TECHNICAL EVALUATION REPORT
COMPLETION OF REMEDIATION
ACTIVITIES AT THE FORMER
WATERBURY CLOCK FACTORY,
232 N ELM STREET
WATERBURY, CONNECTICUT
DOCKET 030-38960

June 25, 2024

1.0 INTRODUCTION

1.1 New Opportunities, Inc. Submittal

In an email dated January 16, 2024 (available in U.S. Nuclear Regulatory Commission (NRC's) Agency Documents Access and Management System (ADAMS) Accession No. ML24024A118), New Opportunities, Inc., current owner of the former Waterbury Clock Factory site (former Waterbury site) at 232 North Elm Street, Waterbury, Connecticut, submitted a notification that the radium contamination cleanup project conducted by their contractor, Decontamination Decommissioning and Environmental Services, LLC (DDES) at the former Waterbury site had been completed.

1.2 Site History and Description

Prior to establishing its autonomy in 1857, the former Waterbury Clock Company was part of the Benedict and Burnham Manufacturing Company, which began manufacturing brass clocks in 1850. By 1873, the Waterbury Clock Company moved its base of operations to the corner of Cherry Avenue and North Elm Street in Waterbury, Connecticut. The company started using luminous radium paint in 1919, and that process presumably continued, at least, until 1944 when operations were moved to other facilities. In 1949, the plant was subdivided into parcels that were subsequently acquired by small manufacturing firms or individuals for storage or light industrial uses. At some later date, the property was transferred to New Opportunities, Inc., a community action agency serving Waterbury, Meriden, Torrington and 27 surrounding Connecticut towns, offering a variety of social service programs designed to eliminate poverty and assist people in need. New Opportunities, Inc. uses the facility for its headquarters and a family development center.

New Opportunities, Inc. owns and occupies Building I and J (see Figure 1), which the site owner references as Phase I and Phase II, respectively. Phase I and Phase II are the focus of this report. The facility, located at 232 N Elm Street, includes a south wing (Phase I) and north wing (Phase II). Based on interior design features, it is speculated to have been a machine shop for the former Waterbury Clock Company but is now mostly office space (ADAMS Accession No. ML16291A488).

Buildings I and J are five-story structures with a combination of brick walls, wood floors, and wood columns at regular intervals within the interior. Most of the interior has been renovated to accommodate the current office space use.

Figure 1. Aerial Photo of the Former Waterbury Clock Company, Waterbury, CT, Phases I (Building I) and II (Building J)

1.3 Regulatory Basis

The Energy Policy Act of 2005 (EPAct) amended section 11e.(3) of the Atomic Energy Act of 1954 to place discrete sources of radium-226 under NRC regulatory authority as byproduct material. The EPAct, in part, expanded the definition of byproduct material to include certain discrete sources of radium-226. The NRC subsequently amended Parts 20, 30, 31, 32, 33, 35, 50, 61, 62, 72, 110, 150, 170, and 171 of Title 10 of the *Code of Federal Regulations* (10 CFR) to implement provisions of the EPAct.

In 2016, the NRC conducted radiological surveys of the former Waterbury site utilizing the guidance in Temporary Instruction 2800/043, Inspection of Facilities Potentially Contaminated with Discrete Radium-226 Sources (initially ADAMS Accession No. ML16035A053 and later revised to ML20351A280). The exposure rate measurements on the fourth and fifth floors of Phase I, and fourth floor of Phase II, exceed the 40 μR/h Temporary Instruction threshold, suggesting that a site worker could receive a dose exceeding 100 millirem per year (mrem/yr) [1 millisievert per year (1 mSv/yr)] solely from the external gamma exposure pathway if they occupied those areas for greater than 8 hours a day on an annual basis. As a result of the findings from these surveys, in 2017, the NRC informed the site owner that residual radium contamination identified at the property could potentially result in doses exceeding the NRC dose limits for members of the public and unrestricted release of licensed sites (ADAMS Accession No. ML17068A332).

