

E-Beam Destruction of Contaminants in Water

Summary

Next-generation electron beam (E-beam) technology creates the potential to treat the complex and difficult waste streams of today and tomorrow. Fermi National Accelerator Laboratory brings 50 years of groundbreaking E-beam experience across technology research, innovation, and application to unlocking this potential from a capacity and cost perspective using proprietary Lab intellectual property. Fermilab's technology will deliver a high throughput, portable, scalable, and cost-effective solution to a wide variety of contaminants. Potential applications include contaminants of increasing health, regulatory, economic, and public relations concerns.

Key Benefits

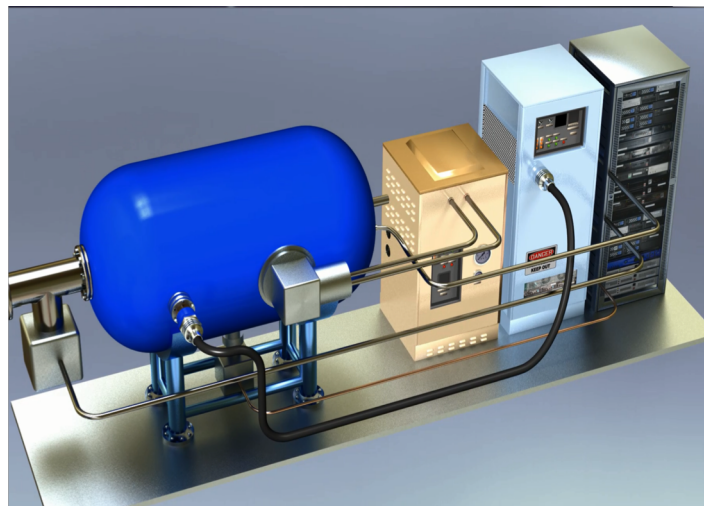
Fermilab waste "Swiss Army Knife" treats multiple contaminants simultaneously, including:

Perfluorates	PCBs	TCE
Pharmaceuticals	MTBE	Pathogens
Dyes	Organics	Agricultural run off

- **Decreased susceptibility to additional contaminants** – such as organic compounds and dissolved solids – that significantly reduce the efficacy of existing and near-term solutions

Key Fermilab improvements over existing E-beam technology include:

- Increased device power enables **500,000 gallons/day throughput** per unit
- New cooling approach reduces size from a three-story building to a **compact and portable skid-mounted unit**
- Superconducting technology **increases energy efficiency by 50% and decrease overall OpEx costs by 30%**



High Power and Energy Efficient Electron Beam Accelerator Being Developed at Fermilab.

Future Benefits

Technology mitigates future treatment, cost, compliance, and risk issues:

- **Avoids the long ramp up period to develop new solutions** for the next high-profile contaminant – and the next, and the next – given its broad-acting treatment approach
- **Avoids the capital, operational, and space costs of deploying parallel treatment technologies** for many existing and new contaminants

Technology Roadmap

- Laboratory validation of E-beam treatment of single contaminants
- Field sample testing of complex wastewater streams
- Field engineering study to define key device specifications and requirements
- Development and testing of 20% field demonstration unit
- Manufacturing of full-scale unit

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