

June 28, 2004

Dr. James N. Petersen
Vice Provost for Research
Washington State University
Pullman, WA 99164-1030

SUBJECT: NRC INSPECTION REPORT NO. 50-027/2004-201 AND NOTICE OF VIOLATION

Dear Dr. Petersen:

This refers to the inspection conducted on June 7-10, 2004, at your Washington State University TRIGA research reactor in the Nuclear Radiation Center. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, the NRC has identified two violations of NRC requirements. These violations are cited in the enclosed Notice of Violation (Notice). The circumstances surrounding them are described in detail in the subject inspection report. The violations are of concern because they should have been identified by your own review of the documents involved.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response in accordance with its policies to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/reading-rm/adams.html>.

Should you have any questions concerning this inspection, please contact Craig Bassett at (404) 562-4712.

Sincerely,

/RA/

James E. Lyons, Program Director
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-027
License No. R-76

Enclosures: 1. Notice of Violation
2. NRC Inspection Report No. 50-027/2004-201

cc w/enclosure: Please see next page

Washington State University

Docket No. 50-27

cc:

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

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NOTICE OF VIOLATION

Washington State University
Nuclear Radiation Center

Docket No. 50-027
License No. R-76

During an NRC inspection conducted on June 7-10, 2004, two violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violations are listed below:

- A. 10 CFR Part 71.5(a) requires that each licensee, who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the Department of Transportation (DOT) regulations in 49 CFR Parts 170 through 189 appropriate to the mode of transport.

49 CFR Part 172.203(d)(6) requires that the description for a shipment of a Class 7 (radioactive) material must include, on the shipping papers, the transport index assigned to each package in the shipment bearing Radioactive Yellow II or Radioactive Yellow III labels. (49 CFR 173.403 defines Transport Index [TI] as the dimensionless number (rounded up to the next tenth) placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation.)

Contrary to the above, during the period from June 2002 to June 2004, no Transport Index was listed on the shipping papers of 28 shipments of packages of radioactive material bearing Yellow II labels made to various recipients.

This is a Severity Level IV violation (Supplement V).

- B. 10 CFR Part 71.5(a) requires that each licensee, who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 170 through 189 appropriate to the mode of transport.

49 CFR Part 172.403(b) specifies that the proper label to affix to a package of Class 7 (radioactive) material is based on the radiation level at the surface of the package and the Transport Index (TI). Also, the label to be applied must be the highest category required for any of the two determining conditions for the package. 49 CFR Part 172.403(c) requires that the category of label to be applied to radioactive material packages be Radioactive Yellow II if the TI is greater than 0 but not more than 1, or if the maximum radiation level at any point of the external surface is greater than 0.5 millirem per hour (mrem/hr) but less than or equal to 50 mrem/hr. (Footnote 2 to Paragraph (c) states that, if the measured TI is not greater than 0.05, the value may be considered to be zero. Also, 49 CFR 173.403 defines TI as the dimensionless number (rounded up to the next tenth) placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. For nonfissile material packages, the number is the maximum radiation level from the external surface of the package in millirem per hour at one meter.)

Contrary to the above, during the period from June 2002 to June 2004, 12 shipments were classified as White I instead of Yellow II even though the radiation levels measured at one meter from the surface of the packages being shipped read 0.06 millirem per hour or above, indicating a TI of 0.1 or greater, using the "rounded up to the next tenth" rule. This resulted in packages being shipped without the proper label attached and without the appropriate TI being designated.

This is a Severity Level IV violation (Supplement V).

Pursuant to the provisions of 10 CFR 2.201, Washington State University is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with a copy to the responsible inspector, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/reading-rm/adams.html>. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated at Rockville, Maryland
this day of

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

Docket No: 50-027

License No: R-76

Report No: 50-027/2004-201

Licensee: Washington State University

Facility: Nuclear Radiation Center

Location: Pullman, WA

Dates: June 7-10, 2004

Inspector: Craig Bassett

Approved by: James E. Lyons, Program Director
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Washington State University
Nuclear Radiation Center
Report No.: 50-027/2004-201

The primary focus of this routine, announced inspection included onsite review of selected aspects of the licensee's Class II research reactor safety programs including: organizational structure and staffing, design control and review and audit functions, procedures, radiation protection, environmental protection, and transportation of radioactive materials since the last NRC inspection of these areas. The licensee's programs were acceptably directed toward the protection of public health and safety, however, two apparent violations were noted in the area of transportation.

