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# HOTH ESMI Application for RD&D and NYSDEC Responses

**From:** ESMI
**To:** NYSDEC  Kevin Wood; Regional Material Management Engineer, Paul Sierzenga; Regional Air Pollution Control Engineer
**Date**: December, 23, 2023

**Application 1: December 23, 2023-** ESMI submitted an **"Application for Solid Waste Management Facility Permit"** for an Research, Development and Demonstration Permit through the NYSDEC.

| Question | Summaries, Quotes, Notes, and Clarification Statements |
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| **1: _____**<br><br>***What precautions will be made to ensure that soil being transported does not leak, spill, or contaminate other regions during transport?*** | ESMI is applying to accept soil from NY, MA, VT, NH, NJ, and CT (pg1).<br><br>*[Clarification: States are listed in ESMI "Application for Solid Waste Management Facility Permit"for an Research, Development and Demonstration Permit through the NYSDEC.]* |
| **2: _____**<br><br>**How can ESMI state that truck traffic would be unaffected if it would take 200-357 trucks (15-25 per day) of soil to move 5000 tons of soil?  What data can you provide that the facility is currently operating at this scale, 15-25 trucks per day?** | The application is for **5000-tons of PFAS contaminated soil for treatment** by thermal desorption under a 360.18 Research, Development, and Demonstration Permit.<br>***[Clarification:* 5000-tons of contaminate soil is equivalent to**<br>• 357 large dump trucks equates to at least 25 trucks per day, each carrying 14 tons (Lynch trucking 2024),<br>• 200 18-wheelers equates to at least 15 trucks per day each carrying 25 tons (Towing 2024) of soil,<br>• 192 Super dump trucks equates to at least 14 trucks per |

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| | day carrying 19-26 tons (Super Dump 2018). ] |
| **3: _____**<br><br>**How can you verify that all of the PFAOs have been removed from the soil if the EPA still states that not all PFAS are even known yet? Tests for all types of PFAOs don't even exist yet.** | ESMI is applying to receive PFAS contaminated soil to study the ability of the thermal desorption technology deployed at the facility to treat soils contaminated with PFAS while controlling emissions. (pg 2)<br>*[**Clarification**: Thermal Desorption is a treatment process that heats soil to exceed the boiling point of contaminants, allowing them to be desorbed (released/unabsorbed) and subsequently thermally oxidized into carbon dioxide and water.]* |
| **Questions** | **Letter Accompanying Application- Summaries, Quotes, Notes, and Clarification Statements** |
| **4: _____**<br><br>**Please provide data proving that thermal desorption can eliminate ALL PFAS contaminant concentrations within soil.**<br><br>**What are the names of the Alaskan companies referenced in the application on page 5 and where can we find their soil and emission data?** | "Thermal desorption is a robust remedial technology that has been proven to significantly reduce or **eliminate contaminant concentrations** within soil and media." (pg 5)<br><br>*[**Clarification**: RD&D permit 58z10005 in no way eliminated contaminant concentrations. See posting on handsoffthehudson.org to see the results being referenced here.]* |
| **5:**<br>**What data can ESMI provide that confirms ALL PFAS can be desorb from soil at temperatures BELOW their boiling point as stated on page 4 of the application supporting document, especially taking into account that the PFAS are most likely bound even more strongly to the organic matter in the soil?** | The Facility Process and System Components section outlines that Thermal Desorption Units (TDUs) **eliminate soil contaminants by exceeding their boiling points**, minimizing residual levels. "Thermal Desorption is a treatment process by which soil and media (solid matrix/matrices) are heated to a temperature that exceeds the boiling point of the soil contaminants. As the boiling point of the contaminant is reached, |

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| | contaminants are desorbed from the soil matrix reducing or eliminating the contaminant(s) from the solid matrix." (pg 4) . |
| **6: _____**<br><br>**The previous 2018 RD&D Project is cited 32 times in which only 22 tons of PFAs were processed and only 20 PFAS compounds were analyzed.**<br><br>**What does the statement "successfully reduced" mean if there was no way of knowing the actual concentration of PFAS in the soil that was processed?**<br>**What are the NYSDEC guidelines for water and how would repeated exposure to the stream that runs by the facility be impacted over time?** | ESMI's Direct Fired Thermal Desorption Units can reach an average treatment temperature of 975°F (523.9°C), with planned soil treatment temperatures of 700°F (371°C), 800°F (427°C), and 900°F (482 °C) aimed at effectively desorbing PFAS while adhering to NYSDEC guidelines. Previous findings from a **2018 RD&D Project** indicated that a temperature near 915°F (491°C) successfully **reduced** leachable PFAS to below NYSDEC drinking water limits.<br><br>*[**Note**: PFAS was **reduced** but there is no indication of the percent decrease of the residual PFAs that remained in the soil or was emitted into the air.]* |
| **7: _____**<br><br>**Page 5 from the Permit Application states that organic matter in the soil can prevent PFAs from being removed. What are the soil cleanup objectives, if not to remove PFAS from the soil even if it has a high organic matter?** | **ESMI noted that soil organic matter (SOM) might retain PFAS by binding it, which could hinder desorption, but complete SOM removal is not essential for achieving soil cleanup objectives.** The current RD&D will include analyses of soil organic matter levels in treated soil to further investigate its influence on PFAS concentrations 9 (5 pg). |
| **8: _____**<br><br>**What does EMSI mean on page 8 of the application when it says ESMI "BELIEVES PFAS can be controlled at temperatures LOWER than 982 ℃" when it is a well established fact that PFAS must reach 1000-1200 ℃?** | **Secondary Treatment Unit** - During the second phase of treatment, the thermal oxidizer heats up the chemicals that have been separated from the soil (PFAS) and heats them to a temperature where they are converted into less harmful chemicals (carbon dioxide, water, and carbon tetrafluoride). The system that ESMI is currently using is only permitted to run as high as 982° C,. ESMI would like to test their current chamber to see if it can handle higher temperatures (843°, 898°C 954°C), |

