May 22, 2025

New York State Department of Environmental Conservation
232 Golf Course Road
Warrensburg, New York 12885
Attention: Beth Magee; Deputy Regional Permit Administrator

RE: Request for Information; DEC Permit Application 5-5330-00038/00027 (SW RD&D)

Dear Ms. Magee,

ESMI of New York (ESMI), a Clean Earth Company, is submitting responses to New York State Department of Environmental Conservation (NYSDEC) letter, dated March 19, 2025 (Attachment A), received via email, requesting information to support DEC Permit Application 5-5330-00038/00027 (SW RD&D).

The numbered responses below correlate to numbered statements or information requests in NYSDEC's March 19, 2025 letter (Letter).

1. The PFAS RD&D project dated April 8, 2019 (2019 Project), had requested authorization to operate at two separate thermal oxidation temperatures. Page 8 of the 2019 Project submittal states "… ESMI is proposing to perform tests on the system at 1750°F and 1500°F." Clean Earth had identified 2,000-tons of soil (1,000-tons per each test temperature) to support testing timeframes associated with Environmental Protection Agency (EPA) Other Test Method(s) (OTM) emission testing procedures.

   Clean Earth, noted on Page 8 of the SW RD&D, "… ESMI is proposing to perform tests on the system at 1550°F, 1650°F and 1750°F."

   On Page 12 of the SW RD&D, "ESMI is providing notice that one or more PoP Test may include the addition of a lime product to the effluent process airstream from the PTU prior to the STU. EPA ORD concluded "Removal of FTOH vapors and subsequent products of incomplete destruction through CaO (calcium oxide) thermal treatment requires moderately low temperatures (<800°C), thus reducing the energy needed to achieve thermal destruction." ESMI would replicate the operating parameters of a PoP Test STU temperature where the hydrated lime injection to allow the test results to be compared to one another and determine if benefits were demonstrated for DRE, PFAS mass emissions, and PIC generation."

   In the SW RD&D, Clean Earth identified a minimum of four, an option for five, separate test conditions (1550°F, 1650°F, 1750°F, and lime product addition). Utilizing 1,000-tons per test condition, 5,000-tons was the largest soil volume anticipated to be required to complete the testing (SW RD&D Application; PFAS Soil Sources, Anticipated Tonnage, and Treatment Timeframes, Page 9). Please note, NYSDEC request, response provided in number 4 below, would add additional tonnage to the SW RD&D Application.

2. Clean Earth acknowledges the statement from NYSDEC. In accordance with the Clean Earth and NYSDEC meeting held on May 2, 2025, Clean Earth will update the body of the submittal with the requested information.

3. Clean Earth will update AERMOD Modeling (AERMOD) if soil analysis submitted with the Clean Earth Waste Profile demonstrates PFAS concentrations greater than those presently modeled. If multiple soil projects comprise the required tonnage, Clean Earth will model the project with weighted average PFAS concentrations.

4. Clean Earth would note Shields et al., 2023 was conducted by injecting AFFF into the EPA Office of Research and Development "Rainbow Furnace". Clean Earth is not proposing, does not intend to, nor is permitted to receive AFFF or any liquid wastes for treatment by thermal desorption.
   Shields et al., 2023, in Supporting Information Figure S1 Pilot-scale furnace description, demonstrates retention times at injection temperatures are less than 0.25 seconds (conservative estimation based on Figure S1). SW RD&D Page 4 notes Clean Earth's thermal oxidizer has a retention time of 2-seconds.
   AFFF is known to have PFAS concentrations equal to or greater than 3% by volume and to have high precursor concentrations. AFFF PFAS concentration is factors greater than PFAS detections in soil and as modeled by Clean Earth. (A 3% AFFF is equal to 30,000-parts per million; Clean Earth modeled PFAS soil concentrations less than 100-part per billion).
   Clean Earth acknowledges NYSDEC statement and is willing to perform an emissions test at a thermal oxidation temperature of 2,000°F. Per Clean Earth's response number 2 above, this additional test will increase the operating time and tonnage required to complete all emission testing. With the addition of a 2,000°F temperature, bringing the testing scenarios up to six individual tests, Clean Earth may require up to 6,000-tons of PFAS contaminated soil to support the SW RD&D.

