

UNITED STATES NUCLEAR REGULATORY COMMISSION REGION III 2056 WESTINGS AVENUE, SUITE 400 NAPERVILLE, IL 60563-2657

June 9, 2025

EA-24-122 EAF-RIII-2025-0071 NMED No. 240121 (closed)

Andre Argenton Chief Sustainability Officer The Dow Chemical Company 1803 Building Midland, MI 48674

## SUBJECT: NOTICE OF VIOLATION; NRC REACTIVE INSPECTION REPORT NO. 030-04783/2024001 (DRSS) - THE DOW CHEMICAL COMPANY

Dear Andre Argenton:

This letter refers to the U.S. Nuclear Regulatory Commission (NRC) reactive inspection conducted on April 1-2, 2024, at your Midland, Michigan, facility with continued in-office review through January 30, 2025. The purpose of the inspection was to review the circumstances surrounding the contamination incident that occurred on March 27, 2024, and to determine whether licensed activities were being performed in accordance with NRC requirements.

During the inspection three apparent violations of NRC requirements were identified. The apparent violations involved the failures to: (A) immediately report the release of radioactive material, so that, had an individual been present for 24 hours in the area, the individual could have received an intake in excess of five times the annual limit on intake; (B) notify the NRC within 24 hours after the discovery of an unplanned contamination event; and (C) take suitable and timely measurements of quantities of radionuclides excreted from the body for purposes of assessing dose to determine compliance with occupational dose equivalent limits. The circumstances surrounding the apparent violations, the significance of the issues, and the need for lasting and effective corrective actions were discussed with you during a videoconference exit meeting on January 30, 2025. Inspection Report No. 030-04783/2024001 (DRSS) was issued on February 28, 2025, and can be found in the NRC's Agencywide Documents Access and Management System (ADAMS) at accession number ML25037A271. ADAMS is accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html.

In the letter transmitting the inspection report, we provided you with the opportunity to address the apparent violations identified in the report by either attending a predecisional enforcement conference, by attending an alternative dispute resolution (ADR) mediation session, or by providing a written response before we made our final enforcement decision. In a letter dated March 26, 2025 (ML25091A064), you provided a written response to the apparent violations. In your written response, you disputed apparent violations A and C listed above.

The NRC reviewed your response to apparent violation A and determined that the event was reportable because the amount of material spilled was 10 times greater than the annual limit on intake and at the time of the incident, no evaluation was performed to determine that an individual would not receive greater than five times the annual limit on intake. A retrospective analysis and calculation for the intake of the individual involved with the event was provided as part of your written response, however, this evaluation was not performed at the time of the incident. At the time of the incident, the amount of material spilled and the potential for intake of that material required a 24 hour report.

The NRC also reviewed your response to apparent violation C and determined that the bioassay sampling for the individual involved in the spill of carbon-14 (C-14) labeled 1,3-dichloropene was not suitable and timely. Dow's bioassay program required that a 24-hour urine collection be taken when working with greater than 20 millicuries of C-14. Your staff collected a urine sample approximately 23 hours after the exposure and found detectable activity. A second urine sample was collected approximately 120 hours after the exposure and did not find detectable activity. Based on the absence of activity in the second sample, the radiation safety officer (RSO) recognized that the sample results could be in error based on the biological half-life of the chemical compound. The RSO conducted research and determined the biological half-life of the incident with the second sample collected at approximately 120 hours was not suitable and timely since the chemical form or the biological clearance time was not initially considered during the sampling and analysis process during this incident.

With respect to violation C, we also considered your response that the NRC had approved your bioassay procedure. The NRC did not specifically review and approve the adequacy of the bioassay or other licensee procedures submitted as part of the licensing process. The NRC only verifies that a procedure is in place where necessary. Whether implementation of a procedure is effective to meet regulatory requirements is determined through inspection, and in this case, the bioassays performed under the procedure were not suitable or timely under the circumstances.

Based on the information developed during the inspection and the information that you provided in your response to the inspection report dated, March 26, 2025, the NRC has determined that three violations of NRC requirements occurred. These violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the subject inspection report.

The failures to notify the NRC of releases of radioactive material or contamination events and the failure to take timely measurements of radionuclides excreted from the body are of significant regulatory concern as these failures impact the NRC's ability to perform its regulatory oversight function by not being timely notified of incidents so the NRC can conduct timely and appropriate reviews of incidents. Therefore, these violations have been categorized collectively in accordance with the NRC Enforcement Policy as a Severity Level III problem. The current Enforcement Policy is included on the NRC Web site at http://www.nrc.gov/aboutnrc/ regulatory/enforcement/enforce-pol.html.

