

NUCLEAR REGULATORY COMMISSIONING
DIVISION OF NUCLEAR MATERIALS SAFETY
REGION III

SAFETY EVALUATION REPORT
DECOMMISSIONING PLAN FOR BUILDING DC-3
MATERIALS LICENSE 21-08362-08, DOCKET 030-04858

DOW CORNING CORPORATION
AUBURN, MICHIGAN

June 28, 2021

1. Executive Summary

The Dow Corning Company (Dow-Auburn) has decided to permanently cease activities under Nuclear Regulatory Commission (NRC) radioactive materials License No. 21-08362-08 at their site located at 2200 West Salzburg Road in Auburn, Michigan. Dow-Auburn plans to decommission the site for unrestricted use and terminate its radioactive materials license.

During a site characterization survey, the licensee provided sufficient information that the regulatory conditions under 10 CFR 30.36(g) requiring the licensee to submit a decommissioning plan to the NRC prior to commencement of certain decommissioning activities were met.

The licensee submitted a Decommissioning Plan (DP) to the NRC on April 22, 2019 (Agency Document Access Management System (ADAMS) Accession No. ML19114A482). On August 23, 2019 (ADAMS Accession No. ML19238A276), the NRC issued a Request for Supplemental Information (RSI) in order to complete their acceptance review for the DP. The licensee responded to the RSI by letter dated October 24, 2019 (ADAMS Accession No. ML19347B155). In a letter dated December 20, 2019 (ADAMS Accession No. ML19354B860), the NRC accepted the licensee's DP for Technical Review.

In a conversation record dated February 5, 2020 (ADAMS Accession No. ML20041D786), the NRC issued a Request for Additional Information (RAI) to the licensee associated with its Technical Review of the licensee's DP. In a letter dated April 14, 2020 (ADAMS Accession No. ML20105A239), the licensee responded to NRC's RAI. In further discussions, the NRC documented RAI's on February 2, 2021 (ADAMS Accession No. ML21033B065) and February 23, 2021 (ADAMS Accession No. ML21055A023), and the licensee responded to the RAIs on February 15, 2021 (ADAMS Accession No. ML21049A026) and March 18, 2021 (ADAMS Accession No. ML21082A187), respectively.

The NRC staff has reviewed all the information provided by the licensee and performed an independent assessment of the information, including a review of past activities associated with NRC inspections and licensing actions to determine whether the licensee can perform decommissioning activities safely, in accordance with NRC regulations and released the building for unrestricted use.

Based upon the information available, the NRC concluded that the licensee can perform decommissioning activities safely, in accordance with NRC regulations and, when concluded, will be able to release the building for unrestricted use and terminate the radioactive material license.

2. Facility Operating History

The license was first issued on January 9, 1969. Radioactive materials used at the facility consisted of a variety of beta and gamma emitting radionuclides for research and development. Nuclides approved for use in unsealed form are Tritium (H-3), Carbon-14 (C-14), Chromium-51 (Cr-51), Iodine-125 (I-125), Sulfur-35 (S-35), and Phosphorus-32 (P-32). An analysis of the default screening values (DSVs), quantities used, physical forms, half-lives, and receipt and distribution records concluded that only C-14 and H-3 are radionuclides of concern (ROC) for decommissioning.

NRC Staff 's review of the facility's inspection history did not identify any significant contamination or violations of NRC requirements that could impact the decommissioning of the site. No materials events were identified in NRC's Nuclear Materials Event Database (NMED) that would impact the decommissioning of the site.

3. Facility Description

Licensed operations were conducted within and around the DC-3 building until July 2018, when the licensee notified NRC of its intent to cease operations (ADAMS Accession No. ML18228A804). The DC-3 building is a one-story structure with a footprint of approximately 55,000 square feet (ft²). Approximately 9,000 ft² have historically been controlled as radioactive materials usage areas. Usage and storage areas consisted of rooms where releases via sewer and ventilation to the environment were permitted in accordance with NRC requirements in 10 CFR Part 20.

