APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-128/88-01 Operating License: R-83

Docket: 50-128

Licensee: Texas A&M University (TAMU)
Nuclear Science Center
College Station, Texas 77843

Facility Name: Nuclear Science Center (NSC) - TRIGA Reactor (1 Megawatt)

Inspection At: TAMU-NSC, College Station, Texas

Inspection Conducted: March 7-9, 1988

Inspector: LA Yandell 3/30/88
H. D. Chaney, Radiation Specialist, Facilities Date
for Radiological Protection Section

Approved: LA Yandell 3/30/88
B. Murray, Chief, Facilities Radiological Date
for Protection Section

Inspection Summary

Inspection Conducted March 6-9, 1988 (Report 50-128/88-01)

Areas Inspected: Routine, unannounced inspection of the licensee's radiation protection, emergency planning, nuclear material safeguards, and physical security programs.

Results: Within the areas inspected, five violations (failure to restrict personnel exposures, failure to provide personnel monitoring equipment, failure to control access to high radiation areas, paragraph 4.f; failure to perform safety analysis, paragraph 4.g; and failure to perform surveys, paragraph 4.h), and four open items (see paragraph 2) were identified.

DETAILS

1. Persons Contacted

TAMU

*D. E. Feltz, Director, Nuclear Science Center
*M. E. McLain, TAMU Radiation Safety Officer (RSO)
*J. A. Reuscher, Director, Research Reactor Programs
*C. M. Meyer, Senior Health Physicist (SHP), TAMU-NSC
J. E. Simek, TAMU Assistant Radiation Safety Officer
J. M. Ragan, Assistant Chief of Police, TAMU

Others

C. H. Yeager, Assistant Fire Chief/Training Officer, College Station, Texas

*Indicates those present at the exit interview on March 9, 1988.

2. Open Items

An open item is a matter that requires further review and evaluation by the inspector, including an item pending specific action by the licensee and a previously identified violation, deviation, unresolved item, and programmatic weakness. Open items are used to document, track, and ensure adequate follow-up on matters of concern to the inspector. During this inspection, the following open items were identified:

Number	Title	Paragraph
128/8801-06	Effectiveness of Health Physics (HP) Personnel at the NSC	4.a
128/8801-07	Neutron Dose Rate Instruments	4.d
128/8801-08	Hand and Foot Monitors	4.d
128/8801-09	Diving Activities	4.f

3. Followup on Previous Inspection Findings (92701 and 92702)

(Closed) Unresolved Item 128/8701-03: Potential Uncontrolled Release Path from Radioactive Effluent Storage Tank - This item was identified in NRC Inspection Report 50-128/87-01 and involved the installation of a manually operated valve and open piping between effluent tank No. 3 and the discharge isolation valve without evaluating the safety significance of the design change. This item has been determined to be an apparent violation of the requirements of 10 CFR Part 50.59. This violation is discussed in paragraph 4.g of this report.

(Closed) Violation 128/8701-02: Failure to Implement the Emergency Plan - This item was identified in NRC Inspection Report 50-128/87-01 and involved the failure to renew letters of agreement with offsite emergency support services. The NRC inspector reviewed the licensee's response to the Notice of Violation. The licensee's corrective actions appear to be adequate to prevent a recurrence of this violation and maintain current letters of agreement with fire and hospital support services.

4. Radiation Protection (40750)

The licensee's radiation protection program was inspected to determine compliance with the requirements of the Facility Operating License, Amendment No. 10; Technical Specifications (TS) 3.5, 3.6, 3.7, 4.5, 4.6, 6.1, 6.2.5, 6.3, 6.4, 6.6, and 6.7; 10 CFR Parts 19 and 20; the TAMU Emergency Plan (EP); and the recommendations of NRC Regulatory Guides (RG) 8.4, 8.7, 8.8, 8.10, 8.13, 8.14, and 8.26 and ANSI N323-1978.

