

U. S. ATOMIC ENERGY COMMISSION
REGION III
DIVISION OF COMPLIANCE

Report of Inspection

CO Report No. 50-264/68-1

Licensee: Dow Chemical Company
License No. R-108
Category E

Date of Inspection: September 26, 1968

Dates of Previous Inspection: October 24 and 25, 1967

Inspected By: *G. Fiorella* Reactor Inspector October 17, 1968

Reviewed By: *H. D. Thornburg* Senior Reactor Inspector October 17, 1968

Proprietary Information: None

SCOPE

An announced inspection was made ^{at} to the 100 kw TRIGA Mark I Research Reactor located in Midland, Michigan.

SUMMARY

Safety Items - None.

Noncompliance Items - None.

Unusual Occurrences - None.

Status of Previously Reported Problems - No problems involving followup action were reported in the previous report.

Other Significant Items - Visual inspections of the fuel elements and control rods revealed no abnormal conditions.

No problems have been encountered with the operation of the control rod switch noted during the previous inspection.

Management Interview - Inspection results were discussed with Drs. W. H. Beamer and O. U. Anders. The following items were covered:

1. The inspector reviewed the reporting requirements of the facility's license. Dr. Beamer expressed some concern about what types of experiences should be reported in accordance with the provisions of the license. The inspector informed Drs. Beamer and Anders that judgement should be based on the appropriate reporting sections of the license.
2. The inspector discussed with Dr. Beamer of the annual reporting requirements of 10 CFR 50.59.

Dr. Beamer was informed that the organization of special scram and maintenance records was considered a significant improvement over those observed during the previous inspection.

DETAILS

A. Persons Contacted

Dr. W. H. Beamer, Laboratory Director
Dr. O. U. Anders, Reactor Supervisor
Mr. L. G. Silverstein, Radiological Officer
Mr. J. Charms, Assistant Radiological Officer

B. Administration and Organization

The organizational staff of the facility has not changed since the last inspection. All reactor operators (7) have Senior Reactor Operator licenses. Dr. Anders continues to assume the responsibilities of Reactor Supervisor. A review of the senior reactor operator availability and reactor coverage practices with Dr. Beamer and Dr. Anders confirmed that the intent of Section 50.54(m) of 10 CFR 50 is being met.^{1/}

The minutes of the Reactor Operations Committee and Radiation Hazards Committee were reviewed. The frequency of the meetings and material coverage were noted to be in accordance with the intent of the provisions of the technical specifications.

C. Operations

The reactor has been operated on an average of four days per week. Operating runs have ranged from one to six hours at the maximum license power level of 100 kw. Small sample activation continues to be the primary purpose for reactor operation.

^{1/} R. H. Engelken memo, "Interpretation of Readily Available on Call" dated 8-16-68.

Details (continued)

A total of four scrams were experienced since the last inspection. Three were due to power range switching errors, the fourth to electronic noise.

D. Facility Procedures

The emergency procedures were reviewed by the inspector. It was noted that the objectives of the Reactor Inspection Guide, Chapter 2000 were being met by procedures and the overall company emergency protection program.

Practice emergency evacuations are normally conducted once per quarter. The last practice emergency evacuation was conducted in September 1968.

E. Primary System

A review of operating records disclosed that the reactor pool temperature has been maintained below 120°F as required by the technical specifications. The maximum temperature noted in the records was 90°F. The inspector was informed by Dr. Beamer that there had been no indications of pool leakage. Current experience indicates that the pool level drops approximately 1/2 inch over a week's period of time due to evaporation. The loss of water by evaporation is maintained at a minimum because of a pool lid which covers approximately 80% of the pool.

A review of the records and discussions with Dr. Beamer did not disclose any problems with drain leaks, pipe breaks, or unaccountable water losses.

A review of activity measurements of evaporated pool water samples disclosed activities essentially at background levels.

