

January 7, 2010

Dr. Melinda P. Krahenbuhl
Facility Director
Dow Chemical Company
1602 Building
Midland, MI 48674

SUBJECT: DOW CHEMICAL COMPANY- NRC ROUTINE INSPECTION REPORT
NO. 50-264/2009-202

Dear Dr. Krahenbuhl:

The U.S. Nuclear Regulatory Commission (NRC) conducted an inspection on December 9-11, 2009, at your Dow TRIGA Research Reactor (Inspection Report No. 50-264/2009-202). The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection. Areas examined during the inspection are identified in the enclosed report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, no safety concern or noncompliance of requirements was identified. No response to this letter is required.

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

Should you have any questions concerning this inspection, please contact Jack Donohue at 301-415-3163 or electronic mail at Jack.Donohue@nrc.gov.

Sincerely,

/RA/

Johnny H. Eads, Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-264

License No. R-108

Enclosure:
As stated

cc w/encl: See next page

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

Docket No: 50-264

License No: R-108

Report No: 50-264/2009-202

Licensee: The Dow Chemical Company

Facility: TRIGA Research Reactor

Location: Midland, Michigan

Dates: December 9-11, 2009

Inspector: Jack Donohue

Approved by: Johnny H. Eads, Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

The Dow Chemical Company
TRIGA Research Reactor
Inspection Report No. 50-264/2009-202

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the Dow Chemical Company (the licensee's) Class II research reactor facility safety programs including the Radiation Protection Program and As Low as Reasonably Achievable (ALARA) and the Transportation of Radioactive Material Program since the last U. S. Nuclear Regulatory Commission (NRC) inspection in these areas. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Radiation Protection Program

- Signs, notices and postings met the regulatory requirements.
- Personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels, and NRC's regulatory limits.
- Surveys were completed and documented acceptably to permit evaluation of the radiation hazards present.
- Radiation survey and monitoring equipment was being maintained and calibrated acceptably.
- Radiation protection training was acceptable and was being conducted as required.
- The Radiation Protection and ALARA Programs satisfied regulatory requirements.

Transportation of Radioactive Materials

- The program for shipping radioactive material satisfied regulatory requirements.

REPORT DETAILS

Summary of Facility Status

The Dow Chemical Company (the licensee's) 300 kilowatt Training Research Isotope Production General Atomics (TRIGA) Mark I research reactor has been operated in support of experiments, reactor operator training, and periodic equipment surveillances. During the inspection, the reactor was operated in support of on-going work.

1. Radiation Protection Program

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) Parts 19 and 20, and the applicable technical specification (TS) requirements:

- Area and personnel dosimetry results for 2008 and 2009
- Facility and equipment during tours
- Radiation protection training records
- Maintenance and calibration of radiation monitoring equipment, including the water radioactivity monitor, area radiation monitor, and the continuous air monitor
- Radiological signs and posting various areas of the facility
- Facility monthly, annual, and other periodic contamination and area radiation surveys from October 2007 to present
- Monthly pool water Tritium analyses from October 2007 to present
- TRIGA Reactor 2008 Annual Audit, dated January 19, 2009
- Ohio State University "Reactor Operations Committee Audit Report" dated November 16-17, 2009
- The Dow Chemical Company Radiation Protection Program Audit - Michigan Operations, dated November 30, 2009
- Procedure entitled, "Personnel and Area Survey Procedures Using a Geiger-Mueller (GM) Survey Meter," dated May 11, 2004
- Procedure entitled, "Wipe Testing Procedures - Loose Isotopes," dated May 11, 2004
- DNRRP No. 3.3.3, "Handling, Storage, and Disposal of Radioactive Material," dated September 2006
- DNRRP No. 4.2.2, "Area Monitor Calibration," dated November 11, 2006
- DNRRP No. 4.2.3, "Water Radioactivity Monitor Calibration," dated January 22, 2009
- DNRRP No. 4.2.4, "Continuous Air Monitor Calibration," dated November 11, 2006
- DNRRP No. 4.7.1, "Wipe Tests and Radiation Surveys," dated November 11, 2006
- DNRRP No. 4.7.2, "Procedure for the Disposal of Waste Generated in the Neutron Activation Analysis Group," dated June 16, 2008

- Standard IH-477 - Radiation Protection Program, "Control of Ionizing Radiation Hazards," revised April 15, 2009
- The Annual 2008 As Low As Reasonably Achievable (ALARA) Report

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 results were documented on the appropriate forms, evaluated as required and corrective actions taken when readings or results exceeded set action levels. The number and location of survey points was adequate to characterize the radiological conditions. The inspector verified that the Radiation Safety Officer (RSO) reviews all of the survey records. The RSO also conducts an annual independent contamination survey of the facility and has verified that all of the readings are as expected.

(2) Postings and Notices

The inspector reviewed the postings required by 10 CFR Part 19 at the entrances to various controlled areas including the Reactor Room, and radioactive material storage areas. The postings were acceptable and indicated the radiation and contamination hazards present. The facility's radioactive material storage areas were found to be properly posted.