The NRC inspector reviewed selected records, interviewed personnel, observed work practices, and performed independent radiological surveys.

a. Radiation Protection (RP) Organization and Controls

The RP program at the TAMU-NSC was supported by the TAMU Radiological Safety Office by the full-time assignment of two Radiological Safety Office health physicists, and a part-time graduate student. The NSC had developed internal RP procedures that were site specific in nature (training, radioactive material (RAM) control, instrument calibration, exposure controls, effluent monitoring, and radiological surveys).

TS 6.1.1 states that the responsibility for enforcing the rules for protection of NSC personnel against radiation rests with the NSC Director. TS 6.1.2(d) states that the RSO is responsible for providing "onsite" advice, technical assistance, and review in all areas related to occupational and radiological safety. The RSO is an ex-officio member of the Reactor Safety Board (RSB).

The NRC inspector reviewed the circumstances surrounding the reported over exposure of an experimenter which occurred while conducting neutron diffraction studies at the NSC during the period of August 20 through November 16, 1987. Further discussions of the overexposure are contained in paragraph 4.f.

The NRC inspector determined that the NSC SHP had briefed the experimenter on special dose reduction techniques to be employed during the neutron diffraction studies. The NRC inspector noted that, even though positive beam shut off devices were available, they were not used. The NSC SHP stated that he had observed the experimenter, on several occasions, walking through the neutron beam to adjust diffraction apparatus. On November 12, 1987, the licensee received notification from their dosimetry processor that a thermoluminescent dosimeter (TLD) exceeded 10 CFR Part 20.101 limits. As a result of

the reported overexposure, the experimenter was identified and advised by the Assistant Radiation Safety Officer "to not place himself in any areas where additional exposures could be received." The NRC inspector noted during a review of daily pocket dosimeter (PD) results for NSC personnel for December 1987 and January 1988 that the experimenter received an additional dose of approximately 129 and 119 millirem per month, respectively. The likelihood that the experimenter had worked in a radiation field was further evident when the processing of the official TLD badge at the end of the fourth calendar quarter 1987 showed the experimenter had received 30 millirems of exposure since the special processing of his original fourth quarter TLD on or about November 16, 1987. The licensee had not investigated the reason for the differences in the PD and TLD results.

The additional exposure and the failure to use adequate exposure reduction techniques during the neutron diffraction studies indicate that the advice and instructions provided by the facility HP and the RSO were not followed by the experimenter. The NRC inspector discussed with NSC management and the RSO at the inspection exit meeting his perceptions that the facility HPs were intimidated by NSC experimenters and that radiation protection requirements were not being aggressively enforced at the facility.

This is considered an open item pending licensee evaluation and action. (128/8801-06)

No violations or deviations were identified.

b. Qualifications and Staff Training

The NRC inspector reviewed the licensee's HP staff qualifications, radiation worker training and retraining, and training records.

No violations or deviations were identified.

c. Experiments

The licensee's program for control of experiments was inspected to determine compliance with TS 3.6.

The NRC inspector reviewed the following experiments:

Experiment No.	Title	Dated
E-3	Extraction of Radiation From Beam Tubes	02-22-85
E-17	Installation and Operation of a Reflector and Water Shutter for Beam Ports 1 & 4	02-22-85

E-20	D_2O Moderated Rotisserie Irradiation Device	07-27-87
E-21	Noble Fission Gas Product Irradiator/ Generator	Proposed

The NRC inspector reviewed the licensee's irradiation of gem stones (rough cut topaz). The gem stone irradiation and distribution operation appears to agree with the instructions contained in NRC Generic Letter 86-11, "Distribution of Gems Irradiated in Research Reactors."

No violations or deviations were identified.

d. Radiation Protection (RP) Instrumentation

The NRC inspector reviewed the licensee's inventory of RP instruments (portable dose rate, laboratory counters, air samplers, etc.), including functional checks, and calibration records.

