



December 15, 2024

2024-012

Document Control Desk
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Washington, DC 20555-0001
Rockville, MD 20852

Subject: Submission of Technical Specification Required Report for Event Notification 56595,
Identification of Degraded Fuel Element During 2023 Maintenance Outage; License
Number R-83 Docket No.: 50-128

During the routine maintenance outage of June 2023 at the Nuclear Science Center Reactor (NSCR) at the Texas A&M Engineering Experiment Station (TEES), a fuel element did not pass the standard inspection testing for length and bend. In accordance with Technical Specification (TS) 3.1.5.2, the fuel element is considered damaged and must be removed from the core if it does not meet the four conditions listed. In this case, the degraded fuel element was determined to be slightly swollen, as listed in TS 3.1.5.2.d. As the fuel is defined as “damaged” by TS 3.1.5.2, this meets the definition of “Reportable Occurrence” as defined in TS 1.3.

In accordance with TS 6.6.2, a report was made to the U.S. NRC in accordance with TS 6.7.2. The event was called in to the Headquarters Operations Office which assigned it Event Number 56595. Enclosed is the follow-up report required by TS 6.7.2.1. The Facility acknowledges that the report was not submitted within fourteen days of the event, as required in TS 6.7.2.1.

Should you have any questions, or require further information, please contact me by phone at 9779.845.7551, or email at jere@tamu.edu.

Sincerely,

Jere H. Jenkins
Director—Nuclear Engineering & Science Center

ENCLOSURE

Follow-up Report for Event Notification

Event Number: 56595
Facility: Texas A&M University (TAMU)
Notification Date: 06/29/2023
Notification Time: 10:20 ET
License No.: R-83
Docket No.: 050-00128
Subject: Degraded Fuel Pin

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1 Summary

During the routine maintenance outage and technical specification (TS) required fuel inspection (TS 4.1.5.1), a fuel element (Element 11394 in Bundle 62, Northwest position) did not pass the standard surveillance tests of length and bend. The cause of the failure¹ to pass the surveillance testing was determined to be swelling, which did not allow the element to enter the General Atomics provided go/no-go gauge.

As required by TS 4.1.5.2, when a fuel element is found to not pass the surveillance testing, the entire core—or every element—must be inspected. There were no other failures found during the inspection. Primary coolant radioassays did not detect any fission products in the pool water, indicating that the cladding was intact.

A fuel shuffle plan was created, moving Element 11422 from its core location to replace the “failed” element, and a previously unused spare (Element 11448) was placed in F2NW. A 50.59 analysis was performed of the change finding no change to the existing safety bases. Low-power physics testing confirmed that the key core parameters were unchanged. Regular operations resumed upon successful completion of the physics testing and annual calibrations.

2 Detailed Description

In accordance with Technical Specification 4.1.5.1, fuel inspections are conducted annually, including 20% of the elements used in the previous year, at least four elements located in the highest pulse temperature locations in the core, such that the entire core is inspected over the course of five years. Inspections include visual inspection to observe for degradation, and a measurement of length and bend. The length and bend test is performed using a fixture known as a “go/no-go gauge” purchased from the fuel vendor, General Atomics. NSCR staff administratively inspect 25% of the elements each year, which is more conservative, such that the entire core will be inspected over the course of four years instead of five.

The fuel presently being used in the Nuclear Science Center Reactor (NSCR) was delivered and installed in 2006 under the Department of Energy HEU/LEU conversion program. It is standard TRIGA® 30/20 stainless steel-clad uranium-zirconium hydride fuel for TRIGA® conversion reactors, which differ from standard TRIGA reactors slightly in size.

During the routine maintenance outage of Summer 2023, and the embedded technical specification (TS) required fuel inspection, a fuel element (Element 11394 in Bundle 62, Northwest position) did not pass the standard surveillance tests of length and bend. The cause of the failure was determined to be swelling, which did not allow the element to completely enter the General Atomics go/no-go gauge. Element 11394 was moved to the long-term in-pool storage and will be excluded from further use. All fuel records were updated accordingly.

As required by TS 4.1.5.2, when a fuel element is found to not pass the surveillance testing, the entire core—or every element—must be inspected. There were no other failures found during the additional fuel inspection. Primary coolant radioassays did not detect any fission products in the pool water, indicating that the cladding was intact.

¹ Fuel elements that do not pass the visual inspection or measurement tests are considered “failed” as defined in TS 4.1.5. This should not be taken to imply that the cladding is not intact.

