

# Novel Electron Beam Technology for Water Treatment

## Solution to a Big Problem

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 in technology research, and innovation to developing new high capacity applications at lowered costs.

Fermilab's technology will deliver a high-throughput, portable, scalable, and cost-effective solution to treatment of a wide variety of contaminants. Potential applications include contaminants of increasing health, regulatory, economic, and public relations concerns.

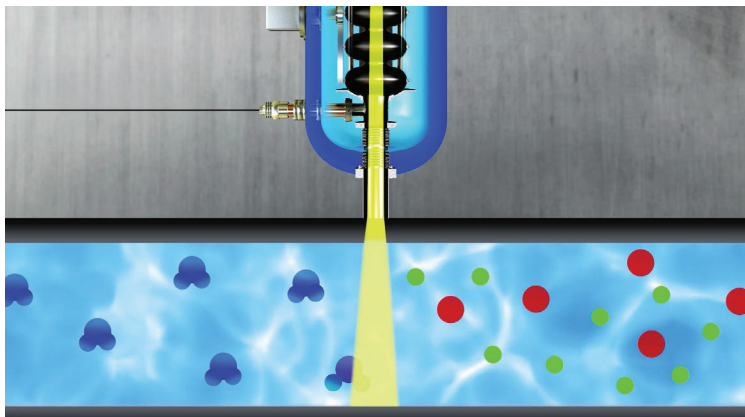
## Advances to "E-beam" Technology

Fermilab's "multi-tool" for waste treats multiple contaminants simultaneously, including:

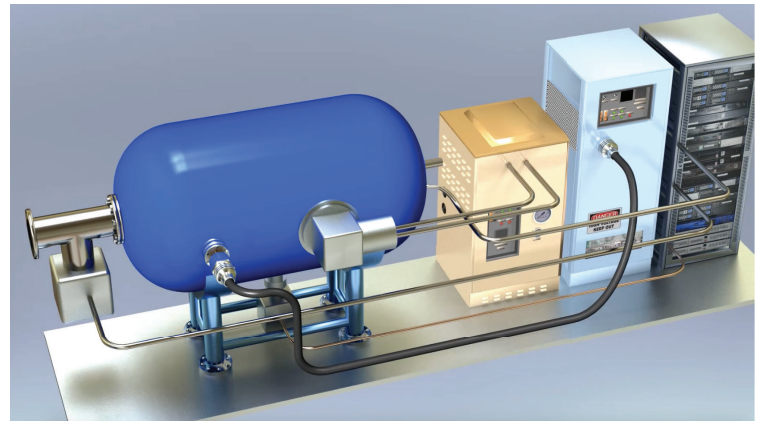
Perfluorates	TCE	PCBs
Pharmaceuticals	MTBE	Pathogens
Organics	Dyes	Agricultural runoff

## Key Fermilab improvements over existing E-beam technology include:

- Increased device power enables 200,000 gal/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 decreases overall OpEx costs by 30%



During the treatment process, electrons create charged species that are very effective at breaking down many complex contaminants.



## 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

For more information contact

Charlie Cooper, [ccooper@fnal.gov](mailto:ccooper@fnal.gov), <http://iarc.fnal.gov/>