10 CFR Part 20, Subpart D – "Radiation Dose Limits for Individual Members of the Public," and specifically 10 CFR 20.1301, "Dose limits for individual members of the public," establishes the requirements for protection of members of the public from licensed operations. 10 CFR 20.1301 provides, in pertinent part, that the total effective dose equivalent to individual members of the public from the licensed operation does not exceed 100 mrem (1 mSv) in a year, exclusive of the dose contributions from sources enumerated therein, including, but not limited to, background radiation.

10 CFR Part 20, Subpart E – "Radiological Criteria for License Termination," and specifically 10 CFR 20.1402, "Radiological Criteria for Unrestricted Use," establishes the requirements for the release of a site for unrestricted use. 10 CFR 20.1402 provides, in pertinent part, that a site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from the background radiation results in a total effective dose equivalent to an average member of the critical group that does not exceed 25 mrem [0.25 millisievert (mSv)] a year.

In 2018, the NRC staff proposed an alternative approach to provide oversight of the radium contamination and subsequent remediation (ADAMS Accession No. ML17318A176). The proposed alternative approach was consistent with the risk-informed, graded approach approved by the Commission in its Staff Requirements Memorandum regarding Commission Paper, SECY-17-0026, "Policy Considerations and Recommendations for Remediation of Non-Military, Unlicensed Historic Radium Sites in Non-Agreement States." Specifically, NRC indicated that the site owner would not be required to obtain a license, provided certain terms and conditions, as described in the proposed alternative, were met. Notably, these terms and conditions included, among others, that the site owner would:

- Continue to restrict access to the areas outlined in your letter to the NRC dated July 31, 2017 (ADAMS Accession No. ML17306A829), to ensure no exceedance of the public dose limit of 100 mrem/yr (1 mSv/yr) and maintain the site to prevent further dispersion of radiological material.

- Work to remediate the site, in accordance with the requirements of 10 CFR Part 20, Subpart E, Radiological Criteria for License Termination.

In 2023, the NRC notified the site owner that given the site owner's continued good-faith efforts to meet the aforementioned terms and conditions, the NRC intends to continue forgoing licensing the site (ADAMS Accession No. ML23066A190).

To satisfy the terms and conditions of the NRC's alternative approach to licensing, in 2018, the owner requested NRC approval for a Cleanup Plan for the site (ADAMS Accession No. ML19028A060). The Cleanup Plan describes the remedial actions of certain areas of the 232 North Elm Street site to reduce residual radioactivity to concentrations that would meet unrestricted release criteria in 10 CFR 20.1402. In 2019, NRC staff approved the site owner's Cleanup Plan (ADAMS Accession No. ML19044A522).

1.4 Summary of Proposed Action

The Cleanup Report, which accompanied New Opportunities, Inc.'s email notification describes the results of remediation activities conducted by its contractor, DDES (ADAMS Accession No. ML24024A118). The remediation activities are focused on locations identified in previous site assessments, notably those conducted by the NRC and its contractor,

ORAU, at the former Waterbury site. The purpose of the remediation activities is to reduce radium contamination levels to satisfy the action level of 40 microrem per hour (μrem/hr) at 1 meter, which was established in NRC's Temporary Instruction 2800/043 and corresponds to the NRC's public dose limit [i.e., 100 mrem/yr (1 mSv/yr)] for a worker who spends 2,300 hours annually near the source of contamination.

Based upon the results of the post-remediation survey, the Cleanup Report indicates that the site now meets the aforementioned action level identified in the NRC's Temporary Instruction, based upon the following:

- All areas identified in excess of the worker action level (40 μR/hr) have been remediated and are below the action level.
- The facility does not meet criteria for unrestricted release.
- None of the measurements obtained for removable contamination exceeded the administrative removable contamination limit of 20 dpm/100cm^2 for radium-226, which is identified in the Cleanup Plan (ADAMS Accession No. ML19028A060) and was approved by NRC (ADAMS Accession No. ML19044A522).
- The greatest structure exposure rate measurement from within the site was at 38 μR/hr at 1 meter for radium-226.