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| **IF the temperatures required to break down PFAS are much higher than the capabilities of the current thermal oxidizing system, how will those PFAS be destroyed?**<br><br>**If studies being cited on page 8 of the application states that 99% of PFAs were removed, why are the plume map attached modelled with 99.9% and 99.99% efficacy? Wouldn't less effective PFAs destruction result in more will be released into the atmosphere, and the more concentrated the PFAS will be,** | but those temperatures still do not exceed the temperatures needed to completely break down PFAS.<br><br>"ESMI **believes** the Thermal Desorption Units has the capacity and efficiency to control PFAS at a temperature lower than the 1800°F (982° C)." (pg 8)<br><br>[NOTE: This test was in regards to PCBs not PFAS. Destruction of some PFAS is estimated to be between 1000 and 1200 degrees Celsius.] |
| **9: _____**<br><br>**Although there are no air regulations in place regarding PFAOS as stated on page 10 of the permit application, New York State resident have a new law protecting them and guaranteeing their right to clean air, water, and and healthy environment. What are the current EPA suggestions for PFAS emissions and how will the company handle lawsuits when citizens rights have been taken from them?** | "ESMI's review of NYSDEC air resources regulations identified an ambient air concentration for PFOA13. ESMI did not identify any specific regulations for PFOS emissions standards in NYSDEC regulations." (PG 10) |
| **10: _____**<br><br>**Why do the emissions maps use soil with concentrations of 2.061 micrograms per kg (0.002061 ppm) if the 2018 study only reduced contamination of PFAS to 7760 micrograms per kilogram (7.76ppm)? Furthermore, the initial soil contamination of 122.91 micrograms per kilogram if Clean** | Since the 2018 RD&D Project, several entities and the Environmental Protection Agency Office of Research and Development (EPA ORD) have completed projects demonstrating that PFAS can be desorbed from soil (including the ESMI 2018 RD&D Project) and PFAS emissions can be controlled by thermal oxidation to meet State identified emissions criteria. (pg 10) |

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| **Earth is currently accepting soils with over 9000 ppm or 9,000,000 micrograms per kilogram?** | |
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| **11: _____**<br><br>**How will accidental spills and contamination be handled at the facility? What impact would a spill have on the environment?**<br><br>**Don't you agree that a SEQRA should be conducted to investigate the impact this might have on the environment?** | ESMI is proposing to treat 3,000 to 5,000-tons of PFAS contaminated soil during the project. Based on a 30-ton/hour treatment rate, ESMI anticipates that the TDU will be treating PFAS contaminated soil for approximately 167-hours over a two (2) week period. |
| **12:____Ben Bramlage_____**<br><br>**What monitors will be used to measure the air emissions?**<br>**How many monitors will there be?**<br>**Where will they be located?**<br>**How many PFAs will be tested for by these monitors?**<br>**What response do you have for the PFAS that are not being tested for?** | A single PFAS emission test, which includes 3-separate sampling events, is anticipated to require 16-hours to complete; or one emissions test per day. |
| **13:_____**<br><br>**What other facilities are able to process soil in this way?** | ESMI has not engaged in identifying soil sources for the RD&D Project and will not actively seek soil for the project until NYSDEC has provided authorization for the RD&D Project. Acceptance of the soil associated with this RD&D will not |

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| **If soil is being imported from as far away as New Jersey, wouldn't the CO2 emitted by an environmental impact and therefore require a SEQRA to be complete?** | increase the annual number of trucks received at the facility or increase the number of hours the facility operates on average annually. Since the soil will be stockpiled in the building for a period to allow for soil analysis and evaluation, the floorspace taken by the RD&D Project will limit the material that can be accepted by the facility. This floorspace would normally be utilized to store and manage inbound soil projects. Limiting available floor space to accept contaminated soils limits the facility's ability to operate at full-scale, reducing material acceptance, and limiting truck traffic to the facility during the RD&D Project. |
| **14:_____**<br><br>**How many trucks are received on a daily basis at ESMI?**<br><br>**5000 tons of Soil would equal 15 18 wheelers or 25 super dump trucks per day.** | Acceptance of the soil associated with this RD&D will not increase the annual number of trucks received at the facility or increase the number of hours the facility operates on average annually. Since the soil will be stockpiled in the building for a period to allow for soil analysis and evaluation, the floorspace taken by the RD&D Project will limit the material that can be accepted by the facility. This floorspace would normally be utilized to store and manage inbound soil projects. Limiting available floor space to accept contaminated soils limits the facility's ability to operate at full-scale, reducing material acceptance, and limiting truck traffic to the facility during the RD&D Project. |
| **15:_____**<br><br>**Define the PFAS criteria for RD&D soil. Why would the soil** | If the RD&D Soil does not meet the PFAS criteria, soil will be moved back to the soil storage building for subsequent thermal treatment or disposed of in accordance with regulatory guidelines at permitted disposal facilities with whom ESMI and |

