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The Dow Chemical Company
Midland, Michigan 48667

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Regional Adminsistrator
US Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

DOW TRIGA RESEARCH REACTOR - DOCKET 50-264

Enclosed is the Annual Report for the Dow TRIGA facility for the year 1995.

Very truly yours,

Ward L Rigot

W. L. Rigot
Reactor Supervisor
1602 Building

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DOW TRIGA* RESEARCH REACTOR

ANNUAL REPORT - 1995

There were no major changes, maintenance problems, or down time involving the reactor during 1995. Operation of the reactor continues to bc plagued with an unacceptably large number of unintentional shutdowns (SCRAMs), most of which seem to be caused by the control system itself, although there seems to be a year-to-year decrease of these.

There were two US NRC inspections in 1995. The required annual audit was conducted by an outside consultant; recommendations were made and the Reactor Operations Committee has responded to these recommendations. The normal in-house audits of the radiation protection program, safety and housekeeping, and records were also performed and the recommendations acted upon.

A. Staff, Licenses, and Training

The staff consists of four Senior Reactor Operators. There have been no staffing changes during this period.

W. L. Rigot	Reactor Supervisor
T. J. Quinn	Assistant Reactor Supervisor
J. D. Romick	Assistant Reactor Supervisor
M. E. Buchmann	Senior Reactor Operator

Licenses are current. Rigot and Quinn licenses will be up for renewal in 1999, while the Buchmann and Romick licenses will be up for renewal in 1997. All operators took medical examinations during 1995.

The current two-year re qualification program started in the second quarter 1994 and will be completed during 1996. Four quarterly re qualification sessions were held during 1995; all operators have participated and successfully completed the requirements for these sessions. The SROs are current with operating experience and participation in hypothetical emergency drills, Reactor Operation Committee meetings, an annual operating examination, and the annual fuel inventory.

Operation of the reactor is an important part of the training program, since this reactor is operated on an as-needed basis, which results in numerous operations each involving reactivity manipulations, use of the control console, placement and retrieval of samples and handling of radioactive materials. The minimum experience of an operator during 1995 was 30.3 hours of actual operating time, involving 192 reactivity manipulations, and the maximum experience was 218.0 hours of actual operating time, involving 765 reactivity manipulations. Furthermore, each licensed person performed about 1/4 of the daily checkout procedures and at least two monthly checkout procedures; one of the monthly checkouts (an extensive combination of tasks involving the physical plant, the control system, and operating characteristics) was performed under the direction of another SRO as part of the annual operating examination.

J. A. Grappin has replaced R. M. A. Hahne as the Radiation Safety Officer and sits as a member of the committee.

S. B. Butts	Facility Director; Chairman
W. L. Rigot	Reactor Supervisor
J. A. Grappin	Radiation Safety Officer
T. J. Quinn	Assistant Reactor Supervisor
T. D. Lickly	Research Associate

* TRIGA is a registered trademark of General Atomics

S. B. Butts is the Research Manager in charge of the Dow Michigan Division Inorganic, Environmental and Thermal Analysis group of the Analytical Sciences Laboratory; Rigot and Quinn report administratively to Butts; Grappin is the Dow Midland location Radiation Safety Officer as well as the TRIGA Radiation Safety Officer and reports, as does Lickly, to the Dow Environmental, Health, Safety and Security department.

B. Reactor Operating Experience

The reactor was operated for 2.05 Megawatt-days during 1995 for a total of 348 hours (an average of 17.8% of the available normal working hours) and 1,611 reactivity manipulations, including checkouts and testing as well as the irradiation of samples.

C. Major Changes

During 1995 there were no major changes in the facility and there were no authorizations of new tests or experiments significantly different than those performed previously.