There were two locations outside of the DC-3 building where licensed material was utilized, an outdoor research area and a storage shed. The outdoor research area was not in contact with the ground thus no radioactive material was directly transmitted to the environment. The storage shed was an enclosed facility where licensed material for stored prior to disposal and was cleaned up after the licensed material was shipped offsite.

4. Radiological Status of Facility

Radiosynthesis lab operations consisted of labeling compounds with radioactive materials using wet chemistry methods. These wet chemistry labs were the highest radioactive material use (volume and curie content) within the building. Radio-labeling operations were performed mainly using up to curie quantities of C-14, with much lesser quantities of H-3. Routine decontamination of the facility performed during operations reduced the consolidation of significant levels of contamination to inaccessible areas such as the air ventilation systems and portions of the fume hood. Labeled compounds were distributed to other laboratories for research in the building and contained smaller quantities of radioactive material and, therefore, lower levels of contamination were found in the other research areas.

5. Dose Modeling

The NRC staff has reviewed the information in the DP for the area within and around the DC-3 building. The NRC staff determined that, based on the radionuclides the licensee was approved to use under the license, the review of the licensee's inspection reports, receipt records, distribution records, and the half-life value of all the licensed materials, the ROC for the purpose of potential dose from decommissioning activities will be limited to the contributions of C-14 and H-3.

The NRC staff independently reviewed the licensee's characterization surveys and the methodology of the decommissioning process as detailed in the DP. The NRC staff has determined that there are no planned releases of radioactive effluent to the environment during the decommissioning process and that primary activities that could result in occupational radiation dose will be during the decontamination and decommissioning of the ventilation ducting, the contamination areas, and drain piping.

Based upon the quantity of contamination reported in these areas to be remediated, and the annual limit of intake (ALI)'s shown in 10 CFR Part 20, Appendix B, Table 1 "Occupational Values" relating to the ROC, the occupational dose to the worker is expected to be less than 10 percent of the NRC regulatory annual limit for occupational exposures (< 500 millirem/year (mrem/yr)).

As stated previously, no releases of radioactive material effluent to the environment is anticipated. Using conservative modeling and factoring in the residual contamination levels, the derived concentration guideline levels (DCGLs), the information in the characterization study, and the licensee's stated intent to retain ownership of the building, the worst case scenario dose estimated for a member of the public is less than 1 mrem/year.

6. Environmental Information

Based on the review of the licensee's DP, the NRC staff requested information about any activities that had occurred that might have impacted the soil outside of the DC-3 building. Storage of low-level waste had occurred in a storage unit external to the DC-3 building. The waste was shipped off-site, and storage area was properly decontaminated. The storage area information provided by Dow-Auburn had no indication of any radioactive material spills. The activities that had occurred in the environment did not have any dose consequences and had no impact in the decommissioning of the facility.

7. As Low As Reasonably Achievable (ALARA) Analysis

Due to the level of contamination discovered by the licensee's characterization surveys, a detailed comprehensive ALARA plan is not required. The NRC staff reviewed the licensee's ALARA protocol such as good housekeeping practices, contamination controls, and established contamination investigation levels. Based on these ALARA practices and the contamination levels present at the facility, NRC staff has determined that the licensee's ALARA analysis is sufficient to show that reasonable efforts will be taken to keep dose and contamination levels at a minimum.

8. Planned Decommissioning Activities

NRC staff has reviewed the licensee's DP and determined that the information submitted to the NRC was adequate to address the contamination levels and the radionuclides of concern that are present at the facility. The decommissioning activities and the contamination controls that were submitted by the licensee are adequate and representative of the standard industry practice for decommissioning similar facilities. The major areas for decommissioning include: (1) the radiosynthesis lab; (2) the ventilation air ducting; (3) the sink drains; (4) the localized contamination hotspots' and, (5) the building floors.