<table>
<tr><td>be treated again, if the first round of treatment didn’t remove the PFAS?<br><br>Are you testing for all 11,000 pfas that could exist in the soil?</td><td>Clean Earth have existing business relationships.</td></tr>
<tr><td></td><td>SUMMARY OF EMISSION POINT MODELING USING AERMOD SOFTWARE</td></tr>
<tr><td>16:_____<br><br>Where will less dense particles go? Where are the current models with the updated AERMOD?</td><td>The current version of AERMOD, version 23132 was used to complete the Air Dispersion/Deposition Modeling.</td></tr>
<tr><td>17-<br><br>FE School is less than 1 mile away. How will you ensure that students are not being subjected to pfas contamination? Will monitors be at the school?</td><td>The following sites were identified as sensitive.<br><br>Table 1 – List of Sensitive Receptors Within Modeling Area<br><table><tr><th>Facility Name</th><th>Location (UTM Coordinates)</th><th>Approximate Distance from Facility (km)</th></tr><tr><td>Fort Edward Jr. Sr. High School</td><td>614811.26m, 4792114.38m</td><td>0.97</td></tr><tr><td>School on Burgoyne</td><td>615068.06m, 4793260.20m</td><td>0.83</td></tr><tr><td>Fort Edward Village Recreation</td><td>615168.68m, 4791200.98m</td><td>0.86</td></tr><tr><td>Learning Express Family Daycare</td><td>614061.73m, 4792415.84m</td><td>1.75</td></tr><tr><td>A Mother’s Dream Daycare</td><td>614550.77m, 4794149.78m</td><td>1.80</td></tr><tr><td>Fort Edward-Kingsbury Health Center</td><td>614987.73m, 4791610.57m</td><td>1.38</td></tr><tr><td>Fort Edward Village Recreation</td><td>615155.76m, 4792128.53m</td><td>0.85</td></tr><tr><td>Wedgewood Golf Club</td><td>616233.14m, 4792572.79m</td><td>0.85</td></tr><tr><td>Mullen Park</td><td>615253.85m, 4792023.77m</td><td>0.85</td></tr></table></td></tr>
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**19 - Every molecule that settles will accumulate over time.**

**In 2 weeks, 2.75E-5 per hours, would result in 9.24E-3. That is a 33500% increase in concentration over 2 weeks.**

| Contaminant | Max Hourly Dispersion Concentration | SGC | % of SGC | Max Annual Hourly Dispersion | AGC | |
|---|---|---|---|---|---|---|
| | All values in ug/m³ | | | | | |
| Total Sampled PFAS (99.9% DRE, full receptor grid) | 2.75E-05 | N/A | N/A | 2.72E-07 | 0.0053[1] | 0. |
| Total Sampled PFAS (99.9% DRE, 1.5 mile endpoint) | 5.39E-06 | N/A | N/A | 7.08E-08 | 0.0053[1] | 0. |
| Hydrogen Fluoride (HF) | 1.26 | 5.6 | 23% | 0.0124 | 0.071 | |
| Carbon Tetrafluoride ($CF_4$) | 5.28E-03 | N/A | N/A | 5.21E-05 | 0.33[2] | 0 |

**20- Where are the new models using Method 2 with maps of where the smaller less dense PFAS will settle?**

**Why do the maps only model 800 Square meters when the plumes are clearly settling outside this parameter?**

For Method 1 deposition, the particle size distribution in Barton et al., 2006 was used. This particle size distribution reflects ambient air measurements downwind of a manufacturing facility. Method 1 deposition is used for particulates greater than **10 microns in diameter,** the applicability of this method for estimating deposition is uncertain.
A particle density of **1.8 g/cm3** was used in the modeling analyses as it is representative of the contaminants to be modeled, PFOA,PFOS, PFHxS, PFNA, and PFBS, which range from 1.780 to 1.841 g/cm3 (pg28)

[**NOTE**: ***The DEC determine METHOD 1 to be unacceptable as PFAS are both small than 10 micrometers and less dense than 1.780 g/cm3.]***

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**FROM:** NYSDEC
**TO:** ESMI
**DATE:** March 15, 2023

NYSDEC sent a “Notice of Incomplete Application” from DEC to ESMI regarding application for Solid Waste Management Facility Permit for an Research, Development and Demonstration Permit.

| Questions | APPLICATION- Summaries, Quotes, Notes, and Clarification Statements |
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| | 1. ESMI did not attach the model protocol to the application |
| **21- Why did you use AERMOD method 1 in your initial application?** | 2. ESMI can not use Method 1 in AERMOD as it should only be used when a single fraction of the emitted particles have a size greater than 10 um. |
| **22- How will the boiling point of sulfonate PFAS be calculated considering their resistance to boiling when adhered to soil?** | 3. “The list of PFAS compounds for which the Boiling Points (BPs) provided is incomplete in comparison to the full analyte lists for the newest sampling techniques available for measuring the concentrations of various PFAS compounds in the different environmental media (e.g., soil water/liquid, air).” (pg 1 & 2)<br>a. List does not include all types of PFAS<br>b. Sulfonate PFAS compounds (like PFOS) tend to interact more strongly with soil and have higher boiling points than carboxylate PFAS compounds of the same chain length, which could affect their environmental persistence and potential for remediation.<br>c. The comparison between the sulfonate **PFOS** and the carboxylate **PFOA** with 8-carbon chains reveals that, despite having the same number of carbon atoms, PFOS adheres more strongly to soil and exhibits a higher boiling point.<br>d. If there are larger sulfonate PFAS compounds contaminating the soils being processed (similar to what’s being indicated for the carboxylates), they’d be believed to have even higher BPs associated with them. |

