

# Cost-Effective Per- and Polyfluoroalkyl Substances Removal

Per- and polyfluoroalkyl substances (PFAS) have been used at Department of Defense bases as fire suppressant foams since the 1970s. An increasing number of bases throughout the country are detecting PFAS in groundwater supplies. This creates an alarming problem for humans, because PFAS have been classified as carcinogens and endocrine disruptors by regulatory authorities. Because of their ability to resist chemical and biological degradation, PFAS materials persist in the environment when released. While removal of the PFAS from water can be accomplished with membrane separation techniques, there is currently no reliable *in situ* water treatment method for destroying the molecules. RTI International is working with Yale University to destroy PFAS molecules with a novel single-atom catalyst.

## Expected DoD Benefits

### Reduced Cost

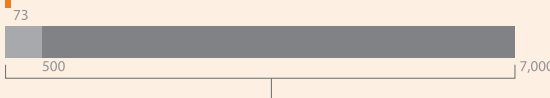


**Electrical energy per order (EEO)**  
A commonly used, normalized measure of energy consumption to achieve 90% degradation of a pollutant

### RTI Approach

73 k Wh/m<sup>3</sup>/order for Novel Single Atom Catalyst  
\$202,502/yr to reduce 10,000 gal/day of ground water by 99%

- No disposal waste byproduct generated
- Significant life-cycle cost advantage
- Fully mineralizes PFAS compounds



### Other Approaches

500 to 7,000 k Wh/m<sup>3</sup>/order for Other Decompositions Methods  
\$2,219,200/yr for 800 k Wh/m<sup>3</sup>/order EEO to reduce 10,000 gal/day of ground water by 99%

- Uses costly ion exchange resins
- Generates highly concentrated difficult-to-treat byproduct stream
- Produces a solid waste that requires incineration



The RTI approach provides more than **\$2 million in savings** (assuming \$0.10/kWh electricity) at the same level of removal as alternative PFAS degradation approaches.

### Time

- RTI's approach will significantly reduce the time required for site cleanup and closure by using a pump-and-treat method.
- The proposed rapid integration of a new photocatalyst technology into an existing pilot-scale reverse osmosis and ultraviolet reactor system will expedite the commercial design, development, and deployment after demonstration.

### Modularity

- The modular design allows for fit-for-purpose configuration for different co-contaminants and scale-up to various flows for **virtually any DoD site that requires treatment.**

**We are actively pursuing DOD sites to test technology.**

To explore partnership opportunities, contact Zachary Hendren at 919.541.6605 or zhendren@rti.org.

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