August 19, 2003

Dr. Kenneth R. Hall, Deputy Director
Texas Engineering Experiment Station
1095 Nuclear Science Road
3575 TAMU
College Station, TX 77843-3575

SUBJECT: NRC INSPECTION REPORT NO. 50-128/2003-201

Dear Dr. Hall:

This letter refers to the inspection conducted on June 23-26, 2003, at your Nuclear Science Center (NSC) Reactor. 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, no safety concerns or noncompliances of NRC requirements were identified. No response to this letter is required.

In accordance with 10 CFR 2.790 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 Stephen Holmes at 301-415-8583.

Sincerely,

/RA/

Patrick M. Madden, Section Chief
Research and Test Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-128
License No. R-83

Enclosure: NRC Inspection Report No. 50-128/2003-201

cc w/encl.: Please see next page

cc:

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P.O. Box Drawer 9960
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Governor's Budget and
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Texas A&M University System
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Texas State Department of Health
Radiation Control Program Director
Bureau of Radiation Control
Dept. of Health
1100 West 49th Street
Austin, Texas 78756-3189

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

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U. S. NUCLEAR REGULATORY COMMISSION

Docket No:	50-128
License No:	R-83
Report No:	50-128/2003-201
Licensee:	Texas A&M University
Facility:	Texas Engineering Experiment Station Nuclear Science Center
Location:	College Station, TX
Dates:	June 23 to 26, 2003
Inspector:	Stephen W. Holmes
Approved by:	Patrick M. Madden, Section Chief Research and Test Reactors Section New, Research and Test Reactors Program Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

This routine, announced inspection included onsite review of various aspects of the licensee's programs concerning operations, emergency preparedness, security and safeguards, radiation protection, material control and accounting, and transportation of radioactive material as they relate to the licensee's one Megawatt Class II Research Reactor. The licensee's programs were directed toward the protection of public health and safety and were in compliance with NRC requirements. No safety concerns or violations of regulatory requirements were identified.

Organization, Operations, and Maintenance Activities

- Staffing, operations, reporting, and record keeping met requirements specified in Technical Specifications Section 6.0. Maintenance was being completed as required.

Review, Audit, and Design Change Functions

- The Reactor Safety Advisory Committee acceptably completed review and oversight functions required by Technical Specifications Section 6.2. No design changes had been initiated since the last NRC operations inspection.

Operations Activities

- The Operational activities were consistent with applicable Technical Specifications and procedural requirements.

Operator Licenses, Requalification, and Medical Activities

- The Requalification Program was being completed as required and records were being maintained. The operators were maintaining their licenses in an active status.

Fuel Handling and Movement

- Fuel handling activities and documentation were as required by Technical Specifications and facility procedures.

Surveillance

- The program for Surveillance and Limiting Conditions for Operations confirmations was being implemented in accordance with Technical Specifications Sections 3.0 and 4.0 requirements.

Emergency Preparedness

- The Emergency Plan and Emergency Implementation Procedures were being audited and reviewed annually as required.

- Letters of Agreements documenting emergency support to be provided by offsite agencies were being maintained and updated as required.

- Annual drills were being held as required and documentation was maintained concerning the follow-up critiques and subsequent corrective actions if needed.

Radiation Protection Program

- The Radiation Protection Program being implemented by the licensee satisfied regulatory requirements.

Transportation

- Removable external radioactive contamination for shipment RFS No. 03-0230/231/250 met 49 CFR 173.443 requirements.

Material Control and Accounting

- Special Nuclear Materials was being acceptably controlled and inventoried as required.

Physical Safeguards and Protection

- The physical protection features, equipment, and procedures of the Nuclear Science Center satisfied the Physical Protection Plan requirements.

Gaseous Effluents

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

REPORT DETAILS

Summary of Plant Status

The licensee's one megawatt Research and Test Reactor continued to be operated in support of education, operator training, irradiation of various materials, laboratory experiments, and various types of research. During the inspection, the reactor was started, operated, and shut down as required and in accordance with applicable procedures to support these ongoing activities.