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| **23- If you are releasing CF4, which is 7390 times stronger than CO2 as a greenhouse gas, why are you stating there is no environmental impact of this project?** | 4. The **CF4 AGC** value is incorrect, and it should be **330 µg/m³** rather than **0.332 µg/m³**. (pg 2)<br><br>[note: CF4 stands for carbon tetrafluoride, a perfluorocarbon (PFC) compound with the chemical formula $CF_4$. It is a colorless, odorless, and non-flammable gas at room temperature. **CF4 is a greenhouse gas and contributes to global warming. Although it is present in the atmosphere in very small quantities, its global warming potential (GWP) is extremely high. Its GWP is approximately 7390 times that of carbon dioxide ($CO_2$) over a 100-year period.]** |
| **24- How is it possible to model all 9,000- 11,000 or more known types of PFAS that could be in the soil?** | 5. ESMI needs to test for more types of PFAS chemicals. This means we will either redo the whole test with all the new chemicals or change the results to account for the higher total amount of PFAS. This will help make sure the test shows the true impact of these chemicals on the environment and follows the rules. |
| **25- How has the DEC resolved the issue that ESMI does not know that they will perform at a 99.90% or 99.99% reduction of PFAS?**<br><br>**On what grounds can they say they will be 99.9% effective at destroying PFAS when the temperatures required to destroy them are not being attained at the facility?** | 6. In summary, there is a need for clarification regarding the **0.1 g/s "Representative" PFAS emission rate** listed in the tables. It is important to explain how this value was determined and what it represents in the context of the modeling results. (pg 2) |
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| **25- Why are the documents available at the HUDSON FALLS Library and not the FORT EDWARD LIBRARY?**<br><br>**Why weren't residents of Hudson Falls notified of the meeting if they are the ones being impacted as an environmental justice, disadvantaged community?** | The facility is located about **one mile** from the **Hudson Falls Environmental Justice** and **Disadvantaged Communities area**. (pg 2)<br>a. **DEC's initial screening** suggests that the facility may have **potential adverse environmental impacts** on these EJ/DAC areas.<br>b. Based on the screening, the facility is required to **prepare a Public Participation Plan (PPP)** that satisfies the specific guidelines set out in **CP-29, Part V.D.**<br>c. **One public informational meeting** to be held **within the DAC/EJ area**.<br>d. A **records repository** for public review, which should be made available at the **Hudson Falls library** for the community to access relevant documents and information. |

**From:** ESMI

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**To:** NYSDEC
**Date**:**March 15, 2024**

**ESMI Response to NYSDEC Incomplete Application**

| Questions | APPLICATION- Summaries, Quotes, Notes, and Clarification Statements |
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| | AERMOD Modeling Protocol and modified AERMOD Dispersion and Deposition Model will be submitted and included in Attachment B of this document by the end of day on Thursday, April 18, 2024. Timeline for the modeling update pushed due to vacation schedules at C.T. Male Associates. |
| | Method 2 could not be used as it is undergoing investigation. Method 1 was used according to Barton et. al 2006. A particle density of 1.8 g/cm3 was used in the modeling analyses as it is representative of the contaminants to be modeled, PFOA, PFOS, PFHxS, PFNA, and PFBS, which range from 1.780 to 1.841 g/cm3. |
| **26- With more than 9,000 types of PFAS identified to date, how can only 0.74% (70/9000 x 100) of PFAS be tested for by Eurofins or Analye companies and still be sufficient at determining how much PFAS remains in the soil or in the air emissions?**<br><br>**Are these companies testing soil and air emissions or just soil?** | Eurofins EPA 1633 Analyte List, tests for 40-PFAS compounds while the Eurofins PFAS Extended Analyte List tests for 70-PFAS compounds; |
| **27- The temperatures required to break down PFAS are much** | “Since ESMI could not identify boiling points for all the PFAS compounds in the PFAS Analyte Lists, Eurofins and Pace Analytical were consulted to determine if boiling points of |

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| **higher than the capabilities of the current thermal oxidizing system currently in place. How will those PFAS be destroyed if the system can not reach the temperature necessary to destroy them?**<br><br>**What does EMSI mean when it says it <u>BELIEVES</u> PFAS can be controlled at temperatures LOWER than 982 ℃ when it is a well established fact that PFAS must reach 1000-1200 ℃.**<br>**The studies cited on this page had 99% efficacy, why are the plume map on page 84-107 calculated with 99.99% efficacy?** | these compounds existed. **Therefore, for PFAS compounds that do not have a boiling point listed, no boiling point was able to be identified."** If ESMI receives additional data from Eurofins or Pace Analytical, or information becomes available via other sources, ESMI will share the information with NYSDEC.<br><br>The highest noted PFAS boiling point was for Perfluorohexane sulfonic acid, 845.6°F . Please note the below discussion on boiling points and operating temperatures. **ESMI does not <u>believe</u> that the boiling point for all compounds must be exceeded for them to desorb from contaminated soil.**<br><br>***[Note:. This information is contradicting the ESMI response to DECs questions in August 2024.* When asked to clarify how PFAs with unknown boiling points will be removed from soils, ESMI states boiling temps do not need to be reached.**<br><br>*"Since ESMI could not identify boiling points for all the PFAS compounds in the PFAS Analyte Lists, Eurofins and Pace Analytical were consulted to determine if boiling points of these compounds existed.* ***Therefore, for PFAS compounds that do not have a boiling point listed, no boiling point was able to be identified."]*** |
| | ESMI acknowledges on Page 7 of the RD&D Project submittal that soil organic matter plays a role in PFAS retention within the soil matrix. Through analysis to be completed during this RD&D Project, ESMI hopes to develop scientific data that will help identify how soil organic matter alters PFAS retention in soil matrices. |
| 2**8- Clean earth website already states that "Clean Earth has a long history of treating contaminated soil and possesses a portfolio of treatment technologies".** | Engagement to identify soil sources did not seem prudent without a RD&D Permit since asking clients to hold PFAS contaminated soil for an undefined period without a treatment commitment was not viewed as proper client management practice. Until such time that soil(s) for the project have been identified, the assumption submitted by NYSDEC will not be able to be confirmed.<br><br>**[NOTE: Clean Earth, the parent company of ESMI is currently processing AFFF from** |

