



TRIGA Reactors Facility  
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November 5, 1990

Document Control Desk  
U.S. Nuclear Regulatory Commission  
One White Flint North  
11555 Rockville Pike  
Rockville, Maryland 20852

Subject: Docket No. 50-89: Reactor Facility License No. R-38; Reportable Occurrence

Gentlemen:

At approximately 1400 hours on Monday, October 29, 1990, General Atomics (GA) notified the Region V office of the Nuclear Regulatory Commission of an occurrence involving GA's TRIGA Mark I reactor (License R-38), which had occurred earlier that day. This report was made to Mr. Greg Yuhas - with a follow up by a report on October 30 to the regional office - by Dr. Junaid Razvi, Physicist-in-Charge (PIC) of GA's TRIGA Reactors Facility, and Dr. Keith Asmussen, Manager, Licensing and Nuclear Compliance. While the occurrence may not have been a "reportable" occurrence, we nevertheless reported it to the regional office to keep the commission fully informed of the problem.

Accordingly, the circumstances of the event are described herein and submitted within 10 days as required by the applicable license.

### Sequence of Events

After making a core excess reactivity measurement as the final step in the completion of the daily startup checklist procedure, the operator decided to drop rods individually to shutdown, in order to obtain rod drop times on each rod. Measurement of rod drop times is part of the checks of various reactor systems performed on a weekly basis, and the operator was attempting to take this data upon completion of the core excess measurement in order to complete part of the weekly checklist requirement. The sequence of events is adequately described by the operator's logbook entry:

"Manually scrambling individual rods to measure drop times"

"0235 TR - .96 sec"  
Shim 1 - 0.94 sec"  
Shim 2 - 0.67 sec"  
Reg - 1.29 sec\*"

"\*rod will not scram via magnet switch - must use manual scram"

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The inability of the regulating rod to drop as described above was subsequently reported to the Associate PIC at 0730 the same day, and no subsequent reactor runs were performed by the operator.

Analysis and troubleshooting revealed that the problem was not in the magnet current interrupt switch, but in the control rod drive hardware. Part of the coupling assembly connecting the control rod to the drive mechanism was not properly aligned, which caused the rod drop times to be longer than expected. When the magnet current interrupt switch - which is not part of the scram loop on the reactor, but is used for momentary interruption of magnet current to drop individual rods - was used to drop the rod, the momentary interruption was inadequate to free the rod from the magnet, hence the rod did not drop. However, when the scram loop was opened by using the manual scram switch, magnet current was cut to the electromagnets, and the rod fell, although a fraction of a second (but noticeably) slower than other rods. Note however that the minimum scram time of two seconds or less continued to be met.

We then proceeded to have the control rod drive and associated connecting hardware removed for further troubleshooting and repair.

#### Analysis

In June, 1990, the control rod drives on the Mark I reactor were upgraded to new stepping motor (DC) drives as part of hardware upgrades that were being performed on the reactor. To make this changeover, a new upper connecting rod was fabricated, which is coupled to the original piston rod via flange connectors (see attached drawings).

Upon removal and a careful evaluation of this assembly for the regulating rod, it was found that the old piston rod section had a noticeable bend ("wobble") in it when compared to the upper connecting rod. This wobble had a measured eccentricity of 1/4-inch (1/2-inch overall side to side motion). The cause of the wobble was found to be a slight misalignment at the flange section of the piston rod. This misalignment caused the lower connecting rod (piston rod) to slightly rub on the teflon washer located in the bottom of the barrel assembly, which slightly impeded the free motion of the rod.

#### Corrective Action

The problem was corrected by machining the flange surfaces of both the piston and connecting rods to remove approximately 10 mils of metal from the surfaces. Doing this reduced the wobble to an eccentricity of about 10 mils (20 mils side to side motion), which is acceptable for proper control rod action.