1. Organization and Maintenance Activities

a. Inspection Scope (Inspection Procedure [IP] 69001)

To verify staffing, reporting, and record keeping requirements specified in Technical Specifications (TS) Sections 6.1, 6.6, and 6.7 were being met, the inspector reviewed:

- organization and staffing for the Texas A&M Nuclear Science Center (NSC)
- TS for the Texas Engineering Experimental Station (TEES), Texas A&M University System NSC Reactor Facility, Amendment No.15, dated November 1, 1999
- administrative controls and management responsibilities specified in the TS Section 6.0
- NSC SOP, Section I, Policy and procedures, not dated
- NSC SOP, Section III, Reactor maintenance and surveillance (M&S), not dated
- NSC SOP, Section IV, Maintenance and surveillance of support systems, not dated
- Texas A&M University NSC 2002 Annual Report, dated April 2003

b. Observations and Findings

TS section 6.1.1 prescribes the line management organization structure for the NSC reactor. The Deputy Director TEES, the NSC Director, the senior reactor operator (SRO) on duty, and the operating staff comprise level one to four management. A radiation safety officer (RSO) and the Reactor Safety Board (RSB) comprise the rest of the organization.

The licensee's current operational organization structure and assignment of responsibilities were consistent with those specified in the TS Section 6.1.1. All positions were filled with qualified personnel. Through discussions with licensee representatives the inspector determined that no functional changes had occurred in the organization since last inspected during NRC inspection No. 50-128/2000-201 August 2000 (ADAMS Accession No. ML3746052). Review of records verified that management responsibilities were administered as required by TS Section 6.1.2 and applicable procedures.

A review of the reactor operations and maintenance logs showed that they were being completed as required by TS Section 6.7 and problems, if any, were being documented. The annual reports summarized the required information and were issued at the frequency specified in TS Section 6.6.1.

c. Conclusions

Staffing, operations, reporting, and record keeping met the requirements specified in TS Section 6. Maintenance was being completed as required.

2. Review, Audit, and Design Change Functions

a. Inspection Scope (IP 69001)

To verify that the licensee had established and conducted reviews and audits as required in TS Section 6.2 and to determine whether modifications to the facility, if any, were consistent with 10 CFR 50.59, the inspector reviewed:

- TS for the TEES, Texas A&M University System NSC Reactor Facility, Amendment No.15, dated November 1, 1999
- RSB meeting minutes from June 1, 2001 through the present
- completed audits and reviews from 2000 through 2002
- design changes reviewed under 10 CFR 50.59 for 2001 and 2002
- NSC SOP, Section I.H, RSB, dated March 6, 1990.

b. Observations and Findings

The inspector reviewed minutes of the last five RSB meetings. The minutes showed that the committee met more frequently than once per calendar year as required by TS Section 6.2.2.a and that a quorum was present each meeting. The topics considered during the meetings were appropriate and as stipulated in TS Section 6.2.3. The RSB conducted audits and reviews of emergency preparedness and security plans, the ALARA program, and the licensee's conformance of operations and maintenance items to the TS, as required by TS Section 6.2.4. and 6.2.5. Results of the audits were discussed with the licensee and recommendations for improvement were made. The inspector's review of the committee's audit of licensee response and corrective actions for previous transportation and procedure violations and its approval of an amendment to an approved experiment (Revision three to Experiment Authorization No. 26) confirmed they were fulfilling their duties as required by TS Section 6.2.

Through review of applicable records and interviews with licensee personnel, the inspector determined that no design changes had been made since last inspected during NRC inspection No. 50-128/2000-201 August 2000 (ADAMS Accession No. ML3746052).

c. Conclusions

The RSB acceptably completed review and oversight functions required by TS Section 6.2. No design changes had been made since the last NRC operations inspection.

3. Operations

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify compliance with TS Sections 2, 3, and 6 and the applicable procedures:

- TS for the TEES, Texas A&M University System NSC Reactor Facility, Amendment No.15, dated November 1, 1999
- reactor console logs and maintenance logs for 2000 through the present
- selected entries on NSC forms:
  531 - Morning Facility Checklist - Daily dated March 5, 2001
  532 -Triga Reactor Pre-startup Checklist dated September 25, 2002
  533 - Reactor Operations Facility Checklist - Daily Surveillance dated March 25, 2002
  534 - Facility Security Shutdown Checklist - Daily Surveillance dated January 25, 2000
- staffing for operations as recorded on the reactor log sheets
- observation of selected startup, operations, and shutdown activities on June 24 and 25, 2003
- Texas A&M University NSC 2002 Annual Report, dated April 2003
- NSC SOP, Section II, Reactor Operations, not dated
- NSC SOP, Section III, Reactor maintenance and surveillance (M&S), not dated
- NSC SOP, Section VI, Maintenance and surveillance of support systems, not dated

b. Observations and Findings

Reactor operations were carried out following written procedures and TS requirements. Information on the operational status of the facility was recorded in log books and on checklists as required by procedures and TS Sections 6.3 and 6.7. 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 Section 6 and administrative procedures. Scrams were identified in the logs and records, reported as required, and their cause(s) resolved before the resumption of operations under the authorization of an SRO.

