**[7590-01P]**

**NUCLEAR REGULATORY COMMISSION**

**[Docket No. 50-264; NRC-2012-0026]**

# License Renewal for the Dow Chemical TRIGA Research Reactor

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Environmental assessment and finding of no significant impact; availability.

**FOR FURTHER INFORMATION CONTACT:** Geoffrey A. Wertz, Project Manager, Research and Test Reactor Licensing Branch, Division of Policy and Rulemaking, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-0893; e-mail: *Geoffrey.Wertz@nrc.gov*.

**SUPPLEMENTARY INFORMATION:**

## I. Introduction

The U.S. Nuclear Regulatory Commission (NRC or the Commission) is considering issuance of a renewed Facility Operating License No. R-108, to be held by Dow Chemical (Dow, or the licensee), which would authorize continued operation of the Dow Training, Research, Isotope production, General Atomics (TRIGA) Research Reactor, located in Midland County, MI. Therefore, as required by Title 10 of the *Code of Federal Regulations* (10 CFR) 51.21, the NRC is issuing this Environmental Assessment and Finding of No Significant Impact. The renewed license will be issued following the publication of this document.

## II. EA Summary

Identification of the Proposed Action:

The proposed action would renew Facility Operating License No. R-108 for a period of 20 years from the date of issuance of the renewed license. The proposed action is in accordance with the licensee's application dated April 1, 2009, as supplemented on September 24, 2010; January 12, February 11, April 20, May 12, May 27, August 12, August 31, October 12, November 10, and December 6, 2011; and January 13, January 20, February 7, and June 11, 2012. In accordance with 10 CFR 2.109, the existing license remains in effect until the NRC takes final action on the renewal application.

Need for the Proposed Action:

The proposed action is needed to allow the continued operation of the Dow TRIGA Research Reactor to routinely provide opportunities to conduct neutron activation analysis, isotope production, neutron radiography, and irradiation studies for a period of 20 years.

Environmental Impacts of the Proposed Action:

The NRC completed its safety evaluation of the proposed action to issue a renewed Facility Operating License No. R-108 to allow continued operation of the Dow TRIGA Research Reactor for an additional 20 years and concluded there is reasonable assurance that the Dow TRIGA Research Reactor will continue to operate safely for the additional period of time. The details of the NRC staff's safety evaluation will be provided with the renewed license that will be issued as part of the letter to the licensee approving its license renewal application. This document contains the environmental assessment of the proposed action.

The Dow TRIGA Research Reactor is located on the Michigan Division of the Dow Chemical Company in Midland, MI and is a part of the Analytical Sciences Laboratory. The reactor is housed in a laboratory building constructed of concrete panel, concrete block walls, and steel frame. The reactor site comprises of the reactor building. Adjacent to the site are research buildings to the east and other industrial buildings in the outlying area. The nearest residence is located approximately 480 meters (530 yards) from the site boundary.

The Dow TRIGA Research Reactor is a pool-type, light water moderated and cooled research reactor licensed to operate at a steady-state power level of 300 kilowatt (kW) thermal power. The fuel is located at the bottom of an aluminum lined concrete pool with a volume of approximately 19,000 liters (5,000 gallons) and a depth of 6.5 meters (21.5 feet). The reactor is fueled with standard low-enriched uranium TRIGA fuel. A detailed description of the reactor can be found in the Safety Analysis Report (SAR) for the Dow TRIGA Research Reactor dated April 1, 2009. There were two major modifications to the Facility Operating License No. R-108 since renewal of the license on May 8, 1989. License Amendment No. 6 dated December 13, 1990, approved installation of a microprocessor based instrument and control system. A heat exchanger upgrade was completed in 2005, and a review in accordance with 10 CFR 50.59 was completed by the licensee prior to return to operation.

The licensee has not requested a change to the facility design or operating conditions as part of the renewal request. No changes are being made in the types or quantities of effluents that may be released off site. The licensee has systems in place to control the release of radiological effluents and implements a radiation protection program to monitor personnel exposures and releases of radioactive effluents. As discussed in the NRC staff's safety evaluation, the systems and radiation protection program are appropriate for the types and quantities of effluents expected to be generated by continued operation of the reactor. There

would be no increase in routine occupational or public radiation exposure as a result of license renewal. As discussed in the NRC staff's safety evaluation, the proposed action will not significantly increase the probability or consequences of accidents.

Therefore, the NRC staff finds that license renewal would not change the environmental impact of facility operation. The NRC staff evaluated information contained in the licensee's application and data reported to the NRC by the licensee for the last six years of operation to determine the projected radiological impact of the facility on the environment during the period of the renewed license. The NRC staff finds that releases of radioactive material and personnel exposures were all well within applicable regulatory limits. Based on its evaluation, the NRC staff concludes that continued operation of the reactor would not have a significant environmental impact.