A response comparison was made between the NRC's and the licensee's neutron dose rate instruments. As a result of this comparison, the NRC inspector determined that the licensee's instrument readings were approximately three times lower than the NRC's instrument. The NRC inspector discussed with the SHP the differences in the way the two instruments were calibrated. Both instruments had been calibrated within the last 6 months. The NRC's was calibrated by the National Bureau of Standards using a heavy water (D_2O) moderated Californium-252 source and the NSC's was calibrated with two, 10 curie Plutonium-Beryllium (Pu-Be) sources. The upper range calibration point for the licensee's instrument was 390 mrem/hr.

The comparison measurements were based on the response to a collimated (1 inch by 1 inch beam tube), gamma and thermalized neutron beam from the TRIGA reactor operating at 1 megawatt. The radiation levels in the beam were about 8 r/hr gamma and 12 rem/hr neutrons. The NRC instrument had an upper range of 20 rem/hr as compared to an upper range of 1 rem/hr for the licensee's instrument. Since the neutron radiation levels in the beam exceeded the upper range of the licensee's instrument, both instruments were positioned so that they were exposed to only a portion of the beam. Due to the positioning of the detectors and the lack of data on the neutron energy spectrum, it could not be determined whether or not the licensee's neutron instrument provided an accurate dose rate measurement for conditions at the NSC. However, industry practices indicate that the calibration of remmeters with a hard neutron spectrum such as that produced by a Pu-Be calibration source would cause an over response to a thermalized neutron spectrum. ANSI N323-1978, "Radiation Protection Instrument Test and Calibration," recommends that a calibration source or sources preferably should be of a radiation energy similar to that with which the instrument will be used and of a radiation exposure sufficient to

reach full scale of any instrument to be calibrated. However, the Pu-Be neutron calibration source used by the licensee produces neutrons in the 3-5 MeV range whereas the expected neutron energies associated with the beam port work would be in the KeV-eV range. In addition, the Pu-Be source did not have enough output to allow calibration on the upper range. This is considered an open item pending licensee evaluation of the suitability of their neutron dose rate measuring instrumentation, especially in the area of calibration and upper limits of response. (128/8801-07)

The NRC inspector noted on March 6, 1988, that the hand and foot monitors located at the entrance/exit to the Materials Handling Area (MHA), a contamination control area inside of the reactor building, showed high radiation background levels (600 to 800 counts per minute-cpm) that prevented the monitors from detecting low levels of contamination on a person. The MHA monitors were also noted to have a large buildup of debris on the foot monitors. There is another set of hand and foot monitors in the administrative wing of the facility that are used only when leaving the facility. The NRC inspector noted that these monitors were showing background levels of approximately 200 cpm and were used primarily to monitor personnel before leaving the site. The NRC inspector discussed with the NSC SHP the appropriateness of using the MHA monitors with such a high background. The SHP stated that these monitors (at the MHA) were for detecting very high levels of radioactivity and that the monitors used in the administrative wing would detect low levels of radioactivity. Considering that the monitors in the administrative wings are not routinely used during transit to and from the MHA and are primarily used prior to leaving the facility, there is a possibility that the spread of contamination could occur in the NSC without detection through routine facility surveys. This is considered an open item pending further licensee review of the suitability of the foot and hand monitors used at the MHA. (128/8801-08)

No violations or deviations were identified.

e. Area Radiation Monitors

The licensee's calibration and operational program for area radiation monitors was inspected for compliance with TS 3.5, 4.5, and 5.4.

The NRC inspector reviewed the licensee's records, procedures, and observed instrumentation to verify the annual calibration (1986-1988) and daily functional check programs.

No violations or deviations were identified.

f. Personnel Monitoring and Exposure Control

The licensee's program for personnel monitoring and exposure control was inspected to determine compliance with 10 CFR Parts 20.101, 20.102, 20.103, 20.104, 20.105, 20.201, 20.202, and 20.203.

The NRC inspector reviewed the personnel dosimetry records for NSC personnel (TLD and film badge) kept by the TAMU-RSO for 1987-88. The licensee's dosimetry processor was noted to have successfully participated in the National Voluntary Laboratory Accreditation Program. Records of extremity and whole body radiation exposures were properly documented and maintained on forms equivalent to those referenced in 10 CFR Parts 20.201 and 20.401.