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| **Wouldn't that mean you have already identified sources of contaminated soil but are not sharing where they would be coming from?** | **Air force bases. https://www.cleanearthinc.com/news/clean-earth-introduces-resolvetm-pfas-services There website states "PFAS can contaminate soil in several ways: through landfill leachate, contaminated wastewater, firefighting and the use of aqueous film forming foam (AFFF), air deposition, industrial sources and more. Fortunately, Clean Earth has a long history of treating contaminated soil and possesses a portfolio of treatment technologies.]** |
| **29- Where are the maps of emission with the 0.1 g/s value?** | The "Representative" PFAS of 0.1 g/s is an arbitrary value and was modeled as a screening level to allow emissions of other PFAS contaminants to be estimated by scaling the "Representative" PFAS modeling results.<br><br>[NOTE: ALL emission maps model the emission plume with 99.99% effectiveness not 99.9%] |
| **30- Does ESMI still believe that they shouldn't have to have a meeting where they answer questions about their process and its effectiveness?** | ESMI submitted to NYSDEC on April 11, 2024 an email requesting clarification on the determination that a Public Participation Plan (PPP) is required pursuant to DECCommissioner Policy 29 (DEC CP 29). The email is provided in Attachment E.<br><br>The premise for the clarification is DEC CP 29 states a PPP "… shall apply to applications for major projects and major modifications…". **ESMI believes that Research, Development, and Demonstration Permits, as defined by State regulation, are minor projects. Based on the references provided in the noted email, ESMI does not believe That a PPP is required for the RD&D Project.** ESMI is awaiting response to the clarification by NYSDEC. |
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**From:** NYSDEC
**To:** ESMI
**Date**: **June 5, 2023**

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**NYSDEC Response to Incomplete Application**

| Questions | APPLICATION- Summaries, Quotes, Notes, and Clarification Statements |
|---|---|
| | The DEC states that Method 1 is still not acceptable as most if not ALL air contaminants will be less than 10 um, and therefore will have different gravitational settings, velocities, and aerodynamic resistance. |
| | There is an expansive list of PFAS that the DEC will need "evaluated". The expanded testing most likely can not occur in the 2 week window, but could be submitted after. |
| **31- IF the DEC is our safeguard against further pollution of our environment, why are they helping ESMI work around the language barrier that is keeping them from receiving their RD&D permit?**<br><br>**Why is the DEC suggesting that ESMI not list the PFAS being measured, and to use a general statement to encompass some, but not all chemicals known at this time?** | The DEC tells ESMI that rather than listing individual pfas, it would be better to use the more encompassing term "pfas" or "pfas compounds" in general to allow for flexibility for the evaluation of pfas that will be measured and required at some time.<br><br>**THE DEC ADVISES ESMI to CHANGE THE FIRST SENTENCE TO <u>"THE PFAS CONTAMINANTS WILL BE EVALUATED INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING USEPA REGULATED COMPOUNDS."</u>** |
| | There is still a need to explain how the 99-99.99% range was determined. Documentation supporting specified PFAS destruction efficiency range for the thermal treatment system must be included. |

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| **32- CF4 is a known greenhouse gas that is 700x more potent than the CO2 currently being emitted from the ESMI facility, and therefore has a significant impact on the environment. Why does the permit stated that there will be know environmental impact from this emission?** | AGC for $CF_4$ is 330 ug $m^{-3}$ not .330 ug $m^{-3}$, therefore the maximum annual dispersion concentration would be 5% not 0.02%. Stating that the $CF_4$ AGC listed has not formally been accepted by the NYSDEC is incorrect. |

**From:** NYSDEC
**To:** ESMI
**Date**: August 1st, 2024

**ESMI FINAL Response to NYSDEC**

| **QUESTIONS** | **APPLICATION- Summaries, Quotes, Notes, and Clarification Statements** |
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| **33- Updated maps show no difference in emission plumes. They are still only modeling a 800 m3 sector and many of the plumes are located off the grid. Why don't the maps model the plume in its entirety?** | The updated Protocol for Emission Point Modeling Using AERMOD Software (AERMOD Protocol) and Summary of Emission Point Modeling Using AERMOD Software. AERMOD Summary are contained in Attachment B and Attachment C of this document, respectively. |