In accordance with the NRC Enforcement Policy, a base civil penalty in the amount of \$9,000 is considered for the Severity Level III problem. Because your facility has not been the subject of escalated enforcement actions within the last two inspections, the NRC considered whether credit was warranted for *Corrective Action* in accordance with the civil penalty assessment process in Section 2.3.4 of the Enforcement Policy. Corrective actions for the violations included: (1) revising the Loose Isotope Emergency Response Procedure to include guidance

on reporting events to the NRC; (2) training health physics personnel and other personnel involved in making NRC reportability determinations on the revised procedure, including any new personnel involved in reporting determinations; (3) revising the Bioassay Program for Radioisotopes and Loose Isotope Emergency Response Procedure to provide clarification regarding suitable and timely bioassays including that for a 24-hour urine bioassay, all urine that is excreted in the 24-hour period following the accidental intake (or planned work with quantities exceeding bioassay procedural requirements) needs to be collected to ensure the most accurate estimate of exposure can be generated; (4) assembling take home bioassay kits including suitable containers and instructions for use; (5) training Occupational Health department staff on the presence of the kits and the purpose of take home bioassay kits and instructions on use; (6) planning a radioactive contamination event response drill to be conducted in calendar year 2025; and (7) training for loose isotope workers, to be conducted in 2025 that will include a review of the contamination incident and lessons learned.

In addition, the annual Radiation Safety Refresher Training, conducted in December 2024 for loose isotope users, was primarily focused on spills and loss of containment events including a review of the contamination event. The training also included a hands-on simulated spill emergency response exercise. The Personnel and Area Survey Procedures Using a Geiger-Mueller (GM) Survey Meter procedure was revised to include a form to document results of personnel surveys to be completed during a contamination event. Based on the above actions, *Corrective Action* credit is warranted.

Therefore, to encourage prompt and comprehensive correction of violations, and in recognition of the absence of previous escalated enforcement action, I have been authorized, after consultation with the Director, Office of Enforcement, not to propose a civil penalty in this case. However, significant violations in the future could result in a civil penalty. In addition, issuance of this Severity Level III problem constitutes escalated enforcement action that may subject you to increased inspection effort. The NRC also includes significant enforcement actions on its web site at (http://www.nrc.gov/reading-rm/doc-collections/enforcement/actions/).

The NRC has concluded that information regarding: (1) the reason for the violations; (2) the corrective actions that have been taken and the results achieved; and (3) the date when full compliance will be achieved is already adequately addressed on the docket in NRC Inspection Report No. 030-04783/2024001 (DRSS) and your letter dated March 26, 2025. Therefore, you are not required to respond to this letter unless the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to provide additional information, you should follow the instructions specified in the enclosed Notice.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure." a copy of this letter, its enclosures, and your response, if any, will be made available electronically for public inspection in the NRC Public Document Room and in the NRC's ADAMS, accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such information, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information.

Sincerely,

Signed by Giessner, Jack on 06/09/25

John B. Giessner **Regional Administrator** 

Docket No. 030-04783 License No. 21-00265-06

Enclosure: Notice of Violation

cc w/encl: Kelly Wegener-Gave, Radiation Safety Officer Ryan Weiss, Senior Counsel, U.S. Operations, Regulatory and the Americas Legal Melissa Schisler, Global Director of Toxicology Meghan Watt, Chair, Radiation Safety Committee State of Michigan

Letter to A. Argenton from J. Giessner dated June 9, 2025.

#### SUBJECT: NOTICE OF VIOLATION; NRC REACTIVE INSPECTION REPORT NO. 030-04783/2024001 (DRSS) -THE DOW CHEMICAL COMPANY

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# OFFICIAL RECORD COPY

### NOTICE OF VIOLATION

The Dow Chemical Company Midland, Michigan

Docket No. 030-04783 License No. 21-00265-06 EA-24-122 EAF-RIII-2025-0071

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted on April 1-2, 2024, at your Midland, Michigan, facility violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are listed below:

A. Title 10 of the *Code of Federal* Regulations (10 CFR) 20.2202(a)(2) requires, in part, that each licensee immediately report any event involving byproduct material possessed by the licensee that may have caused, or threatens to cause the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the annual limit on intake.

Title 10 CFR Part 20, Appendix B, Table 1, states that the annual limit on intake for carbon-14 compounds is 2,000 microcuries.

Contrary to the above, on March 27, 2024, the licensee failed to immediately report the release of radioactive material inside or outside of a restricted area, so that, had an individual been present for 24 hours, an individual could have received an intake five times the annual limit on intake. Specifically, the licensee failed to make an immediate report to the NRC after a worker dropped an ampoule containing approximately 20,300 microcuries of a carbon-14 labeled compound inside a laboratory, contaminating the floor and a worker's shoes.