Overexposure

The NRC inspector reviewed the circumstances surrounding the reported overexposure of an NSC experimenter that occurred while conducting neutron diffraction studies during the period of August 20 through November 16, 1987. In accordance with the requirements of 10 CFR Part 20.403, the NRC was informed by the licensee of the reported overexposure by letter dated December 10, 1987. During this inspection, the NRC inspector had the licensee recreate the conditions that existed during the overexposure. The NRC inspector's radiological surveys determined that the combined gamma and neutron radiation levels from the beam used in the neutron diffraction studies were approximately 20 rem/hr (approximately 8 r/hr gamma and 12 rem/hr neutron). The radiation beam is a 1 inch X 1 inch mixed gamma and thermalized neutron radiation beam as it exits the rectangular beam port. The unshielded beam traverses a 10-foot area and expands to a 6 inch X 6 inch diameter beam at about 10 feet from the beam port. The size and alignment of the beam remain fixed during the diffraction studies. The beam was located at about 48 inches above floor level. The location where the experimenter periodically crossed through the beam was approximately 8-10 feet from the face of the beam tube.

The licensee's dosimetry vendor reported to the licensee by telephone on Thursday November 12, 1987, that a TLD indicated an exposure of 2.370 rem for the third calendar quarter exposure period (July 1 through September 30, 1987). The licensee's RSO office identified the experimenter and on November 12, 1987, changed-out the individual's fourth quarter TLD and sent the fourth quarter TLD to the dosimetry vendor for special processing. The dosimetry vendor contacted the licensee on November 16, 1987, and reported that the TLD showed an exposure of 4.490 rem for the period October 1 through November 12, 1987.

10 CFR Part 20.101 states that during any calendar quarter, the total occupation dose to the whole body shall not exceed 3 rems. The failure to restrict personnel exposures to less than 3 rem per quarter is an apparent violation of 10 CFR Part 20.101 (128/8801-01).

Documents reviewed by the NRC inspector indicated that on or about September 9, 1987, the SHP conducted a study to determine the suitability of using borated paraffin bricks for temporary shielding during apparatus adjustments by the experimenter. This was approximately 19 days after the start of the experiment. The licensee discussed in their December 10, 1987, letter actions that were taken (completed on or about December 9, 1987) to reduce the likelihood of future overexposures while conducting neutron diffraction studies. The licensee installed a remotely operated water shutter and hoist operated beam shield that could be used to reduce the neutron beam dose rates to 500 mrem/hr. The gamma dose rate was reduced to 10 r/hr. The licensee also installed a beam catcher so that a path was provided for the experimenter to pass without being exposed to high dose rates. One radiation survey conducted on August 19, 1987, stated that personnel were instructed to stay away from the beam. These observations indicate that the licensee staff did not evaluate implementation of dose reduction techniques until after the start of the experiment.

Personnel Monitoring

10 CFR Part 20.202(a) requires that licensees provide appropriate personnel monitoring equipment. The NRC inspector's review of the personnel monitoring device provided to the experimenter identified two problems. First, the dosimeter did not have specific neutron monitoring capabilities. The dosimeter consisted of a 4-element (TLD-100) beta-gamma TLD badge. Even though TLD-100 will respond to neutrons, the badge was designed primarily as a beta-gamma monitoring device. The licensee questioned the dosimeter vendor to determine if it would be possible to establish the neutron dose from the glow curve read-outs. The vendor reported that the read-outs only indicate a total "rem" dose and that it was not possible to establish a specific neutron dose. The NRC inspector questioned the licensee as to why a reliable state-of-the-art neutron dosimeter was not provided to the experimenter. The licensee stated that the failure to provide specific neutron dosimetry was an apparent oversight.