The inspector verified that required items were logged and cross referenced with other logs and forms, as required, and that TS Section 2 and 3 operational limits had not been exceeded.

As noted previously, operations logs and records documented that shift staffing met the minimum requirements for duty and on-call personnel.

c. Conclusions

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

4. Operator Licenses, Requalification, and Medical Activities

a. Inspection Scope (IP 69001)

To verify that operator requalification activities and training were conducted as required and that medical requirements were met, the inspector reviewed:

- SRO and Reactor Operator (RO) Requalification Program, dated April 1997
- NSC SOP, Section X, Reactor operator training, not dated
- active license status of all current operators
- logs and records of reactivity manipulations (NSC Form 525) for 2000 through the present
- written examinations given during 2001 and 2002
- training lectures (NSC Forms 521 and 523) and records for the current training cycle
- Individuals' NSC Form 522, Reactor Operator Two-Year Training Records
- medical examination records

b. Observations and Findings

The facility has nine qualified, licensed SROs, five ROs, and a number of trainees. All of the operators' licenses were current.

A review of the training records showed that training had been conducted in the areas outlined in the licensee's NRC approved requalification program. Records reviewed verified that annual written and operational examinations were being administered as required. Medical exams were performed biannually as required. The inspector noted that the licensee was tracking and documenting hours and reactor manipulations to ensure that the operators met the requalification program requirements and those stipulated in 10 CFR 55.53(e) to maintain operating licenses in an active status. In order to comply with the requirement for actively performing their operator functions for a minimum of four hours per calendar quarter, the licensee included time spent on the reactor console, supervisory functions, and maintenance, as appropriate. This was consistent with 10 CFR Part 55 requirements.

c. Conclusions

The Requalification Program was being completed as required and records were being maintained. The operators were maintaining their licenses in an active status.

5. Fuel Handling and Movement

a. Inspection Scope (IP 69001)

To verify adherence to TS Sections 4.2, 5.1, 5.2, 6.1, 6.7 and licensee fuel handling and inspection requirements the inspector reviewed:

- TS for the TEES, Texas A&M University System NSC Reactor Facility, Amendment No.15, dated November 1, 1999
- NSC SOP Section II.H, Fuel Manipulations, Revision 4, dated February 9, 2000
- NSC SOP Section II.I, Reactor Core Manipulations, Revision 4, dated February 9, 2000
- NSC SOP Section III.H, Fuel Element Surveillance and Inspection, Revision 3, dated March 2, 2001
- applicable fuel logs and records
- NSC Reactor Log sheets from 2000 through the present
- fuel bundle FB 27 and FB II DOT/FE 7487 movement records
- fuel handling equipment and instrumentation

b. Observations and Findings

Procedures for refueling, fuel movement, and TS Section 4.2.4 required surveillances ensured controlled operations for the reactor core. All fuel movements were recorded in the reactor log and individual fuel element log sheets.

The inspector noted that the data recorded for fuel was acceptable and was cross referenced in the operations logs. Log entries verified that 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 fuel movements were conducted in accordance with TS Section 6.1 and licensee procedures Through records review and interviews with licensee personnel, the inspector confirmed that acceptable radiological and criticality controls were established and implemented for fuel movements as required.

c. Conclusions

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

6. Surveillance

a. Inspection Scope (IP 69001)

To determine that surveillances and Limiting Conditions for Operations (LCOs) verifications were being completed as required by TS Sections 3.0 and 4.0, the inspector reviewed:

- TS for the TEES, Texas A&M University System NSC Reactor Facility, Amendment No.15, dated November 1, 1999
- NSC SOP, Section II, Reactor Operations, not dated
- NSC SOP, Section III, Reactor maintenance and surveillance (M&S), not dated
- NSC SOP, Section VI, Maintenance and surveillance of support systems, not dated
- NSC SOP, Section VII.B, Health Physics Maintenance and Surveillance, not dated
- NSC SOP Section II.J, Power Calibration, Revision 1, dated May 10, 2000
- NSC SOP Section II.K, Control Rod Calibration, Revision 1, dated March 17, 1997
- NSC SOP Section III.B, Fuel Element Temperature Measuring Channel Maintenance and Surveillance, Revision 1, dated February 9, 2000
- NSC SOP Section III.H, Fuel Element Surveillance and Inspection, Revision 3, dated March 2, 2001
- NSC SOP Section III.I, Scram Circuit Surveillance, Revision 2, dated February 9, 2000
- NSC SOP Section III.J, Transient Rod Drive Maintenance and Surveillance, Revision 2, dated February 9, 2000 Revision
- NSC SOP Section VII.B.7, Area Radiation Monitor, 3, dated August 25, 1994
- NSC Form 557, Annual Reactor Maintenance and Surveillance Schedule, dated October 4, 1999, for years 2001, 2002, and 2003
- associated surveillance and calibration data and records for 2000-2003

