

Fermilab and the Environment

Managing Tritium in Water

Fermilab’s program to monitor and manage low levels of tritium in surface and sewer water on the laboratory site.

Tritium, which has a half-life of 12.3 years, is an expected byproduct of accelerator operations at Fermilab. As part of our environmental monitoring program, we regularly sample the water discharged into the creeks on site and report the results to the Illinois Environmental Protection Agency, as required by state regulations. We also regularly test the water in the sanitary sewers. The low levels of tritium found since 2005 in Indian Creek, some Fermilab ponds and the sanitary sewers are far lower than the standards Fermilab is required to meet. They pose no threat to human health or the environment.

Fermilab is committed to go beyond merely satisfying the regulatory standards. We strive to keep the tritium discharges as low as reasonably achievable, keep the public fully informed, and engage the public in forming our goals and plans. We discuss our plans with the Fermilab Community Advisory Board, and we post the results of the surface and sanitary sewer water samples on our website: www.fnal.gov/pub/tritium.

What is tritium?

Tritium is a weakly radioactive isotope of the element hydrogen. It forms water molecules like regular hydrogen atoms and emits low-energy particles that cannot penetrate the skin. In nature, tritium is produced when cosmic particles hit the particles that make up Earth’s atmosphere. Tritium is also produced in small quantities when particles propelled by an accelerator hit other particles. It is only harmful if people drink water with high levels of tritium over many years.



Does this tritium constitute a health risk to Fermilab neighbors?

No. The levels found in Indian Creek and in our sanitary sewer discharge are extremely low compared to what is safe for a lifetime of continuous exposure to tritium in water. The table below illustrates how tritium concentrations found at Fermilab compare to safe concentrations in surface and sewer water. The levels are specified in picocuries (pCi, the amount of radiation produced) per milliliter (ml, metric volume) of water. The regulatory standard for drinking water is also listed, although the water leaving the Fermilab site poses no threat to drinking water.

For further information

If you have any concerns or questions, please call the Fermilab Office of Communication at 630-840-3351, or go to www.fnal.gov/pub/neighbors to submit a question online.

Standards and Fermilab water sample locations

Surface Water Standards for DOE Facilities
(These apply to Indian Creek and Fermilab ponds.)

Sanitary Sewer Water Standards for DOE Facilities

Federal Drinking Water Standards

Tritium concentrations in Indian Creek at site boundary

Tritium concentrations in sanitary sewer water pumped to Batavia

Limits and observed tritium levels

1,900 pCi/ml
Standard for continuous, safe external exposure to water, established by the U.S. Department of Energy

9,500 pCi/ml, and no more than 5 curies (5 million million picocuries) over the course of a year.
Standard established by the U.S. Department of Energy

20 pCi/ml
Standard for water safe to use as a drinking water supply, established by the U.S. Environmental Protection Agency (EPA)

Typically 1–3 pCi/ml
Typical low levels found in samples taken in recent years; the tritium stems from discharges from on-site ponds

Typically 1–8 pCi/ml
Levels found in water samples from sewer in recent years