

April 19, 2007

Dr. Theresa A. Maldonado, Deputy Director  
Texas Engineering Experiment Station  
Texas A&M University  
1095 Nuclear Science Road  
College Station, TX 77843-3575

SUBJECT: NRC INSPECTION REPORT NO. 50-128/2007-201

Dear Dr. Maldonado:

This letter refers to the inspection conducted on April 3-4, 2007, at the Texas A&M University Nuclear Science Center Reactor Facility. 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 observation of activities in progress. Based on the results of this inspection, no safety concerns or noncompliance with U.S. Nuclear Regulatory Commission (NRC) requirements were identified. No response to this letter is required.

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

Should you have any questions concerning this inspection, please contact Mr. Kevin M. Witt at (301) 415-4075.

Sincerely,

*/RA/*

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

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

Enclosure: NRC Inspection Report No. 50-128/2007-201  
cc w/encl: Please see next page

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**ACCESSION NO.: ML071080007**

**TEMPLATE #: NRR-106**

OFFICE	PRTB	PRTB:LA	PRTB:BC
NAME	KWitt:cah	EHylton	JEads
DATE	04/19/2007	04/19/2007	04/19/2007

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Texas A&M University System

Docket No. 50-128

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

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

Docket No: 50-128

License No: R-83

Report No: 50-128/2007-201

Licensee: Texas A&M University

Facility: Nuclear Science Center Reactor

Location: College Station, TX

Dates: April 3-4, 2007

Inspectors: Kevin M. Witt  
Johnny H. Eads  
Marvin M. Mendonca  
William C. Schuster

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

## EXECUTIVE SUMMARY

Texas A&M University  
Nuclear Science Center Reactor  
Inspection Report No. 50-128/2007-201

The primary focus of this routine, announced inspection included onsite review of selected aspects of the licensee's Class II research and test reactor safety programs including: organizational structure and staffing, operations logs and records, procedures, requalification training, surveillance and limiting conditions for operation, experiments, design changes, committees, audits and reviews, emergency preparedness, maintenance logs and records, fuel handling and movement, and follow-up on previous open items.

The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

### Organization and Staffing

- The licensee's organization and staffing and assignment of responsibilities remained in compliance with the requirements specified in Technical Specification Section 6.

### Operations Logs and Records

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

### Procedures

- Facility procedures and document reviews satisfied Technical Specification Section 6.3 requirements and procedural compliance was acceptable.

### Requalification Training

- The Requalification Program was generally being completed as required and records were being maintained.

### Surveillance and Limiting Conditions for Operation

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

### Experiments

- The approval and control of experiments met Technical Specification and applicable regulatory requirements.

### Design Changes

- Based on the records reviewed, the inspectors determined that the licensee's design change program was being implemented as required.

### Committees, Audits, and Reviews

- The Reactor Safety Board acceptably completed the review, oversight, and audit functions required by Technical Specification Section 6.2.

### Emergency Preparedness

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

### Maintenance Logs and Records

- Maintenance was being completed as required.

### Fuel Handling and Movement

- The fuel handling activities and documentation were conducted in accordance with the facility Technical Specifications.

### Follow-up on Previous Open Items

- The issues identified in previous inspection reports were closed.

## REPORT DETAILS

### **Summary of Plant Status**

The licensee's TRIGA research reactor, licensed to operate at a maximum steady-state thermal power of one megawatt (1 MW), continues to be operated in support of operator training, surveillance, and utilization involving neutron activation analysis. During the inspection the reactor was operated on Tuesday and Wednesday at full power to conduct sample irradiations.

#### **1. Organization and Staffing**

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

To verify that the licensee's organization and staffing were as stated in Section 6.1 of the Technical Specifications (TS) for the Texas Engineering Experimental Station, Texas A&M University System Nuclear Science Center Reactor (NSCR) Facility, Amendment No.15, dated November 1, 1999, the inspectors reviewed:

- organization and staffing for the Texas A&M University (TAMU) Nuclear Science Center (NSC)
- administrative controls and management responsibilities specified in the NSC TS
- NSC Standard Operating Procedure (SOP), Chapter I, "Policy and Procedures," Section I-C, "Administration," Revision (Rev.) 0, dated March 6, 1990
- NSC SOP, Chapter II, "Reactor Operations," Section II-A, "General Organization and Responsibilities," Rev. 1, dated February 9, 2000
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-A, "General," Rev. 1, dated February 9, 2000
- NSC SOP, Chapter VI, "Maintenance and Surveillance of Support Systems," Section VI-A, "General," Rev. 0, dated February 1, 1985
- Texas A&M University NSC 2005 Annual Report, dated March 30, 2006
- Texas A&M University NSC 2006 Annual Report, dated March 23, 2007

##### **b. Observations and Findings**

The organizational structure and functions of the Texas Engineering Experimental Station (TEES) and the NSCR had not functionally changed since the last inspection (refer to NRC Inspection Report No. 50-128/2006-201). The licensee's current operational organization and assignment of responsibilities, as reported in the latest Annual Report, were consistent with those specified in the TS Sections 6.1.1 and 6.1.2. All positions were filled with qualified personnel and a review of the applicable records verified that staffing was as required by TS Section 6.1.3 and the licensee's procedures. There have been no changes in the staffing since the last inspection. The inspectors noted that the licensee has not filled the position of Manager of Reactor Operations. The inspectors also noted that the staffing levels at the facility are sufficient for the current state of operations activity.