Organizational Structure and Staffing

- The organizational structure and responsibilities were consistent with Technical Specification Section 6 requirements.

Review and Audit and Design Control Functions

- The review and audit program was being conducted acceptably by the Reactor Safeguards Committee.
- The latest change completed by the licensee was reviewed using the criteria specified in 10 CFR 50.59, determined to be acceptable, and approved as required.

Procedures

- Facility procedural review, revision, control, and implementation satisfied Technical Specification requirements.

Radiation Protection Program

- Surveys were being completed and documented acceptably to permit evaluation of the radiation hazards present.
- Postings met the regulatory requirements specified in 10 CFR Parts 19 and 20.
- Personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels and NRC's regulatory limits.
- Radiation monitoring equipment was being maintained and calibrated as required.
- Acceptable radiation protection training was being provided to staff personnel.
- The Radiation Protection Program being implemented by the licensee satisfied regulatory requirements.

Effluent and Environmental Monitoring

- Effluent monitoring satisfied license and regulatory requirements.
- Releases were within the specified regulatory and Technical Specification limits.

Transportation of Radioactive Materials

- Two apparent violations were noted: failure to properly complete shipping papers and failure to affix the proper labels to packages during the review of radioactive material shipments made by the licensee.

REPORT DETAILS

Summary of Plant Status

Washington State University's one megawatt research and test reactor continued to be operated in support of irradiation work for various organizations, operator training, surveillance, and experiments involving Boron Neutron Capture Therapy (BNCT). During the inspection, the reactor was started up, operated, and shut down as required and in accordance with applicable procedures to support these ongoing 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 No. 18, dated April 26, 2002, were being met:

- Washington State University (WSU) Nuclear Radiation Center organizational structure and staffing
- staff qualifications
- management responsibilities
- WSU Nuclear Radiation Center Administrative Procedure Number (No.) 1, "Responsibilities and Authority of Reactor Operating Staff," (not dated)

b. Observations and Findings

The Nuclear Radiation Center organizational structure and the responsibilities of the reactor staff had not changed since the last inspection. However staffing levels had changed and licensed reactor staff consisted of the Director, Nuclear Radiation Center, the Reactor Supervisor, and a Reactor Technician. All of these individuals were Senior Reactor Operators (SROs). Another person, working at the facility, was also an SRO but was actually funded by another program. Although the staff was of limited size, the organizational structure and staffing at the facility were as required by TS. Qualifications of the staff met TS requirements. Review of records verified that management responsibilities were administered as required by TS and applicable procedures.

c. Conclusions

The organizational structure and functions were consistent with TS Section 6 requirements.

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 Sections 6.5.4 and 6.5.5 and to verify compliance with 10 CFR 50.59, the inspector reviewed selected aspects of:

- Reactor Safeguards Committee (RSC) meeting minutes for 2003 through 2004 to date
- RSC Facility Records Quarterly Audits for 2003 through 2004 to date documenting reviews of operations records, summary records, and administrative records
- safety review records for the past two years
- responses to the safety reviews and audits
- the most recent facility design change concerning upgrade of reactor power monitoring channels
- facility configuration
- WSU Nuclear Radiation Center Administrative Procedure No. 3, "Approval and Review of Facility Modifications and Special Tests or Experiments," (not dated)

b. Observations and Findings

(1) Review and Audit Functions

The inspector verified that RSC membership satisfied TS requirements and that the RSC had quarterly meetings as required. 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.

Since the last inspection all required audits of reactor facility activities and reviews of programs, procedures, equipment changes, and proposed tests or experiments, had been completed and documented. Additionally, the annual review of the Radiation Protection Program and the biennial reviews of the emergency and security plans had been conducted and acceptably documented.