A. Radiological Impact

Environmental Effects of Reactor Operations:

Gaseous radioactive effluents are discharged by the facility exhaust system via an exhaust vent located 8 feet above ground on the side of the reactor room, at a volumetric flow rate of approximately 48 cubic meters per minute (1700 cubic feet per minute). A fume hood in the laboratory adjacent to the reactor room used for sample preparation exhausts through a stack on top of the reactor building. Other release pathways do exist; however, they are normally secured during reactor operation and have insignificant volumetric flow rates compared to the facility exhaust system. The only significant nuclide found in the gaseous effluent stream is Argon-41. The licensee performed calculations to estimate the production level of Argon-41 associated with operation of the reactor at high power. The licensee's calculations indicated that annual Argon-41 release would result in an offsite concentration of 9.8E-10 microcuries per

milliliter (µCi/ml), which is below the limit of 1.0E-8 µCi/ml specified in 10 CFR Part 20, Appendix B for air effluent releases. The NRC staff reviewed the licensee's calculation and found it to be acceptable. The bounding calculation of total gaseous radioactive releases is less than two percent of the air effluent concentration limits set by 10 CFR Part 20, Appendix B. The potential annual radiation dose to a member of the general public resulting from this concentration is approximately 0.00056 milliSieverts (mSv) (0.056 millirems (mrem)), and this demonstrates compliance with the dose limit of 1 mSv (100 mrem) set by 10 CFR 20.1301. Additionally, this potential radiation dose demonstrates compliance with the air emissions dose constraint of 0.1 mSv (10 mrem) specified in 10 CFR 20.1101(d).

The licensee disposes of liquid radioactive wastes by solidifying liquid waste. The NRC staff's review of Dow TRIGA Research Reactor annual reports covering the last 6 years indicated that the licensee reported no routine releases of liquid radioactive waste by any of the disposal methods.

Solid low-level radioactive waste generated at the Dow TRIGA Research Reactor is disposed under the guidance of the Radiation Safety Committee and the site Radiation Safety Officer using the Dow Radiation Protection Manual. The bulk of the waste consists of samples, sample vials, gloves, and paper towels. The licensee disposes of the waste by decay in storage or shipment to a low level waste broker in accordance with all applicable regulations for transportation of radioactive materials. The licensee stated that no spent nuclear fuel has been shipped from the site to date. To comply with the Nuclear Waste Policy Act of 1982, Dow Chemical Company has entered into a contract with the U.S. Department of Energy (DOE) that provides that DOE retains title to the fuel utilized at the Dow TRIGA Research Reactor and that DOE is obligated to take the fuel from the site for final disposition.

Chapter K of the Dow TRIGA Research Reactor SAR stated that personnel exposures are well within the limits set by 10 CFR 20.1201, and are as low as is reasonably achievable (ALARA). The Radiation Protection Program tracks personnel exposures, which are usually less than 0.01 mSv (10 mrem) per year. Personnel dosimeters mounted on the interior walls of the reactor room provide a quarterly measurement of total radiation exposures at those locations. These dosimeters typically measure annual doses of less than 0.1 mSv (100 mrem) in the reactor room. No changes in reactor operation that would lead to an increase in occupational dose are expected as a result of the proposed action.

Based on the NRC staff's review of the past 6 years of data from the Dow TRIGA research reactor annual reports, the NRC staff concluded that operation of the Dow TRIGA Research Reactor does not have any significant radiological impact on the surrounding environment. No changes in reactor operation that would affect off-site radiation levels are expected as a result of license renewal.

Environmental Effects of Accidents:

Accident scenarios are discussed in Chapter M of the Dow TRIGA Research Reactor SAR. The maximum hypothetical accident (MHA) is the uncontrolled release of the gaseous fission products contained in the gap between the fuel and the fuel cladding in one fuel element to the reactor building and into the environment. The licensee conservatively calculated doses to facility personnel and the maximum potential dose to a member of the public in the event of the MHA. The NRC staff performed independent calculations to verify that the doses provided by the licensee represented conservative estimates for the MHA. The results are provided in the DTRR License Renewal Safety Evaluation Report. The NRC staff concluded that the maximum doses resulting from this hypothetical accident would be well below the limits in

10 CFR Part 20 of 50 mSv (5000 mrem) for occupational workers, and 1 mSv (100 mrem) for members of the public. The proposed action will not increase the probability or consequences of accidents.