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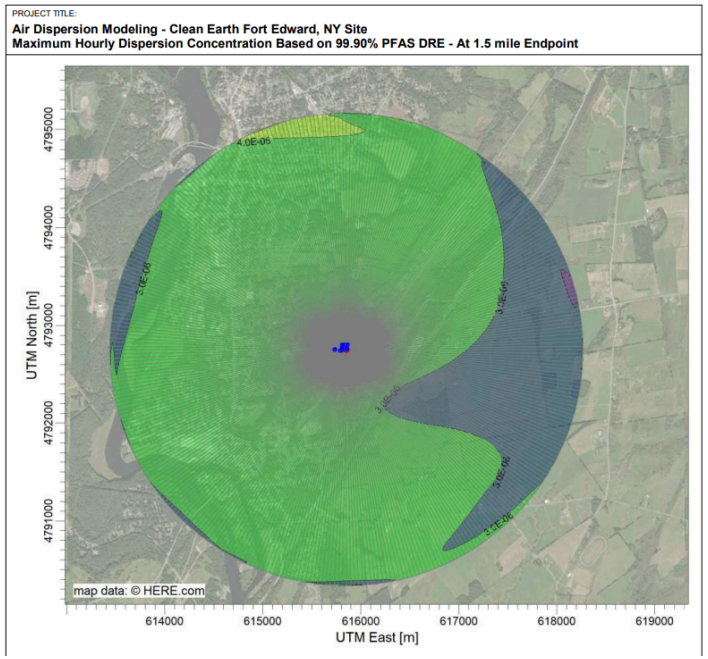
| **Page 57 shows an increase in emission concentration over Hudson Falls which is a DAC and EJ community. Why isn't the plume modeled completely? Does the concentration** |  |

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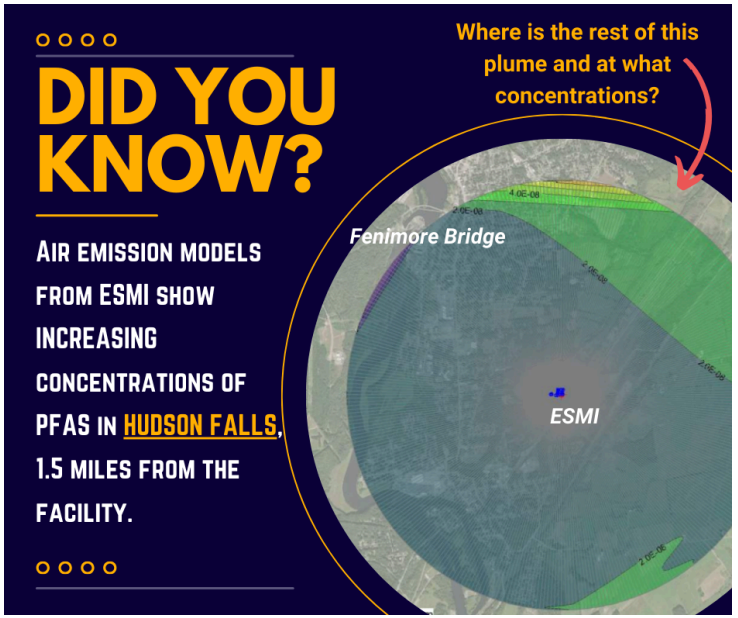
| **Concern: Page 58 shows a PFAS plume over Hudson Falls and is incomplete as it extends past the 1.5 mile radius.** |  |
| | ESMI states that information about certain types of PFAS requested by the DEC was already included in the original application and that they would remodel any other PFAS not described in the original model. |
| **34- How has the DEC resolved the issue that ESMI continues to model PFAS emissions with 99.9% PFAS destruction when they failed to provide statistically significant data to support their claim and refuses to model the DRE at the secondary treatment unit?** | ESMI provides three citations of reference documents that show destruction removal efficiencies (DRE's) of 99.9% and 99.99%, which represent the lower of the DRE's (higher emission totals). ESMI didn't think it was necessary to model the higher destruction removal efficiencies as in the reference documents, nor model DRE at the secondary treatment unit.<br><br>[Note: The efficiency calculations are based on studies that attain higher temperatures for desorption with less organic matter, and higher thermal oxidation of the PFAS gases. The reference to the |

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| | 2018 study only processed 22 tons of soil with very low levels of PFAS compared to the levels that could be accepted and processed at ESMI. Only 20 PFAS were tested for as opposed to the 900-11000 known compounds at this time.] |
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| **35. Emergency response:**<br>What emergency protocols are in place for managing accidental spills on roadways, fire at the ESMI facility, equipment failures?<br><br>If a fire at the facility did occur or spill did happened during transport what is the potential for PFAS release into the environment and potential human and ecosystem exposures? | |
| **36. Truck route**<br><br>What is the route trucks will take when transporting PFAS containing soils?Will this be by residential areas and schools? What ecologically sensitive areas will these trucks be traveling near? What are those specific routes? Have these facilities and property owners been notified? | |
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| **37. Soil Containment During Transport**<br><br>How will soil spillage, dust or leaks from trucks during transit be prevented? If it rains during transportation of soils what is preventing PFAS leakage from trucks?<br><br>What would happen to property values, water sources, private wells if there was an accidental spill during transport of PFAS soils? How does Clean Earth plan to resolve these issues? | |
| **38. Environmental and Health damages and liabilities**<br><br>We are highly concerned in terms of the risk of air or water pollution impacting nearby residents.<br><br>What financial responsibilities will Clean Earth uphold if there was an accidental release of PFAS into our community? How will you pay for health monitoring of our residents long term and their possible care? How will Clean Earth compensate property owners for damages if water sources are contaminated or property destroyed? | |

**39. Site Management**

What specific site containment measures are used to prevent the spread of contaminated soil during transport or storage? How will Dust suppression systems avoid contamination of surrounding areas?

