

APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

NRC Inspection Report: 50-274

Operating License: R-113

Docket: 50-274

Licensee: U.S. Department of the Interior  
Geological Survey (USGS)  
Denver, Colorado 80225

Facility Name: Geological Survey TRIGA MARK I Reactor (GSTR)

Inspection At: GSTR Site, Federal Center, Denver, Colorado

Inspection Conducted: November 10, 1988

Inspector:

R. D. Switt for  
Blaine Murray, Chief, Reactor Programs Branch

12/2/88  
Date

Approved:

[Signature]  
Richard L. Bangart, Director, Division of  
Radiation Safety & Safeguards

12/5/88  
Date

Inspection Summary

Inspection Conducted November, 10, 1988 (Report 50-274/88-01)

Areas Inspected: Special, announced startup inspection including reactor status, startup procedures, and radiation protection.

Results: Within the areas inspected, one violation was identified (failure to instruct individuals, paragraph 9).

Enclosures contain PROPRIETARY INFORMATION  
Decontrolled when separated from enclosures

DETAILS

1. Persons Contacted (USGS)

- \*L. Filiper, Branch Chief, Branch of Geochemistry
- \*H. Millard, Jr., Reactor Administrator
- \*T. DeBey, Reactor Supervisor (In Training)
- \*P. Hefler, Senior Reactor Operator (SRO)
- \*R. Perryman, SRO
- \*W. Smith, Health Physicist

\*Denotes those present at the exit interview on November 10, 1988.

2. Facility Status

In March 1987, the licensee identified several small leaks in the reactor pool liner caused by corrosion. The licensee attempted to correct the problem by patching the leaks, but were unsuccessful and the number of leaks increased. On September 24, 1987, the licensee notified Region IV that followup liner inspections had identified numerous new leaks. On October 2, 1987, reactor operations were terminated pending installation of a new liner.

The present status of the reactor is: (1) a new liner has been installed, (2) the core support and related systems have been reassembled and installed in the reactor, (3) with the exception of "B" ring fuel elements, the fuel elements have been placed in the core, and (4) the reactor is ready to operate and the licensee has requested authorization to restart the reactor.

No violations or deviations were identified.

3. New Liner

After leakage problems were identified with the original liner, the licensee awarded a contract to fabricate a new liner. The new liner was designed to fit inside of the original defective liner with a space (annulus) of about three inches between the two liners. The new liner was completed and delivered on October 5, 1988.

One problem was encountered during the installation of the new liner in that the liner fell off of the trailer on to the asphalt road surface as it was being unloaded. The licensee had video taped the unloading process. The NRC inspector viewed the tapes and also examined photographs of the liner surface that impacted on the asphalt. The affected liner area was located near the bottom of the liner and appeared to be about eight inches in diameter with a slight dent of about 1/8 - 1/4 inch deep. The licensee had radiographs and dye penetrant tests performed on the dented area. These tests did not identify any liner

integrity problems. The liner was also partially filled with water before installation in the reactor for the purpose of leak testing the liner; no leaks were identified.

No violations or deviations were identified.

4. Startup Procedure

The NRC inspector reviewed the licensee's proposed startup procedures. For the most part, the startup procedures are essentially the same procedures used during the previous routine operations. The following two specific items were discussed during the exit interview that relate to startup activities:

Radiation Levels

An annulus now exists between the old and new liners that could result in increased radiation levels at the top of the reactor. The licensee had installed additional polyethylene and lead shielding above the annulus for neutron and gamma dose reduction in an effort to maintain radiation levels at an acceptable level.

Pool Temperature

The capacity of the new liner is about 8,000 gallons compared to 8,900 gallons for the original liner. The decreased water level could result in increased pool water temperatures. The change in pool water volume could affect power calibration results.

The licensee agreed to inform Region IV regarding the above items after the first week of reactor operation or as soon as any problem areas were identified.

No violations or deviations were identified.

5. Reactor Operations

The NRC inspector reviewed the status of persons involved with operating the reactor. Currently, P. Helfer and R. Perryman have an active SRO license. Mr. T. DeBey joined the USTR staff in mid-1988 and is scheduled to take his SRO examination in December 1988.

The NRC inspector reviewed the operator requalification program in effect during the liner replacement outage. It was noted that P. Helfer, R. Perryman, and T. DeBey spent one week in training at the General Atomics, San Diego facility during September 1988.

No violations or deviations were identified.

6. Maintenance Logs and Records

The NRC inspector reviewed maintenance logs and records for the period September 1, 1987 - November 10, 1988. From the review of log entries

and interviews with USGS personnel, it was noted that problems were encountered concerning Quality Assurance activities associated with the fabrication of the liner. However, the licensee stated that all problem areas were properly resolved.

No violations or deviations were identified.

7. Reactor Operations Committee Meetings

The NRC inspector reviewed the Reactor Operations Committee (ROC) meeting minutes for meetings held on March 21, 1988, and August 22, 1988. It was noted that the ROC had an active role during the liner replacement outage. It was also noted that the committee met in early November 1988 and gave ROC approval to restart the reactor.