The radiosynthesis lab (room 250) will require extensive remediation. Planned decommissioning activities will consist of decontamination, dismantlement of the

ventilation air duct system and structures, and removal of contaminated materials and equipment. The DP indicates that high efficiency particulate air (HEPA)-filtered vacuums will be used as necessary to remove loose materials from surfaces. The contaminated drain and fume hood items will be bagged and shipped as radioactive waste. The drain will be removed and surveyed for residual activities. The fume hood will be wiped or encapsulated to minimize the spread of the surface activities. All shelves and drawers will be removed, surveyed, and decontaminated or disposed as appropriate. Utilities will be disconnected or removed, as needed, and benchtops will be removed and decontaminated or disposed as appropriate. Casework and utilities components will be removed, including electrical conduit/cable, piping systems and piping structural supports. Any residual water contained in piping systems will be collected and disposed of via a drain after testing an aliquot of the residual water to show compliance with NRC release criteria.

9. Project Management and Organization Project Management and Organization, Qualifications and Training

The NRC staff has reviewed the description of the decommissioning project management organization, position descriptions, management and safety position qualification requirements, use and oversight of contractors and conduct of worker training using the Consolidated Decommissioning Guidance NUREG-1757, Volume 1, "Consolidated Decommissioning Guidance," Section 17.2 Project Management and Organization. The NRC staff determined that Dow-Auburn has provided sufficient information to allow the NRC staff to determine that the licensee's decommissioning project management organization and structure should allow decommissioning activities to be conducted safely and in accordance with NRC requirements.

The licensee provided the various decommissioning management positions and qualifications necessary including the Dow-Auburn Radiation Safety Officer and contractor management support. The NRC staff reviewed the information provided and found that there are sufficient staffing and adequate qualification requirements for each staff position to ensure proper oversight of the program and to ensure the decommissioning activities as detailed in the DP can be accomplished safely.

Dow-Auburn provided the training program that shall be in place during decommissioning remediation efforts. The NRC staff independently reviewed the information and found, based upon the type of decommissioning remediation planned, contractor and licensee staff would have adequate training to ensure their safety and the safety of the general public during radiological remediation.

10. Radiation Safety and Health Program

NRC staff has reviewed the information in the DP for the area within and around the DC-3 building at Dow-Auburn facility using, NUREG 1757, Vol. 1, Rev. 2, "Consolidated Decommissioning Guidance," Section 17.3.1.1, "Workplace Air Sampling Program." The licensee used C-14 and H-3 in addition to small quantities of radioactive material with half-lives less than 120 days at the facility. The licensee ceased operations in 2018 and submitted a Decommissioning Plan. The residue of short half-life radionuclides have decayed to the point that they would not significantly contribute to occupational or public dose. Therefore, C-14 and H-3 were identified as the ROC for decommissioning. The highest surface removable contaminations identified were found at 8560 disintegrations per minute per 100 square centimeters (dpm/100 cm²) for H-3 and 14127 dpm/100 cm² for C-14. Carbon-14 and H-3 were found in the fume hood and ductworks in the

radiosynthesis lab. Dow-Auburn will dispose of the fume hood and ductworks as radioactive wastes. Engineering Controls such as containment structures, negative pressure air balance equipment, and HEPA filter vacuums will be used to prevent or control the spread of airborne radioactive contamination when the licensee removes the fume hood and ductwork and performs works to reduce the volume of waste. Dow-Auburn has committed to the performance of air monitoring during this work and established an administrative control to stop work if air monitoring results exceed 10 percent of the derived air concentrations (DAC) limits established in 10 CFR Part 20, Appendix B. Work will be performed in accordance with the approved Radiation Work Permit, and the work areas will be posted with signs to inform workers of hazards and appropriate work controls implemented as required under the Dow-Auburn radiation protection plan. Based on the low residue of radioactive contamination in the radiosynthesis lab and the proposed engineering and administrative controls in place, the quantity of airborne radioactive contamination, if any, will be below the annual limit for intake (ALI) for H-3 (8E+04 microcuries) and C-14 (2E+03 microcuries) or the DAC limit for H-3 (2.0E-05 microcuries/milliliter) and C-14 (1.0E-06 microcuries/milliliter) as specified in 10 CFR Part 20, Appendix B.