What specific site containment measures are used to prevent the spread of contaminated soil during transport or storage?

How will Dust suppression systems avoid contamination of surrounding areas?

Upon an observation of the facility it seems poorly equipped to manage most of these concerns. The facility for storage is not air tight and does not have doors. There are open piles of treated soils. This is concerning because there are several PFAS compounds that Clean Earth was not able to eliminate during their 2018 study.

*Appendix*

Table 1. Pre-Primary, Post-Primary, and Post-Secondary Treatment measurements for total mass concentration of 20 PFAS compounds in soil

| Substance | Pre-Primary Treatment (ppb) | Post-Primary Treatment (ppb) | Post-Primary Removal Efficiency | Post-Secondary Treatment (ppb) | Post-Secondary Removal Efficiency |
|---|---|---|---|---|---|
| Perfluorobutanoic acid (PFBA) | 0.42 | ND | 100% | ND | 100% |
| Perfluoropentanoic acid (PFPeA) | 0.63 | ND | 100% | ND | 100% |
| Perfluorohexanoic acid (PFHxA) | 0.70 | ND | 100% | ND | 100% |
| Perfluoroheptanoic acid (PFHpA) | 1.10 | ND | 100% | ND | 100% |
| Perfluorooctanoic acid (PFOA) | 4.50 | ND | 100% | ND | 100% |
| Perfluorononanoic acid (PFNA) | 2.90 | ND | 100% | ND | 100% |
| Perfluorodecanoic acid (PFDA) | 5.70 | ND | 100% | ND | 100% |
| Perfluoroundecanoic acid (PFUnA) | 3.00 | ND | 100% | ND | 100% |
| Perfluorododecanoic acid (PFDoA) | 2.20 | ND | 100% | ND | 100% |
| Perfluorotridecanoic acid (PFTriA) | 0.94 | ND | 100% | ND | 100% |
| Perfluorotetradecanoic acid (PFTeA) | 0.88 | ND | 100% | ND | 100% |
| Perfluorobutanesulfonic acid (PFBS) | 0.09 | ND | 100% | ND | 100% |
| Perfluorohexanesulfonic acid (PFHxS) | 0.24 | 0.05 | 78.1% | ND | 100% |
| Perfluoroheptanesulfonic acid (PFHpS) | 0.55 | 0.05 | 90.3% | ND | 100% |
| Perfluorooctanesulfonic acid (PFOS) | 88.00 | 7.65 | 91.3% | ND | 100% |
| Perfluorononanesulfonic acid (PFNS) | 0.04 | ND | 100% | ND | 100% |
| Perfluorodecanesulfonic acid (PFDS) | 0.13 | ND | 100% | ND | 100% |
| Perfluorooctanesulfonamide (FOSA) | 1.15 | ND | 100% | ND | 100% |
| (NMeFOSAA) | 3.35 | ND | 100% | ND | 100% |
| (NEtFOSAA) | 6.40 | ND | 100% | ND | 100% |
| **Total PFAS** | **122.91** | **7.76** | **93.7%** | **ND** | **100%** |

*The Pre-Primary Treatment samples were taken from the original sample prior to the primary thermal desorption treatment in December 2018, the Post-Primary Treatment samples were taken after the initial treatment in December 2018, and the Post-Secondary Treatment samples were taken after the second treatment in February 2019. The Removal Efficiencies correspond to the difference in mass concentrations between the Pre-Primary Treatment samples and the respective Post-Treatment*

| | |
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| | For example PFHxs 78.1% , PFHpS 90.3%, PFOS 91.3% removal efficiencies. If these PFAS remain in the post treated soils this is very concerning. |
| **40. Emissions standard**<br><br>What are the current emissions standards that EMSI will be complying with in terms of PFAS and PFOS air emissions? | The NYSDEC published its Environmental Notice Bulletin that that proposes an allowable concentration in ambient air for PFOA of 0.0053 µg/m3. The concentration level – called an annual guideline concentration (AGC) – only pertains to PFOA, which has led some critics to claim that the proposed regulation does not go far enough, since PFOA have largely been phased out from use in the United States. Instead, critics argue, the regulation should have encompassed more of the over 7,000 PFAS compounds to account for the vast number of recently created PFAS that are more widely used today in industrial settings. Essentially there are no emissions standards that exist in NYS. |
| **41. Monitoring and Reporting**<br><br>During the processing of PFAS soils will emissions be tested by spectrophotometry? How frequently? | The most advanced type of air emissions test that could potentially detect all types of chemicals being emitted is a combined gas chromatography-mass spectrometry (GC-MS) analysis of an air sample collected using a comprehensive sampling system; this method provides |