B. Non-Radiological Impacts

The Dow TRIGA Research Reactor core is cooled by a light water primary system consisting of the reactor pool, a heat removal system, and a processing system. Cooling occurs by natural convection, with the heated coolant rising out of the core and into the bulk pool water. The large heat sink provided by the volume of primary coolant allows several hours of full-power operation without any secondary cooling. The heat removal system transfers heat to the secondary system via a 100 kW-heat exchanger and a 1 megawatt (MW) heat exchanger. The secondary system normally uses a 1 MW, closed loop system, through a chiller which discharges the heat directly to atmosphere. The secondary system may be cooled by a 100 kW heat exchanger. The heat is transferred to potable water which is discharged to a sewer system. During operation, the secondary system is maintained at a higher pressure than the primary system to minimize the likelihood of primary system contamination entering the secondary system and ultimately the environment.

Based on the information described above, the NRC staff finds that release of thermal effluents from the DOW TRIGA Research Reactor will not have a significant effect on the environment. The licensee complies with the appropriate Michigan Department of Environmental Protection permit for secondary water discharge, and no violations of the permit have occurred. Given that the proposed action does not involve any change in the operation of the reactor, the NRC staff concludes that the proposed action will not have a significant impact on the local water supply.

National Environmental Policy Act (NEPA) Considerations:

The NRC has responsibilities that are derived from NEPA and from other environmental laws, which include the Endangered Species Act (ESA), Coastal Zone Management Act (CZMA), National Historic Preservation Act (NHPA), Fish and Wildlife Coordination Act (FWCA), and Executive Order 12898 Environmental Justice. The following presents a brief discussion of impacts associated with these laws and other requirements.

A. Endangered Species Act

Federally- or State-listed protected species have not been found in the immediate vicinity of the Dow TRIGA Research Reactor, and effluents and emissions from the reactor have had no impact on critical habitat. Therefore, no effects on the aquatic or terrestrial habitat in the vicinity of the Dow TRIGA Research Reactor or to threatened, endangered, or protected species under the Endangered Species Act would be expected. The NRC staff consulted the State of Michigan, Department of Natural Resources and Environment who stated, “The project should have no impact on rare or unique natural features at the locations specified above if it proceeds according to the plans provided.”

B. Coastal Zone Management Act

The Dow TRIGA Research Reactor is not located within any managed coastal zones, nor would the effluents and emissions from the Dow TRIGA Research Reactor impact any managed coastal zones.

C. National Historic Preservation Act

The NHPA requires Federal agencies to consider the effects of their undertakings on historic properties. The National Register of Historic Places (NRHP) lists the closest historic

property as the Midland County Courthouse. The Midland County Courthouse is located at 301 West Main Street, Midland, MI, and is approximately 2.1 km (1.3 miles) northwest of the Dow TRIGA Research Reactor. Given the distance between the facility and the Midland County Courthouse, continued operation of the Dow TRIGA Research Reactor will not impact any historical sites. A Section 106 Review was submitted to the State Historic Preservation Office regarding this activity. The State Historic Preservation Office concurred that this activity did not affect historic properties.

D. Fish and Wildlife Coordination Act

The licensee is not planning any water resource development projects, including any modifications involving impounding a body of water, damming, diverting a stream or river, deepening a channel, irrigation, or altering a body of water for navigation or drainage.

E. Executive Order 12898 – Environmental Justice

The environmental justice impact analysis evaluates the potential for disproportionately high and adverse human health and environmental effects on minority and low-income populations that could result from the license renewal and the continued operation of the Dow TRIGA Research Reactor. Such effects may include human health, biological, cultural, economic, or social impacts. Minority and low-income populations are subsets of the general public residing around the Dow TRIGA Research Reactor and all are exposed to the same health and environmental effects generated from activities at the Dow TRIGA Research Reactor.

Minority Populations in the Vicinity of the Dow TRIGA Research Reactor – According to 2010 census data, 7.2 percent of the total population (approximately 5,779 individuals) residing within a 10-mile radius of the Dow TRIGA Research Reactor identified themselves as

minority individuals. The largest minority groups were Hispanic or Latino (of any race) (1,848 or 2.3 percent) followed by Asian (1,582 or 2 percent). According to U.S. Census Bureau 2010 estimates, about 7 percent of the Midland County population identified themselves as minorities, with persons of Hispanic or Latino origin (of any race) comprising the largest minority group (2.1 percent), followed by Asian (2.1 percent) and Black or African American (1.4 percent).

Low-income Populations in the Vicinity of the Dow TRIGA Research Reactor – According to 2010 Census data, an average of 10.2 percent of families and 14.5 percent of individuals residing within counties in a 10-mile radius of the reactor (Midland, Bay, and Saginaw Counties), were identified as living below the Federal poverty threshold in 2010. The 2010 Federal poverty threshold was $22,314 for a family of four.

