2007 through the date of the inspection
- Monthly Console and Auxiliary Equipment Checklist Log (O.9) containing documentation of equipment maintenance as indicated on the WSU Nuclear Radiation Center Form No. 40, entitled "Console Auxiliary Equipment Maintenance Checklist," latest form revision dated September 2008
- WSU Nuclear Radiation Center Reactor Operating Log (O.1) sheets from January through August 2009
- WSU Annual Report entitled "Annual Report on the Operation of the Washington State University TRIGA Reactor" for the periods from July 1, 2006 through June 30, 2007, dated August 13, 2007
- WSU Annual Report entitled "Annual Report on the Operation of the Washington State University TRIGA Reactor" for the periods from July 1, 2007 through June 30, 2008, dated August 22, 2007 (*sic*)
- WSU Nuclear Radiation Center Administrative Procedure, Section No. 5, entitled "Surveillance Documentation Review," (not dated)
- WSU Nuclear Radiation Center Administrative Procedure, Section No. 6, entitled "Performance of Maintenance Activities," (not dated)
- WSU Nuclear Radiation Center SOP No. 5, "Standard Procedure for Performing Preventive Maintenance on the Reactor and Associated Equipment," dated February 9, 2006
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- WSU Nuclear Radiation Center SOP No. 8, "Standard Procedure for Control Element Maintenance, Removal, and Replacement," dated February 17, 1995
- WSU Nuclear Radiation Center SOP No. 13, "Standard Procedure for Performing Power Calibrations," dated March 6, 2008
- WSU Nuclear Radiation Center SOP No. 14, "Standard Procedure for Alignment of the Fuel Temperature System," dated November 29, 2006
- WSU Nuclear Radiation Center SOP No. 15, "Standard Procedure for Control Element Calibration," dated December 4, 2003
- WSU Nuclear Radiation Center SOP No. 23, "Standard Procedure for Pool Water Analysis," dated September 29, 2005
- WSU Nuclear Radiation Center SOP No. 31, "Standard Procedure for the Transfer of Non-Fuel Devices and Experimental Apparatus into and out of the Reactor Pool," dated September 29, 2005

b. Observations and Findings

(1) Maintenance

The Inspector noted that routine and preventive maintenance was controlled by, and documented in, the maintenance or reactor operations logs and the monthly Console Auxiliary Equipment Maintenance Checklists consistent with the TS and licensee procedures. Unscheduled maintenance or equipment repair was reviewed to determine if the work required a 50.59 evaluation. Verifications and operational systems checks were performed following completion of the maintenance to ensure system operability before the equipment was returned to service.

(2) Surveillance

The Inspector determined that the daily, weekly, monthly, semiannual, and other periodic checks, tests, and verifications for TS required Limiting Conditions for Operations (LCOs) were being completed as required. In addition, all surveillance and LCO verifications reviewed were completed on schedule as required by TS and in accordance with licensee procedures. Extensive checklists were used to track completion of the various required surveillances and LCO verifications. The checklists included the date the activity was completed and by whom. These checklists provided acceptable documentation of the results and proper control of reactor operational tests and surveillances. Some of the daily and periodic checks of equipment operability included recording system parameters such as temperature, pressure, and flow. All recorded results observed by the inspector were within prescribed TS and procedure parameters and in close agreement with the previous surveillance results.

c. Conclusions

The maintenance logs, records, performance, and reviews satisfied TS and procedure requirements. The program for tracking and completing surveillance

checks and LCO verifications satisfied TS requirements and licensee administrative controls.

8. Procedures

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify that the licensee was complying with the requirements of TS Sections 6.5.4 and 6.8:

- Selected administrative and standard operating procedures
- Related logs and records documenting procedure implementation
- Records documenting procedure changes and temporary changes
- Administrative controls as outlined in WSU Nuclear Radiation Center Administrative Procedure, Section No. 2, entitled "Standard Procedure for the Approval, Revision, and Review of Standard Operating Procedures," (not dated)

The inspector also observed the use and implementation of procedures by licensee personnel.

b. Observations and Findings

Procedures were available for those tasks and items required by the TS and facility directives. Written changes were reviewed and approved by the RSC as required. The SOPs were required to be reviewed biennially TS Section 6.5.4. While the last review was completed July 21, 2008, it was noted that the previous review had been completed August 25, 2005. The licensee was informed that the issue of conducting biennial reviews of the SOPs as required by the TS would be identified as an IFI and would be reviewed during a future inspection (IFI 2009-201-02).

