

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION I

Report No. 81-02

Docket No. 50-184

License No. TR-5 Priority -- Category E

Licensee: U. S. Department of Commerce
National Bureau of Standards
Washington, D. C. 20234

Facility Name: NBS Reactor

Inspection At: Gaithersburg, Maryland

Inspection Conducted: July 23-24, 1981

Inspectors: *W. J. Lazarus* 8/31/81
W. J. Lazarus, Reactor Inspector date

_____ date

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Approved by: *Robert M. Gallo* 8/31/81
R. M. Gallo, Chief, Reactor Projects date
Section, No. 1A, DR&PI

Inspection Summary:

Inspection on July 23-24, 1981 (Report No. 50-184/81-02)

Areas Inspected: Special unannounced inspection to follow up on the moderator drain incident which occurred on July 18, 1981.

Results: No items of noncompliance were identified.

Region I Form 12
(Rev. April 1977)

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1. Persons Contacted

Mr. N. Bickford, Shift Supervisor (SRO)
*Dr. R. Carter, Chief, Reactor Radiation Division
Mr. P. Cassidy, Health Physicist
*Mr. T. Raby, Chief, Reactor Operations
Mr. J. Ring, Shift Supervisor, SRO
*Mr. J. Torrence, Deputy Chief, Reactor Operations

*Denotes those present at exit interview

2. Followup on Moderator Drain Incident Background

On Saturday, July 18, 1981, at 11:05 A.M., the SRO arrived in the Control Room of the NBS Reactor and found that the reactor vessel level indicator and recorder were indicating full down scale. His investigation revealed that the moderator had been drained to the D₂O Storage Tank, leaving only the moderator in the Core Holdup Tank in the reactor vessel. This covers the fuel to one-half its height. The Chief and Deputy Chief of Reactor Operations were notified. The SRO took radiation surveys in the vicinity of the vessel head. All readings were normal. No area radiation monitors had alarmed. The reactor vessel was refilled from the storage tank. Investigation with an ultrasonic probe revealed flow through 1 inch injection valve DWV-39. This valve is pneumatically operated and indicated closed in the Control Room. (Indication represents valve command, not actual position). The valve was manually shut with the override hand wheel. With flow re-established reactor inlet and outlet temperatures were 100^oF. A moderator sample indicated normal isotopic activity with no fission products. With conditions returned to normal, the reactor was left until the next SRO inspection on Sunday, July 19, 1981 at 11:00 A.M. At this time it was noted that vessel moderator level had decreased to 104 inches (normal 158 inches). This level is 5 feet above the top of the core. Investigation revealed that the sample valves had been left open following the sample taken the previous afternoon. The valves were shut and the vessel refilled.

Inspection Findings

The inspector reviewed the Shift Supervisor's Log and Console Log for July 1-23, 1981 and the vessel level recorder trace for July 17-19, 1981. Radiochemical analyses of samples of D₂O and helium sweep taken following the incident were reviewed and compared to previous analyses. Based on the review of records and interviews with personnel the inspector was able to substantiate the above description of the incident. The inspector noted that at the time that the core was partially uncovered, the reactor had been shutdown for two weeks, except for a period of four hours at less than 6 Mw on July 14, 1981. Analyses performed for the FSAR indicate that cooling is necessary for 10 hours following operation at 10Mw for decay heat removal purposes to prevent fuel plate temperatures from exceeding 800^oF. No fuel damage was expected or identified as a result of this incident. It is estimated that the maximum fuel temperature reached was less than normal operating temperatures. The licensee inspected DWV-39 and found that its air controller was out of adjustment. The controller span and zero were re-adjusted and the valve functioned normally. No other failures of this nature have been identified. Following the second moderator drain incident which was a result of leaving the sample valves open, the licensee instituted a checklist which requires a licensed operator to be present when samples are drawn to verify that the valves are reclosed and to initial the checklist.

The inspector reviewed reactor normal and emergency procedures to verify that proper procedures had been implemented. Based on this review the inspector noted that there was no guidance for operators on refill of the reactor vessel following refueling or an inadvertent moderator drain, which would describe normal/alternate fill paths, flowrates, precautions, etc. The licensee agreed to review procedure coverage in this area. This item is unresolved (184/81-02-01).

The inspector discussed corrective actions taken and/or planned by the licensee. These include:

- implementation of a shutdown checklist (includes valve position checks)
- 2 hour earlier shutdown on Friday evenings when the reactor is to be unattended for the weekend (verify stable conditions)
- Possible low vessel level annunciator for building Master at Arms.

These items will be reviewed in a subsequent inspection (184/81-02-02).

The inspector had no further questions concerning this incident. No items of noncompliance were identified.

3. Exit Interview

A management meeting was held with the licensee (see detail 1 for attendees) to discuss the scope and findings of this inspection as detailed in this report.