(2) Design Change

Records and observations showed that changes made during 2003 and to date at the facility 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 modification completed since the last inspection involved replacing the facility pendulum-style seismometer with a new three-axis digital seismometer. The licensee's facility modification procedure was followed and an evaluation was completed as required. The licensee considered the criteria included in the revised 10 CFR 50.59 and concluded that the change was an acceptable change under the regulations. Although not required by procedure, a review by the RSC was requested and conducted, and the RSC approved the change. The change, review, and approval appeared to be acceptable.

c. Conclusions

The review and audit program was being conducted acceptably by the Reactor Safeguards Committee. The latest change completed by the licensee was reviewed

using the criteria specified in 10 CFR 50.59, determined to be acceptable, and approved as required.

3. 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:

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

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 Standard Operating Procedures (SOPs) were reviewed biennially as required by TS Section 6.5.4 with the last review being completed December 2, 2003.

Training of personnel on procedures and the applicable changes was acceptable. Through observation of reactor operations and experiment handling, 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

Procedural review, revision, control, and implementation satisfied TS requirements.

4. Radiation Protection Program

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with 10 CFR Parts 19 and 20, TS Sections 3.7, 5.4, and 6.8, and procedural requirements:

- radiation and contamination survey records documented on the appropriate forms in accordance with WSU Nuclear Radiation Center SOP No. 10
- Nuclear Radiation Center dosimetry records for 2002 through the first three months of 2004
- calibration and periodic check records for radiation monitoring instruments documented on the applicable forms

- Preventative Maintenance Checklists for 2003 and 2004
- Radiation Monitor Calibration Schedule Forms for 2003 and 2004
- Radiac Calibration Forms for specific instruments
- WSU Nuclear Radiation Center SOP No. 10, "Standard Procedure for Health Physics Surveys," last revised August 18, 1999
- WSU Nuclear Radiation Center SOP No. 17, "Standard Procedure for Checkout and Calibration of the Area Radiation Monitors," last revised December 4, 2003
- WSU Nuclear Radiation Center SOP No. 23, "Standard Procedure for Portable Survey Instrumentation Check and Calibration," last revised December 4, 2003
- WSU Nuclear Radiation Center SOP No. 27, "Standard Procedure for RM-14 Check and Calibration," last revised December 4, 2003
- WSU Nuclear Radiation Center Administrative Procedure, "Radiation Protection Program" last reviewed August 2001
- Washington State University Radiation Protection Program Manual dated March 15, 1994
- ALARA Policy as outlined the "Radiation Protection Program"

The inspector also toured the facility to note any changes that may have been made and observed the use of dosimetry and radiation monitoring equipment. Licensee personnel were interviewed and radiological signs and postings were observed as well.

b. Observations and Findings

(1) Surveys

The inspector reviewed weekly general area radiation and contamination surveys and semiannual neutron surveys of the Pool Room and the Beam Room from 2003 to date. The surveys had been completed by licensee personnel as required by WSU Nuclear Radiation Center SOP No. 10. The results were documented on the appropriate forms and evaluated as required, and corrective actions taken when readings or results exceeded set action levels.

During the inspection, the inspector conducted a radiation survey of the Pool Room, the Heat Exchanger/Pump Room, Radiochemistry Laboratory, and Computer/Analyzer Room, and compared the readings detected with those found by the licensee. The results were comparable and no anomalies were noted.

(2) Postings and Notices

The inspector reviewed the postings at the entrances to various controlled areas including the Control Room, the Pool Room, the Beam Room, and various laboratories in the Nuclear Radiation Center. The postings were acceptable and indicated the radiation and contamination hazards present. Other postings also showed the industrial hygiene hazards present in the areas. The facility's radioactive material storage areas were noted to be properly posted. No unmarked radioactive material was detected in the facility. Copies of current notices to workers required by 10 CFR Part 19 were posted on various bulletin boards throughout the facility including one in the stairway leading to the Control Room and one in the Conference Room as well.