D. Unscheduled Shutdowns

There were 33 unscheduled shutdowns (SCRAMs) during 1995, down from 42 during 1994, 47 during 1993, 59 during 1992 and 72 during 1991. During the almost ten years following 1-1-81 the yearly average was 6 SCRAMs, with a high of 9 (1983) and a low of 3 (1989), using the control instrumentation installed in 1971 and 1973. After installation of the new console there were 4 SCRAMs during installation and startup in the last two weeks of December, 1990, 72 during 1991, 59 during 1992, 47 during 1993 and 42 during 1994. Some of these were related to hardware problems which have since been fixed, but a large majority seem to be due to two aspects of the control system: computer crashes and noise in the digital smoothing process which produces the period signal.

About 94% of the SCRAMs were associated with the operation of the console: the digital smoothing process (about 24 %), computer crashes (about 55%), period SCRAMs at the count-rate/Campbell crossover (about 6 %), and others (about 9 %). About 6 % of the SCRAMs were associated with operator errors.

The difference in the total number of SCRAMs between 1994 and 1995 can be attributed to a better understanding by the operators of the algorithm used for generating the digital input to the safety channel and a better overall understanding of the operation of the console.

E. Major Preventive and Corrective Maintenance of Safety Significance

In March of this year there were difficulties in the ability of the pneumatic system to reliably deliver samples to and from the reactor. When samples were not returned from the reactor, the reactor was secured and the samples were manually removed. General Atomics was contacted and a recommendation for a replacement motor was given. The motor was ordered and installed. The system has operated with no interruptions since installation. This has improved the reliability of the system, minimized unnecessary shutdowns, and reduced the possibility of increased exposure from manual removal of the samples from the reactor terminus.

F. Radioactive Effluents

The only radioactive material normally released to the environment from the facility is argon-41, which is produced from activation of the natural argon dissolved in the pool water and subsequently escapes from the pool into the reactor room and from there to the outside of the building, and from the natural argon present in the air used to transport samples from a laboratory into a terminus in the core of the reactor.

Since 1993 the reactor room air particulate monitor sporadically indicated very slight increases of air-borne radioactivity over the natural background levels. These increases were of the order of the background level and the sum of background plus the anomalous radioactivity was never more than about one-fourth the level required to trip the alarm on the air particulate monitor. Overall the average release after dilution or diffusion is estimated to be less than 25% of the allowed or recommended maximum concentration.

During one operation on September 18, 1995, while operating at 250 kilowatts the continuous air monitor increased to a level higher than previously observed. Previous attempts to identify the isotope causing the increased radiation levels in the reactor room have been impossible due to the low activities observed. However during this run, when the filter was removed from the continuous air monitor and a gamma ray spectrum taken of the emitted radiation, there was a significant increase in the magnesium-27 activity. An investigation showed that a press-fit joint on the exhaust tube from the pneumatic system had separated. The joint was taped and the reactor operated at 250 kilowatts; no increase in the continuous air monitor reading was observed. The magnesium-27 activity was assumed to come from the fast neutron reaction of aluminum on the interior of the pneumatic tube. Subsequent experiments confirmed these assumptions. At the highest observed level the concentration of magnesium-27 in the reactor room, the effluent concentration was less than 5% of the limit. The continuous air monitor trace observed on September 18. 1995 is consistent with previous traces, with respect to buildup and decay rates. The conclusion is that the previous increases in the continuous air monitor were also due to magnesium-27 from the pneumatic system. The elevated level reoccurred in December and it was assumed that the magnesium-27 must be coming from the switches/valves which control the direction of travel of samples within the pneumatic system. These are one-way valves and should not allow air from the pneumatic system into the reactor room. Since these valves are part of the original installation of the facility, it is possible that they no longer seat perfectly. New one-way valves have been ordered and will be installed in 1996.

G. Radiation Exposures

Radiation exposures received by facility personnel and visitors are monitored using film badges and thermoluminescent detectors. No persons have received exposures approaching 25% of those allowed or recommended in 10CFR20.

W. L. Rigot
Reactor Supervisor
13 March 1996