##### **c. Conclusions**

The licensee's organization and staffing and assignment of responsibilities remained in compliance with the requirements specified in TS Section 6.

## 2. Operations Logs and Records

### a. Inspection Scope (IP 69001)

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

- Scram Log
- staffing for operations as recorded on the reactor log sheets
- NSCR Operations Log Books Numbers 190-197, dated from October 8, 2005 to present
- selected entries on the following facility forms:
  - NSC Form 531, entitled "Morning Facility Checklist - Daily," latest revision dated June 26, 2003
  - NSC Form 532, entitled "TRIGA Reactor Pre-startup Checklist," latest revision dated January 8, 2005
  - NSC Form 533, entitled "Reactor Operations Facility Checklist - Daily Surveillance," latest revision dated March 11, 2003
  - NSC Form 534, entitled "Facility Security Shutdown Checklist - Daily Surveillance," latest revision dated October 5, 2004
  - NSC Form 573, entitled "Irradiation Cell Entry Log," latest revision dated August 2, 2001
  - NSC Form 574, entitled "Irradiation Cell Operations Checklist," latest revision dated August 2, 2001
  - NSC Form 590, entitled "Unscheduled Scram Recovery Checklist," latest revision dated October 5, 2004
- selected TAMU NSC Daily SRO Checklists for 2005 and 2006
- NSC SOP, Chapter II, "Reactor Operations," Section II-A, "General Organization and Responsibilities," Rev. 1, dated February 9, 2000
- NSC SOP, Chapter II, "Reactor Operations," Section II-B, "Operations Records," Rev. 3, dated February 9, 2000
- NSC SOP, Chapter II, "Reactor Operations," Section II-C, "Reactor Startup," Rev. 5, dated August 19, 2003
- NSC SOP, Chapter II, "Reactor Operations," Section II-D, "Steady State Mode Operation," Rev. 1, dated September 3, 1999
- NSC SOP, Chapter II, "Reactor Operations," Section II-F, "Reactor Shutdown," Rev. 0, dated December 15, 1993
- NSC SOP, Chapter II, "Reactor Operations," Section II-I, "Reactor Core Manipulation," Rev. 4, dated February 9, 2000
- NSC SOP, Chapter II, "Reactor Operations," Section II-M, "Response to Alarms," Rev. 1, dated February 9, 2000
- Memorandum from W. D. Reece, Director, to M. Spellman, Associate Director, "Change to Minimum Staff Requirements for Reactor Start-Up (SOP II-C)," dated April 24, 2003

### 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 procedure. Use of maintenance and repair logs satisfied procedural requirements. Operational problems and events noted in the appropriate logs were reported, reviewed, and resolved as required. The inspectors verified that required items were logged and cross referenced with other logs and forms, as required, and that TS Sections 2 and 3 operational limits had not been exceeded. Operations logs and records also documented that shift staffing met the minimum requirements for duty and on-call personnel. The inspectors noted that the licensee recently replaced all of the fuel in the core with new low enriched Uranium fuel. The licensee stated that there have been differences in the operating characteristics of the fuel. The characteristics of the new fuel during steady state and pulse operation indicate different operating temperatures than previously observed. The peak pulsing temperature has varied by as much as 400°F higher than the previous core loading. The inspectors noted there may be undiscovered fuel characteristics that have not arisen yet. The NRC will continue to monitor the performance of the new fuel throughout future inspections.

Unintentional scrams that occurred during reactor operations were recorded in the scram log. There was an large number of scrams that occurred at the facility in 2005 due to the safety amplifier #2. The licensee has investigated this trend further, corrected the problem and has not seen any further incidents. In 2006 there was one scram due to an experimentation error. Current operational logs for 2007 indicate a similar frequency of unscheduled shutdowns with 2006. When a scram occurs, the root cause analysis is completed by the SRO on duty before the resumption of operations.

The inspectors conducted observations of the reactor staff on April 3 and 4, 2007, and reviewed the log books and associated records and logs. The inspectors noted that the licensed reactor operators were knowledgeable and competent. Observation of operational activities also confirmed that reactor operations were carried out in accordance with written procedures and TS requirements.

c. Conclusions

Operational activities were consistent with applicable TS and procedural requirements.

**3. Procedures**

a. Inspection Scope (IP 69001)

To verify that facility procedures were being reviewed, revised, and implemented as required by TS Section 6.3, the inspectors reviewed selected aspects of:

- selected forms and checklists
- procedural reviews and updates
- selected operating and administrative procedures and logs
- Reactor Safety Board (RSB) meeting minutes for December 20, 2005 and April 13 and July 14, 2006
- selected entries on the following facility forms:

- NSC Form 595, entitled "Procedure Change Notice," latest revision dated January 26, 2005
- NSC Form 597, entitled "Procedure Change Notice Update Checklist," latest revision dated January 26, 2005
- NSC SOP, Chapter I, "Policy and Procedures," Section I-D, "Format," Rev. 3, dated February 25, 2002
- NSC SOP, Chapter I, "Policy and Procedures," Section I-E, "Origination," Rev. 1, dated February 25, 2002
- NSC SOP, Chapter I, "Policy and Procedures," Section I-F, "Review and Approval," Rev. 1, dated February 25, 2002
- NSC SOP, Chapter I, "Policy and Procedures," Section I-G, "Distribution and Binding," Rev. 1, dated July 31, 1986

b. Observations and Findings

The licensee's procedures were found to be acceptable for the current facility status and staffing level. The inspectors noted that the procedures specified the responsibilities of the various members of the staff as well as the RSB. The procedures were being audited/reviewed periodically and were updated as needed. It was also noted that revisions to forms and procedures were presented to the RSB for review and approval as required by TS. The inspectors verified that the latest revisions to various procedures and forms had been through this review and approval process as required.