(3) Dosimetry

The licensee used a National Voluntary Laboratory Accreditation Program accredited vendor (Landauer) to process the optically stimulated luminescence (OSL) whole body dosimeters and extremity thermoluminescent dosimeters (TLDs) supplied to staff personnel. Through direct observation, the inspector determined that dosimetry was acceptably used by facility personnel and exit frisking practices were in accordance with radiation protection requirements.

An examination of the records for the past two years, through March 2004, showed that all whole body exposures were within NRC limits and within licensee action levels. Extremity monitoring, accomplished through the use of finger ring TLDs, also generally showed low doses to the hands of staff members. The highest annual whole body exposure received by a single individual for 2002 was 56 millirem deep dose equivalent (DDE). The highest annual extremity exposure for 2002 was 70 millirem shallow dose equivalent (SDE). The highest annual whole body exposure received by a single individual in 2003 was 78 millirem DDE. The highest annual extremity exposure for 2003 was 310 millirem SDE.

(4) Radiation Monitoring Equipment

The calibration of portable survey meters, friskers, fixed radiation detectors, and air monitoring instruments were typically completed by licensee personnel. The calibration records of selected portable survey meters, friskers, fixed radiation detectors, and air monitoring equipment in use at the facility were reviewed. Calibrations were completed according to the procedure given in the manufacturer's technical manual using NIST traceable calibration sources. Calibration frequency met the requirements established in the applicable manuals and records were being maintained as required.

(5) Radiation Protection Program

The licensee's Radiation Protection Program was established in the WSU Nuclear Radiation Center Administrative Procedure of the same name dated August 2001. The program was further explained in the campus document entitled, "WSU Radiation Protection Program Manual," dated March 15, 1994. The program required that all personnel who had unescorted access to work in a radiation area or with radioactive material receive training in radiation protection, policies, procedures, requirements, and facilities prior to entry. As noted previously, the program was being reviewed annually as required.

(6) ALARA Policy

The ALARA Policy was also outlined and established in the WSU Nuclear Radiation Center Administrative Procedure, "Radiation Protection Program." The ALARA program provided guidance for keeping doses as low as reasonably achievable and was consistent with the guidance in 10 CFR Part 20.

(7) Radiation Protection Training

The inspector reviewed documentation of the training given to new employees by the WSU Radiation Safety Office entitled, "Radiation Safety Course." The content of the course given was acceptable and the training program generally satisfied requirements in 10 CFR 19.12.

(8) Facility Tours

The inspector toured the Control Room, Pool Room, Heat Exchanger/Pump Room, Beam Room, and selected support laboratories and offices. Control of radioactive material and control of access to radiation and high radiation areas were acceptable. As noted earlier, the postings and signs for these areas were appropriate.

c. Conclusions

The inspector determined that the Radiation Protection Program being implemented by the licensee satisfied regulatory requirements because: 1) surveys were being completed and documented acceptably; 2) postings met regulatory requirements; 3) personnel dosimetry was being worn as required and doses were well within the NRC's regulatory limits; 4) radiation monitoring equipment was being maintained and calibrated as required; and, 5) acceptable radiation protection training was being provided.

5. Effluent and Environmental Monitoring

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with the requirements of 10 CFR Part 20 and TS Sections 3.7-3.9, 3.12, 5.6, and 6.10:

- airborne release records documented in the Average Monthly Concentration of Ar-41 Released section of the Reactor Operations Summary Log for the period from 2002 to the present
- liquid release records also documented in the Reactor Operations Summary Log and calculated on the appropriate forms in the Liquid Waste Tank Release Data Log for the period from 2002 to date in 2004
- Radiation Monitor Calibration Schedule Forms for 2003 and 2004
- licensee Annual Reports for reporting periods: July 2001 - June 2002, and July 2002 - June 2003
- WSU Nuclear Radiation Center SOP No. 11, "Standard Procedure for Analysis of Liquid Waste Samples," last revised December 4, 2003
- WSU Nuclear Radiation Center SOP No. 18, "Standard Procedure for Ar-41 Monitor Checkout and Calibration," last revised December 4, 2003
- WSU Nuclear Radiation Center SOP No. 21, "Standard Procedure for Environmental Monitoring," last revised December 4, 2003
- WSU Nuclear Radiation Center SOP No. 22, "Standard Procedure for TLD Environmental Monitoring Program," last revised December 4, 2003