ESMI looks forward to continuing collaborating with NYSDEC in developing a research project designed to provide all parties scientific data to support management practices and regulatory decisions for PFAS contaminated soil management in New York State. Should you have any questions on this document, its contents, or require additional information, please let me know.

Sincerely,

Robert Martin
Technical Director
P: 518.747.5500
E: rmartin@cleanearthinc.com

Attachment A

NYSDEC Letter Dated March 19, 2025

NEW YORK STATE | Department of Environmental Conservation

KATHY HOCHUL
Governor

AMANDA LEFTON
Acting Commissioner

Sent Via Email Only

March 19, 2025

Robert Martin
ESMI of New York LLC
304 Towpath Lane
Fort Edward, NY 12828
rmartin@harsco.com

RE: REQUEST FOR INFORMATION
DEC Permit Application #5-5330-00038/00027 (SW RD&D)
ESMI of New York LLC
Fort Edward (T), Washington County

Dear Mr. Martin:

I am writing in response to the Solid Waste Management Research, Development and Demonstration (RD&D) permit application for the referenced facility received by our office on December 29, 2023. Staff in our Division of Materials Management and Division of Air Resources have further reviewed the submission and found that the following additional information is needed:

1. The permit application proposes to treat 3,000-5,000 tons of Per-and polyfluoroalkyl substances (PFAS) contaminated soil during the two-week project. In the summary report of the previous PFAS RD&D project dated April 8, 2019, it stated that ESMI was planning to request approval for a larger scale RD&D project to treat PFAS contaminated soil. This report stated approximately 2,000 tons of soil would be required. Please explain why 3,000-5,000 tons of PFAS contaminated soil is required for this project and why a smaller amount of material is not sufficient. It is understood that the facility does not know where it will source the contaminated soil from at this time, and therefore the levels of PFAS contamination are unknown. However, further justification on the amount of soil requested must be included in the application. 6 NYCRR Part 360.18(b)(6) states that a permit application for an RD&D project must demonstrate that the quantity and types of waste proposed for use in the project are no more than those needed to satisfy the project's objectives.

2. 6 NYCRR Part 201-1.16(a)(1) states that research and development activities cannot produce commercial quantities of materials or products for sale. Therefore, the material produced from this RD&D project cannot be sold. The material may be given away for reuse at no cost under a case-specific beneficial use determination that includes PFAS contaminated soil or used as landfill daily cover, if demonstrated that the treated material meets the regulatory requirements for the intended use. The application should be revised to reflect a new end use for the material.

3. ESMI has stated that it has not identified the specific contaminated soil sources for the RD&D project. Therefore, estimated soil PFAS concentrations were used as the basis for the AERMOD modeling to show that air emissions during the RD&D test are below the Air Guideline Concentrations. Should the PFAS concentrations in the contaminated soil sourced for the RD&D project exceed those used in the modeling analysis, an updated modeling analysis demonstrating no exceedance of the Air Guideline Concentrations must be provided to the Department prior to the test.

4. According to EPA's 2024 Interim Guidance on the Destruction and Disposal of PFAS, the preliminary research on thermal treatment of PFAS suggests that the minimum conditions for PFAS destruction include well mixed environments with temperatures greater than 1,100°C (2012 °F) and optimized combustion stoichiometry (Shields et al., 2023). These conditions may adequately destroy PFAS and minimize products of incomplete combustion (PIC). ESMI stated that the secondary treatment unit (STU) at the facility can operate at temperatures up to 2000°F. To evaluate the STU's ability to control PFAS and eliminate potential PICs emissions, the Department requests that the RD&D Project includes a test condition for STU operating at 2000°F.

In addition to the above, please be reminded that the Department has determined that a second public participation meeting is required, with this meeting being held in-person at a location within or near the Village of Hudson Falls. As requested in my January 14, 2025 email, please provide a proposed date, time and location for the meeting for our review along with a mock-up meeting invitation.

Please feel free to contact me at (518) 623-1283 or beth.magee@dec.ny.gov with any questions.

Sincerely,

Beth A. Magee
Deputy Regional Permit Administrator

ec: Erin Burns – DEC
James Hogan – DEC
Katelyn White – DEC
Yuan Zeng – DEC