The inspectors observed the completion of a reactor start-up, routine operation, and shut-down. It was noted that the required checks, verifications, and actions were completed in accordance with the applicable procedure.

c. Conclusions

Facility procedures and document reviews satisfied TS Section 6.3 requirements and procedural compliance was acceptable.

**4. Requalification Training**

a. Inspection Scope (IP 69001, 92701)

To verify that operator requalification activities and training were conducted as required in the licensee's Reactor Operator Requalification Program, and that medical requirements were met, the inspectors reviewed:

- medical examination records
- active license status of all current operators
- written examinations given to operators for 2005 and 2006
- NSCR Operations Log Books Numbers 190-197, dated from October 8, 2005 to present
- logs and records of reactivity manipulations for 2006 through the present
- training lectures and records for selected individuals for the current and previous training cycles documented on:

- NSC Form 521, "Reactor Operations Two-Year Training Cycle," latest revision dated August 19, 1999
- NSC Form 522, "Reactor Operator Two-Year Training Records," latest revision dated January 31, 2005
- NSC Form 523, "NSC Reactor Operator Requalification/Training Lecture," latest revision dated February 3, 2005
- NSC Form 524, "SRO and RO Requalification Exam Cover Sheet," latest revision dated July 17, 2001
- Radiation Safety Board Reactor Requalification Program Audits dated June 20, 2003, and February 8, 2005
- Self Audit of 2004-2006 Requalification Training Cycle, dated November 6, 2006
- NSC SOP, Chapter X, "Reactor Operator Requalification Program," Rev. 2, dated March 2, 2001

b. Observations and Findings

The facility had several qualified and licensed Senior Reactor Operators (SROs) and several Reactor Operators (ROs). The inspectors noted that some of the ROs had recently completed a licensing examination for upgrade to SRO licenses. The results of this examination will be documented in a separate NRC report. 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 operational examinations were being administered as required. Written examinations were administered within the time frame as required. The inspectors 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. Medical exams for the various qualified operators were performed biennially as required.

During review of the lectures and examinations for the emergency preparedness and security topics, the inspectors noted that the same individual prepared the exam and was exempt from those sections for two consecutive years. The Requalification Program specifies that a waiver cannot be obtained for two consecutive years. The licensee noted that there was a severe shortage of manpower and the most careful method of conducting the training was to have the same individual prepare the lecture and exam for two consecutive years. The inspectors noted that due to the minimal safety significance, this constitutes a violation of minor significance that is not subject to enforcement action in accordance with the NRC Enforcement Policy §IV.B.

During review of the biennial medical exam records, the inspectors noted that one of the licensed operators may not have been fully examined according to the recommended guidance in ANS/ANSI 15.4. The medical examination record for the one individual indicated that there were no restrictions, however, the inspectors noted that the individual was wearing corrective lenses. The licensee indicated that they did not know if the doctor conducting the medical examination was aware of the individual

wearing corrective lenses or the requirement to evaluate the visual acuity of the individual. The licensee stated that they will investigate this issue further and will notify the NRC if any changes need to be made to the individuals operating license. This issue will be considered by the NRC as an Inspection Follow-up Item (IFI) and will be reviewed during the next inspection at the facility (IFI 50-128/2007-201-01).

c. Conclusions

The Requalification Program was generally being completed as required and records were being maintained.

**5. Surveillance and Limiting Conditions for Operation**

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 inspectors reviewed:

- NSC Reactor Operations Log Books Numbers 192 - 194
- surveillance and calibration data and records for 2006 and 2007 documented on the following facility forms:
  - NSC Form 532, entitled "TRIGA Reactor Pre-startup Checklist," completed April 4, 2007
  - NSC Form 546, entitled "Semiannual Fuel Element Temperature Measuring Channel Maintenance," completed September 7, 2006
  - NSC Form 547, entitled "Semiannual Linear Power Measuring Channel Maintenance and Surveillance," completed October 29, 2006
  - NSC Form 548, entitled "Semiannual Log Power Measuring Channel Maintenance," completed October 10, 2006
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-A, "General," Rev. 1, dated February 9, 2000
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-B, "Fuel Element Temperature Measuring Channel Maintenance and Surveillance," Rev. 1, dated February 9, 2000
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-C, "Linear Power Measuring Channel Maintenance and Surveillance," Rev. 3, dated August 19, 2003
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-D, "Log Power Channel Maintenance and Surveillance," Rev. 2, dated August 19, 2003
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-K, "Control Rod Inspection," Rev. 2, dated February 9, 2000
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-L, "Control Rod Drive Maintenance," Rev. 2, dated February 9, 2000
- NSC SOP, Chapter VI, "Maintenance and Surveillance of Support Systems," Section VI-A, "General," Rev. 1, dated February 9, 2000
- Texas A&M University NSC 2006 Annual Report, dated March 23, 2007

b. Observations and Findings

The inspectors 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. 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 inspectors satisfied the limits/parameters listed in the procedure or checklist.

c. Conclusions

The program for Surveillance and LCO confirmations was implemented in accordance with Technical Specifications Sections 3.0 and 4.0 requirements.