Second, the NRC inspector identified several concerns regarding the effectiveness of the licensee's personnel monitoring program to properly monitor non-uniform radiation fields. NRC Information Notice 81-26, Part 3 provided information regarding personnel monitoring in non-uniform radiation fields. Since the reported overexposure involved a collimated beam, the possibility exists that the experimenter could have received an exposure higher than that reported by the dosimeter vendor. This is due to the fact that a single dosimeter located in the chest area may not record the highest dose received by the user as he traversed the beam.

The failure to provide appropriate personnel monitoring equipment is an apparent violation of 10 CFR Part 20.202. (128/8801-02)

High Radiation Areas

Facility Operating License No. R-83 requires that the licensee comply with the requirements of 10 CFR Part 20. 10 CFR Part 20.202(b)(3) defines a "High Radiation Area" as any area, accessible to personnel, in which there exists radiation at such levels that a major portion of the body could receive in any 1-hour a dose in excess of 100 millirem.

10 CFR Part 20.203(c) requires, in part, that licensee's shall post and control high radiation areas. Each entrance or access point to a high radiation area shall be: (1) equipped with a control device which shall cause the level of radiation to be reduced below that of a high radiation area; or (2) equipped with a control device which shall energize a conspicuous visible or audible alarm signal in such a manner that the individual entering the high radiation area and the licensee or a supervisor of the activity are made aware of the entry; or (3) maintained locked except during periods when access to the area is required, with positive control over each individual entry.

A review of licensee records indicated that on or about August 19, 1987, work was initiated to prepare reactor beam port No. 1 for use by an experimenter for neutron diffraction studies. This was the same person discussed in paragraph 4.f relating to an apparent overexposure. Beam port experiments are conducted in accordance with a standing experiment authorization (EA-3, "Extraction of Radiation From Reactor Beam Tubes"). This procedure did not specify any specific control to be implemented for high radiation area controls. In accordance with this procedure, the neutron diffraction studies were authorized by the reactor supervisor. The beam port No. 1 experiment area was cordoned off by use of a 4-foot high chain link wire fence that encompassed an approximate 18-foot by 16-foot area in the basement of the reactor containment. This experiment area was considered to be a small area of the larger basement area which contains other work areas and laboratories. Access to this area (basement) was normally via a single door that had a warning light over it that indicated high radiation operations were in progress. The neutron diffraction studies were conducted periodically between August 20 and November 16, 1987. The licensee's radiation surveys taken before and during the studies showed that there was access to combined gamma and neutron radiation dose rates above 10 rem/hr near the experiment apparatus. Periodic adjustments of the diffraction apparatus were performed by the experimenter and his assistant during the experiment. Other NSC personnel performing work within the basement area were not prevented from moving around the entire area. Beam port No. 1's lockable cover provided an alarm to the reactor control room whenever the port was opened. The fenced off area was equipped with an unlocked gate and was posted as a high radiation area. During neutron diffraction studies, continuous HP coverage was not provided by the NSC HP staff and personnel access into the posted area was not positively controlled. The NSC SHP stated that he had observed the experimenter inside the fenced off area several times and that the experimenter had

passed through the radiation beam on several occasions. The failure to provide positive access control over high radiation areas is an apparent violation of 10 CFR Part 20.203(c)(2)(iii). (128/8801-03)

Diving Activities

The NRC inspector also determined during the inspection that the licensee routinely performs underwater maintenance in the reactor pool with the use of divers. The licensee reviewed each dive and provided multiple personnel dosimetry to the divers. Due to the cleanliness and absence of significant radioactivity in the reactor coolant, the divers used swim trunks or wetsuits. Each diver was showered and whole body surveyed with low level beta/gamma sensitive radiation survey instruments prior to leaving the facility. The NRC inspector discussed with the licensee their RP program and determined that they provided adequate RP oversight, management review, and radiation protection. However, the NRC inspector requested that the licensee evaluate their program to determine agreement with the information in NRC Information Notice No. 82-32, "Overexposure of Diver During Work in Fuel Storage Pool." The NRC inspector noted that the licensee did not possess a suitable dose rate monitoring instrument for performing underwater dose rate surveys or a suitable alarming dosimeter for use by the divers during diving operations. Predive radiation surveys are performed with pocket dosimeters suspended in the area that the diver will be in during the work. This is considered an open item pending licensee evaluation of the radiation exposure control aspects of diving activities in the reactor pool. (128/8801-09)

