

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 some ponds, creeks and sanitary sewers on site 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 related to 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 some ponds, creeks and our sanitary 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 levels found at Fermilab compare to safe levels in surface and sewer water. The levels are specified as either total curies (Ci, the amount of radiation produced) or as picocuries per milliliter (pCi/ml, the radiation per metric volume). The regulatory standard for drinking water is also listed, although the water from 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/contact to submit a question online.

Standards and Fermilab water sample locations

Surface water standard for DOE facilities

These apply to surface water flowing offsite.

Tritium concentrations measured in on-site ponds at Fermilab

Tritium concentrations measured in Indian Creek at Fermilab site boundary

For comparison: Federal drinking water standard

Does not apply to surface water or sanitary sewer.

Sanitary sewer water standard for DOE facilities

Amount of tritium measured in sanitary sewer water pumped to Batavia

Limits and observed tritium levels

2,600 pCi/ml

Standard established by the U.S. Department of Energy

Typically 1-20 pCi/ml or not detectable

Typical low levels found in samples taken in recent years

Typically 1-5 pCi/ml or not detectable

Typical low levels found in samples taken in recent years; the tritium stems from discharges from on-site ponds

20 pCi/ml

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

5 curies (5 million million picocuries) over the course of a year

Standard established by the U.S. Department of Energy

Less than 1 curie over the course of a year

Low levels found in samples from sewer water in recent years