**6. Experiments**

a. Inspection Scope (IP 69001)

The inspectors reviewed selected aspects of the following in order to verify that experiments were being conducted consistent with TS Sections 3.6 and 6.4:

- potential hazards identification
- NSCR Operations Log Books Numbers 190-197, dated from October 8, 2005 to present
- NSC SOP, Chapter IV, "Procedures for Use of Experimental Procedures," Section IV-A, "Experiment Review and Approval," Rev. 1, dated January 25, 2002
- NSC SOP, Chapter IV, "Procedures for Use of Experimental Procedures," Section IV-G, "In-Pool Irradiations," Rev. 0, dated May 2, 1984
- Request of Services, In-Pool Irradiation 07-138, dated April 3, 2007
- Texas A&M University NSC 2005 Annual Report, dated March 30, 2006
- Texas A&M University NSC 2006 Annual Report, dated March 23, 2007

b. Observations and Findings

The inspectors observed an in-pool irradiation experiment which was approved and authorized by the NSCR Director and the Chairman of the RSB in accordance with TS 6.4(a) and SOP, Chapter IV, Section IV-A. The observed experiment was a routine experiment, denoted as in-pool irradiation #07-138. The in-pool irradiation experiment had been reviewed and approved by the Duty Health Physicist and SRO on duty as required and were conducted under the cognizance of the Reactor Supervisor. The licensee estimated the reactivity worth of the experiment and recorded it on the appropriate sheet. The inspectors observed the transfer of the experimental sample inside the pool to the storage location to allow decay for a specified period to limit radiation exposure. The inspectors also observed coordination with the control room to assure reactor response was consistent with reactivity worth estimates. The inspectors observed that the experiment was positioned and constrained as required.

The results of the experiments were documented on the NSCR Operations Log Book sheets and on the irradiation request forms. No new experiments had been initiated, reviewed, or approved since the last inspection.

c. Conclusions

The approval and control of experiments met TS and applicable regulatory requirements.

**7. Design Changes**

a. Inspection Scope (IP 69001)

In order to verify that any modifications to the facility were consistent with 10 CFR 50.59 and were reviewed as stipulated in TS Section 6.2, the inspectors reviewed selected aspects of:

- completed audits and reviews for 2005 and 2006
- RSB meeting minutes for December 20, 2005 and April 13 and July 14, 2006
- program for design changes reviewed in accordance with 10 CFR 50.59
- Modification authorization (MA) # 55, entitled, "Log Power Drawer Replacement," dated May 26, 2005
- MA # 58, entitled, "Safety Evaluation for the Facility Air Monitoring Channels - Modification and Upgrade," undated
- NSC SOP, Chapter I, "Policy and Procedures," Section I-B, "Purpose and Scope of the Review Mechanism," Rev. 0, dated February 1, 1985
- NSC SOP, Chapter I, "Policy and Procedures," Section I-F, "Review and Approval," Rev. 1, dated February 25, 2002
- Texas A&M University NSC 2005 Annual Report, dated March 30, 2006
- Texas A&M University NSC 2006 Annual Report, dated March 23, 2007

b. Observations and Findings

Through review of applicable records and interviews with licensee personnel, the inspectors determined that no significant changes requiring prior NRC approval had been initiated and/or completed at the facility since the last inspection. The procedure for change authorizations at the NSCR was required to be completed for all changes at the facility. The inspectors verified that administrative controls were in place that required the appropriate review and approval of all changes prior to implementation. The NSCR Director determines whether change authorizations need to be reviewed by the RSB based on the complexity of the project and the relation to the safety of the reactor and the staff supporting operations. MA forms are completed to inform operations personnel of operating information and to document NSCR activities which are not recorded in the operating log book. The MAs are normally approved by the director and the RSB chairman.

The inspectors also reviewed other evaluations and corresponding design change packages for various changes. From these reviews, the inspectors determined that the facility design change evaluations had adequate supporting documentation and

information. Additionally, the inspectors found that the 10 CFR 50.59 reviews and approvals conducted by the RSB for those that were required were focused on safety and met TS and procedural requirements. Post installation verification testing of the systems was thorough and adequately documented when completed. Procedure and drawing changes were included in the change packages and were consistent with TS and procedural requirements for facility changes.

The inspectors reviewed a design change for the modification and upgrade of the facility air monitor radiation level indications. The licensee previously had analog indications of air radiation levels in the control room and decided to change the indications to digital to increase the operability of the instruments as well as increased capabilities. The inspectors observed that the licensee discussed the modification between NSCR staff members and determined that the modification was in accordance with the appropriate requirements and was of minimal safety significance. The inspectors noted that the modification had been implemented and the appropriate analysis generated. The inspectors also noted that the MA forms have not been signed by the NSCR Director or the RSB. The licensee noted that review and signatures of the paperwork will be obtained at the next RSB meeting. The procedure for conducting MAs specifies that the staff may review the proposed change if it is judged by management to be of such insignificance that RSB review is not required. The licensee has stated that the threshold for obtaining prior RSB approval is dependent on the reactor safety envelope.

c. Conclusions

Based on the records reviewed, the inspectors determined that the licensee's design change program was being implemented as required.