Training of personnel on procedures and the applicable changes was acceptable. Through observation of reactor surveillance and maintenance operations, the inspector verified that personnel conducted TS activities in accordance with applicable procedures. Records showed that procedures for potential malfunctions (e.g., radioactive releases, contaminations, and reactor equipment problems) had been developed and were implemented as required.

c. Conclusions

The review, revision, and control of procedures by the licensee satisfied TS requirements.

9. Emergency Preparedness

a. Inspection Scope (IP 69001)

To ascertain whether the licensee was acceptably implementing the various aspects of their emergency preparedness program, the inspector reviewed selected aspects of:

- Emergency drills and exercises for the past two years
- Administrative Requirements Schedule Log (A.4) sheets
- Training records for licensee staff and support personnel
- Emergency response facilities, supplies, equipment, and instrumentation
- Offsite support as documented in the Letter of Agreement with the hospital
- WSU Nuclear Radiation Center Short Form Emergency Procedure, latest Rev. dated May 25, 2005
- WSU Nuclear Radiation Center SOP No. 6, "Standard Procedure in the Event of an Emergency Situation," dated July 21, 2008
- WSU Nuclear Radiation Center SOP No. 29, "Standard Procedure for Security and Emergency Plan Training for Nuclear Radiation Center, Radiation Safety Office, and Campus Police Personnel," dated May 17, 2005

b. Observations and Findings

The Emergency Plan (E-Plan) in use at the facility, entitled "Emergency Preparedness Plan for the Nuclear Radiation Center, Washington State University," was the same as the version most recently approved by the NRC and was dated June 19, 1994. The E-Plan was to be audited and reviewed biennially as required by TS Section 6.5.4. The inspector noted that the last review was completed July 21, 2008, but the previous review had been completed August 25, 2005. The licensee was informed that the issue of conducting biennial reviews of the Emergency Plan as required by the TS would be included with the IFI identified previously for biennial procedure review (see Section 8 of this report) and would be reviewed during a future inspection (IFI 2009-201-02).

It was noted that implementing procedures were reviewed and revised as needed. Emergency facilities, instrumentation, and equipment were being maintained and controlled, and supplies were being inventoried as required in the E-Plan. The inspector and a licensee representative conducted an inventory of one of the emergency kits in the facility to verify its contents were as stipulated in the E-Plan.

The Inspector determined through records review and through interviews with licensee personnel that emergency responders were knowledgeable of the proper actions to take in case of an emergency. The agreement with the Pullman Regional Hospital, which had been updated May 23, 2008, was being maintained in effect. Communications capabilities with the various campus, city, and county support groups were acceptable and off-site support for the facility was verified to be acceptable and in accordance with the E-Plan. The alarm system had been tested weekly and monthly as stipulated in the E-Plan.

In addition, the inspector determined that the emergency drills were being conducted as required by the E-Plan. The most recent drill, which had been conducted January 9, 2009, required the response of the facility emergency organization and simulated response from off-site support organizations. Critiques were written following the drills to document any strengths and weaknesses identified and to develop possible solutions to any problems noted.

The inspector, accompanied by the Reactor Supervisor, toured the Pullman Fire Station on August 26, 2009. During the tour the inspector spoke with Fire Department (FD) personnel about their response capabilities and their role of providing support services for the research reactor facility. The FD representatives stated that they had received needed training during preparations for previous drills and that continued participation in drills would provide ongoing valuable experience. The fire station was noted to be well equipped to handle fire emergencies and the personnel were knowledgeable of the correct actions to take in response to problems at the facility. The inspector noted that there was a good working relationship between FD personnel and licensee staff.

c. Conclusions

The emergency response program was conducted in accordance with the requirements stipulated in the Emergency Preparedness Plan.

10. 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 IFI and two Unresolved Items (URIs).

b. Observation and Findings

- (1) URI 50-027/2007-201-01 - Follow-up on the submittal of a change to the NRC to clarify the Requalification Program.

By letter dated July 6, 2007, the licensee informed the NRC that an SRO had not completed an annual operating test within the required 15 month timeframe allowed between operating examinations. As corrective action, the letter indicated that the facility had conducted training for all operators concerning the requirements contained in the Requalification Plan. The letter also indicated that, in the future, the licensee planned to schedule the operations exams such that all qualified operators would take the exam in the same month. It was thought that this would eliminate any confusion about when an operations exam was due. The licensee also indicated that this issue (the completion of the operations exams) would be added to the yearly administrative surveillance checklist. In addition, the letter also indicated that the licensee planned to change the Requalification Plan to clarify what steps to take when the 15 month interval between operations exams was not met

During an inspection of the facility by the NRC in August 2007, the inspector reviewed the problem and the corrective actions. The inspector verified that the operator in question had completed training on the Requalification Plan and had completed an operations exam as required. It was also noted that the completion of the operations exams had been added to the yearly administrative surveillance checklist (in February of each year). However, it was noted that no change to the Requalification Plan had been submitted to the NRC for approval. This was designated as an URI.