The NRC staff determined the proposed air sampling program was adequate to ensure protection of workers and public during the licensed activities and that doses will be maintained ALARA in accordance with 10 CFR 20.

NRC staff reviewed the information in the DP for the area within and around the DC-3 building using NUREG-1757, Vol. 1, Rev. 2, "Consolidated Decommissioning Guidance," Section 17.3.3, "Internal Exposure Determination." Based on this review, the NRC staff determined that the licensee, Dow-Auburn provided sufficient information on the methods to be used to calculate internal dose for occupational workers using measurements from air samples or bioassays. NRC staff conclude that the licensee's program for internal dose will comply with 10 CFR 20.1101(b); 10 CFR 20.1201(a)(1), (d), and (e); [10 CFR 20.1204](#); and [10 CFR 20.1502\(b\)](#). Based on the ROC and the concentrations involved, Dow-Auburn is not expecting any internal exposure. However, urine bioassays may be performed based on the results of airborne radioactivity measurements. NRC staff has reviewed the proposed methodology, the estimated quantities for the ROC, the radiological and contamination controls that will be implemented, and determined that appropriate actions will be taken to ensure that no licensee or contractor personnel are likely exceed 10 percent of NRC regulatory requirements.

The NRC staff has reviewed the information in the DP according to NUREG 1757, Volume. 1, Rev. 2, *Consolidated Decommissioning Guidance*, Section 17.3.1.4, External Exposure Determination. Based on this review, the NRC staff has determined that Dow-Auburn, has provided sufficient information on methods to measure or calculate the external dose of a worker to conclude that the licensee's program to determine external exposure will comply with 10 CFR 20.1101(b), 10 CFR 20.1201(c), 10 CFR 20.1203, 10 CFR 20.1501(a)(2)(i) and (c), 10 CFR 20.1502(a), and 10 CFR 20.1601. External dose determinations will be based on contamination surveys and work performed when removing the fume hood ducting. The NRC staff determined, based on the DCGL based on the screening values in NUREG 1757 Volume 2 and the contamination identified in the scoping survey, that the external exposure is less than 10 percent of the occupational dose limits established in 10 CFR Part 20. To further reduce the potential for external exposure, the licensee has committed to perform decontamination of the contamination spots and to implement ALARA.

The NRC staff has reviewed the information in the DP using NUREG 1757, Vol. 1, Rev. 2, *Consolidated Decommissioning Guidance* Section 17.3.1.6, Contamination Control Program. Based on this review, the NRC staff concluded that Dow-Auburn, has provided sufficient information to limit external exposure and control/prevent skin contamination through the use of administrative controls. These administrative controls include use of protective and personal clothing, identifying and addressing, to the extent possible, fixed and removable contamination on work surfaces, transport vehicles, equipment (including ventilation hoods), and packages. In reviewing the available information and guidance, NRC staff determined that the licensee's proposed program for summation of internal and external exposures as detailed in the DP and the Dow-Auburn radiation protection plan will comply with 10 CFR 20.1501(a), 10 CFR 20.1702, and 10 CFR 20.1906(b), (d), and (f).

The NRC staff reviewed the DP and additional information provided and verified that the licensee will establish a program and have written procedures to ensure that work in contaminated areas will be controlled as required by 10 CFR 20.1702. Radiation Work Permits (RWP) will be generated and reviewed by the licensee's Radiation Safety Committee prior to work taking place.