**8. Committees, Audits, and Reviews**

a. Inspection Scope (IP 69001)

In order to verify that the licensee had established and conducted reviews and audits as required in TS Section 6.2 the inspectors reviewed selected aspects of:

- completed audits and reviews for 2003 and 2004
- RSB meeting minutes for December 20, 2005 and April 13 and July 14, 2006
- NSC SOP, Chapter I, "Policy and Procedures," Section I-H, "The Reactor Safety Board," Rev. 1, dated August 19, 2003
- NSC Reactor Operations RSB Audits, dated October 10 and November 11, 2005, January 26 and March 22, 2007
- NSC Reactor Operator Requalification Program RSB Audits, dated February 8, 2005, and April 27, 2006
- Texas A&M University NSC 2005 Annual Report, dated March 30, 2006
- Texas A&M University NSC 2006 Annual Report, dated March 23, 2007

b. Observations and Findings

The licensee has established the RSB for all activities at the NSCR. A charter is established in licensee procedures for the RSB and the inspectors verified that the council is following all aspects of the charter. The RSB membership satisfied the council's procedural rules. The RSB had meetings more frequently than required and a quorum was always present as required. Review of the minutes indicated the RSB provided guidance, direction and oversight, and ensured suitable use of the reactor. The minutes provided an acceptable record of RSB review functions and of RSB safety oversight of reactor operations.

Audits required by TS Sections 6.2.4 and 6.2.5 were performed by RSB members and met the applicable requirements. The audits appeared to be acceptable. The inspectors noted that the safety reviews and audits, and the associated findings, were acceptably detailed and that the NSCR staff were supportive of the audits. During review of the audits, the inspectors noted that the licensee immediately corrected any minor issues. The audits did not identify any issues related to the safe operation of the NSCR.

c. Conclusions

The RSB acceptably completed the review, oversight, and audit functions required by TS Section 6.2.

**9. Emergency Preparedness**

a. Inspection Scope (IP 69001)

To verify compliance with TS Section 6.2 and the licensee's Emergency Plan (E-Plan) for the TEES, Texas A&M University System NSCR Facility, Revision 2, dated December 14, 1999, the inspectors reviewed selected aspects of:

- NSC SOP, Chapter IX, "Emergency Preparedness," Section IX-A, "Emergency Classification Guide," Rev. 3, dated May 10, 2000
- NSC SOP, Chapter IX, "Emergency Preparedness," Section IX-B, "Evacuation Procedures," Rev. 1, dated December 19, 1997
- annual training records for the College Station Fire Department, the Texas A&M Environmental Health and Safety Department, and the College Station Medical Center
- offsite support and annual reconfirmation of letters of agreement between NSC and the College Station Medical Center and the unsigned 2006 annual agreement letter between NSC and the College Station Fire Department
- emergency drills and exercises for 2006 and 2007
- emergency response facilities, supplies, equipment and instrumentation
- RSB meeting minutes for December 20, 2005 and April 13 and July 14, 2006
- summary of emergency drill conducted on December 15, 2006 involving off-site participation written on January 8, 2007
- Radiation Safety Board Emergency Plan Audit, dated April 2, 2007
- Texas A&M University NSC 2006 Annual Report, dated March 23, 2007



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 licensee staff and the RSB audited and reviewed the E-Plan and Implementing procedures to effectively execute the E-Plan at least annually.

Through records review, and interviews with licensee personnel, the inspectors 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 with one exception. The annual offsite support letter of agreement with the College Station Fire Department had not been signed by the Fire Department. The licensee had records indicating that they were actively pursuing this issue. Based on a review of training records, it is evident that the College Station Fire Department continues to support facility operations even without a signed updated letter of agreement. This issue will be considered by the NRC as an IFI and will be reviewed during the next inspection at the facility (IFI 50-128/2007-201-02).

Communications capabilities with emergency support groups were tested during the biennial off-site drill December 15, 2006, and were acceptable. Emergency facilities, instrumentation, and equipment were being maintained and inventoried as required by E-Plan Sections 10.4 and 10.5. To ensure appropriate emergency response personnel are notified in the event of an emergency, the emergency notification roster was updated and verified quarterly as required by E-Plan Section 8.5.

The inspectors reviewed documentation of the latest off-site emergency response drill. The biennial drill required by the E-Plan had been conducted on December 15, 2006. The College Station Medical Center participated in the drill. A critique was held following the drill to discuss the strengths and weaknesses identified during the exercise and to develop possible solutions to any problems identified. The results of the critique were documented.

The inspectors 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 E-Plan.

**10. Maintenance Logs and Records**

a. Inspection Scope (IP 69001)

To determine that maintenance was being completed as required by the TS and applicable procedures, the inspectors reviewed:

- NSC Reactor Operations Log Books Numbers 192 -194

- surveillance and calibration data and records for 2006 and 2007 documented on the following facility forms:
  - NSC Form 546, entitled "Semiannual Fuel Element Temperature Measuring Channel Maintenance," completed September 7, 2006
  - NSC Form 547, entitled "Semiannual Linear Power Measuring Channel Maintenance and Surveillance," completed October 29, 2006
  - NSC Form 548, entitled "Semiannual Log Power Measuring Channel Maintenance," completed October 10, 2006
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-A, "General," Rev. 1, dated February 9, 2000
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-B, "Fuel Element Temperature Measuring Channel Maintenance and Surveillance," Rev. 1, dated February 9, 2000
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-C, "Linear Power Measuring Channel Maintenance and Surveillance," Rev. 3, dated August 19, 2003
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-D, "Log Power Channel Maintenance and Surveillance," Rev. 2, dated August 19, 2003
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-K, "Control Rod Inspection," Rev. 2, dated February 9, 2000
- NSC SOP, Chapter III, "Reactor Maintenance and Surveillance," Section III-L, "Control Rod Drive Maintenance," Rev. 2, dated February 9, 2000
- NSC SOP, Chapter VI, "Maintenance and Surveillance of Support Systems," Section VI-A, "General," Rev. 0, dated February 1, 1985
- Texas A&M University NSC 2006 Annual Report, dated March 23, 2007

b. Observations and Findings

A review of the reactor console and maintenance logs showed that they were being maintained as required and problems, if any, were being documented. This review also demonstrated that maintenance was being conducted consistent with the TS and applicable procedures. Maintenance activities ensured that equipment remained consistent with the Safety Analysis Report and TS requirements.

