

ECT Makes Submission to US EPA on PFAS Destruction, Showcasing REM Technology

Highlights:

- ECT has lodged a public comment in response to the US Environmental Protection Agency's (EPA) Interim Guidance on the destruction and disposal of PFAS, a consultation which opens only once every four years.
- The submission presents performance data for the Company's exclusively licenced Rapid Electrothermal Mineralisation (REM) technology against the EPA's Section 5 evaluation framework, addressing technology readiness, destruction efficacy, mass balance, byproduct safety, and regulatory relevance.
- The REM technology was evaluated on GAC samples that were laden with aqueous film-forming foam (AFFF), firefighting solutions provided by the U.S. Army Corps of Engineers. AFFF contains ~40 different types of PFAS. This laboratory demonstration showed applicability to real-world PFAS waste streams.
- In PFAS-contaminated soils, REM removed more than 99% of various PFAS while preserving key soil properties, converting the fluorine into non-toxic calcium fluoride.
- On Granular Activated Carbon (GAC) and IX resins, REM achieved full fluorine mass balance, accounting for 96–99.9% of fluorine as inorganic fluoride, with >99.9% PFAS removal and no detectable volatile organic fluorides.
- Traditional PFAS treatments often fail to fully destroy the compounds, generating secondary waste or harder-to-capture byproducts. The REM process doesn't just make PFAS "disappear", it converts the fluorine into known, non-toxic mineral forms and accounts for essentially every fluorine atom through testing.
- REM's high destruction performance, full fluorine mass balance, and regulatory-grade analytics make it a leading candidate to meet EPA expectations for safe, verifiable PFAS disposal.
- ECT is currently procuring commercial samples of PFAS-laden soil and GAC for validation with its pilot system, supporting the pathway to commercialisation.

Environmental Clean Technologies Limited (ASX: **ECT**) (**ECT** or **the Company**) advises that it has submitted a public comment to the United States Environmental Protection Agency (EPA) in response to the EPA's Interim Guidance on the destruction and disposal of per- and polyfluoroalkyl substances (PFAS).

The submission presents data on the Company's Rapid Electrothermal Mineralisation (REM) technology, which has demonstrated the ability to break down PFAS and account for the resulting fluorine through to stable, non-toxic mineral forms.

The EPA opens this request for public comment only once every four years, making it an important opportunity for ECT to position REM against the framework the EPA uses to evaluate emerging PFAS destruction technologies. Drawing on its fluorine mass-balance results, ECT believes REM is well placed to address the key requirements set out in the Interim Guidance.

What the EPA Is Doing About PFAS

PFAS, often called “forever chemicals”, are man-made substances used in products like plastics, textiles, food packaging, and firefighting foams.

They are extremely persistent in the environment, can build up in soil and water, and have been linked to serious health concerns such as cancers, immune system effects, fertility issues, and organ damage.

Because of these severe risks, the US EPA has sharply lowered allowable PFAS levels in drinking water and is tightening expectations for how PFAS wastes are destroyed and disposed of.

Traditional approaches, such as incineration, chemical oxidation, or filtration onto granular activated carbon (GAC) and ion-exchange (IX) resins, often do not fully break PFAS down and can create secondary waste streams or new, smaller fluorinated compounds that are even harder to capture and regulate.

This is one reason the US Department of Defense and other stakeholders have raised concerns and, through recent National Defense Authorization Acts, imposed temporary limits on PFAS incineration to reduce the risk of incomplete destruction and harmful emissions, particularly where byproducts and emissions are not fully characterised.

ECT Alignment with EPA Interim Guidance and Section 5 Expectations

In its public comment to the EPA's Interim Guidance, ECT is providing information that speaks directly to the Section 5 evaluation framework for emerging PFAS destruction technologies. Specifically, the REM data package addresses:

- Technology readiness
- Destruction efficacy and mass balance
- Byproduct and community protection
- Regulatory relevance

ECT believes that this combination of high destruction performance, full fluorine mass balance, and use of regulatory-grade analytical methods positions REM as a leading candidate to satisfy the EPA's expectations for safe, verifiable PFAS destruction and disposal.

Why the “Fate of Fluorine” Matters

The strength of the carbon–fluorine bond is what makes PFAS both useful and so hard to destroy.