2.0 ANALYSIS

This Technical Evaluation Report summarizes the actions taken by the site owner to remediate radium-226 contamination at the facility and documents the NRC staff's evaluation of the site owner's actions described in the Cleanup Survey Report.

2.1 <u>Site Remediation</u>

2.1.1` Cleanup Plan

To demonstrate that the NRC's unrestricted release criteria are met, the site owner proposed, in a 2018 Cleanup Plan (ADAMS Accession No. ML19028A060), to use a total Derived Concentration Guideline Level (DCGL) for radium-226 of 1,116 disintegrations per minute per 100 square centimeters (dpm/100 cm^2) for total residual radioactivity levels and 111 dpm/100 cm^2 for removable residual radioactivity based on the building occupancy scenario in DandD, Version 2.4. DandD is a computer code that can assess compliance with the dose criterion of 10 CFR 20.1402. The site owner also proposed the use of 819 dpm/100 cm^2 and 20 dpm/100cm^2 as the total and removable screening values corresponding to 19 mrem/yr (0.19 mSv/yr), which is the State of Connecticut standard. The NRC staff approved the Cleanup Plan in April 2019 (ADAMS Accession No. ML19044A522).

2.1.2 Remediation Activities and Surveys

In the 2024 Cleanup Report, the site owner's contractor described remediation activities conducted on walls and flooring to address elevated radioactivity previously and newly identified in areas of the 4th and 5th Floors of Buildings I and J. Residual radioactivity and resulting exposure rates were reduced as described in the pre- and post-remediation survey results table in Appendix B, "Cleanup Survey Summary," of the Cleanup Report.

Exposure rates were reduced below the 40 μR/h action level specified in NRC's Temporary Instruction 2800/043 for workers, which corresponds to the NRC's 100 mrem/yr (1 mSv/yr) public dose limit specified in 10 CFR 20.1301. However, total residual radioactivity levels remaining after decontamination exceed the site owner's NRC-approved DCGLs in all areas identified in the Cleanup Report. The Cleanup Report did not provide data to support its assertion that none of the removable radioactivity measurements exceeded the administrative removable contamination limit of 20 dpm/100cm^2 for radium-226.

2.1.3 Side-by-Side Survey

An NRC Region I inspector performed an inspection at the former Waterbury site when remediation activities were conducted by the site owner's contractor in October 2023 which are documented in a memorandum (ADAMS Accession No. ML24072A033). The NRC inspector observed radiological survey activities and performed side-by-side radiation surveys during the remediation of the site. The NRC inspector noted that the site owner's contractor moved storage racks and performed a survey of areas that were not surveyed by ORAU during the site assessments. The site owner's contractor identified and remediated additional areas beyond those identified by ORAU. The NRC side-by-side exposure rate measurements confirmed that all the identified areas of contamination were remediated so that there were no readings above 40 μR/hr at one meter per Temporary Instruction 2800/043.

2.1.4 Dose Assessment

Total residual radioactivity levels remaining after decontamination as described in the post-remediation survey results table in Appendix B, "Cleanup Survey Summary," of the Cleanup Report exceed the site owner's NRC-approved DCGLs in all areas identified in the Cleanup Plan. The site owner developed DCGLs that correspond to NRC's unrestricted release dose criterion at 10 CFR 20.1402 [i.e., 25 mrem/yr (0.25 mSv/yr)] and the State of Connecticut's dose criterion [i.e., 19 mrem/yr (0.19 mSv/yr)]. Therefore, residual radioactivity levels remaining do not meet NRC's dose criterion for unrestricted use.

3.0 STATE CONSULTATIONS

During the remediation, members of the Connecticut Department of Energy and Environmental Protection (DEEP) made intermittent site visits.
NRC staff also consulted with DEEP staff regarding the results of its surveys and determination about the adequacy of the site remediation. DEEP had no additional comments.

