FAQs

What is groundwater?

Groundwater begins as rain or snow melt that seeps or infiltrates into the ground, and is then stored in soils such as sand, gravel, clays, and fractured rocks. In short, groundwater is the water present beneath the Earth's surface. Groundwater moves within these materials by the force of gravity. That is, groundwater flows from an area of higher elevation to a lower elevation.

What is tritium?

Tritium is a radioactive form of hydrogen. It is produced naturally from the interactions of cosmic rays and gases in the upper atmosphere. It is also present as a by-product of nuclear reactors.

What is a Becquerel?

The becquerel is the standard international unit to measure radioactive decay or radioactivity. One becquerel is the decay of one atom of a radioisotope per second, and is an extremely small amount of radioactivity. The amount of tritium in water is measured in becquerels per litre.

What is the purpose of the PNGS groundwater monitoring program?

Pickering Nuclear Generating Station (PNGS) has a mature and robust groundwater monitoring program in place to address the following objectives:

- Confirm on-site groundwater flow direction;
- Monitor on-site groundwater quality to ensure timely detection of inadvertent releases to groundwater; and
- Ensure that there are no adverse off-site impacts from PNGS groundwater.

Is there a limit for tritium in PNGS groundwater?

There is no regulatory limit for tritium in PNGS groundwater. This is because groundwater at the site is not used as a source of drinking water.

How does groundwater flow at PNGS?

The groundwater flow patterns at the site remain unchanged from the original interpretations. Near the PNGS reactor buildings, the groundwater flows northwest towards the Forebay, which is a monitored discharge pathway. Further south, there is a component of groundwater flow that is directed towards Lake Ontario. Further away from the reactor buildings, groundwater generally flows from the north towards the Lake. The rate of groundwater flow depends on the soil material that the groundwater is flowing through. In general, soil material changes with depth. As a rough estimate, the groundwater velocities are likely in the range of 30 to 100 metres per year in bedrock.

In areas where groundwater flows directly to the lake, OPG continues to assess that there is no adverse impact to sources of drinking water as is evident from the water samples analysed from the local water supply plants.

How are the groundwater samples collected at PNGS?

Groundwater samples are collected from monitoring wells, which are small-diameter wells specifically drilled for the collection of water quality data. In the GIS interactive map, the monitoring wells at PNGS are shown as “MW-xxx-yy”, where “xxx” is a unique identifier and “yy” represents the depth of the monitoring well in feet.

What is the data collected from the groundwater monitoring program telling us?

The data collected from the monitoring wells indicate the presence of tritium. Tritium trends over time show that levels for the most part have remained steady or have decreased, indicating stable or improved environmental performance. Tritium in groundwater naturally decays over time.

There are no indications of adverse off-site impacts from PNGS groundwater. The tritium concentrations at site perimeter groundwater monitoring locations remain low. In 2019, the annual average tritium concentration in municipal drinking water samples collected from three downstream water supply plants, as part of the annual OPG PNGS Environmental Monitoring Program, ranged from 4.4 Bq/L to 6.6 Bq/L. This is well below the Ontario Drinking Water Quality Standard for tritium of 7,000 Bq/L, and emphasizes that there are no adverse off-site impacts from the operation of the station with respect to groundwater.

What is the background level of tritium in Lake Ontario?

Tritium in Lake Ontario, along with all the Great Lakes, originates from several sources: natural cosmogenic tritium, residual tritium fallout from atmospheric weapons testing, current emissions from nuclear plants, and residual tritium from past emissions of nuclear plants. In 2019, the Lake Ontario background component of tritium, including only natural cosmogenic tritium and residual weapons fallout tritium, was conservatively estimated to be 1.25 Bq/L.

When groundwater sampling results are below the Method Detection Limit of the analytical instruments, how is this data reported by OPG?

OPG conservatively reports the data at the Method Detection Limit of the instrument in these cases.

How are monitoring wells selected to display in the GIS?

The monitoring wells presented in the map are selected if they exhibit an increasing trend in concentration of parameters monitored and/or detection of new or elevated concentration of parameters monitored.