GA Technologies

In Reply
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February 27, 1986

Mr. Cecil O. Thomas, Chief
Standardization and Special Projects Branch
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Facility License R-38; Docket 50-89
Submittal of Annual Report (3 copies)

Dear Mr. Thomas:

The following is an annual report required by the applicable Technical Specifications of the Mark I TRIGA reactor. The present report covers the operation for the year 1985. The numbered sections below are those referred to in Section 9.6e of the Technical Specifications.

Part I

A brief narrative summary of (1) operating experience (including experiments performed), (2) changes in facility design, performance characteristics and operating procedures related to reactor safety occurring during the reporting period, and (3) results of surveillance tests and inspections.

1. The Mark I reactor was operated during the year to provide 287 pulses (10703 to 10989) and numerous steady-state irradiations for experiments. The operations included: activation analysis, neutron radiography, King furnace high-temperature studies of reactor fuel, numerous irradiations of samples or pieces of equipment, training and requalification exercises for operator trainees, and testing of commercial instrumentation.

2. No changes in facility design, performance characteristics, or operating procedures related to safety occurred during this reporting period.

3. The surveillance tests and inspections were performed as required by Sections 3.0, 4.0 and 5.0 of the Technical Specifications. Some results are presented below.

Fuel Surveillance

The fuel was inspected visually and for bending and length changes December 16-17, 1985. All elements except two were satisfactory. These two elements, Nos. 1671 and 3173, were snug or tight in the 1/32-inch bend jig. They both passed the 1/16-inch bend jig test.

A020
1/0

However, both were difficult to remove from the core and do not slide into some core positions. These two elements have been removed from further service.

Control Rod Surveillance

The visual inspection for deterioration was conducted December 18, 1985. All control rods were found to be in satisfactory condition.

Pulsing System Surveillance

The mechanical components of the pulsing system (pulse control rod, air piston, lip seal, anvil, and accumulator) were inspected, cleaned as required, lubricated, and reassembled on July 1, 1985 and December 18, 1985. A rubber boot in the shock absorber was found to have a crack. The rubber boot is not essential but will be replaced in the future.

Reactor Safety Systems

As specified in the Technical Specifications, Channel Tests of the reactor safety system channels, Channel Calibrations of the Power Level monitoring channels, Calibration of the Temperature measuring channels, Channel Checks of the power-level measuring channels, and Channel Checks of the fuel-element temperature measuring channels were performed. The tests were performed at least as often as required, and the results were satisfactory. In no case was a required safety channel scram found to be operating outside the specified safety limits. The reactor power-level monitoring channels were calibrated at least monthly during the reporting period, the last in the year on December 19, 1985. Three of these monthly tests required changes in the calibration of at least one of the five channels by an amount greater than 5%.

The monitor and survey systems were under surveillance during the reporting period. The frequency of calibrations was as indicated below.

Continuous Air Monitor

Alarm setpoints were checked daily. The system was calibrated semiannually with three U-235 sources in front of detector (600 cts/min, 1500 cts/min, 5000 cts/min).

Eberline Area Monitors

Operation was checked daily; alarms were activated in response to a source every two weeks; calibration was performed semiannually with a 4mCi Cs-137 source.

Part II

A tabulation showing the energy generated by the reactor (in megawatt-hours).

The energy generated in 1985 by the Mark I was 48,143.9 kilowatt-hours (48.14 megawatt-hours).

Part III

The number of emergency shutdowns and inadvertent scrams, including the effect, if any, on the safe operation of the reactor, and the reasons for any corrective maintenance required, if any.

Seven unplanned scrams occurred during the year. None had essential safety implications. The details are as cited below.

1. April 10, 1985. A scram from full power was caused by flux tilt in the core during a neutron radiography run. The operator neglected to set the auxiliary power channel to full scale as is usually done during this operation. As a result the flux tilt scrammed this channel. No safety implication.

2. May 16, 1985. A less experienced RO (licensed) caused a scram on Percent Power (1) during a neutron radiography run by not realizing the effect of flux tilt. Operator error; no safety consequence.

3. May 17, 1985. Scram from 250 KW when operator noticed that Fuel Temperature #1 was reading "0". By jiggling the TRIP TEST switch, he inadvertently caused a scram. Even without this channel, two other temperature channels were functioning correctly. No safety implications.

4&5. May 24, 1985. A less experienced RO (licensed) caused a scram from full power by not taking account of the fluctuation in power reading caused by a rotating Lazy Susan (sample irradiator). A second scram on the same channel occurred on restart. Operator error. No safety implications.

6. May 31, 1985. The Magnet ON lamp burned out. This caused the REG ROD to scram automatically. The light bulb was replaced and operation returned to normal. No safety implication.

7. August 22, 1985. The Fuel Temperature #1 thermocouple opened during a run, causing the FT #1 temperature meter to go full scale causing a scram. There was no safety implication because adequate additional temperature channels were in use.

Part IV

Discussion of the major maintenance operations performed during the period, including the effect (if any) on the safe operation of the reactor, and the reasons for any corrective maintenance required.