No other violations or deviations were identified.

g. Environmental and Radioactive Effluents Releases

The NRC inspector reviewed the licensee's environmental monitoring program and reports jointly performed by TAMU-RSO and the State of Texas Department of Health, walked down the radioactive liquid waste (RLW) collection and discharge system (see Figure 12.1 of the TAMU Safety Evaluation Report - NUREG-0947), and reviewed RLW handling, sampling and counting procedures.

The NRC inspector reviewed the circumstances surrounding the release of approximately 30,000 gallons of potentially contaminated water from radioactive effluent storage tank No. 2 on June 14, 1987. Due to the failure of a domestic water supply valve in the reactor coolant demineralizer room, clean water was dumped to the room sump and was pumped to tank No. 2 for several hours causing it to overflow. The licensee performed an investigation, sampled the environment, sampled the effluent and determined that the spill did not exceed the radioactive effluent concentration limits of 10 CFR Part 20, Appendix B. Trace quantities of cobalt-60, manganese-54, and cesium-137 were found in the soil around the radioactive effluent

storage tanks. The NRC inspector obtained a soil sample from a overflow area near the storage tanks for gamma spectrum analysis by Region IV.

During the NRC inspection conducted during the period January 12-14, 1987, an unresolved item was identified (128/8701-03) regarding the performance of a safety review prior to the changing of the design of the radioactive liquid effluent storage tank No. 3. The licensee indicated that a record might exist on the design change and a review by the RSB. On March 9, 1988, the NRC inspector determined that the licensee had apparently not performed the required safety analysis for installation of a valve and pipe onto the tank discharge piping that could possibly provide an uncontrolled discharge path to the environment. The failure to perform a safety analysis of the design change for the radioactive waste storage system is an apparent violation of 10 CFR Part 50.59. (128/8801-04)

No other violations or deviations were identified.

h. Radiological Surveys

The NRC inspector reviewed radiation and contamination survey records regarding radiological surveys performed by the NSC HP staff to determine compliance with the requirements of 10 CFR Part 20.201, and the recommendations of industry standard ANSI/ANS 15.11-1977. The licensee's use of beta, beta/gamma and alpha counting of contamination smears was reviewed. The use of survey procedures, facility diagrams, survey frequency, and the results of completed surveys for 1987 and 1988 were reviewed. The NRC inspector also conducted confirmatory radiation and contamination surveys of the NSC facility.

During the review of the circumstances surrounding the possible overexposure of an experimenter (see paragraphs 4.a. and 4.f) for details), the NRC inspector determined on March 9, 1988, that the licensee's surveys and evaluation of the neutron diffraction study experiment did not meet the requirements of 10 CFR Part 20.201. Facility Operating License No. 4-83 requires that the licensee comply with the requirements of 10 CFR Part 20. 10 CFR Part 20.1(c) requires, in part, that each licensee make every reasonable effort to maintain radiation exposures as low as reasonable achievable (ALARA). 10 CFR Part 20.201(a) states, in part, that "survey" means an evaluation of the radiation hazards incident to the production, use, or presence of radioactive materials or other sources of radiation under a specific set of conditions. Also, 10 CFR Part 20.201(b) requires that licensees shall make or cause to be made such surveys as (a) may be necessary for the licensee to comply with the regulations in this part, and (b) are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

Licensee logs and radiation survey documents indicated that the gamma and neutron radiation dose rate surveys of the experiment area were performed on August 19, 20, and 27, 1987, and September 8, 1987. All of the surveys showed a very high dose rate (combined gamma and neutron radiation) for the unshielded neutron beam at beam port No. 1. Licensee survey results indicated that radiation levels associated with the beam were 10 r/hr gamma and greater than 1 rem/hr neutron.

