



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

August 1, 2023

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

SUBJECT: DOW CHEMICAL COMPANY – U.S. NUCLEAR REGULATORY COMMISSION
ROUTINE INSPECTION REPORT NO. 05000264/2023201

Dear Dr. Yusuf:

From May 30 – June 1, 2023, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Dow TRIGA Research Reactor. The enclosed report documents the inspection results which were discussed on June 1, 2023, with you, members of your staff, and other management and support personnel.

The inspection examined activities conducted under your license as they relate to public health and safety, compliance with the Commission's rules and regulations, and compliance with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel. Based on the results of this inspection, no findings of non-compliance with NRC requirements were identified. No response to this letter is required.

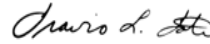
In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the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

S. Yusuf

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

Sincerely,



Signed by Tate, Travis
on 08/01/23

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

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ROUTINE INSPECTION REPORT NO. 05000264/2023201
DATED: AUGUST 1, 2023

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

Docket No.: 50-264

License No.: R-108

Report No.: 05000264/2023201

Licensee: Dow Chemical Company

Facility: Dow TRIGA Research Reactor

Location: Midland, Michigan

Dates: May 30 - June 1, 2023

Inspector: Craig H. 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. 05000264/2023201

The primary focus of this routine safety inspection was the onsite review of selected aspects of the Dow Chemical Company (Dow, the licensee's) 300 kilowatt, Class II research reactor safety program including: (1) organization and staffing; (2) procedures; (3) experiments; (4) health physics; (5) design changes; (6) emergency planning; and (7) inspection of transportation activities. 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 licensee's organization and staffing was in compliance with the requirements specified in the technical specifications (TSs).

Procedures

- The licensee maintained and implemented written procedures in accordance with TS requirements.

Experiments

- Experiments were reviewed and approved as required by the TSs.

Health Physics

- The facility radiation safety program (RSP) satisfied regulatory requirements and environmental monitoring was conducted in accordance with the license and the regulations.

Design Changes

- No changes, tests, or experiments, subject to the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, "Changes, tests and experiments," were initiated or completed.

Emergency Planning

- The emergency preparedness program was conducted in accordance with the licensee's emergency plan (E-Plan) and regulatory requirements.

Inspection of Transportation Activities

- The program for shipping radioactive material satisfied regulatory requirements.

REPORT DETAILS

Summary of Facility Status

The Dow 300 kilowatt, TRIGA Mark I research reactor was operated in support of research, reactor operator training, and periodic equipment surveillances. During the inspection, the reactor was operated to support irradiation of research samples.

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
- Dow annual operating reports for 2021 and 2022
- TSs for the Dow TRIGA Research Reactor (DTRR) dated June 18, 2014
- Reactor Operations Committee (ROC) meeting minutes for 2021 through 2023
- DTRR operation logbooks numbers (Nos.) 130 through 132, covering operations from June 23, 2021, to the present
- various sections of DTRR chapter 3, “Administrative Procedure”

b. Observations and Findings

Through discussions with licensee staff, the inspector verified that the management structure at the facility remained the same as noted in the previous NRC inspections. The inspector confirmed that the reactor staff consisted of three individuals: the Facility Director/ Reactor Supervisor (FD/RS), an assistant RS, and a reactor operator. The inspector verified that all three maintained senior reactor operator licenses. The inspector reviewed the applicable records and verified that shift staffing was as required by TS section 6.1 and the licensee’s procedures.

c. Conclusion

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

2. 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
- ROC meeting minutes for 2021 through the present
- various sections of DTRR chapter 3, “Administrative Procedure,” and chapter 4, “Operating Procedure”

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 through review of the ROC meeting minutes, as well as discussions with licensee personnel, that procedure and experiment changes were reviewed and approved by the ROC as required by the TSs. Through records review of various activities at the facility, including controlled area surveys, reactor operations, and completion of experiments, the inspector verified that licensee personnel conducted activities in accordance with applicable procedures.

c. Conclusion

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

3. Experiments

a. Inspection Scope (IP 69001 – Section 02.06)

To ensure that the requirements of TS sections 3.7, 4.7, and 6.5 were met concerning the experiment program, the inspector reviewed selected aspects of:

- review and approval process for experiments
- DTRR operation logbooks Nos. 130 through 132
- section 3.3 of DTRR chapter 3, “Administrative Procedure”
- completed, “TRIGA Activation Request Forms,” for 2021 to the present
- completed, “Approval Sheet for Special Experiments,” i.e., annual fuel inspection, for 2022 and 2023

b. Observations and Findings

The inspector observed the systems used for the irradiation of various materials in the reactor core including the pneumatic tube irradiation facility and the rotating rack or lazy susan system that surrounds the reactor core. The inspector verified that the FD/RS reviewed and approved all experiments and sample irradiations conducted at DTRR in accordance with the TS sections 3.7 and 4.7. The inspector confirmed that experiments were conducted in accordance with approved, authorized requests.

c. Conclusion

The inspector determined that experiments were reviewed and approved as required by the TSs.

4. Health Physics

a. Inspection Scope (Inspection Procedures (IP) 69001 – Section 02.07)

The inspector reviewed the following to verify compliance with 10 CFR Part 19, “Notices, Instructions and Reports to Workers: Inspection and Investigations, 10 CFR Part 20, “Standards for Protection against Radiation,” and the applicable TS requirements:

- radiation safety training records
- DTRR operation logbooks Nos. 130 through 132
- radiological signs and posting in various areas of the facility
- environmental and personnel dosimetry results from 2021 to the present
- maintenance and calibration of radiation monitoring equipment and survey meters
- various sections of DTRR chapter 3, "Administrative Procedure," chapter 4, "Operating Procedure," and chapter 5, "Radiological Safety"

b. Observations and Findings

(1) Surveys

The inspector reviewed monthly radiation and contamination surveys of the reactor building which were conducted by the facility staff. The inspector noted that the results were documented on the designated forms and evaluated as by the Radiation Safety Officer (RSO). The inspector found that the surveys characterized the radiological conditions present in the facility. The inspector confirmed that the RSO also conducted an annual independent radiation and contamination survey of the facility and verified that all the readings were within established limits.

(2) Postings and Notices

The inspector reviewed the postings required by 10 CFR Part 20 at the entrances to various controlled areas including the reactor bay and radioactive material storage areas. The inspector confirmed that the postings were acceptable and surveys were completed of the areas indicating the radiation and contamination hazards present.

(3) Dosimetry

The inspector verified that the licensee used a National Voluntary Laboratory Accreditation Program-accredited vendor to process personnel dosimetry. Through direct observation, the inspector confirmed that optically stimulated luminescent (OSL) whole body dosimeters and finger ring thermoluminescent dosimeters were used by facility personnel. The inspector examined the dosimetry records for facility personnel for the past 2 years and found that all exposures were well within NRC limits and licensee action levels. The inspector confirmed that all DTRR personnel were provided with an equivalent of NRC Form 5 annually.

(4) Radiation Monitoring Equipment

Through records review, the inspector verified that calibration records were maintained as required by procedure, and calibration frequencies met the requirements established in TS section 4.6. The inspector noted that the licensee's tracking system for ensuring the instrument calibrations were completed on time was acceptable.

(5) Radiation Safety and Training Programs

The inspector verified that the RSP provided guidance for keeping doses as low as reasonably achievable and was consistent with the guidance in 10 CFR Part 20. The

inspector confirmed that the RSP was reviewed annually as required by 10 CFR 20.1101, "Radiation protection programs," paragraph (c). The inspector verified that the RSP was established in Dow standards, including IH-477, "Control of Ionizing Radiation Hazards," and through DTRR procedures.

The inspector noted that the RSP required all personnel who work with radioactive material to receive training in radiation protection policies, procedures, and requirements prior to having unescorted access at the facility. The inspector confirmed that appropriate radiation safety training was provided to staff and visitors.

(6) Environmental Monitoring

The inspector verified that OSL dosimeters were used for environmental monitoring. Records reviewed by the inspector showed that there was minimal radiation exposure to the environment from reactor operation during the past 2 years. The inspector verified that there was no liquid effluent discharged from the reactor facility. Through review of calculations conducted by the RSO, the inspector confirmed that gaseous effluents from the reactor facility were less than 25 percent of the allowed maximum concentrations in 10 CFR Part 20.

c. Conclusion

The inspector determined the RSP satisfied regulatory requirements and environmental monitoring was conducted in accordance with license and regulatory requirements.