The DP and additional information provided indicate that dosimetry is not required based on the anticipated levels of contamination. However, the DP stated that air sampling and in-process surveys will be conducted to ensure contamination is controlled and worker doses remain below 10 percent of the occupational dose limits. The NRC staff has determined that, based on the information provided and the guidance in Regulatory Guide 8.21 *Health Physics for Byproduct Material at NRC-licensed processing and manufacturing plants*, the licensee's plan and procedures should be adequate to ensure that the worker doses remain below 10 percent of the occupational dose limits and appropriate controls will be implemented to limit the spread of contamination.

The Dow-Auburn DP stated that baseline surveys to determine the background radiation levels and radioactivity from natural sources for areas where decommissioning activities are not required to show compliance with NRC's release criteria. This statement was due to the small quantities of C-14 and H-3 used and the residual contamination levels identified in the scoping surveys compared to the default screening values. Based on the information provided by Dow-Auburn's DP, the NRC staff concurs with the Dow-Auburn decision related to background radiation surveys.

As stated in the DP, the licensee committed to the use of the default screening values and the surface contamination levels specified in NUREG 1556, Vol. 7, Revision 1, *Program Specific Guidance about Academic, Research and Development and other Licenses of Limited Scope, including Electron Capture Devices and X-Ray Florescence Analyzers* Table M-2 Acceptable Surface Contamination Levels. Table M-2 sets the maximum contamination level for removable surface contamination at 1,000 dpm/100 cm² for beta-gamma emitters. The NRC staff reviewed the characterization and scoping surveys results provided in the DP, which indicates that there are some areas of removable contamination above the screening value that will need to be remediated. If the licensee performs the remediation and surveys as described, the licensee's plans and procedures are adequate to complete the decommissioning while minimizing contamination.

11. Radioactive Waste Management Program

The NRC staff has reviewed the licensee's descriptions of the radioactive waste management program for the Dow-Auburn site, according to the guidance provided in NUREG -1757, Vol.1, Rev. 2, *Consolidated Decommissioning Guidance*, Section 17.5

Radioactive Waste Management Program. In the DP, the licensee provided information on how waste materials will be packaged, stored and where waste will be processed and disposed of. From the information provided and standard decommissioning practices, NRC's review of the DP and additional documents provided by the licensee provided reasonable assurance that mixed waste will not be generated during decommissioning.

The NRC staff verified that waste will be properly packaged and stored onsite prior to disposal and that waste will be properly shipped offsite for final disposal by an authorized recipient. The NRC staff has determined that the licensee's programs for the management of radioactive waste generated during decommissioning operations ensure that the waste will be managed in accordance with NRC requirements and in a manner that is protective of the public health and safety.

12. Quality Assurance Program

The NRC staff has reviewed the Quality Assurance Program for the Dow-Auburn facility, according to the NUREG 1757, Vol.1, Rev. 2, *Consolidated Decommissioning Guidance*, Section 17.6 Quality Assurance Program. The licensee intends to use the quality assurance (QA) program and procedures provided by Chase, the contractor that will be completing the decommissioning work. The licensee RSO will provide oversight of the project and will periodically update the Radiation Safety Committee on the progress and any issues that arise. In the DP, Dow-Auburn provided additional information on some QA program elements, including the organizational responsibilities and the ability for personnel to identify issues and stop work if necessary. The NRC staff reviewed the information provided and determined that the QA program management and responsibilities for the decommissioning activities are adequate.

The Dow-Auburn DP included QA Documents and identified records that will be maintained for decommissioning. These records include the procedures and radiation work permits needed to complete the work, surveys and the calibration records of the instruments used, and the Final Status Survey Report. NRC Staff reviewed the proposed documentation that the licensee has committed to maintaining and the proposed contents of the documents and has determined that the QA program will adequately document the decommissioning in accordance with NRC regulations.

The NRC staff reviewed the licensee's description of the test and measurement equipment that will be used during decommissioning to ensure that the equipment will be maintained and calibrated and to ensure documentation records are maintained. In its DP, the licensee has committed to documenting the calibration results in the final status survey (FSS) results. Based on the information provided, the NRC staff determined that the survey instrumentation will be adequately maintained and calibrated.