The surveys performed by the NRC inspector indicated that the neutron radiation levels were about 12 rem/hr. Since the licensee's neutron survey meter had an upper range of only 1 rem/hr, the licensee was allowing personnel to work in high radiation areas without performing adequate surveys to evaluate the full extent of neutron radiation levels present.

This failure to perform adequate surveys is considered an apparent violation of 10 CFR Part 20.201(b). (128/8801-05)

In addition, the licensee's prework surveys did not evaluate the neutron energy spectrum for determining dose equivalents per the guidance in 10 CFR 20.4(c).

No other violations or deviations were identified.

i. Posting

The licensee was found to have posted information notices on availability of regulatory matter (licenses, 10 CFR's, operating procedures, etc.) and Form NRC-3 in several areas in the NSC.

No violations or deviations were identified.

j. Radioactive Material Control

The NRC inspector reviewed the licensee's controls over radioactive materials produced in the reactor and used to directly support reactor operation to determine compliance with the requirements of License Condition II(3).

No violations or deviations were identified.

5. Emergency Planning and Preparedness (40750)

The NRC inspector reviewed the implementation of the TAMU-NSC Emergency Plan which was approved by the NRC on November 1982, to determine compliance with 10 CFR 50.54(q).

The NRC inspector reviewed assignment of responsibilities, development of implementing procedures, emergency facilities, letters of agreement with local emergency services, inventories of emergency kits and first-aid

facilities, communications and recall lists, RSB audits of the EP and the licensee's critiques of drills. He reviewed also the EP training of NSC personnel; College Station, Texas, firemen, hospital and ambulance personnel; and TAMU Police Department personnel. The NRC inspector discussed with selected personnel their responsibilities during a reactor accident at the facility.

No violations or deviations were identified.

6. Materials Control and Accounting (85102)

The NRC inspector reviewed the nuclear materials inventory program to determine compliance with License Condition II.B.(2). The NRC inspector reviewed accountability procedures and practices, records and materials status reports for the period January 1987 through September 1987. The RSB audit of fuel accountability was reviewed. The material accountability and controls were found to be well implemented. A visual verification of the current fuel inventory showed 85 standard TRIGA fuel elements and 101 FLIP elements.

No violations or deviations were identified.

7. Physical Security (81421)

The NRC inspector reviewed the licensee's compliance with License Condition II.C(3) and the requirements of the NRC approved Physical Security Plan (PSP) Revision 1, dated June 1979.

No violations or deviations were identified.

8. Exit Interview

The NRC inspector met with the licensee representatives identified in Paragraph 1 of this report at the conclusion of the inspection on March 9, 1988. The NRC inspector summarized the scope and the inspection findings. On March 16, 1988, NRC, Region IV requested from the licensee the following commitments relative to the conduct of further neutron diffraction studies, investigation into the overexposure of the NSC employee, and current high radiation area controls for the NSC:

a. The Nuclear Science Center Reactor Safety Committee will perform a detailed review of the neutron diffraction studies being conducted at the NSC with the TRIGA reactor. This will be completed prior to resumption of the neutron diffraction study. This review should verify compliance with Facility Technical Specification and facility Standard Operating Procedure requirements, and ensure that appropriate dose reduction techniques (including health physics surveillance requirements) are incorporated into the experiment.

b. The Radiation Safety Office will conduct a review of the high radiation area control procedures/practices used at the NSC for

compliance with the requirements of 10 CFR Part 20.203(c). This review should evaluate controls over individual high radiation areas that are located within larger controlled areas, such as beam port work within the basement portion of the NSC.

c. Complete and issue by April 1, 1988, the results of your investigation into the possible overexposure of an experimenter during the fourth calendar quarter of 1987 while conducting neutron diffraction studies at the NSC.

The licensee's representatives agreed to the above and a Confirmatory Action Letter was issued to the licensee on March 17, 1988, as a follow-up to this discussion.