5. Design Changes

a. Inspection Scope (IP 69001 – Section 02.08)

To ensure that facility changes were reviewed and approved as required by TS section 6.2 and 10 CFR 50.59, the inspector reviewed selected aspects of:

- DTRR operation logbooks Nos. 130 through 132
- Dow annual operating reports for 2021 and 2022
- ROC meeting minutes for 2021 through the present
- various sections of DTRR chapter 3, "Administrative Procedure," and chapter 4, "Operating Procedure"

b. Observations and Findings

The inspector confirmed that the program for reviewing and evaluating changes to facilities, experiments, and procedures was in place and satisfied NRC requirements. Through review of applicable records and interviews with licensee personnel, the inspector verified that no changes to structures, systems, or components, procedures, or experiments, subject to 10 CFR 50.59 requirements, were initiated or completed since the last inspection.

c. Conclusion

The inspector determined that no changes, tests, or experiments occurred since the last inspection.

6. Emergency Planning

a. Inspection Scope (IP 69001 – Section 02.10)

The inspector reviewed the implementation of selected portions of the emergency preparedness program including:

- DTRR E-Plan dated December 4, 2012
- monthly inventories of emergency equipment and supplies
- emergency response supplies, equipment, and instrumentation
- evacuation and emergency drills conducted in 2021 through 2022
- memorandum of agreement, Office of Emergency Management, County of Midland Michigan, dated May 2, 2023

b. Observations and Findings

The inspector observed the emergency supplies, instrumentation, and equipment and confirmed that these items were as described in the E-Plan. The inspector found that all facility personnel received annual emergency response training. The inspector verified that the licensee reviewed the E-Plan and conducted monthly inventories of the emergency response equipment and supplies as required in the E-Plan.

The inspector confirmed that emergency and evacuation drills were conducted annually as required by the E-Plan. The inspector noted that critiques were held to discuss the drills and a written follow-up to each drill was completed to document any issues identified during the exercises.

The inspector toured the emergency services and security (ES&S) headquarters (building 1105), which contains the emergency response equipment and vehicles at Dow Chemical Midland – Michigan Operations. These assets would be available in case of an emergency at the DTRR. The inspector discussed the functions and capabilities of this facility with ES&S personnel. The inspector found response personnel to be knowledgeable of their duties and the facility to be properly staffed and well maintained.

c. Conclusion

The inspector determined that the emergency preparedness program was implemented in accordance with the licensee's E-Plan and regulatory requirements.

7. Inspection of Transportation Activities

a. Inspection Scope (IP 86740)

To verify compliance with regulatory and procedural requirements for transferring or shipping licensed radioactive material, the inspector reviewed the following:

- DTRR operation logbooks Nos. 130 through 132
- Dow annual operating reports for 2021 and 2022

b. Observations and Findings

Through records review and discussions with licensee and health physics personnel, the inspector noted that the licensee didn't ship any radioactive material under the reactor license. The inspector verified that disposal of radioactive waste, transfers of radioactive material to other Dow facilities, and shipments to other entities, were completed under Dow's Broad Scope License (No. 21-00265-06) by the Radiation Safety group with guidance from the RSO and the Dow Radiation Safety Manual.

c. Conclusion

The inspector determined that no radioactive material shipments were made under the auspices of the reactor license during the past 2 years.

8. Exit Interview

The inspection scope and results were summarized on June 1, 2023, with members of licensee management. The inspector described the areas inspected and discussed the inspection findings. 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

S. Brockington	Senior Delivery Leader, Dow Emergency Services and Security, Midland – Michigan Operation
N. Goodman	Senior Reactor Operator
R. Gwizdala	Senior Security Technician, Dow Emergency Services and Security, Midland – Michigan Operation
B. Haskins	Assistant Reactor Supervisor and Senior Reactor Operator
L. Miller	Nurse Practitioner and Associate Health Services Manager, Dow Medical
K. Raquepaw	Technician, Dispatch, Dow Emergency Services and Security, Midland – Michigan Operation
T. Stockman	Analytical Sciences Director and Level 1 for the DTRR
C. Sushynski	EH&S Technologist Lead
T. Topolinski	EH&S Sustainability Technician Leader, ES&S
K. Wegener-Gave	Site and Reactor Facility Radiation Safety Officer
J. Weldy	Reactor Operations Committee member and Senior Environmental Health and Safety Improvement Manager
S. Yusuf	DTRR Facility Director and Reactor Supervisor

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors
IP 86740	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened:

None

Closed:

None