(3) Dosimetry

The inspector determined that the licensee used optically stimulated luminescent (OSL) dosimeters for whole body monitoring of beta and gamma radiation exposure. The dosimetry was supplied and processed by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited vendor. An examination of the OSL and thermo luminescent dosimeters (TLD) results indicating radiological exposures at the facility for the past two years showed that the highest occupational doses, as well as doses to the public, were well within 10CFR Part 20 limitations. Through December 2009 records showed that the highest annual whole body exposure received by a single individual was 10 millirem (mrem) deep dose equivalent (DDE) and the highest individual whole body exposure had been received was 42 mrem lens dose equivalent (LDE) and the highest shallow dose equivalent (SDE) was 74 mrem. Total cumulative dose for Reactor Personnel was 215 mrem. Through direct observation the inspector determined that dosimetry was acceptably used by facility personnel and exit frisking practices were in accordance with facility radiation protection requirements.

(4) Radiation Monitoring Equipment

The calibration verification of portable survey meters and friskers was completed by staff personnel. The fixed area radiation detectors were calibrated at the facility by the staff using a Cs-137 source. The calibration records of portable survey meters, friskers, fixed radiation detectors, and air monitoring equipment in use at the facility were reviewed. Calibration frequency met the requirements established in TS 4.4 while records were being maintained as required. The inspector verified that proper precautions are always used to maintain doses ALARA while conducting the calibrations at the Dow TRIGA Research Reactor (DTRR). The inspector reviewed the licensee's tracking system for ensuring the instrument calibrations are completed on time and found it to be satisfactory.

(5) Radiation Protection Program

The licensee's Radiation Protection Program (RPP) was established through the procedures. The RPP provides guidance for keeping doses ALARA and is consistent with the guidance in 10 CFR Part 20. The inspector verified that the RPP was being reviewed annually as required by 10 CFR 20.1101(c). No issues related to the RPP were identified in the review of the program. The RSO reviews the overall implementation of the radiation protection program at the DTRR.

The RPP requires that all personnel who work with radioactive materials receive training in radiation protection, policies, procedures, requirements, and the facilities prior to having unescorted access at the facility. The RSO is responsible for conducting the training and all of the training is typically conducted both on a computer and with practical applications. A test is administered at the end of the training to verify that the individuals understood the material presented. The training covered the topics required to be taught in 10 CFR Part 19 and the review of training materials and tests indicated that the staff were instructed on the appropriate subjects.

(6) Facility Tour

The inspector toured the reactor facility, counting laboratories and accompanying facilities. Control of radioactive material and control of access to radiation and high radiation areas were observed to be acceptable. The postings and signs for these areas were appropriate. Licensee personnel followed the indicated precautions for access to controlled areas.

(7) Environmental Monitoring

Several OSL dosimeters were placed around the inside walls of the reactor facility and minimal doses were recorded. Records (2008) show

that there was minimal radiation exposure to the environment from the reactor during the previous year. There was no liquid effluent discharged from the reactor facility. The licensee indicated that gaseous effluents (Ar 41) from the reactor facility were 0.65 mrem/year.

c. Conclusions

The inspector determined that: (1) surveys were being completed and documented as required, (2) postings met regulatory requirements, (3) personnel dosimetry was being worn and recorded doses were within the NRC's regulatory limits, (4) radiation monitoring equipment was being maintained and calibrated as required, (5) the RPP satisfied regulatory requirements, (6) the radiation protection training program was being administered as required, and (7) environmental monitoring satisfied license and regulatory requirements.

2. 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:

- Standard IH-477 - Radiation Protection Program, "Control of Ionizing Radiation Hazards," revised April 15, 2009
- Selected records of various types of radioactive material shipments

b. Observations and Findings

Through records review and discussions with licensee personnel, the inspector determined that the licensee had not shipped any radioactive material since the previous inspection in this area.

c. Conclusions

No radioactive material shipments had been made under the auspices of the reactor license during the past year.

3. Exit Interview

The inspector presented the inspection results to licensee management at the conclusion of the inspection on December 11, 2009. The inspector described the areas inspected and discussed in detail the inspection observations. No dissenting comments were received from the licensee. 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. Dhingra	Chairman, Reactor Operations Committee and Director Analytical Sciences - Core R&D
B. Haskins	Senior Reactor Operator - Assistant Reactor Supervisor
M. Krahenbuhl	Facility Director
J. Weldy	Radiation Safety Officer
S. Yusuf	Reactor Supervisor

INSPECTION PROCEDURES USED

IP 69001	Class II Non-Power Reactors
IP 86740	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened:

None

Closed:

None

Discussed:

None

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Reasonably Achievable
10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
DDE	Deep Dose Equivalent
DNRRP	Dow Nuclear Research Reactor Procedure
DTRR	Dow TRIGA Research Reactor
IP	Inspection Procedure
LDE	Lense Dose Equivalent
MREM	Millirem
NRC	U. S. Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OSL	Optically Stimulated Luminescence
RPP	Radiation Protection Program
RSO	Radiation Safety Officer
SDE	Shallow Dose Equivalent
TLD	Thermo Luminescent Dosimeters
TRIGA	Training Research Isotope Production General Atomics
TS	Technical Specification

Dow Chemical Company

Docket No. 50-264

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