From the EPA’s perspective, it is not enough to say that PFAS concentrations go down; a credible destruction technology must show where the fluorine atoms end up after treatment and confirm that they are no longer in toxic or mobile forms. In practical terms, this includes:

- Proving the original PFAS concentrations are gone or below current detection capabilities.
- Proving that any breakdown products are not volatile organic fluorides (VOFs) or short-chain PFAS with similar or worse toxicity.
- Showing that the fluorine has been converted into stable, non-toxic inorganic mineral forms such as calcium fluoride or sodium fluoride.

ECT’s REM technology has been designed and tested specifically around this “fate of fluorine” requirement and has already demonstrated a full fluorine mass balance for PFAS captured on GAC and IX resins, and high fluorine mineralisation with near-complete accountability in PFAS-contaminated soils in peer-reviewed studies.

REM Destroys PFAS and Locks Up Fluorine

REM works by rapidly heating contaminated soil or sorbents (like GAC and IX resin) to around 1,000 °C within seconds using a controllable electrical current, then cooling them just as quickly. In soils, naturally occurring calcium acts as a built-in “mineralisation agent,” helping drive the fluorine away from the PFAS and into calcium fluoride, a naturally occurring, non-toxic mineral.

Independent testing has demonstrated REM can:

- Remove more than 99% of various PFAS while preserving key soil properties such as particle size and water infiltration.
- For GAC and IX resins, with modest additions of sodium hydroxide or calcium hydroxide per mole of fluorine, convert approximately 90–96% of the fluorine from PFAS into inorganic fluoride for the PFAS tested, while achieving >99.9% PFAS removal, with remaining fluorine associated with reactor surfaces or residual PFAS below 0.01% of the original concentration.

In summary, this means REM does not just make PFAS “disappear”. It converts the fluorine into known, non-toxic mineral forms and accounts for essentially every fluorine atom through testing.

Full Fluorine Mass Balance Possible with REM

To address EPA expectations for emerging PFAS destruction technologies, ECT has performed detailed fluorine mass balance studies on PFAS-contaminated GAC and IX resins, including materials supplied by the US Army Corps of Engineers, and complementary mineralisation and mass balance studies on PFAS-contaminated soils.

These studies combine multiple established analytical methods to track:

- Remaining PFAS and other organic fluorine compounds
- Volatile organic fluorides (VOFs) and other gaseous products
- Inorganic and ionic fluoride products
- Total organic fluorine (TOF) using combustion ion chromatography (CIC) and related EPA-recognised methods, supported by non-targeted analysis (NTA) of samples.

Using this toolkit, prior peer-reviewed studies have shown that without any mineralisation agent, only about 38% of the organic fluorine from PFAS can be accounted for, and trace VOFs can form. When REM is used together with carefully controlled amounts of calcium or sodium as mineralisation agents, 96–99.9% of the fluorine is accounted for as inorganic fluoride, with no detectable VOFs and residual PFAS at or below 0.01% of the starting concentration. Importantly, ultrashort-chain PFAS such as trifluoroacetic acid (TFA), which can appear after incomplete combustion in other processes, are not detected after REM treatment.

These findings allow ECT to state that REM can account for almost every fluorine atom from the original PFAS through to non-toxic mineral endpoints, with no evidence of hidden or unmeasured fluorinated byproducts under tested conditions.

Commenting on the update, ECT Chief Technology Officer, Justin Sharp, said: *“We welcome the opportunity to set out REM’s evidence on fully accounting for fluorine to the EPA through this public comment process. This ability will likely be the most important determining factor of PFAS destruction as regulations continue to rise over the coming decades.*

“Proving not only that the carbon–fluorine bond in PFAS is broken, but where the fluorine ends up after destruction, is becoming central to how regulators evaluate PFAS treatment. In ECT’s testing, REM accounted for and mineralised essentially all of the fluorine released from the PFAS tested, predominantly as non-toxic calcium fluoride, with no volatile organic fluorides or other short-chain PFAS with even worse toxicity detected.

“We believe REM is well positioned to meet these requirements, with the potential to be deployed in situ for soil remediation or on-site for GAC and IX resin remediation at water treatment plants.”

Next Steps

ECT is currently procuring commercial samples of PFAS-laden soil and GAC for non-targeted analysis (NTA) of samples with its pilot system. This will aid the Company’s efforts in future regulatory validation of the REM system by continually validating the method with commercial rather than synthetic samples, paving the way to commercialisation.

This announcement is authorised for release to the ASX by the Board.

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