1. Maintenance was required on the electronic system in 1985. The following sections detail these efforts.

   a. March 21, 1985. It was observed that the linear recorder indication shifted when changing from MANUAL to AUTO mode. The trouble was traced to wiring that had become loose and was shorting the negative voltage post to the ground terminal post. No effect on Safety Channels.

   b. June 14, 1985. The rod position indicators for REG and SAFE rods failed. The old type indicators, which are no longer available, were replaced by the new type installed on the Mark F console last year. Improved readability resulted from use of the new type rod position indicator.

   c. August 26, 1985. The TRIP TEST switch failed for Fuel Temperature #1. On September 10, 1985 the TRIP TEST switch was replaced with a new unit. There were no safety implications since adequate other temperature channels were in use.

2. Maintenance was required on the control rod drives in 1985. The details follow.

   a. February 4, 1985. The drive shaft pinion gear drift pin fell out making it impossible to drive the rod up or down. The rod, of course, was properly in the core. No safety implication.

   b. March 4, 1985. The SHIM Rod drive was replaced with a spare. This unit was reworked to eliminate intermittent problems observed recently. This rod drive was reinserted in the system on August 7, 1985, and tested acceptably. There were no safety problems associated with this maintenance, only annoying operational problems.

   c. March 4, 1985. Reinserted a drift pin of proper size in Reg Rod pinion gear. See a. above.

   d. May 28, 1985. The Reg Rod Magnet winding opened. The Magnet head was replaced with a spare unit. A replacement spare was ordered.

   e. September 10-24, 1985. The SHIM rod drive assembly was replaced with a repaired spare which had incorrectly wired limit switches and motor drive wiring. A number of wiring repairs were made and the working unit was finally installed.

3. Maintenance on the fuel temperature instrumented fuel elements was performed in 1985. The details follow.

   a. August 22, 1985. The last of the three thermocouples in TC 5927 failed. In the future, TC 5927 will be used for core excess reactivity adjustment in the "F" ring. Element TC 2122 will be used for FT (fuel temperature) #1 safety channel. No safety implication.

   b. August 28, 1985. A new TC fuel element (TC 6581) was installed This was used for FT #1 Safety channel. No safety implication.

4. Maintenance was performed on the radiation monitoring system in 1985. The details follow.

   a. January 18, 1985 - The AC cable to the Mark I CAM was replaced. This resulted in the use of an adequate plug size and less heating at the plug. No safety implication.

   b. February 7, 1985. GEL batteries were installed as replacements in the RM-14 units for AIR and WATER monitors. No safety implication.

   c. October 24, 1985. The fan belt on the ventilation fan motor for Mark I reactor room system was replaced.

Part V

A summary of each change to the facility or procedures, tests, and experiments carried out under the conditions of Section 50.59 of 10 CFR 50.

No new applications of 10 CFR 50.59 were made during 1985. The 50.59 application discussed in last year's Annual Report has yet to be modified as needed. The new digital console is still in development by ELECTRONICS and has not yet been tested at the TRIGA facility beyond the tests already described last year and which continued into 1985.

Part VI

A summary of the nature and amount of radioactive effluents released or discharged to the environs beyond the effective control of the licensee is measured at or prior to the point of such release or discharge.

During the calendar year 1985, 0.09 curies of Argon-41 were released from the facility to the atmosphere.

All liquid and solid wastes are transferred to GA's SNM-696 Licensed Waste Processing Facility for ultimate disposal by an authorized disposal vendor.

Part VII

A description of any environmental surveys performed outside the facility.

There have been no significant changes to the Environmental Surveillance Program during 1985.

Part VIII

A summary of radiation exposures received by facility personnel and visitors, including the dates and time of significant exposure, and a brief summary of the results of radiation and contamination surveys performed within the facility.

Facility Personnel Whole Body Exposures for the Year 1985 (Rem):

Number of Employees Monitored	High	Low	Average
18	0.485	0.025	0.228

Nonfacility GA Personnel Whole Body Exposures for the Year 1985 (Rem):

Number of Employees Monitored	High	Low	Average
81	0.700	0.000	0.019

The majority of these exposures were received at other facilities at the GA site.

Contractor/Customer Personnel Whole Body Exposures for the Year 1985 (Rem):

Number of Persons Monitored	High	Low	Average
96	0.760	0.000	0.053

Visitor Whole Body Exposures for the Year 1985 (Rem):

Number of Persons Monitored	High	Low	Average
7	0.000	0.000	0.000

Routine Wipe Surveys

High Wipe	227	β dpm/100 cm^2
Average Wipe	<25	β dpm/100 cm^2
Low Wipe	<25	β dpm/100 cm^2

Routine Radiation Measurements

High	150	mR/hr @ 1 foot
Average	2	mR/hr @ 1 foot
Low	0	mR/hr @ 1 foot

Should you desire additional information concerning the above, please contact me at:

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Very truly yours,

Keith E. Asmussen

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cc: John B. Martin, U.S. NRC, Region V