UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 15, 2022

Dr. Siaka Yusuf, Facility Director
Dow TRIGA Research Reactor
Dow Chemical Company
Building 1602
Midland, MI 48674

SUBJECT: DOW CHEMICAL COMPANY – U.S. NUCLEAR REGULATORY COMMISSION ROUTINE INSPECTION REPORT NO. 05000264/2022201

Dear Dr. Yusuf:

From February 28 – March 2, 2022, the U.S. Nuclear Regulatory Commission (NRC) staff conducted a routine inspection at the Dow TRIGA Research Reactor facility. The enclosed report documents the inspection results, which were discussed on March 2, 2022, with you, members of management, members of the Reactor Operations Committee, and members of the reactor staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and records, observed various activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

If you have any questions concerning this inspection, please contact Craig Bassett at (240) 535-1842, or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

Roche, Kevin signing on behalf of Tate, Travis on 04/15/22

For
Travis L. Tate, Chief
Non-Power Production and Utilization Facility Oversight Branch
Division of Advanced Reactors and Non-Power Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Docket No. 50-264
License No. R-108

Enclosure:
As stated

cc: See next page

cc:

Office of the Mayor
333 West Ellsworth
Midland, MI 48640

Office of the Governor
Room 1 – Capitol Building
Lansing, MI 48913

Ms. Kristan Soto, Chair
Radiation Safety Committee
The Dow Chemical Company
Environmental Health and
Safety Responsible Care Leader
1790 Building
Midland, MI 48674

Dr. Wayde Konze
Global Research and Development
Director for Analytical Sciences
Chair, Reactor Operations Committee
The Dow Chemical Company
1897 Building
Midland, MI 48667

Test, Research and Training
Reactor Newsletter
Attention: Ms. Amber Johnson
Dept of Materials Science and Engineering
University of Maryland
4418 Stadium Drive
College Park, MD 20742-2115

Radiological Protection Section
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
525 West Allegan Street
P.O. Box 30473
Lansing MI 48909-7973

SUBJECT: DOW CHEMICAL COMPANY – U.S. NUCLEAR REGULATORY COMMISSION ROUTINE INSPECTION REPORT NO. 05000264/2022201
DATED: April 15, 2022

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U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No.:	50-264
License No.:	R-108
Report No.:	05000264/2022201
Licensee:	Dow Chemical Company
Facility:	Dow TRIGA Research Reactor
Location:	Midland, Michigan
Dates:	February 28 – March 2, 2022
Inspector:	Craig Bassett
Approved by:	Travis L. Tate, Chief Non-Power Production and Utilization Facility Oversight Branch Division of Advanced Reactors and Non-Power Production and Utilization Facilities Office of Nuclear Reactor Regulation

Enclosure

EXECUTIVE SUMMARY

Dow Chemical Company
Dow TRIGA Research Reactor
Inspection Report No. 05000264/2022201

The primary focus of this routine, announced inspection of the Dow Chemical Company (Dow, the licensee) Class II research reactor facility was the onsite review of selected aspects of the safety programs including: (1) organization and staffing; (2) operations logs and records; (3) procedures; (4) requalification training; (5) surveillance and limiting conditions for operation (LCOs); (6) committees, audits and reviews; (7) maintenance logs and records; and (8) fuel handling logs and records. The U.S. Nuclear Regulatory Commission (NRC) staff determined that the licensee's programs were acceptably directed toward the protection of public health and safety and in compliance with NRC requirements.

Organization and Staffing

- The facility organization and staffing were in compliance with the requirements specified in its technical specifications (TSs).

Operations Logs and Records

- Reactor operations logs and record keeping conformed to TS requirements.

Procedures

- Written procedures were reviewed, approved, and implemented in accordance with TS requirements.

Requalification Training

- Current operator requalification was conducted as required by the Dow requalification program.

Surveillance and Limiting Conditions for Operation

- Surveillances were conducted and LCOs were maintained in accordance with TS requirements.

Committees, Audits and Reviews

- The Reactor Operations Committee (ROC) provided the review and oversight required by the TS.

Maintenance Logs and Records

- Maintenance activities were conducted in accordance with licensee procedures.

Fuel Handling Logs and Records

- Fuel handling and inspection activities were completed and documented as required by the TS and licensee procedures.