b. Observations and Findings

The inspector determined that selected daily, monthly, annual, other periodic checks, tests, verifications, and calibrations for TS-required surveillances and LCOs were completed as stipulated. Surveillances, LCOs, and calibration reviews were completed on schedule and performed in accordance with licensee procedures. All the recorded results were within the TS and procedurally prescribed parameters and in close agreement with the previous surveillance results. The records and logs reviewed were accurate, complete, and being maintained as required. All values checked by the inspector satisfied the limits/parameters listed in the procedure or checklist.

c. Conclusions

The program for surveillance and LCOs confirmations was being implemented in accordance with TS Sections 3.0 and 4.0 requirements.

7. Emergency Preparedness

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- TS for the TEES, Texas A&M University System NSC Reactor Facility, Amendment No.15, dated November 1, 1999
- Emergency Plan (E-Plan) for the Texas Engineering Experimental Station, Texas A&M University System NSC Reactor Facility, Revision 2, dated December 14, 1999
- NSC SOP, Section IX, Emergency plan and procedures, not dated
- Reactor Operations and Operator Training Manual, "Section V Emergency Procedures," latest Revision dated January 1995
- RSB meeting minutes from June 1, 2001 through the present
- emergency response facilities, supplies, equipment and instrumentation
- training records
- offsite support and letters of agreement
- emergency drills and exercises for 2001 and 2002
- Texas A&M University NSC 2002 Annual Report, dated April 2003
- Memorandum - Biannual Off-Site Emergency Drill from Bill Asher to Dr. W.D. Reece, Director, dated December 3, 2002

b. Observations and Findings

The E-Plan in use at the reactor and emergency facilities was the same as the version most recently submitted to the NRC. The RSB audited and reviewed the E-Plan at least annually, not to exceed 15 months, as required by TS and E-Plan Sections 6.2.4.d and 10.4 respectively. Implementing procedures were reviewed and revised as needed to effectively execute the E-Plan.

Through records review, and interviews with licensee personnel, the inspector determined that emergency responders were knowledgeable of the proper actions to take in case of an emergency. Agreements with outside response organizations had been updated and maintained as necessary. Communications capabilities with these support groups were tested during the biennial off-site drill November 27, 2002, and were acceptable.

Emergency facilities, instrumentation, and equipment were being maintained and controlled as required by E-Plan Section 10.4 and supplies were being inventoried semiannually as required by E-Plan Section 10.5.

The inspector reviewed documentation of the latest emergency drill. The annual drill required by the E-Plan had been conducted on November 27, 2002. The drill involved an injury and an oil fire in the mechanical equipment room caused by an air compressor explosion. Both reactor and radiation staffs participated in the response. Additionally off-site fire, ambulance, and campus police responded. The "injury" was transported to the College Station Medical Center, who also participated in the drill. Critiques were held following the drills to discuss the strengths and weaknesses identified during the exercise and to develop possible solutions to any problems identified. The results of these critiques were documented.

The inspector verified that emergency preparedness and response training was being completed as required and that training for off-site and reactor staff personnel was conducted and documented as stipulated by the E-Plan.

c. Conclusions

The emergency preparedness program was conducted in accordance with the Emergency Plan.

8. **Radiation Protection Program**

a. Inspection Scope (IP 69001)

The inspector reviewed the following regarding the licensee's radiation protection program (RPP) to ensure that the requirements of 10 CFR Part 20 were being met:

- NSC SOP, Section VII, Health Physics Procedures, not dated
- NSC SOP Section VII.A.1, Radiation Protection Program, Revision 3, dated December 4, 1997
- NSC SOP Section VII.A.5, Annual Review of SOP Section VII (HP Procedures), Revision 2, dated October 3, 1990
- NSC SOP Section VII.B.13, Portable Survey Instrument Calibration and Operability Check, Revision 4, dated September 3, 1999
- NSC SOP Section VII.B.14, Personnel Dosimeters, Revision 6, dated October 15, 1999
- NSC SOP Section VII.C.14, Site Survey, Revision 2, dated September 3, 1999
- NSC SOP Section VII.C.15, Facility Radiation Survey, Revision 2, dated December 4, 1997
- NSC SOP Section VII.C.16, Special Radiation or Activity Surveys, Revision 3, dated December 19, 1997
- NSC SOP Section VII.C.17, Facility Contamination Surveys, Revision 3, dated December 4, 1997
- NSC SOP Section VII.D, Health Physics Training, undated
- NSC SOP Section VII.E, Personnel Dosimetry, undated
- RSB meeting minutes from June 1, 2001, through the present