The inspector reviewed this issue again during this inspection. It was noted that the licensee had submitted a letter to the NRC dated January 17, 2008, stipulating specific actions that would be required if an operator did not meet the 15 month interval between operating exams. However, following the review, the inspector found no record of this correspondence from the licensee in the NRC's document systems (Agencywide Document Access and Management System (ADAMS)). Consequently the licensee drafted a new letter, which was submitted to the NRC on August 26, 2009, explaining what had happened and transmitting the original letter for NRC review.

Because the licensee had completed their corrective actions as outlined, this issue is considered closed.

- (2) URI 50-027/2007-201-02 - Follow-up on corrective actions to be taken in response to failure to follow procedure for reactor power calibration following fuel movement associated with the transient pulse rod inspections.

By letter dated August 8, 2007, the licensee informed the NRC of an observed inadequacy in the implementation of administrative or procedural controls as required by TS Section 6.10(3)(d). The report outlined the circumstances surrounding an apparent failure to follow procedure.

WSU Nuclear Radiation Center SOP No. 8, "Standard Procedure for Control Element Maintenance, Removal, and Replacement," required in Section B.1.b that, for control element drive removal and replacement, the reactor shall be maintained subcritical by least \$5.00 throughout the operation without xenon, assuming that any experiment installed in the reactor may be removed. WSU Nuclear Radiation Center SOP No. 13, "Reactor Power Calibrations," required in Section A that a reactor power calibration be performed immediately following any fuel movement into, out of, or between core positions other than after the removal and reinstallation of a single fuel cluster, provided the same fuel cluster was returned to its identical position in the reactor core. The reactor was not to be operated at any power level for any reason other than calibration operations until the power calibration was completed.

On Monday, July 30, 2007, staff members at the facility removed three fuel bundles from the reactor and transferred them to storage racks within the pool. The fuel was moved in preparation for the removal and inspection of the transient pulse rod. Removal of the three bundles rendered the core subcritical by at least \$5.00 with the rod removed as required by SOP No. 8. (Prior to September 2003 there was no need to remove more than a single fuel bundle to achieve the \$5.00 subcritical margin that SOP No. 8 required to perform the transient pulse rod inspection. However, reconfiguration of the core from 33X to 34A in September 2003 initiated the need to remove three fuel bundles to meet procedural requirements.)

Following the transient pulse rod inspection, the rod was reinstalled and it was verified that the transient pulse rod system functioned properly. The three fuel bundles that had been removed were then replaced in the core in the same grid positions and same orientations that the bundles were in prior to removal. The reactor was returned to normal operations. Subsequently, the licensee noted the requirement in SOP No. 13 that required a reactor power calibration following any fuel movement into, out of, or between core positions.

Upon reviewing this problem, the licensee noted that three fuel bundles had been removed from the core and subsequently replaced in their original grid positions during each of the last four transient pulse rod inspections in calendar years 2004, 2005, 2006, and including 2007. Power calibrations were not performed after these fuel movements. Further investigation indicated that, following the core change from 33X to 34A in September 2003, SOP No. 13 was not updated to integrate the changed requirements for fuel movement to allow compliance with SOP No. 8 without a reactor power calibration. The licensee also determined that there was no indication that the reactor performance had been affected by the fuel movements that were performed as part of the requirement for transient pulse rod inspection. All subsequent routine power calibrations indicated normal core operational parameters. Also, all other core parameters have indicated normal behavior subsequent to the transient pulse rod inspections.

As corrective actions to prevent recurrence, the licensee planned to change SOP No. 13, and SOP No. 7, "Standard Procedure for Core Changes and Fuel Movement," to more fully describe the power calibration requirements and to direct the staff to perform a power calibration after significant fuel movement. According to the proposed change, a power calibration would not be required following the movement of three fuel bundles, associated with the transient pulse rod inspections, under specific conditions. The change was to be reviewed and approved by the RSC during the next scheduled meeting. Also, once the procedures changes were approved, the licensee planned to provide training for all the operators.