c. Conclusions

Maintenance was completed as required.

## 11. Fuel Handling and Movement

a. Inspection Scope (IP 69001)

To verify adherence to TS Sections 3.1.4, 3.3.1.b, 5.1, 5.2, and 5.5, the inspectors reviewed:

- fuel handling equipment and instrumentation
- NSC Reactor Operations Log Book Number 195
- fuel bundle movement records for October 2006

- selected fuel data and records for 2006 core replacement

b. Observations and Findings

The inspectors reviewed selected records for the October 2006 removal of the highly-enriched uranium core, and installation of the current low-enriched uranium core. The inspectors also verified that fuel locations were consistent with records. Records showed that TS required surveillances for refueling and fuel movement were completed to ensure controlled operations for the reactor core. All fuel movements were recorded in the reactor log and in the individual fuel element log sheets.

The inspectors observed 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 inspectors determined that fuel movements were conducted in accordance with TSs to authorized locations. Through records review and interviews with licensee personnel, the inspectors 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 conducted in accordance with the facility TSs.

## 12. Follow-up on Previous Open Items

a. Inspection Scope (IP 69001)

The inspectors reviewed the actions taken by the licensee following identification of IFIs, Unresolved Items (URIs) and Violations (VIOs) during previous inspections.

b. Observations and Findings

- (1) VIO 50-128/2005-201-01 - The licensee allowed an individual to direct licensed activities of other licensed operators without possessing a senior operator license (his license had expired).

NRC Inspection Report No. 50-128/2005-201, dated April 1, 2005, outlined the situation. During that inspection, the inspector noted that the licensee had operated the reactor under the supervision of an individual who did not possess a SRO license. The SRO license of this individual expired on September 16, 2004, in accordance with 10 CFR 55.55. On September 22, 2004, the individual had taken over SRO duties halfway through operations for the day and was in charge while the reactor was at power from 1402 to 1559 hours. After reviewing the circumstances surrounding this incident, it was determined that the licensee had failed to ensure that the individual was current in the requalification program and this ultimately resulted in the lapse of a qualified SRO on duty. The licensee had implemented a new planning calendar to help ensure that timeliness requirements

were met. The inspectors verified that several dates for requalification activities were already placed on the calendar.

While reviewing this issue, the inspectors noted that the licensee has implemented a surveillance tracking program, which confirms the completion of all timeliness requirements. The licensee has ensured that the qualified operators continue to meet the conditions of their operator licenses. This issue is considered closed.

- (2) URI 50-128/2005-201-02 - Failure to conduct audits of the operator requalification program within the 15 month time frame stipulated by the TS.

NRC Inspection Report No. 50-128/2005-201, dated April 1, 2005, outlined the situation. During that inspection, the inspector noted that the Requalification Program Audits were typically conducted by a member of the RSB. One of the items in the audit concerned the failure to conduct the audits in a period not to exceed 15 months. The audits for the requalification program were conducted 19 months apart on June 25, 2003 and February 8, 2005. The licensee had implemented the use of a new planning calendar in an attempt to prevent any future occurrences of this type.

While reviewing this issue, the inspectors noted that the licensee has implemented a surveillance tracking program, which confirms the completion of all timeliness requirements. The inspectors confirmed that the licensee has completed the recent requalification program audits within the required timeframe. The inspectors observed that the surveillance tracking program has placed the appropriate attention on the timely completion of the audits. However, the failure to conduct audits of the operator requalification program within the 15 month time frame stipulated by the TS constituted a violation of minor significance and is being treated as a minor violation not subject to formal enforcement action, consistent with Section IV of the NRC Enforcement Policy. This issue is considered closed.

- (3) URI 50-128/2005-201-03 - Failure to list the information for all shutdowns and scrams that occurred during 2003 in the 2003 Annual Report as required by TS Section 6.6.1.c.

NRC Inspection Report No. 50-128/2005-201, dated April 1, 2005, outlined the situation. During that inspection, the inspector noted that in 2003, shutdowns or scrams occurred on January 14, April 15, June 11, 13, and 24, September 3, October 15, and December 11. However, the information for each scram was not listed in the TAMU NSC 2003 Annual Report. All the appropriate data was given for the aforementioned scrams except for those that occurred on October 15 and December 11.

While reviewing this issue, the inspectors noted that the licensee has placed increased emphasis on the annual report containing the appropriate information. The licensee has implemented additional reviews to ensure that there are numerous opportunities for facility staff to comment on the annual report. The

inspectors confirmed that the licensee has included the appropriate information in the annual reports for 2005 and 2006. However, the failure to list the information for all shutdowns and scrams that occurred during 2003 in the 2003 Annual Report as required by TS Section 6.6.1.c constituted a violation of minor significance and is being treated as a minor violation not subject to formal enforcement action, consistent with Section IV of the NRC Enforcement Policy. This issue is considered closed.