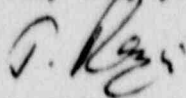
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The poison section of the control rod was removed from its guide tube and checked for rub marks and scratches beyond those already documented from the previous inspection. No signs of scratching or additional rub marks were noted. The control rod assembly was reassembled, rod drop times and rod worth remeasured, and normal reactor operations were resumed at approximately 1500 on Tuesday, October 30, 1990. The installation was reviewed, inspected and accepted by the PIC and the Safety Committee prior to resumption of operations.

While visual inspection of the other control rods and measurement of rod drop times do not indicate any type of problems with the other two standard control rods, they will be carefully examined for the above symptoms during the scheduled core inspection in December, 1990.

We trust you will find the above description of the occurrence and corrective actions satisfactory. If you have questions concerning this report, you may contact me at (619)455-2441.

Very truly yours,



Junaid Razvi, Director  
Radiation Services and  
Physicist-in-Charge

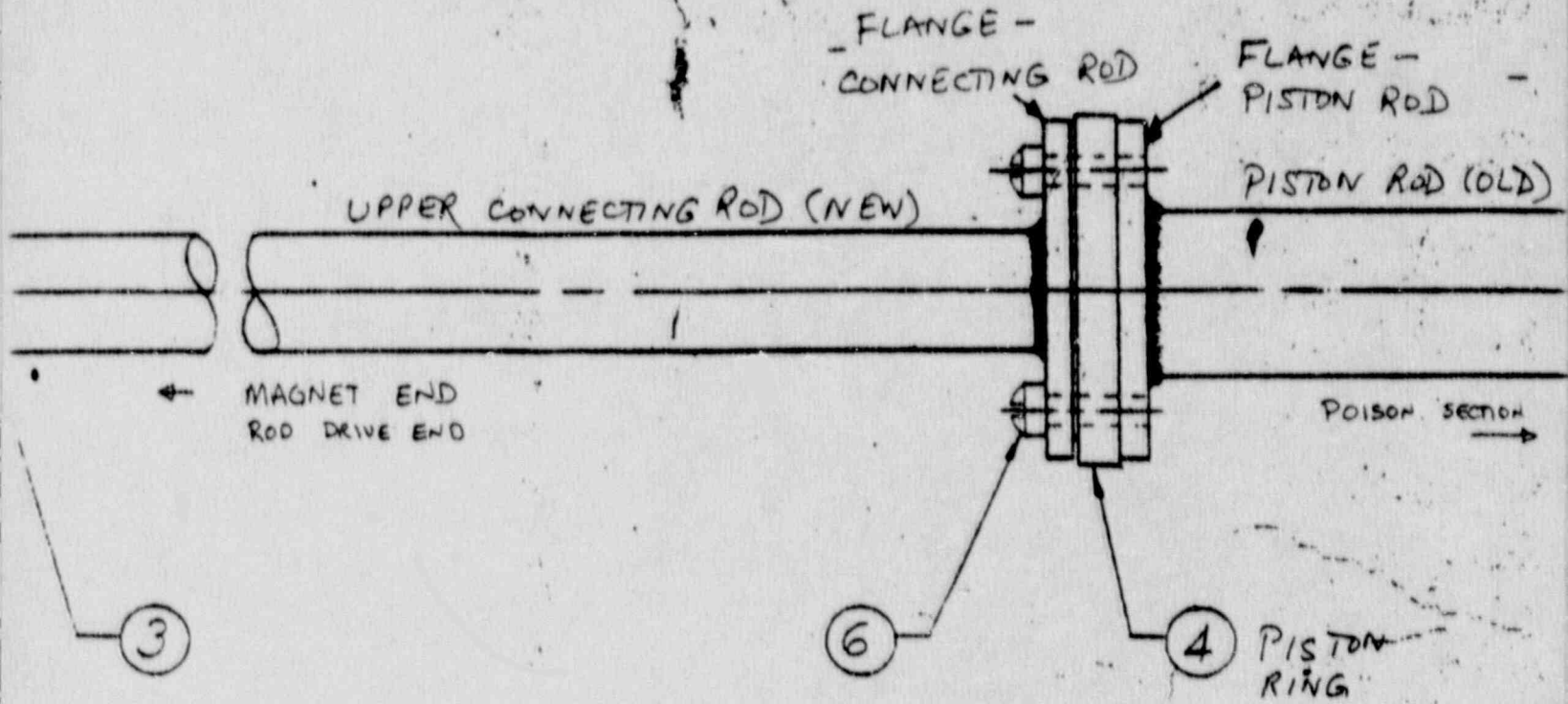
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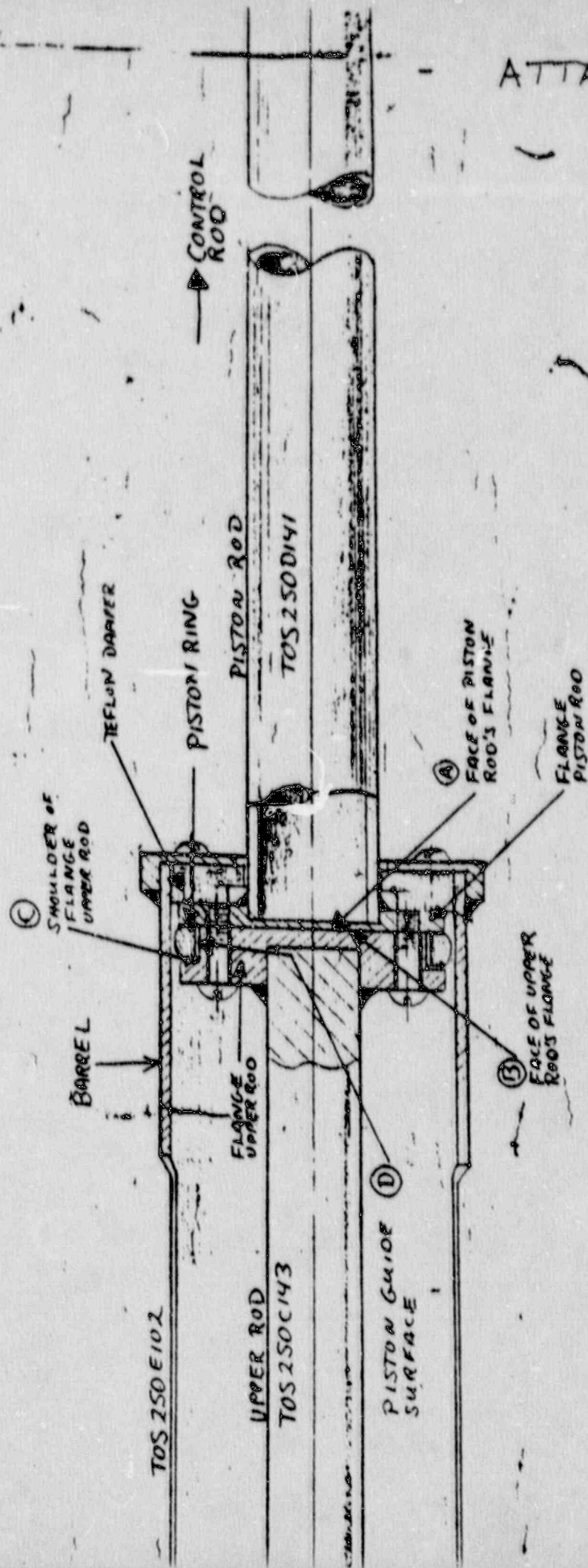
cc: Mr. John B. Martin, Administrator, NRC Region V

REG ROD CONNECTING ROD ASSEMBLY

ATTACHMENT 1

- [GA DRAWING TDS250D -140 ASSY.]





- UPPER ROD & BARREL ASSEMBLY