- RSB completed audits and reviews from 2000 through 2002
- Texas A&M University NSC 2002 Annual Report, dated April 2003
- Personnel dosimetry records for 2001 to 2003

b. Observations and Findings

(1) Radiation Protection Program

The licensee's RPP was established in NSC SOP Section VII.A.1, Radiation Protection Program, Revision 3, dated December 4, 1997. It had been reviewed and approved as required by licensee procedures.

Although individual procedures had been revised, the RPP had not appreciably changed since the last NRC inspection. The licensee reviewed the RPP at least annually as required by 10 CFR 20.1101(c). This review and oversight was provided by the RSO.

The inspector's review of procedure change records, experiment authorizations, and HP records confirmed that the RSO and RSB reviewed RPP changes, experiments, and radiation protection related events/conditions thus carrying out the RPP as required by TS Sections 6.1.1.c. and 6.2.3.e.

(2) Postings and Notices

During tours, the inspector observed that caution signs, postings and controls in the controlled areas were acceptable for the hazards involving radiation, high radiation, and contaminated areas and were implemented as required by 10 CFR 20, Subpart J. Through observations of and interviews with licensee staffs and visitors the inspector confirmed that personnel complied with the signs, postings and controls. The facility's radioactive material storage areas were noted to be properly posted. No unmarked radioactive material was detected in the facility. The inspector confirmed that current copies of NRC Form-3 and notices to workers were posted in appropriate areas in the facility as required by 10 CFR Part 19.

(3) Surveys

The inspector audited the weekly, monthly, quarterly, and other periodic contamination and radiation surveys since January 2001. They were performed and documented as required by NSC procedures. Results were evaluated and corrective actions taken and documented when readings/results exceeded the licensee's established limit of three times background. The inspector's review of the survey records since January 2001, confirmed that contamination in the facility was infrequent. The inspector determined that the survey program satisfied 10 CFR 20.1501(a) requirements.

(4) Dosimetry

The dosimetry program requirements and procedures had not changed since the last inspection August 2000. A National Voluntary Laboratory Accreditation Program-accredited vendor was used to provide dosimetry for personnel, environmental, and area monitoring. The inspector confirmed that dosimetry was being issued to staff and visitors as required by NSC SOP Section VII.E, Personnel Dosimetry. All exposures were well within NRC limits specified in 10 CFR 20.1201. and licensee action levels. Most records showed no exposure above background.

(5) Radiation Monitoring Equipment

The calibration and periodic checks of the portable survey meters and radiation monitoring instruments were performed by the licensee's staff, Texas A&M calibration facilities, or certified contractors. The inspector confirmed that the licensee's calibration procedures and frequencies satisfied TS Section 4.3 and 10CFR20.1501(b) requirements, and the American National Standards Institute N323 "Radiation Protection Instrumentation Test and Calibration" or the instrument's manufacturers' recommendations. The inspector verified that the calibration and check sources used were traceable to the National Institute of Standards and Technology and that the sources' geometry and energies matched those used in actual detection/analyses.

The inspector reviewed the NSC calibrations done since January 2001, and confirmed that the calibration for the portable survey meters in used had been done. All instruments checked had current calibrations appropriate for the types and energies of radiation they were used to detect and/or measure. Calibrations of the permanently installed radiation area monitors and the continuous air monitors were completed in accordance with requirements specified in TS Section 4.3.

c. Conclusions

The inspector determined that, because: 1) surveys were being completed and documented as required by 10 CFR Part 20.1501(a), TS, and licensee procedures; 2) postings met regulatory requirements; 3) the personnel dosimetry program was acceptably implemented and doses were in conformance with licensee and 10 CFR Part 20 limits; 4) Portable survey meters and radiation monitoring instruments were being maintained and calibrated as required, the RPP being implemented by the licensee satisfied regulatory requirements.