REPORT DETAILS

Summary of Facility Status

The licensee continued to operate the 300-kilowatt Mark I Training, Research, Isotopes, General Atomics (TRIGA) research reactor in support of research and development, reactor operator training, and periodic equipment surveillances. During the inspection, the reactor was operated in support of an experiment.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure (IP) 69001 – Section 02.01)

The inspector reviewed the following to verify compliance with the organization and staffing requirements specified in TS Section 6.1:

- organizational structure and staffing
- staff qualifications and management responsibilities
- reactor operations logbooks numbers (Nos.) 129 to 130
- TSs for the Dow TRIGA Research Reactor (DTRR) dated June 18, 2014
- DTRR Annual Reports for calendar years 2020 and 2021
- various Dow Nuclear Research Reactor Procedures (DNRRP) including Nos. 3.2.1, 3.2.2, 3.2.7, and 3.2.8

b. Observations and Findings

Through document review and discussions with licensee staff, the inspector noted that the management structure at the facility changed since the previous NRC inspection. The inspector verified that the Reactor Supervisor (RS) was appointed to fill the Facility Director position as well. The inspector confirmed that the reactor staff consisted of three individuals: the RS, an assistant RS, and a senior research specialist. The inspector found that all three maintained senior reactor operator (SRO) licenses at the facility. The inspector verified that staffing was as required by TS Section 6.1 and licensee procedures.

c. Conclusion

The inspector determined that the licensee's organization and staffing were in compliance with the requirements specified in the TSs.

2. Operations Logs and Records

a. Inspection Scope (IP 69001 – Section 02.02)

The inspector reviewed the following to ensure that selected records were maintained as required by TS Section 3 and licensee procedural requirements:

- scram logbook entries for the past 2 years
- reactor operations logbooks Nos. 129 to 130

- DTRR Annual Reports for the past 2 years
- various DNRRP Procedures including Nos. 3.4, 3.5, 4.1.1, 4.1.2, and 4.6.1

b. Observations and Findings

The inspector observed that an SRO completed a reactor pre-startup checkout, followed by a reactor startup to 5 watts. The inspector also observed that the reactor was then shutdown and the key was removed and secured. The inspector confirmed that reactor operating characteristics and entries required by procedure were recorded in the reactor operations logbook. Through direct observation and a review of operations records, the inspector confirmed that shift staffing met the minimum requirements for reactor operations.

The inspector reviewed the scram logbook and noted that, during the past 2 years, there were several scrams that occurred during the reactor startup sequence. Through discussions with the licensee the inspector found that the majority of the scrams resulted from an old computer processor which the licensee plans to replace as part of a future reactor console upgrade project.

c. Conclusion

The inspector determined that the licensee's operational record keeping program conformed to TS requirements.

3. Procedures

a. Inspection Scope (IP 69001 – Section 02.03)

The inspector reviewed the following to ensure that the requirements of TS Section 6.4 were met:

- procedural control, revision, and implementation
- selected administrative and operations procedures
- ROC semi-annual meeting minutes for the past 2 years
- various DNRRP Procedures including Nos. 3.3.2, 3.3.5, 4.1.2, 4.2.4, and 4.6.1

b. Observations and Findings

The inspector found that procedures were developed for the safe operation of the reactor as required by TS Section 6.4. The inspector verified that procedure and experiment changes were reviewed and approved by the ROC as required by the TSs. The inspector confirmed that training of personnel on procedures was acceptable. The inspector also verified that licensee reactor operator personnel conducted operational activities in accordance with applicable procedures.

c. Conclusion

The inspector determined that procedural review, revision, approval, and implementation satisfied TS requirements.

4. Requalification Training

a. Inspection Scope (IP 69001 – Section 02.04)

The inspector reviewed the following to verify compliance with the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 55, "Operators' Licenses," and the facility requalification program:

- reactor operation logbooks Nos. 129 to 130
- DTRR Annual Reports for the past 2 years
- operator requalification program records for 2019 to the present
- DTRR Requalification Program, approved by the NRC on September 6, 2011

b. Observations and Findings

The inspector noted that the licensee's requalification program was as described in the plan submitted to the NRC and was in accordance with 10 CFR 55.59 "Requalification." The inspector found that the three facility SROs were completing the required written and operating examinations. The inspector verified that all the licensed operators reviewed the emergency plan, security plan, and TSs on an annual basis. The inspector confirmed that the number of hours spent by each operator performing licensed duties were recorded in the operations logbook and that the SROs' quarterly operating hours met the regulatory requirements. The inspector also verified that all operators' licenses were current and each received a physical examination biennially as required by the regulations.

c. Conclusion

The inspector determined that the licensee's operator requalification program was conducted as required by the DTRR requalification program.