- WSU Nuclear Radiation Center SOP No. 26, "Standard Procedure for Continuous Air Monitor Check and Calibration," last revised December 4, 2003
- WSU Nuclear Radiation Center SOP No. 29, "Standard Procedure for Continuous Air Monitor Filter Analysis," last revised December 4, 2003

b. Observation and Findings

The inspector reviewed the calibration records of the area and stack monitoring systems. These systems had been calibrated annually according to procedure. The weekly setpoint verification records for the monitoring equipment were also reviewed. Corrective actions, including recalibration, were completed if the setpoint values were exceeded.

The inspector also reviewed the records documenting liquid and airborne releases to the environment for the past two years. The inspector determined that gaseous release activity continued to be calculated as required by procedure and the results were adequately documented. The releases were determined to be within the annual dose constraints of 10 CFR 20.1101 (d), 10 CFR Part 20 Appendix B concentrations, and TS limits. Liquid release activity was calculated as required and releases were approved by the Reactor Supervisor or an SRO after analyses indicated that they met regulatory requirements for discharge into the sanitary sewer.

On-site and off-site gamma radiation monitoring was completed using environmental TLDs in accordance with the applicable procedures. The data indicated that there were no measurable doses above any regulatory limits. These results and those above were acceptably reported in the Reactor Operations Annual Report for 2002 and 2003. Through observation of the facility, the inspector did not identify any new potential release paths.

c. Conclusions

Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.

6. **Transportation**

a. Inspection Scope (IP 86740)

The inspector reviewed the following to verify compliance with procedural requirements for transferring licensed material:

- records of radioactive material shipments for June 2002 and to date in 2004
- WSU Nuclear Radiation Center SOP No. 33, "Standard Procedure for Off-Site Shipment of Radioactive Material," last revised October 30, 1995
- WSU Nuclear Radiation Center SOP No. 35, "Standard Procedure for Receiving and Opening Packages Containing Licensed Materials," last revised December 4, 2003

b. Observations and Findings

(1) General Shipping Results

Through records review and discussions with licensee personnel, the inspector determined that the licensee had shipped various types of radioactive material since the previous inspection in this area. The records indicated that the radioisotope types and quantities were calculated and dose rates measured as required. All radioactive material shipment records reviewed by the inspector had been completed in accordance with Department of Transportation and NRC requirements except as noted in the two paragraphs below.

(2) Licensee-Generated Shipping Papers

10 CFR Part 71.5(a) requires that each licensee, who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the Department of Transportation (DOT) regulations in 49 CFR Parts 170 through 189 appropriate to the mode of transport.

49 CFR Part 172.203(d)(6) requires that the description for a shipment of a Class 7 (radioactive) material must include, on the shipping papers, the transport index assigned to each package in the shipment bearing Radioactive Yellow II or Radioactive Yellow III labels. (49 CFR 173.403 defines Transport Index [TI] as the dimensionless number [rounded up to the next tenth] placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation.)

In reviewing the shipping papers prepared by the licensee for the period from June 2002 to the present, the inspector noted certain discrepancies with the shipping papers prepared for various shipments of packaged radioactive material labeled as Radioactive Yellow II. On various occasions, when the licensee had prepared shipping papers for specific individuals and had not used a common carrier, such as FedEx for example, the shipping papers did not contain all the required information. (In those instances when a common carrier was used, the licensee generated additional shipping papers, usually as required by the carrier.) When the licensee used only the internally generated documents as the formal shipping papers used to accompany the shipment, no TI was listed. A one meter radiation level reading, listed in millirem per hour (mrem/hr), was entered on the shipping papers but nothing was listed indicating the TI and no dimensionless number was given.