G. Reactor Control and Core Physics

Due to the depletion of the initial Po-Be source, the licensee has received approval to use a 2 curie Am-Be source. ^{2/} The source was placed in position F-17 of the F ring. The Po-Be source is being stored in the reactor pool storage rack.

The maximum available cold clean excess reactivity was noted to be within the 1.5% $\frac{\Delta k}{k}$ limit specified in the technical specifications.

Control rod calibrations were conducted in accordance with the semi-annual frequency required by the technical specifications. The last measurement was conducted on July 27, 1968, using the rising period method.

^{2/} Amendment No. 2 to Facility License R-108.

Details (continued)

The following measured values were obtained from the operating logs:

<u>Rod</u>	<u>Worth</u>
Safety	\$2.57
Shim	3.13
<u>Regulating</u>	<u>.89</u>
Total	\$6.59

The shutdown margin based on the most reactive of the operable rods withdrawn was determined as follows from logbook entries:

Total Rod Worth	\$6.59	
Most Reactive Rod	<u>3.13</u>	
Difference	\$3.46	
Excess Reactivity	<u>2.10</u>	
Shutdown Margin	\$1.36	(~1.0% $\frac{\Delta k}{k}$)

This is in compliance with the minimum technical specification limit of $0.35\% \frac{\Delta k}{k}$.

Control rod scram timing was noted to have been performed within technical specification frequency requirements and all times were noted to be within the one second technical specification requirement.

A review of power level channel calibrations, interlock functional testing, and power level safety circuit functional testing, were all noted to have been performed in accordance with technical specification requirements. No unusual conditions or performances were detected.

H. Core and Internals

The licensee performed a visual examination of each of the fuel elements and control rod blades in accordance with technical specification requirements. Dr. Beamer informed the inspector that except for slight discoloration of some fuel elements, no unusual conditions were noted on either the fuel elements or control blades. It should be noted that the fuel elements for the Dow TRIGA reactor are spent elements used in a G. A. reactor core prior to initial loading at Dow. A review of the records indicated that the blades were tested following installation, to confirm that drop times were normal.

Dr. Beamer informed the inspector that there have been no indications of fuel failures since the original defective element was discovered during the initial startup program. ^{3/} Pool water samples are taken periodically and have not indicated activities significantly above background.

3/ CO Report No. 50-264/68-1.

Details (continued)

P. Radiation Detection

Radiation experience with the licensee was reviewed with Dr. Beamer and Mr. Silverstein. To date, they have stated that there have been no problems with contamination control or irradiated sampling handling procedures. The following significant points of discussions and observation are summarized:

1. Personnel Exposures

Reports from the Landauer Company show that the maximum exposure received from January through August 1968 by reactor operating personnel is 50 mrem.

2. Radiation Levels

With the exception of the area immediately above the pool water, which is measured to be approximately 10 mr/hr at full power, other reactor areas exhibit minimal radiation level intensities.

3. Contamination swipes are being taken in association with sample irradiations. A review of records did not indicate any problems.
4. The alarm set point of the continuous air monitoring sample remains at 1000 counts per minute. A review of traces made during operation disclosed essentially background activities.
5. Calibration and testing of radiation detection instrumentation and alarms was noted to have been calibrated in accordance with technical specification requirements.

S. Experiments and Tests

Numerous activations request forms were reviewed by the inspector and found to contain appropriate descriptive information and approvals for insertion into the reactor experimental facility. The range of experiment worth has been considerably less than the technical specifications maximum of \$2.00. The maximum experiment worth noted was 10¢.

A typical experiment proposal was reviewed by the inspector. Appropriate discussions and approvals required by the technical specifications were confirmed to have been made and documented.

T. Facility Modifications

No facility modifications have been made.

Details (continued)

V. Reliability Information

1. Control rod scram times - Refer Section G.
2. Power level channel calibration - Refer Section G.
3. Safety circuit interlock and functional testing - Refer Section G.
4. Radiation detection alarm testing - Refer Section P-5.