9. Inspection of Transportation Activities

a. Inspection Scope (IP 86740)

The inspector interviewed licensee personnel and reviewed the following records to verify compliance with regulatory and procedural requirements for shipping licensed material:

- NSC SOP, Section VII, Health Physics Procedures, not dated
- NSC SOP, Section VII.C, Radioactive Materials Control, not dated
- NSC SOP, Section VII.C.2, Radioactive Materials Released Off-Site, Revision 2, dated December 20, 1994
- NSC SOP, Section VII.C.2, Radioactive Materials Released From the NSC License R-83, Revision 2, dated December 12, 1997
- Fax from J. Hageman, RSO, Southwest Research Institute (SWI) to NRC Operation Center, dated March 19, 2003
- Field Activity Report, Texas Department of Health (DEH), Bureau of Radiation Control (BRC), dated April 4, 2003
- Radiative Material Release Checklist RFS No. 03-0230/231/250 (NSC Form 854 dated February 7, 2003)
- NSC Health Physics Smear Count Logs for 2003 including one for shipment RFS No. 03-0230/231/250 (NSC HP Form 856 dated January 10, 1996)
- 10 CFR 49.173.443 dated October 1, 2002

The inspector also interviewed the DEH/BRC inspector, the Southwest Research Institute RSO, and NSC staffs concerning the contamination.

b. Observations and Findings

On March 19, 2003, the NRC Operations Center received notification from the RSO of SWI of San Antonio, Texas of receipt of shipment from the NSC that appeared to have non-fixed (removable) radioactive contamination in excess of 49 CFR 173.443 limits. SWI reported that contamination, at a level of about 10,000 dpm/100cm^2, was located on the horizontal surfaces, with little or no contamination on the sides of the shipping cask, and that it was not uniformly distributed.

Subsequently, a telephone conference was held between NRC Headquarters, Region IV, Department of Transportation, Texas DEH/BRC, and Texas A&M NSC staffs. It was decided, since Texas is an agreement state and the NSC reactor is an NRC licensee, that the investigation would be split. The Texas BRC would be responsible for investigating the incident from SWI's end and the NRC would do so from the NSC's end.

The BRC inspector's investigation confirmed SWI's report on the contamination and that the removable surface contamination was a maximum of 10,000 dpm/100cm^2. SWI wipe samples supplied to NSC for their analysis showed the same values within acceptable statical variations.

The inspector reviewed NSC packaging, surveying, swiping, analysis procedures and results, and observed two shipments processed during the inspection.

Radiation monitoring was provided for and accomplished by the licensee to ensure that external radiation and removable surface contamination were within allowed 49 CFR limits. The licensee's radioactive material release checklist provided for checking that radiation monitoring was performed, package labeling was correct and attached as required, and that required accompanying documentation was properly prepared. The inspector verified that release wipes performed by the NSC on the March 19, 2003, shipment to SWI showed contamination below 100 dpm/100cm^2.

During the interview with SWI's RSO the inspector was informed that SWI's wiping method, using a wet Kemwipe© and moderate pressure, had an efficiency of at least 70%. Thus, based on SWI's wipe methodology and its efficiency, the removable contamination on the shipment was approximately 14,300 dpm.

49 CFR 173.443 states that:

"(a) The level of non-fixed (removable) radioactive contamination on the external surfaces of each package offered for transport must be kept as low as reasonably achievable. The level of non-fixed radioactive contamination may not exceed the limits set forth in table 11 and must be determined by either:
(1) Wiping an area of 300 square cm of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements must be taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. The amount of radioactivity measured on any single wiping material, when averaged over the surface wiped, may not exceed the limits set forth in table 11 at any time during transport; or
(2) Using other methods of assessment of equal or greater efficiency, in which case the efficiency of the method used must be taken into account and the non-fixed contamination on the external surfaces of the package may not exceed ten times the limits set forth in table 11."

The limit in table 11 for Non-Fixed External Radioactive Contamination, Beta and gamma emitters and low toxicity alpha emitters is 2,200 dpm/100cm^2.

Since SWI's used a method other than that described in (a)(1) and its efficiency is known, the non-fixed radioactive contamination limit of 22,000 dpm/100cm^2 applies. Therefore, the inspector determined that no violation of 49 CFR 173.443 requirements occurred.

In response to this event, the NSC modified their release survey procedures to enhance their ability to detect non-uniformly distributed contamination and to ensure that the level of removable contamination on the external surfaces of each package offered for transport would be kept as low as reasonably achievable.

c. Conclusions

Removable external radioactive contamination for the shipment to SWI met 49 CFR 173.443 requirements.