B. Title 10 CFR 30.50(b)(1), requires, in part, that each licensee notify the NRC within 24 hours after the discovery of an unplanned contamination event that: (i) requires access to the contaminated area, by workers or the public, to be restricted for more than 24 hours by imposing additional radiological controls or by prohibiting entry into the area; (ii) involves a quantity of material greater than five times the lowest annual limit on intake specified in Appendix B of 10 CFR Part 20 for the material; and (iii) has access to the area restricted for a reason other than to allow isotopes with a half-life less than 24 hours to decay prior to decontamination.

Title 10 CFR Part 20, Appendix B, Table 1, states that the annual limit on intake for carbon-14 compounds is 2,000 microcuries.

Contrary to the above, the licensee failed to notify the NRC within 24 hours after the discovery of an unplanned contamination event that required access to contaminated areas to be restricted for more than 24 hours by imposing additional radiological controls or prohibiting entry into the area; involved a quantity of material greater than five times the lowest annual limit on intake specified in Appendix B of 10 CFR Part 20; and had access restricted for a reason other than to allow isotopes with a half-life of less than 24 hours to decay prior to decontamination. Specifically, at 11:01 a.m. EDT on March 27, 2024, the licensee discovered that a laboratory had been contaminated after a spill of 20,300 microcuries of carbon-14 (greater than five times the 10 CFR Part 20 Appendix B amount of 2,000 microcuries), but the licensee did not report this unplanned

contamination event to the NRC until approximately 1:00 p.m. EDT on March 28, 2024. The licensee prohibited entry into the laboratory for over 24 hours and required additional radiological controls (absorbent paper, additional protective clothing, additional barricade and signage). Access to this area within the laboratory was restricted for a period of several weeks until the contamination was reduced and affixed in place with epoxy paint. The half-life of carbon-14 is 5,700 years.

C. Title 10 CFR 20.1204(a) requires that, for purposes of assessing dose used to determine compliance with occupational dose equivalent limits, the licensee, when required by 10 CFR 20.1502, take suitable and timely measurements of concentrations of radioactive material in air in work areas, or quantities of radionuclides in the body, or quantities of radionuclides excreted from the body, or combination of these measurements.

Title10 CFR 20.1502(b)(1) requires that each licensee monitor the occupational intake of radioactive material by and assess the committed effective equivalent to adults likely to receive, in 1 year, an intake in excess of 10 percent of the applicable annual limits on intake in Table 1, Columns 1 and 2 of Appendix B to 10 CFR 20.1001-20.2402. 10 CFR Part 20, Appendix B, Table 1, states that the annual limit on intake for carbon-14 compounds is 2,000 microcuries.

Contrary to the above, on March 27, 2024, the licensee failed to assess the dose used to determine compliance with occupational dose limits as required under 10 CFR 20.1502 by taking suitable and timely measurements of concentrations of radioactive material in air in work areas, quantities of radionuclides in the body, quantities of radionuclides excreted from the body, or combination of these measurements. Specifically, a worker was exposed to a release of airborne radioactivity from 20,300 microcuries of a compound containing carbon-14 that made the worker likely to receive in one year an intake in excess of 10 percent of the applicable annual limit on intake in Table 1, Columns 1 and 2 of Appendix B to 10 CFR Part 20. The licensee did not perform a bioassay to measure concentrations excreted from the worker's body until approximately 24 hours after the exposure. Because the half-life of the compound containing carbon-14 had a biological half-life of 5.5 hours, this bioassay was not suitable or timely to assess the worker's dose to determine compliance with occupational dose limits.

This is a Severity Level III problem (Enforcement Policy Sections 6.7 and 6.9).

The NRC has concluded that information regarding the reason for the violations, the corrective actions taken and planned to correct the violations and prevent recurrence, and the date when full compliance will be achieved, is already adequately addressed on the docket in Inspection Report No. 030-04783/2024001 (DRSS) and the licensee's letter dated March 26, 2025. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation, (EA-24-122; EAF-RIII-2025-0071)" and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region III, 2056 Westings Avenue, Naperville, IL 60563 within 30 days of the date of the letter transmitting this Notice of Violation (Notice).

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

If you choose to respond, your response will be made available electronically for public inspection in the NRC Public Document Room or in the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC web site at <a href="http://www.nrc.gov/reading-rm/adams.html">http://www.nrc.gov/reading-rm/adams.html</a>. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

Dated this 9<sup>th</sup> day of June 2025.