The following instances were noted. The shipping papers documenting shipments of radioactive material labeled as Yellow II to R. Donelick did not include a TI for shipments made on: June 4, 2002, September 26, 2002, December 11, 2002, January 15 and 21, 2003, February 10, 2003, March 20, 2003, April 16 and 24, 2003, May 1, 2003, June 12, 2003, December 18 and 22, 2003, January 16, 2004, March 18, 2004, April 13, 15, and 20, 2004, May 17, 2004, and June 10, 2004. The shipping papers documenting shipments of radioactive material labeled as Yellow II to Kiddy and/or Cartwright did not include a TI for shipments made on: December 18, 2002, January 2, 17, and 30, 2003, and March 4 and 11, 2003. The

shipping papers documenting a shipment of radioactive material labeled as Yellow II to C. W. Thomas did not include a TI for the shipment made on December 23, 2002. The shipping papers documenting a shipment of radioactive material labeled as Yellow II to J. Kimerling did not include a TI for the shipment made on March 12, 2004.

The licensee was informed that failure include the applicable TI on the shipping papers involving shipments of radioactive material labeled as Yellow II was an apparent violation of 49 CFR 172.203(d)(6) (VIO 50-027/2004-201-01).

(3) White I versus Yellow II Designated Shipments

10 CFR Part 71.5(a) requires that each licensee, who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 170 through 189 appropriate to the mode of transport.

49 CFR Part 172.403(b) specifies that the proper label to affix to a package of Class 7 (radioactive) material is based on the radiation level at the surface of the package and the TI. Also, the label to be applied must be the highest category required for any of the two determining conditions for the package. 49 CFR Part 172.403(c) requires that the category of label to be applied to radioactive material packages be Radioactive Yellow II if the TI is greater than 0 but not more than 1, or if the maximum radiation level at any point of the external surface is greater than 0.5 mrem/hr but less than or equal to 50 mrem/hr. Footnote 2 to Paragraph (c) states that, if the measured TI is not greater than 0.05, the value may be considered to be zero. Also, 49 CFR 173.403 defines TI as the dimensionless number [rounded up to the next tenth] placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. For nonfissile material packages, the number is the maximum radiation level from the external surface of the package in millirem per hour at one meter.

In reviewing the shipping papers prepared by the licensee for the period from June 2002 to the present, the inspector also noted various discrepancies when certain packages of radioactive material were shipped and a White I label was applied to the package. On various occasions radiation readings, taken one meter from the external surface of the radioactive material package being shipped, yielded results of 0.06 mrem/hr or greater. This would have yielded a TI of 0.1, using the "rounded up to the next tenth" rule stated in 49 CFR 173.403 and with a TI of 0.1 or greater a Yellow II label for the package as stipulated by 49 CFR 172.403 would be required .

The following discrepancies were noted. On September 10, 2002, a package, with a maximum radiation level of 0.06 mrem/hr one meter from the external surface of the package, was shipped as White I. On November 4, 2002, a package, with a maximum radiation level of 0.06 mrem/hr one meter from the external surface of the package, was shipped as White I. On December 5, 2002, a package, with a maximum radiation level of 0.06 mrem/hr one meter from the external surface of the package, was shipped as White I. On January 7, 2003, a package, with a maximum radiation level of 0.06 mrem/hr one meter from the external surface of

the package, was shipped as White I. On January 13, 2003, a package, with a maximum radiation level of 0.1 mrem/hr one meter from the external surface of the package, was shipped as White I. On January 15, 2003, a package, with a maximum radiation level of 0.08 mrem/hr one meter from the external surface of the package, was shipped as White I. On January 28, 2003, a package, with a maximum radiation level of 0.2 mrem/hr one meter from the external surface of the package, was shipped as White I. On July 30, 2003, a package, with a maximum radiation level of 0.08 mrem/hr one meter from the external surface of the package, was shipped as White I. On October 7, 2003, a package, with a maximum radiation level of 0.08 mrem/hr one meter from the external surface of the package, was shipped as White I. On October 17, 2003, a package, with a maximum radiation level of 0.06 mrem/hr one meter from the external surface of the package, was shipped as White I. On October 24, 2003, a package, with a maximum radiation level of 0.07 mrem/hr one meter from the external surface of the package, was shipped as White I. On March 9, 2004, a package, with a maximum radiation level of 0.06 mrem/hr one meter from the external surface of the package, was shipped as White I. As indicated above, in each instance, except for the shipment on January 28, 2003, this would have yielded a TI of 0.1, using the "rounded up to the next tenth" rule. The shipment on January 28, 2003, would require a TI of 0.2. Also, a TI of 0.1 or greater would then require a Yellow II label for the package as stipulated by 49 CFR 172.403. Therefore, the packages listed above were shipped without the proper label attached and without the appropriate TI being designated.