10. Material Control and Accounting

a. Inspection Scope (IP 85102)

To verify compliance with 10 CFR Part 70, the inspector reviewed:

- NSC SOP Section III.Q, Special Nuclear Materials (SNM) Accountability, dated October 31, 1984
- nuclear material inventories (DOE/NRC Forms 741 and 742) for the past two years
- accountability records and fuel storage locations
- physical inventory data documented on Form NSC-85
- overall fuel assembly inventory data documented on Form NSC-60A
- Megawatt hours of operation data documented on Form NSC-78
- FULINV - A Fuel Inventory Software Package IAEA Contract No: 3768/FG, contract period June 1987 - May 1988.

The inspector also participated in a physical inventory of the unirradiated fuel and detectors in storage.

b. Observations and Findings

The material control and accountability protocol established by the licensee tracked locations and content of fuel and fission detectors under the research reactor license.

A physical inventory of all SNM on site was conducted semiannually by the licensee. The inspector reviewed and verified that the semiannual material inventories had been performed as required.

Fuel burn-up-related measurements and calculations were acceptably performed and documented. The possession and use of SNM were limited to the locations and purposes authorized under the license. The material control and accountability forms (DOE/NRC Forms 741 and 742) were prepared and transmitted as required. Fuel inventory and movement records were cross referenced and matched.

c. Conclusions

SNM was being acceptably controlled and inventoried as required.

11. Physical Safeguards and Protection

a. Inspection Scope (IPs 81401 and 81431)

The inspector reviewed selected aspects of:

- TS for the TEES, Texas A&M University System NSC Reactor Facility, Amendment No.15, dated November 1, 1999
- the Physical Security Plan (PSP) for Operating License R-83, Docket 50-128, Rev. 1, dated January 1995
- NSC SOP, Section VIII, Security plan and procedures, not dated
- RSB meeting minutes from June 1, 2001 through the present
- Texas A&M Police Department Security Audit Summaries, January 2002 to June 2003
- Texas A&M Police Department Activity Logs for August and November 2002
- security systems, equipment and instrumentations
- implementation of the PSP

b. Observations and Findings

The PSP was the same as the latest approved by the NRC.

The inspector reviewed the implementation of the licensee's PSP. The inspector toured the facility and confirmed that the physical security systems (barriers and alarms), equipment, and instrumentation were as required by the PSP. Keys to access doors were held and controlled only by designated personnel. Access and key control was implemented in accordance with licensee procedures and as required by the plan. The facility was patrolled by campus police as required. The inspector also confirmed that the security checks, tests, verifications, and the biennial audits were performed and tracked as required by the PSP. Corrective actions were taken when required. The inspector verified that there had been no safeguards events since the last security inspection.

The inspector interviewed the Texas A&M Police Department Associate Director, a dispatcher, and several officers. The Associate Director, dispatcher, and officers were knowledgeable of their response responsibilities.

c. Conclusions

Based on the observations, the inspector found that the physical security features, equipment, and procedures of the NSC satisfied the PSP requirements.

12. Gaseous Effluents

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, 4.7, and 6.6:

- TS for the TEES, Texas A&M University System NSC Reactor Facility, Amendment No.15, dated November 1, 1999

- NSC SOP Section VII.B.18, Environmental Surveillance Program, Revision 2, dated September 3, 1999
- NSC Annual Report for 2002 with the effluent monitoring program results for that period
- counting and analysis records associated with airborne releases
- Form 819B - Radioactive Particulate/gaseous Effluent Releases dated July 26, 1999 from 2000 to 2003

b. Observation and Findings

The inspector determined that gaseous releases continued to be monitored as required, were calculated according to established protocol, and were acceptably documented in the annual reports. The airborne concentrations of the gaseous releases were well within the concentrations stipulated in 10 CFR Part 20, Appendix B, Table 2. The dose to the public, as a result of the gaseous releases, was calculated using the COMPLY Code and was well below the dose constraint specified in 10 CFR 20.1101 (d) of 10 millirem per year.

c. Conclusion

Gaseous effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory limits.

13. Follow-up on Previously Identified Issues

a. Inspection Scope

The inspector followed up on five Inspector Follow-up Items (IFI) and one Violation (VIO) as identified and documented in Inspection Report No. 50-128/2003-201. The inspector reviewed these issues with the licensee to determine what actions, if any, had been taken.

b. Observations and Findings

1) IFI 50-128/2002-201-01 (Closed): Follow-up on the licensees commitment to evaluate the tag-out procedure for use when equipment is operated outside its normal parameters

The inspector verified that the licensee had modified its tag-out procedure to make the procedure less onerous to use by allowing a technician to independently post a warning of abnormal conditions. Additionally the procedure was modified to expand the use of caution and warning tags for abnormal operating conditions as well as other conditions for which additional instructions might be needed. This item is considered closed.