During an inspection in 2007, the inspector had reviewed the licensee's report of the event, the investigation, and the planned corrective actions taken. It was noted that the review and investigation appeared to be adequate. However, it was also noted that the proposed procedural changes had not been reviewed and approved by the RSC at that time and the training for all operators had not been completed. The licensee was informed that, since all the anticipated corrective actions had not been completed, this issue would be considered as an URI and would be reviewed during a future inspection.

During this inspection, it was noted that the licensee had revised Procedures 7 and 13 and the revisions were submitted to the RSC for review. A review of the minutes of the RSC meeting held March 6, 2008, indicated that the procedures had been reviewed and approved by that committee as required. It was also noted that training had been conducted for all operators on the procedure revisions.

Because the licensee had completed the revisions and training as they committed, this issue is considered closed.

- (3) IFI 50-027/2007-201-03 - Follow-up on the licensee's actions to correct apparent inconsistencies between SOP No. 6 and the Emergency Plan.

During an inspection in August 2007, the inspector reviewed WSU Nuclear Radiation Center SOP No. 6, "Standard Procedure in the Event of an Emergency Situation," and compared the wording and requirements listed therein with the licensee's Emergency Plan. It was noted that the wording of escalating events from Safety Event -- Class 0 (Non-Reactor Related) to Unusual Event -- Class 1 (Reactor Related) to Alert -- Class 2 (Reactor Related), left room for interpretation as an event elevated from one classification to another. Also, the wording used to describe events in SOP No.6 (Safety Event -- Class 0 (Non-Reactor Related, etc.)), differed from the wording used in the Emergency Plan in the Emergency Classification System and in the Emergency Action Level descriptions. These differences could lead to differing interpretations on how to classify an event at the facility.

When this was discussed with the licensee, they acknowledged the apparent discrepancies and indicated that they would attempt to correct the situation but that, with the limited staff at that time, reactor operations and reactor operator training had to take precedence.

During this inspection, it was noted that the licensee had changed SOP No. 6 so that the wording was generally the same as that of the Emergency Plan. Nevertheless, there were still some differences in the two documents that could possibly lead to different interpretations on how to classify an event.

Because the licensee had made an effort to revise SOP No. 6, this issue is considered closed. However, the licensee was informed that the issue

of correcting the differences between the Emergency Plan and SOP No. 6 would be identified as an IFI and would be reviewed during a future inspection (IFI 2009-201-03).

c. Conclusions

Two URIs and One IFI identified during a previous inspection were closed. One IFI was opened.

11. Exit Interview

The inspection scope and results were summarized on August 27, 2009, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. The licensee did not identify as proprietary any of the materials reviewed by the inspector although some of the material was designated as Safeguards Information. No dissenting comments were received from the licensee and no safeguards information is contained in this report.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

H. Grimes	Vice President for Research and Dean of the Graduate School
C. Hines	Reactor Supervisor
M. King	Reactor Technician and Reactor Operator
K. Marley	Engineering Technician and Reactor Operator
D. Wall	Director, Nuclear Radiation Center

Other Personnel

M. Heston	Operations Officer, Pullman City Fire Department
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INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors
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ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-027/2009-201-01	IFI	Follow-up on the issue of holding the required RSC and/or subcommittee meetings every year as required by TS Section 6.5.3.
50-027/2009-201-02	IFI	Follow-up on the licensee's actions to conduct reviews of the SOPs and the Emergency Plan every two years as required by the TS Section 6.5.4.
50-027/2009-201-03	IFI	Follow-up on the licensee's actions to correct the differences between the Emergency Plan and SOP No. 6.

Closed

50-027/2007-201-01	URI	Follow-up on the submittal of a change to the NRC to clarify the Requalification Program.
50-027/2007-201-02	URI	Follow-up on corrective actions to be taken in response to failure to follow procedure for reactor power calibration following fuel movement associated with the transient pulse rod inspections.
50-027/2007-201-03	IFI	Follow-up on the licensee's actions to correct apparent inconsistencies between SOP No. 6 and the Emergency Plan.

PARTIAL LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
CFR	Code of Federal Regulations
E-Plan	Emergency Plan
FD	Fire Department
HEU	High-enriched uranium
IFI	Inspector Follow-up Item
IP	Inspection Procedure
LCO	Limiting Conditions for Operation
LEU	Low-enriched uranium
MW	megawatt
No.	Number
NRC	Nuclear Regulatory Commission
Rev.	Revision
RO	Reactor Operator
RSC	Reactor Safeguards Committee
SOP	Standard Operating Procedure
SRO	Senior Reactor Operator
TS	Technical Specifications
URI	Unresolved Item
WSU	Washington State University