- (4) URI 50-128/2005-201-04 - Failure to conduct audits of the emergency plan within the 15 month time frame stipulated by the TS.

NRC Inspection Report No. 50-128/2005-201, dated April 1, 2005, outlined the situation. During that inspection, the inspector noted that the Emergency Plan Audits were typically conducted by a member of the Radiation Safety Board. The audits for the emergency plans were conducted 19 months apart on June 20, 2003 and February 8, 2005.

While reviewing this issue, the inspectors noted that corrective actions have been taken and that annual emergency plan audits are now being conducted in a timely manner. The licensee has implemented a new computer based tracking system to track emergency plan audit commitments as well as other recurring regulatory commitments. However, the failure to conduct an emergency plan audit in 2004 within the required frequency constituted a violation of minor significance and is being treated as a minor violation not subject to formal enforcement action, consistent with Section IV of the NRC Enforcement Policy. This issue is considered closed.

- (5) URI 50-128/2005-201-05 - Failure to conduct annual training for the College Station Medical Center Staff as required.

NRC Inspection Report No. 50-128/2005-201, dated April 1, 2005, outlined the situation. During that inspection, the inspector noted that the training for the medical center staff was conducted 27 months apart on January 18, 2001 and April 21, 2003. While conducting the emergency plan audit on June 20, 2003, the licensee did discover the violation of the emergency plan requirement.

While reviewing this issue, the inspector noted that corrective actions have been taken and that training for the medical center staff is now being conducted in a timely manner. The licensee has implemented a new computer based tracking system to track emergency responder training as well as other recurring regulatory commitments. However, the failure to conduct required training for the medical center staff in 2002 within the required frequency constituted a violation of minor significance and is being treated as a minor violation not subject to formal enforcement action, consistent with Section IV of the NRC Enforcement Policy. This issue is considered closed.

- (6) IFI 50-128/2006-203-01 - Follow-up on the issue of ensuring that sufficient guidance and instruction on the proper handling of radioactive material was

included in procedures, Radiation Work Permits (RWPs), and in the training program.

NRC Special Inspection Report No. 50-128/2006-203, dated May 11, 2006, outlined the situation. During that inspection, the inspector noted that although the procedures and training modules gave guidance and instruction on the general use and handling of radioactive material, very little specific information was included on use of survey meters during processing samples and on remote handling of radioactive material and the use of tongs or other tools to provide distance and/or shielding from a potential source of radiation. Licensee personnel indicated that such issues were generally taught and discussed in class. It was also noted that facility staff members were not forbidden from using their hands for a brief period to perform some functions such as removing the inner sample vial from the outer vial if the dose rates allowed. The licensee was informed that the issue of ensuring that sufficient guidance and instruction on the proper handling of radioactive material was an area for improvement.

While reviewing this issue, the inspectors noted that the licensee instituted appropriate corrective actions and is maintaining a high state of awareness. A new procedure was issued in regards to the pneumatic irradiation experimental facility entitled, "Radioactive Materials Handling after Pneumatics Irradiation," dated April 1, 2006. The inspectors determined that all of the actions implemented will ensure the safe operation of this experimental facility. This issue is considered closed.

- (7) IFI 50-128/2006-203-02 - Follow-up on the licensee's review of their Event Notification procedure.

NRC Special Inspection Report No. 50-128/2006-203, dated May 11, 2006, outlined the situation. During that inspection, the inspector noted that because the licensee did not report the potential overexposure as required by the regulations, the licensee indicated that Event Notification to the NRC will be carefully evaluated for the future so that proper notifications are made in a timely manner. The licensee was informed that review of the Event Notification procedure would be followed by the NRC as an IFI and would be reviewed by the NRC during a future inspection.

While reviewing this issue, the inspectors noted that the licensee has reviewed this procedure and has posted several copies in prominent locations around the facility. The licensee indicated that the procedure is useful for any type of event requiring NRC notification and has instructed all of the staff in the use of this procedure. The inspectors determined that the procedure will ensure notification of the proper authorities. This issue is considered closed.

- (8) IFI 50-128/2006-203-03 - Follow-up on the licensee's corrective actions taken in response to the exposure event.

NRC Special Inspection Report No. 50-128/2006-203, dated May 11, 2006, outlined the situation. During that inspection, the inspector noted that the

licensee had taken various actions to improve their radiation protection program. In addition, the licensee has also taken or plans to take the following actions as a result of the exposure event:

- Hold a meeting for all NSC personnel to review the event and review the subjects of ALARA, radioactive material handling, and the use of tools, tongs, and beta shields.
- Plan to issue two finger ring badges to each NAA worker and send the finger rings to the vendor for processing every two weeks, instead of every month, for the next three months.
- Lock the storage cabinets containing the sources at the facility.
- Revise the training program on radioactive materials handling.
- Initiate a program for the NSC Director and/or the RSO to observe work practices on a regular basis to note good and bad practices and correct any problems noted.
- Review the SOP for radioactive material handling and consider special handling procedures in the laboratories.
- Event Notification to the NRC will be carefully evaluated for the future so that proper notifications are made in a timely manner.
- Reassess the dosimetry vendor's response and licensee needs for reliable and rapid information on potential overexposures.
- Work with the dosimetry vendor to ensure that E-mail can and will be sent following any indication of an overexposure after the vendor processes the OSL or TLD badges.
- Plan to permanently install a radiation detector inside the Fume Hood near the point where the pneumatic transfer system tube ends.