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| Who is responsible for the monitoring of these emissions during the test period?<br><br>Will a third party be used to monitor these emissions?<br><br>42. What are the current emissions standards that EMSI will be complying with in terms of PFAS and PFOS air emissions? | high sensitivity and specificity for identifying a wide range of chemical compounds in the air, including both known and unknown pollutants.<br><br>NYS has virtually no air emissions standards for the release of PFAS atmospherically |
| **42. Soil Sources:**<br><br>Where are the PFAS contaminated soils coming from?<br><br>What concentrations of PFAS do they contain?<br><br>What other chemicals do these contaminated soils contain?<br><br>What testing has been done on these soils? Who conducted these tests? What soil testing protocols were used? We would like to see these testing results. | Clean Earth does have a stake in AFFF soils<br><br>A study Occurrence of select perfluoroalkyl substances at U.S. Air Force aqueous film-forming foam release sites other than fire-training areas: Field-validation of critical fate and transport properties R. Hunter Anderson a, * , G. Cornell Long a , Ronald C. Porter b , Janet K. Anderson (2016)<br><br>Paper is a survey from on-going site investigations at U.S. Air Force sites impacted by Aqueous Film-Forming Foam (AFFF)<br><br>See table below. ug/kg= ppb. These PFAS levels are shockingly high, they are not even close to the levels seen in the 50 ton test study done in 2018. One of the highest levels in soils tests was PFOS with a level at 9,700 ppb. |

**Table 2**
Summary statistics[a] for all 16 PFASs measured[b] by matrix.

| PFAS | Parameter | Matrix | | | | |
|---|---|---|---|---|---|---|
| | | Surface soil | Subsurface soil | Sediment | Surface water | Groundwater |
| PFBA | DF[c] | 38.46% | 29.81% | 24.24% | 84.00% | 85.51% |
| | Median | 1.00 | 0.960 | 1.70 | 0.076 | 0.180 |
| | Maximum | 31.0 | 14.0 | 140 | 110 | 64.0 |
| PFBS | DF | 35.16% | 34.62% | 39.39% | 80.00% | 78.26% |
| | Median | 0.775 | 1.30 | 0.710 | 0.106 | 0.200 |
| | Maximum | 52.0 | 79.0 | 340 | 317 | 110 |
| PFPA | DF | 53.85% | 45.19% | 45.45% | 92.00% | 87.68% |
| | Median | 1.20 | 0.960 | 1.70 | 0.230 | 0.530 |
| | Maximum | 30.0 | 50.0 | 210 | 133 | 66.0 |
| PFHxA | DF | 70.33% | 65.38% | 63.64% | 96.00% | 94.20% |
| | Median | 1.75 | 1.04 | 1.70 | 0.320 | 0.820 |
| | Maximum | 51.0 | 140 | 710 | 292 | 120 |
| PFHxS | DF | 76.92% | 59.62% | 72.73% | 88.00% | 94.93% |
| | Median | 5.70 | 4.40 | 9.10 | 0.710 | 0.870 |
| | Maximum | 1300 | 520 | 2700 | 815 | 290 |
| PFHpA | DF | 59.34% | 45.19% | 48.48% | 84.00% | 85.51% |
| | Median | 0.705 | 0.660 | 1.07 | 0.099 | 0.235 |
| | Maximum | 11.4 | 17.0 | 130 | 57.0 | 75.0 |
| PFOA | DF | 79.12% | 48.08% | 66.67% | 88.00% | 89.86% |
| | Median | 1.45 | 1.55 | 2.45 | 0.382 | 0.405 |
| | Maximum | 58.0 | 140 | 950 | 210 | 250 |
| PFOSA | DF | 64.84% | 29.81% | 75.76% | 52.00% | 48.55% |
| | Median | 1.20 | 0.470 | 1.30 | 0.014 | 0.032 |
| | Maximum | 620 | 160 | 380 | 15.0 | 12.0 |
| PFOS | DF | 98.90% | 78.85% | 93.94% | 96.00% | 84.06% |
| | Median | 52.5 | 11.5 | 31.0 | 2.17 | 4.22 |
| | Maximum | 9700 | 1700 | 190000 | 8970 | 4300 |
| PFNA | DF | 71.43% | 14.42% | 12.12% | 36.00% | 46.38% |
| | Median | 1.30 | 1.50 | 1.10 | 0.096 | 0.105 |
| | Maximum | 23.0 | 6.49 | 59.0 | 10.0 | 3.00 |
| PFDA | DF | 67.03% | 12.50% | 48.48% | 52.00% | 34.78% |
| | Median | 0.980 | 1.40 | 1.90 | 0.067 | 0.023 |
| | Maximum | 15.0 | 9.40 | 59.0 | 3.20 | 1.80 |
| PFDS | DF | 48.35% | 11.54% | 33.33% | 8.00% | 20.29% |
| | Median | 3.70 | 3.55 | 2.00 | 17.8 | 0.125 |
| | Maximum | 265 | 56.0 | 2200 | 35.6 | 2.00 |
| PFUnA | DF | 45.05 | 9.62 | 24.24 | 20.00 | 8.70 |
| | Median | 0.798 | 1.15 | 1.60 | 0.021 | 0.025 |
| | Maximum | 10.0 | 2.00 | 14.0 | 0.210 | 0.086 |
| PFDoA | DF | 21.98% | 6.73% | 45.45% | 20.00% | 4.35% |
| | Median | 1.95 | 2.40 | 2.80 | 0.058 | 0.022 |
| | Maximum | 18.0 | 5.10 | 84.0 | 0.071 | 0.062 |
| PFTriA | DF | 15.38% | 13.46% | 24.24% | 0.00% | 1.45% |
| | Median | 0.665 | 1.90 | 1.65 | na | 0.019 |
| | Maximum | 6.40 | 4.70 | 29.0 | na | 0.019 |

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