The licensee was informed that failure to assign the appropriate Transport Index to packages of radioactive material with radiation level readings of 0.06 mrem/hr or greater at 1 meter and failure to designate the shipments as Yellow II and to affix the proper label to packages of radioactive material based on the TI (which was the highest category required) was an apparent violation of 49 CFR 172.403(b) (VIO 50-027/2004-201-02).

c. Conclusions

Two apparent violations were noted during the review of radioactive material shipments made by the licensee for failure to properly complete shipping papers by not listing the appropriate TI and failure to assign the appropriate TI and affix the proper labels to packages.

7. Follow-up on Previously Identified Issues

a. Inspection Scope

The inspector reviewed the actions taken by the licensee following identification of an Inspector Follow-up Item, two violations, and a deviation during previous inspections in May of 2002 and May of 2003, and documented in NRC Inspection Report Nos. 50-027/2002-201 and 50-027/2003-201, dated May 30, 2002, and May 29, 2003, respectively.

b. Observations and Findings

- (1) IFI 50-027/2002-201-02 - Follow-up on the clarification of the last step in the Reactor Startup Checkout.

During a previous inspection, the inspector had reviewed a report sent to the NRC by the licensee. The report detailed a licensee-identified monitoring failure that occurred during the month of June 2000. Due to a personnel error, monthly monitoring of the reactor pool water was not performed in June. The oversight was detected July 31, 2000, at which time a pool water sample was obtained and analyzed. The water sample showed no abnormal radionuclide levels. One of the licensee's corrective actions was to add an item to the Reactor Startup Checkout to ensure that all operations, i.e., all required surveillances, are completed before reactor operation. During a subsequent inspection it was noted that an item had been added to the Checkout sheet but it was unclear as to what it directed the operators to do.

The inspector again reviewed this issue during this inspection and found that the licensee had clarified the step in the checkout. NRC Form No. 34, "WSU Reactor Start-Up Checkoff," last revised August 5, 2003, had been revised in Section X.D.1, entitled, "Surveillance," to required that all appropriate maintenance was complete prior to reactor start-up. This clarified the meaning of this step in the checkout. This issue is considered closed.

- (2) VIO 50-027/2003-201-01 - Failure to conduct training for Pullman Memorial Hospital emergency room personnel in radiation safety and WSU Nuclear Radiation Center emergency procedures as required by the Emergency Plan.

During an inspection in May 2003, it was noted that during 2001, 2002, and until May 2003, no training had been provided for Pullman Memorial Hospital emergency room personnel in radiation safety and WSU Nuclear Radiation Center emergency procedures as required.

During this inspection, the inspector verified that training had subsequently been provided to hospital emergency room personnel. It was also noted that, just prior to the most recent drill, held June 4, 2004, the licensee conducted training for hospital and ambulance personnel so that the lessons being taught would be reinforced during conduct of the drill. This issue is considered closed.

- (3) VIO 50-027/2003-201-02 - Failure to provide the hospital with a copy of the WSU Nuclear Radiation Center Emergency Plan and the associated implementing procedures and failure to conduct annual drill exercises with the Pullman Memorial Hospital.

During the inspection in May 2003, the inspection found that the Pullman Memorial Hospital did not have a copy of the WSU Nuclear Radiation Center Emergency Plan as required by the agreement between WSU and the hospital. It was also noted that, although annual drills were required to be held, none had been held during 2001, 2002, and as of May 2003.