A fuel shuffle plan was created, moving Element 11422 from its core location to replace the “failed” element, and a previously unused spare (Element 11448) was placed in F2NW. A 50.59 analysis was performed of the change using the current MCNP® core model, and no change to the existing safety bases was found to exist. Low-power core-physics testing after the fuel changes confirmed that the key core parameters were unchanged, and the change in fuel was still in accordance with the current safety analysis. Regular operations resumed upon successful completion of the physics testing and annual calibrations required by technical specification. Information about core locations for the fuel elements in question is presented in Figure 1 below.

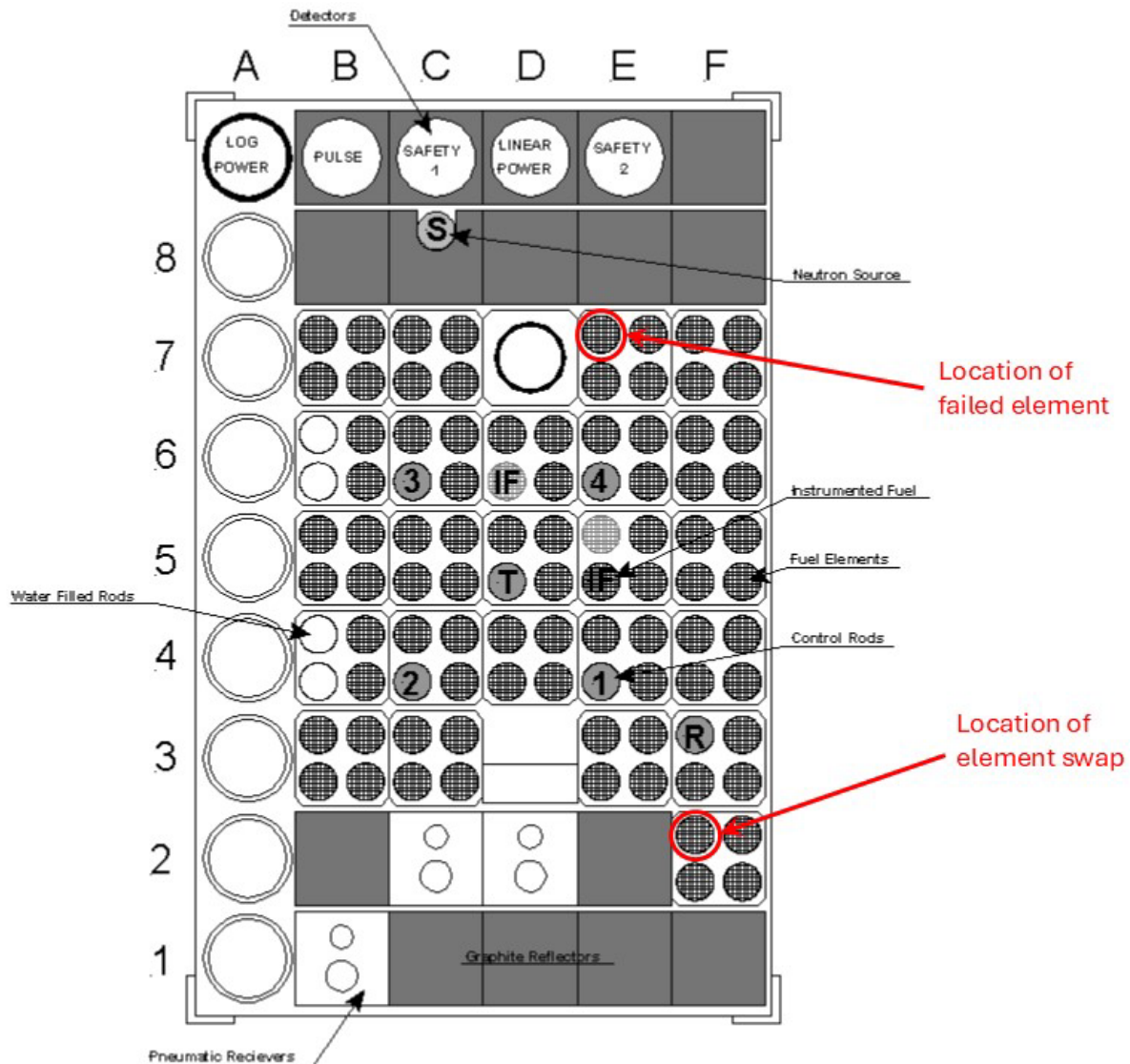


Figure 1: NSCR core map showing locations of failed fuel element, and swapped element.

3 Additional Actions Taken

Improvements have been made to fuel record keeping for the NSCR. Reactor staff will also continue to track and trend the information about fuel conditions.

4 Plant Status

The NSCR resumed normal operations after the completion of the maintenance outage.

5 References

None.