2) IFI 50-128/2002-201-02 (Closed): Follow-up on the licensees commitment to evaluate the shift change log to insure it is relevant and useful to turnover requirements.

The inspector verified that the licensee had changed the way the shift change notebook is used. Information in the reactor log and experiment logs are no longer rewritten in the shift change log. The shift change log is used to pass on information of events and occurrences. This item is considered closed.

3) IFI 50-128/2002-201-03 (Closed): Follow-up on the licensees commitment to evaluate the facility shutdown checklist for inclusion of a final physical walk through of the facility after reactor shutdown.

The inspector verified that the licensee had modified the facility shutdown checklist for inclusion of a final physical walk through of the facility after reactor shutdown. This item is considered closed.

4) IFI 50-128/2002-201-04 (Closed): Follow-up on the licensees commitment to modify the connections on the diffuser pump discharge to reduce the chance of future failure and evaluate other piping connections for similar modifications.

The inspector verified that the licensee had replace the connections on the diffuser pump discharge with metal fittings with locking devices. The licensee also evaluated connections in the skimmer, demineralizer, beam port blow-down systems, and other components in the diffuser system. None were determined to present a similar risk. This item is considered closed

5) IFI 50-128/2002-201-05 (Closed): Follow-up on the licensees commitment to modify the waste tanks to allow them to overflow into each other.

The inspector verified that the licensee had modified the waste tanks to allow them to overflow into each other. This item is considered closed

6) VIO 50-252/2001-201-01 (Closed): Follow-up on licensees failure to follow procedures on three individual incidences on September 16-17, 2002.

The inspector noted that the specific failure to determine the liquid waste concentrations prior to release was not a conscious decision to discharge without analysis; rather it was a consequence of the other two procedural violations. With the plant and procedural modifications implemented above, corrective actions for this violation have been completed. This item is considered closed.

b. Observations and Findings

Five IFIs and one VIO identified during a previous inspection were reviewed and all were closed during this inspection.

14. Exit Interview

The inspection scope and results were summarized on June 26, 2003, with licensee representatives. The inspector discussed the findings for each area reviewed. The licensee acknowledged the findings.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Spellman	Assistant Director, NSC
B. Smith	Senior Reactor Operator
D. Bagley	Senior Reactor Operator
J. Remlinger	Operations Manager, NSC
E. Schneider, Jr.	Associate Director, Texas A&M University Police Department
J. Salsman	Assistant Director/Radiological Safety Officer, Texas A&M University Environmental Health and Safety Department

INSPECTION PROCEDURE USED

IP 69001:	Class II Non-Power Reactors
IP 81401	Plans, Procedures, and Reviews
IP 81431	Fixed Site Physical Protection of Special Nuclear Material of Low Strategic Significance
IP 85102	Material Control and Accounting
IP 86741	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

NONE

Closed

VIO 50-128/2002-202-001	Failure to follow procedures on three individual incidences September 16-17, 2002.
IFI 50-128/2002-201-01	The licensee would evaluate the tag-out procedure for use when equipment is operated outside its normal parameters.
IFI 50-128/2002-201-02	The licensee would evaluate the shift change log to insure it is relevant and useful to turnover requirements.
IFI 50-128/2002-201-03	The licensee would evaluate the facility shutdown checklist for inclusion of a final physical walk through of the facility after reactor shutdown.

IFI 50-128/2002-201-04	The licensee would modify the connections on the diffuser pump discharge to reduce the chance of future failure and evaluate other piping connections for similar modifications.
IFI 50-128/2002-201-05	The licensee would modify the waste tanks to allow them to overflow into each other.

Discussed

NONE

LIST OF ACRONYMS USED

BRC	Bureau of Radiation Control
CFR	Code of Federal Regulations
DEH	Department of Environmental Health
E-Plan	Emergency Plan for the Texas Engineering Experimental Station, Texas A&M University System NSC Reactor Facility, Revision 2, dated December 14, 1999
IFI	Inspector Follow-up Item
IP	Inspection Procedure
LCO	Limiting Condition for Operations
NSC	Nuclear Science Center
NRC	Nuclear Regulatory Commission
PSP	Physical Security Plan
RPP	Radiation Protection Program
RSO	Radiation Safety Officer
RSB	Reactor Safety Board
RO	Reactor Operators
SNM	Special Nuclear Materials
SRO	Senior Reactor Operator
SWI	Southwest Research Institute
TS	Technical Specifications
TEES	Texas Engineering Experiment Station
URI	Unresolved Item
VIO	Violation