During this inspection, the inspector verified that the licensee had provided a copy of the WSU Nuclear Radiation Center Emergency Plan to the hospital emergency room in June 2003. The inspector reviewed the form that a hospital representative had signed indicating that the hospital had received a copy on June 13, 2003. Also, the inspector verified that the licensee had held a drill with the hospital in July 2003. The drill involved handling and treatment of a simulated contaminated, injured person from the Nuclear Radiation Center by ambulance and hospital personnel. It was also noted that another drill was held on June 4, 2004. This most recent drill again involved licensee staff, hospital emergency room personnel, and the ambulance drivers. This item is considered closed.

- (4) DEV 50-027/2003-201-03 - Failure to fulfill a commitment made to the NRC concerning revision of the Emergency Plan to reflect actual training practices.

During the inspection in May 2003, the inspector reviewed the issue of revising the Emergency Plan (E-Plan) to reflect actual training practices involving support organizations. No revision had been completed as of the date of the inspection despite a commitment made to the NRC to implement a revision to the E-Plan.

The inspector noted that, following that inspection, the licensee issued a “pen and ink” change to reflect that the training was on a rotating basis, each organization trained every third year. The licensee later submitted a letter to the NRC outlining the change on June 23, 2003. By letter dated November 20, 2003, the NRC indicated that the change was acceptable. This item is considered closed.

c. Conclusions

The licensee had taken action to resolve previously identified issues involving an Inspector Follow-up Item, 2 violations, and a deviation. The items were closed.

8. Exit Interview

The inspection scope and results were summarized on June 10, 2004, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

E. Corwin	Senior Reactor Operator
K. Fox	BNCT Project Manager, Security Manager, and Emergency Director
S. Sharp	Reactor Supervisor
J. Smeltz	Reactor Operator Trainee
G. Tripard	Director, Nuclear Radiation Center

Other Personnel

M. Blair	Locksmith, WSU Facilities Operations
D. Hagihara	Chair, Reactor Safeguards Committee
L. Porter	Director, WSU Radiation Safety Office
S. West	Lieutenant, WSU Police Department

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors
IP 81401	Plans, Procedures, and Reviews
IP 86740	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-027/2004-201-01	VIO	Failure to include the applicable TI on the shipping papers of shipments of radioactive material packages labeled as Yellow II.
50-027/2004-201-02	VIO	Failure to assign the appropriate Transport Index to packages of radioactive material with radiation level readings of 0.06 mrem/hr or greater at 1 meter and failure to designate the shipments as Yellow II and to affix the proper label to packages of radioactive material based on the TI (which was the highest category required).

Closed

50-027/2002-201-02	IFI	Follow-up on the clarification of the last step in the Reactor Startup Checkout.
50-027/2003-201-01	VIO	Failure to conduct training for Pullman Memorial Hospital emergency room personnel in radiation safety and WSU Nuclear Radiation Center emergency procedures as required by the Emergency Plan.

- 50-027/2003-201-02 VIO Failure to provide the hospital with a copy of the WSU Nuclear Radiation Center Emergency Plan and the associated implementing procedures and failure to conduct annual drill exercises with the Pullman Memorial Hospital.
- 50-027/2003-201-03 DEV Failure to fulfill a commitment made to the NRC concerning revision of the Emergency Plan to reflect actual training practices.

PARTIAL LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
BNCT	Boron Neutron Capture Therapy
CFR	Code of Federal Regulations
DEV	Deviation
DDE	Deep dose equivalent
IFI	Inspector Follow-up Item
IP	Inspection Procedure
mrem/hr	millirem per hour
NRC	Nuclear Regulatory Commission
OSL	Optically stimulated luminescence (dosimeter)
RSC	Reactor Safeguards Committee
SDE	Shallow dose equivalent
SNM	Special Nuclear Material
SOP	Standard Operating Procedure
SRO	Senior Reactor Operator
TLD	Thermoluminescent dosimeter
TS	Technical Specifications
VIO	Violation
WSU	Washington State University