4.0 ENVIRONMENTAL CONSIDERATIONS

4.1 Evaluation of EPA/NRC Memorandum of Understanding Consultation Triggers

The NRC staff considered whether concentrations of residual radioactivity in soil or ground water would trigger consultation with the U.S. Environmental Protection Agency (EPA) under the EPA/NRC Memorandum of Understanding (MOU) (see NUREG-1757, Vol. 1, Rev. 2, Appendix H). At the former Waterbury site, radium-226 contamination was not identified in any exterior soil areas and there is no groundwater involvement. Contamination was limited to building interior surfaces. Therefore, NRC staff concluded that the conditions in the MOU have not been met to trigger consultation with the EPA.

4.2 10 CFR Part 51 Evaluation

A proposed action is eligible for a categorical exclusion or otherwise not required to have an environmental review under 10 CFR 51.22(c)(20) if it is related to the decommissioning of a site where a decommissioning plan is not required by 10 CFR 30.36(g)(1), 40.42(g)(1), or 70.38(g)(1) and the NRC has determined that the facility meets the radiological criteria for unrestricted use in 10 CFR 20.1402 without further remediation or analysis.

The action under consideration by NRC staff is the determination that the former Waterbury site is acceptable for unrestricted use without further remediation or analysis. Because the site is not licensed by the NRC, there was no license condition for the site requiring submission of a decommissioning plan. Therefore, the NRC staff finds that a decommissioning plan was not required by 10 CFR 30.36(g)(1), 40.42(g)(1), or 70.38(g)(1). NRC staff notes, however, that an acceptable cleanup plan was submitted by DDES with the request to perform the remediation activities under the NRC reciprocity program. In addition, based on the NRC evaluation of the cleanup survey results and the results of the NRC's side-by-side measurements, the facility does not meet the radiological criteria for unrestricted use in 10 CFR 20.1402 without further remediation or analysis. Therefore, neither an Environmental Assessment nor an Environmental Impact Statement is warranted for this action and a determination on the need for an Environmental Assessment or Environmental Impact Statement will be made once further remediation or analysis is conducted.

6.0 CONCLUSIONS

As discussed above, based on a review of documents and direct observation of site activities by NRC staff, the NRC staff makes the following conclusions:

1. The remediation of the former Waterbury site and offsite disposal of radium–contaminated building demolition debris was not performed in accordance with all the Cleanup Plan commitments.

2. Based on DDES' post-remediation survey results and side-by-side survey results by NRC's inspector, the NRC staff has reasonable assurance that exposures from the residual radioactivity remaining on the building surfaces at the former Waterbury site would not exceed the worker scenario action level of 40 μR/hr. This action level corresponds to NRC's public dose limit specified at 10 CFR 20.1301. Based on this result, NRC staff recommends removing the access restrictions that were identified in its letters specifying terms and conditions for the site owner and the NRC's approach to oversight of the radium contamination (initially ADAMS Accession No. ML17318A176 and later amended at ML23066A190).

3. The NRC staff does not have reasonable assurance based on the results of the remediation activities and survey results that the expected annual dose from the residual radioactivity remaining on the building surfaces at the former Waterbury site for a building occupant scenario would conform with the requirements in 10 CFR 20.1402 for unrestricted release [i.e., 25 mrem/year (0.25 mSv/yr)].

4. The NRC staff also notes that the projected dose from residual radium-226 contamination levels does not appear to meet the State of Connecticut annual dose limit [i.e., 19 mrem/year (0.19 mSv/yr)] for a post-remediation radiologically contaminated facility.

5. Radioactive wastes generated as a result of the remediation activities have been properly transported from the site and transferred to an authorized facility for disposal.

6. NRC staff consultation with the EPA is not required at this time.

Therefore, the NRC staff concludes that remediation of the former Waterbury site in Waterbury, Connecticut was not completed in accordance with the NRC-approved Cleanup Plan, and the staff will continue to conduct oversight. This evaluation makes conclusions only on the radiological condition of the facility and does not address the possible presence of EPA or State regulated hazardous materials at the site.

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