5. Surveillance and Limiting Conditions for Operation

a. Inspection Scope (IP 69001 – Section 02.05)

The inspector reviewed the following to ensure that the surveillance requirements and LCOs specified in TS Sections 3 and 4 were met:

- reactor operation logbooks Nos. 129 to 130
- surveillance data documented on various forms including the daily startup/shutdown checklists and forms 4.1.3a, 4.1.4, 4.1.5, 4.2.5b, and, 4.3.4a, b, and c

b. Observations and Findings

The inspector noted that daily, monthly, semi-annual, and annual surveillances of systems, as well as equipment checks, tests, and calibrations were completed as required by the TSs. The inspector confirmed that LCO verifications were completed on schedule and in accordance with licensee procedures. All the recorded results reviewed by the inspector were within the TS and procedurally prescribed parameter limits.

c. Conclusion

The inspector determined that the licensee's program for completing surveillance inspections and LCO confirmations satisfied TS requirements and procedural controls.

6. Committees, Audits and Reviews

a. Inspection Scope (IP 69001 – Section 02.09)

The inspector reviewed the following to ensure that the audits and reviews stipulated in TS Section 6.2 were completed by the ROC.

- RS semi-annual reports to the ROC
- ROC semi-annual meeting minutes for the past 2 years
- DTRR Annual Reports for calendar years 2020 and 2021
- DNRRP Procedure Nos. 3.2.4 and 3.4

b. Observations and Findings

The inspector verified that the ROC met at least annually and that a quorum was present as required by TS Section 6.2.2. The inspector noted that the ROC minutes and the RS reports provided a record of ROC review functions and of their safety oversight of the reactor facility. The inspector confirmed that audits of the items required by TS 6.2.3 were completed, usually by annual peer review audits. The inspector confirmed that the safety reviews and audits, and the associated findings, were detailed and the licensee responded to the findings, if needed, and ensured that corrective actions were implemented.

c. Conclusion

The inspector determined that the review and oversight functions required by the TSs were completed by the ROC.

7. Maintenance Logs and Records

a. Inspection Scope (IP 69001 – Section 02.11)

To ensure that maintenance activities were consistent with regulatory requirements, the inspector reviewed:

- scram logbook entries for the past 2 years
- reactor operations logbooks Nos. 129 to 130
- DTRR Annual Reports for the past 2 years
- DNRRP Procedure Nos. 3.4 and 4.5.3
- completed maintenance Forms 4.5.3.b for 2020 to the present

b. Observations and Findings

The inspector confirmed that routine/preventive maintenance was controlled and documented on DTRR reactor maintenance forms. The inspector verified that, after all

maintenance was completed, item or system operational checks were performed to ensure the affected equipment and systems functioned properly before they were returned to service. The inspector also verified that implementation of changes to equipment, systems, tests, or experiments were reviewed by the ROC prior to completion by the reactor staff.

c. Conclusion

The inspector determined that maintenance activities were conducted in accordance with licensee procedures.

8. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001 – Section 02.12)

To verify that TS and procedural requirements were met, the inspector reviewed selected aspects of:

- reactor operation logbooks Nos. 129 to 130
- selected DNRRP Procedures including Nos. 4.3.2, 4.3.3, and 4.3.4 a

b. Observations and Findings

The inspector verified that the licensee maintained records of the various fuel movements and that the movements were conducted and recorded in compliance with licensee procedure. The inspector verified that a minimum of three operators were present when fuel was moved as required by procedure. The inspector confirmed that all fuel movements were documented in the reactor operations logbook, as well as on the fuel element position indicator map in the reactor room. The inspector verified that fuel element inspections included all the fuel elements every 4 years and the control rods were inspected on an annual frequency.

c. Conclusion

The inspector determined that fuel handling and control rod inspection activities were completed and documented as required by TS and licensee procedures.

9. Exit Interview

The inspector presented the inspection results to licensee management and staff at the conclusion of the inspection on March 2, 2022. The inspector described the areas inspected and discussed the inspection observations. The licensee acknowledged the findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Buchmann	Process Analytical Global Leader and ROC member
N. Goodman	Senior Research Specialist and SRO
G. Groeschen	Senior Environmental Health and Safety Specialist and Assistant Radiation Safety Officer
J. HaddSenior	Research and Development Leader and ROC member
B. Haskins	Assistant Reactor Supervisor, SRO, and ROC member
W. Konze	Global Research and Development Director for Analytical Sciences and Chair, ROC
K. Wegener-Gave	Site and Reactor Facility Radiation Safety Officer and ROC member
S. Yusuf	Facility Director, Reactor Supervisor, and ROC member

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened:

None

Closed:

None