While reviewing this issue, the inspectors noted that the licensee has implemented all aspects of their proposed corrective actions. The inspectors determined that the continued emphasis on the proper handling of radioactive materials will ensure the health and safety of the staff at the facility. This issue is considered closed.

- (9) VIO 50-128/2006-203-04 - Failure to make adequate surveys to fully establish the radiological hazards that were present following the initial trial runs of vials containing plastic disks and failure to conduct surveys of the sample vials of irradiated material following the first indication of a possible overexposure on February 24, 2006, to determine the cause of the problem which lead to a failure to acceptably train and monitor workers regarding the handling of sample vials with their hands/fingers.

NRC Special Inspection Report No. 50-128/2006-203, dated May 11, 2006, outlined the situation. During that inspection, the inspector noted that The licensee determined that the root cause for this event was failure to follow procedure. The NRC determined that failure to conduct an acceptable survey of the sample material when the experiment was first initiated was the root cause of the problem that lead to a potential overexposure. The lack of initial surveys, as well as, allowing workers to handle sample vials which lead to improper sample handling by Worker A and failure to follow procedure were contributors to a

violation of the regulations. The licensee submitted a response to the Notice of Violation on May 24, 2006. In this response, the licensee has committed to reviewing and posting a copy of the procedure for reporting, observing work practices and talking to individuals on the safety aspects and correcting deficiencies, emphasizing the restrictions on material storage cabinet in the pneumatics laboratory by locking all cabinets, and installing a beta/gamma radiation detector in the pneumatics hood.

While reviewing this issue, the inspectors noted that the licensee has extensively researched the root causes of the incident and fully understands the significance of it. The licensee has implemented numerous corrective actions and the inspectors has confirmed that all proper actions have been completed. The licensee has committed to ensuring that no future incidents occur that are of a similar nature. This issue is considered closed.

c. Conclusions

The issues identified in previous inspection reports were closed.

**11. Exit Interview**

The inspectors presented the inspection results to licensee management at the conclusion of the inspection on April 4, 2007. The inspectors described the areas inspected and discussed in detail the inspection observations. No dissenting comments were received from the licensee. The licensee acknowledged the findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspectors during the inspection.



## **PARTIAL LIST OF PERSONS CONTACTED**

### Licensee Personnel

T. Fisher	Supervisor, Reactor Maintenance
P. Gondeck	Reactor Operator
A. Heinrich	Senior Reactor Operator
J. Hernandez	Reactor Supervisor
D. Reece	Director, Nuclear Science Center
J. Remlinger	Associate Director
L. Vasudevan	Radiation Safety Officer

## **INSPECTION PROCEDURES USED**

IP 69001:	Class II Non-Power Reactors
IP 92701	Follow-up

## **ITEMS OPENED, CLOSED, AND DISCUSSED**

### Opened

50-128/2007-201-01	IFI	Followup to verify the licensee evaluates whether one of the licensed operators requires additional conditions on the individuals operator license.
50-128/2007-201-02	IFI	Followup to verify the licensee updates the offsite support letter of agreement with the College Station Fire Department.

### Closed

50-128/2005-201-01	VIO	The licensee allowed an individual to direct licensed activities of other licensed operators without possessing a senior operator license (his license had expired).
50-128/2005-201-02	URI	Failure to conduct audits of the operator requalification program within the 15 month time frame stipulated by the TS.
50-128/2005-201-03	URI	Failure to list the information for all shutdowns and scrams that occurred during 2003 in the 2003 Annual Report as required by TS Section 6.6.1.c.
50-128/2005-201-04	URI	Failure to conduct audits of the emergency plan within the 15 month time frame stipulated by the TS.
50-128/2005-201-05	URI	Failure to conduct annual training for the College Station Medical Center Staff as required.
50-128/2006-203-01	IFI	Follow-up on the issue of ensuring that sufficient guidance and instruction on the proper handling of radioactive material was included in procedures, RWPs, and in the training program.
50-128/2006-203-02	IFI	Follow-up on the licensee's review of their Event Notification procedure.

50-128/2006-203-03	IFI	Follow-up on the licensee's corrective actions taken in response to the exposure event.
50-128/2006-203-04	VIO	Failure to make adequate surveys to fully establish the radiological hazards that were present following the initial trial runs of vials containing plastic disks and failure to conduct surveys of the sample vials of irradiated material following the first indication of a possible overexposure on February 24, 2006, to determine the cause of the problem which lead to a failure to acceptably train and monitor workers regarding the handling of sample vials with their hands/fingers

### **LIST OF ACRONYMS USED**

CFR	Code of Federal Regulations
E-Plan	Emergency Plan
IFI	Inspection Follow-up Item
IP	Inspection Procedure
LCO	Limiting Condition for Operations
MA	Modification Authorization
MW	Megawatt
NSC	Nuclear Science Center
NSCR	Nuclear Science Center Reactor
NRC	Nuclear Regulatory Commission
Rev.	Revision
RSB	Reactor Safety Board
RO	Reactor Operator
SOP	Standard Operating Procedure
SRO	Senior Reactor Operator
TAMU	Texas A&M University
TEES	Texas Engineering Experiment Station
TS	Technical Specifications
URI	Unresolved Item
VIO	Violation