Based on this review, the NRC staff has determined that the Dow-Auburn's proposed, QA program is sufficient to ensure that information submitted to support the decommissioning of its facility should be of sufficient quality to allow the staff to determine if the licensee's planned decommissioning activities can be conducted in accordance with NRC requirements.

13. Facility Radiation Surveys

The NRC staff has reviewed the DP for Dow-Auburn, using the guidance in NUREG 1757, Vol. 2, Rev. 1, *Consolidated Decommissioning Guidance*, Section 4.1 Release Criteria 4.2 Characterization Surveys and Section 4.4., Final Status Survey. The licensee stated in

their DP that they intend to use the default screening values for the DCGLs listed in Table B.1 of NUREG-1757, Vol. 1, Rev. 2. These default screening values demonstrate compliance with the unrestricted release dose limit in 10 CFR 20.1402. Based on this information, the NRC staff determined that Dow-Auburn has summarized the DCGLs and area factors used for survey design and for demonstrating compliance with the radiological criteria for license termination.

The licensee conducted scoping and characterization surveys of some building areas as a part of the preparation of the DP with additional surveys to be taken during the decommissioning process. Additional Characterization surveys will be conducted to meet the same criteria as the FSS. Remedial action surveys will also be conducted on areas where decommissioning has been completed.

The NRC reviewed completed characterization and scoping surveys, as well as the description in the DP of the characterization, scoping, and remedial action surveys. In addition, NRC interviewed licensee staff regarding decommissioning processes and performance of independent radiological measurements of the facility. The NRC staff determined that, based upon the information available, the radiological characterization of the building appears adequate to ensure remediation will be effective, work will be conducted safely to ensure worker protection and will demonstrate significant quantities of residual radioactivity have not gone undetected, and sufficient information will be gathered that can be used to design the FSS.

The NRC staff has reviewed the information in the DP for Dow-Auburn facility. The licensee's documentation provides an explanation of the FSS design. This information includes area classifications and a description of survey units, the data quality objectives, and how surveys will be conducted and the statistical tests that will be used to analyze the data. The DP also states what information will be documented in the FSS report.

The NRC staff reviewed the proposed FSS design described in the DP, using the guidance found in NUREG-1757, Vol. 1, and determined that Dow-Auburn's proposed FSS design is adequate to demonstrate compliance with radiological criteria for license termination. In addition, the NRC staff has reviewed the proposal for the FSS and the FSS

report and has determined that, if the licensee performs the surveys as described in the DP, the FSS information should be adequate to release the site for unrestricted use. The NRC will independently review the FSS report when it is submitted as required by the regulations.

14. Financial Assurance

The NRC staff has reviewed the cost estimate for the Dow-Auburn facility against the guidance provided in NUREG 1757 Vol. 3, Rev. 1, *Consolidated Decommissioning Guidance*, Section 4.1 Cost Estimate, and Section 4.2 Prescribed Amount. Based on this review, the NRC staff determined that the cost estimate submitted by the licensee adequately reflects the costs to carry out all required decommissioning activities prior to license termination, that adequate funds are available to complete decommissioning activities and the certification statement submitted by the licensee contains the appropriate information and level of financial assurance coverage.

The NRC staff also reviewed the financial assurance mechanisms, a Letter of Credit and a Standby Trust Agreement, provided by Dow Corning Corporation for the Dow-Auburn facility against the criteria specified in NUREG 1757 Vol. 3, Rev. 1, *Consolidated*

Decommissioning Guidance, Section 4.3 Financial Assurance Mechanisms. Based on this review, the NRC staff determined that the financial assurance mechanisms submitted by the licensee are adequate to ensure that sufficient funds will be available to carry out all required decommissioning activities prior to license termination or, if the license is being terminated under restricted conditions, to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site.