No violations or deviations were identified.

8. Facilities

The NRC inspector toured the reactor facility. In general, the reactor operating areas (Rooms 149 and 150) were clean and well maintained. However, the Radioisotopes Laboratory (Room 151), which is part of the reactor facility, was found to be in need of an extensive house cleaning effort. The room was cluttered and appeared to be used as a waste storage area for irradiated samples and reactor components along with sealed sources on the USGS byproduct material license. Room 151 also contained radioisotope fume hoods that were not well maintained. Formal inventory and labelling procedures had not been established for radioactive material located in Room 151. This is considered an open item pending licensee action to clean up Room 151. (274/8801-02)

No violations or deviations were identified.

9. Radiological Controls

Job Coverage

The NRC inspector reviewed the radiological controls program implemented during the liner replacement work. The liner replacement work involved some extensive health physics activities such as: (1) removal of the fuel elements from the core and placement in fuel storage wells at the beginning of the liner replacement work and replacing the elements after installation of the new liner, (2) removal and replacement of the core support structures, and (3) transfer of the pool water.

One job that demonstrated good planning and health physics control by the licensee involved the transfer of the old Lazy Susan (sample holder), which had been removed from the core and attached to the liner in a temporary storage position, into Room 151. Radiation levels associated with the irradiated portion of the Lazy Susan were estimated to be approximately 350 R/hr measured at one foot. The physical dimensions of

the Lazy Susan necessitated that the component be transferred in an unshielded condition from the pool (Room 149) to the Radioisotope Laboratory (Room 151).

The licensee's personnel monitoring records indicated that the maximum exposure received by any individual between October 2, 1987, and November 1, 1988, was less than 100 mrems.

No violations or deviations were identified.

#### Pool Water

During the liner replacement work, some of the reactor pool water was released into the sanitary sewer system. The NRC inspector reviewed the radionuclide analyses performed on pool water samples before release and determined that the radioactive material concentrations were well below 10 CFR 20, Appendix B limits.

No violations or deviations were identified.

#### Radioactive Material Labeling and Control

As discussed above, the licensee had placed an old Lazy Susan device in a water storage pit located in Room 151 for long term storage. The pit is about 4' x 4' x 15' deep and is surrounded by a separate 10' x 10' enclosure with a single unlocked door. The bottom portion of the device, which was located near the active core, had become activated through several years of use. The estimated radiation levels from the activated portion were approximately 350 R/hr at one foot. A sample transfer tube was attached to the Lazy Susan and extended from the core up to the reactor bridge work area. The transfer tube that extended up from the core was not activated and indicated only background radiation levels.

The NRC inspector noted that the approximately 10 feet of water in the storage pit provided adequate shielding for the activated portion of the Lazy Susan.

The NRC inspector noted that the nonirradiated portion of the sample tube that extended out of the pit, and was accessible to personnel working in Room 151. It was noted that Room 151 was posted and controlled as a radioactive materials and radiation area. However, there were no posting, labelling, or other identifying information to warn personnel as to the location of the Lazy Susan and the associated radiological hazards.

This is considered an open item pending licensee action to identify radioactive materials stored in Room 151. (274/8801-03)

No violations or deviations were identified.

#### Instructions to Workers

The licensee's training program was reviewed to determine compliance with the requirements of 10 CFR 19.12 and the recommendations of

Regulatory Guide 8.13. Through interviews and the review of personnel dosimetry records, it was determined that there has been a high turnover rate among the personnel providing janitorial service at the reactor facility. During certain periods, it has appeared that new janitorial personnel were assigned to the reactor facility on a weekly basis. Janitorial workers were allowed access inside the restricted area. Once inside the restricted area, these workers had access to the reactor console area (Room 150), the reactor bay area (Room 149), and the Radioisotope Laboratory (Room 151).

The licensee stated that there is an attempt to provide a brief orientation for new workers. However, the turnover rate is so frequent that there is no assurance that all workers allowed access into the reactor facility received the instruction specified in 10 CFR 19.12. The problem is compounded by the fact that most of the workers are recent immigrants to the United States and have only a limited understanding of English. During the review of an emergency exercise critique for an emergency exercise conducted July 7, 1988, the NRC inspector noted that a janitorial worker refused to leave the area during an evacuation of Building 15 which contains the reactor facility.

10 CFR 19.12 requires that all individuals working in or frequenting any portion of a restricted area shall be kept informed of the hazards due to radiation present in the area. The failure to instruct workers of radiation hazards present in the work area is an apparent violation of 10 CFR 19.12. (274/8801-01)

No deviations were identified.

10. Physical Security Plan

*Removed for security reasons*

*Tom DeBy 4/19/07*

No violations or deviations were identified.

11. Exit Meeting

The NRC inspector met with the licensee representative denoted in paragraph 1 on November 1, 1988, and summarized the scope and findings of the inspections as presented in this report. Licensee representatives acknowledged their understanding of the inspection findings.