According to American Community Survey census data estimates for 2010, the median household income for Michigan was $45,413, while 12.1 percent of families and 16.8 percent of the state population were determined to be living below the Federal poverty threshold. Midland County had a higher median household income average ($60,543) and a lower percent of families (7.1 percent) and individuals (10.4 percent) living below the poverty level, respectively.

Impact Analysis - Potential impacts to minority and low-income populations would mostly consist of radiological effects, however radiation doses from continued operations associated with the license renewal are expected to continue at current levels, and would be well below regulatory limits.

Based on information described above and the analysis of human health and environmental impacts presented in this environmental assessment, the proposed license renewal would not have disproportionately high and adverse human health and environmental

effects on minority and low-income populations residing in the vicinity of the Dow TRIGA Research Reactor.

Environmental Impacts of the Alternatives to the Proposed Action:

As an alternative to license renewal, the NRC staff considered denial of the proposed action. If the NRC denied the application for license renewal, facility operations would end and decommissioning would be required. The NRC staff notes that, even with a renewed license, the Dow TRIGA Research Reactor will eventually require decommissioning, at which time the environmental effects of decommissioning will occur. Decommissioning will be conducted in accordance with an NRC-approved decommissioning plan which will require a separate environmental review under 10 CFR 51.21. Cessation of facility operations would reduce radioactive effluents. However, as previously discussed in this environmental assessment, radioactive effluents resulting from facility operations constitute only a small fraction of the applicable regulatory limits. Therefore, the environmental impacts of license renewal and denial of the application for license renewal are similar. In addition, denial of the application for license renewal would cause the loss of the benefits of teaching, research, and services provided by facility operation.

Alternative Use of Resources:

The proposed action does not involve the use of any different resources or significant quantities of resources beyond those previously considered in the issuance of License Amendment No. 6 to Facility Operating License No. R - 108 for the Dow TRIGA Research Reactor dated December 13, 1990, which amended the Facility Operating License No. R-108 and technical specifications to allow the installation of a microprocessor based instrumentation and control system.

Agencies and Persons Consulted:

On February 2, 2102, the NRC provided a draft of this Environmental Assessment to the Resource Management Division of the Michigan Department of Environmental Quality for review. On March 5, 2012, the Resource Management Division of the Michigan Department of Environmental Quality responded by electronic mail agreeing with the conclusions of the draft EA, and otherwise had no comments.

The State of Michigan, Department of Natural Resources and Environment was consulted via its website on the proposed activity. On May 7, 2010, the Department of Natural Resources and Environment concurred that there was no effect on endangered species, and otherwise had no comments.

On December 12, 2010, the NRC staff also provided information regarding the proposed activity to the State Historic Preservation Office for a Section 106 Review. On March 4, 2011, the State Historic Preservation Office concurred that the proposed action has no effect on historic properties.

Finding of No Significant Impact:

The NRC staff performed an environmental assessment of the proposed action. The NRC staff concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC staff has determined not to prepare an environmental impact statement for the proposed action.

## III. Further Information

Documents related to this proposed action, including the application for license renewal and supporting documentation, are available electronically at the NRC's Library at

*http://www.nrc.gov/reading-rm/adams.html*. From this site, you can access the NRC's Agencywide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession numbers for the documents related to this document are: the application and its supplements, April 1, 2009 (ADAMS Accession No. ML092150443) and September 24, 2010 (ADAMS Accession No. ML102720859); January 12 (ADAMS Accession No. ML110130501), February 11 (ADAMS Accession No. ML110490391), April 20 (ADAMS Accession No. ML113460120), May 12, (ADAMS Accession No. ML11136A229), May 27 (ADAMS Accession No. ML112150327), August 12 (ADAMS Accession Nos. ML11228A116), August 31 (ADAMS Accession No. ML11249A043), October 12 (ADAMS Accession No. ML112930035), November 10 (ADAMS Accession No. ML113410168), and December 6, 2011 (ADAMS Accession No. ML113460038); and January 13 (ADAMS Accession No. ML 12019A007), January 20, (ADAMS Accession No. ML12025A089 and ML12026A152), February 7, 2012 (ADAMS Accession No. ML12040A128), and June 11, 2012 (ADAMS Accession No. ML12164A784). Letters and electronic mail from the State consultations, May 7, 2010 (ADAMS Accession No. ML101340317), March 4, 2011 (ADAMS Accession No. ML110740100), and March 5, 2012 (ADAMS Accession No. ML120730278). If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, or 301-415-4737 or by e-mail to pdr.@nrc.gov. These

documents may also be viewed electronically on the public computers located at the NRC's PDR, Room No. O1 F21 (first floor), One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. The PDR reproduction contractor will copy documents for a fee.

Dated at Rockville, Maryland, this 10th day of July, 2012.

FOR THE NUCLEAR REGULATORY COMMISSION

Jessie F. Quichocho, Chief
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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