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REPORT
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Regional Council

For Information

REPORT TITLE: **Report on "Forever Chemicals" and Peel Region Drinking Water**

FROM: Kealy Dedman, Commissioner of Public Works

OBJECTIVE

The objective of this report is to provide Regional Council with an update on "forever chemicals" or per- and poly-fluoroalkyl substances (PFAS) along with other contaminants of emerging concern (CECs), the risks to public health, and Peel's actions to determine their prevalence and impact on Peel's drinking water.

REPORT HIGHLIGHTS

- "Forever chemicals" is the term adopted that refers to PFAS, which is a large class of synthetic chemicals known for their stability, heat resistance and water-repellant characteristics.
- Humans are regularly exposed to PFAS because they are found in air, water, foods, and many consumer products. PFAS have been linked to increased risk of cancer and other ailments, but the evidence is limited.
- Currently, PFAS are not regulated under drinking water legislation in Ontario.
- Peel Region has participated in PFAS studies since 2016 and has been voluntarily testing for PFAS since 2020. To date, the PFAS levels detected through Peel's water testing program are below Health Canada's proposed total PFAS limit and the new US Environmental Protection Agency's (USEPA) limits for the parameters Peel tests. More monitoring is planned to confidently understand PFAS levels in Peel.
- In early 2023, Peel Region established a Contaminants of Emerging Concern (CEC) Committee that implemented a surveillance program that tests Peel's water and wastewater for several CECs, including PFAS, and meets quarterly to review findings and discuss new and evolving studies and industry information.
- Many CECs of interest to Peel, such as microplastics, cannot be tested by commercial laboratories, or their analysis is cost-prohibitive. Peel gains information on some of these substances through participation in academic studies and partnerships.
- Health Canada is expected to announce a Total PFAS Guideline later in 2024. Peel staff will update Regional Council in 2025, following Health Canada's release of the revised Guidelines for Canadian Drinking Water Quality.

Report on "Forever Chemicals" and Peel Region Drinking Water

DISCUSSION

1. Background

a) Per- and poly-fluoroalkyl substances (PFAS)

"Forever chemicals" is the term adopted for PFAS due to their persistence in the environment. PFAS is a large class (thousands) of synthetic chemicals known for their stability, heat resistance and water-repellant characteristics. Unfortunately, these substances have been associated with potential negative human health effects.

PFAS have been in use since the 1940s and are still in many products for industrial, firefighting, and household use. Although PFAS have been around for decades, their dangers as a group of chemicals are not well understood and testing methods are only now becoming sensitive enough to understand the extent of their presence, potential exposure routes and impact. PFAS contamination is a global issue, with science racing to determine appropriate methods for their detection, management, removal, and destruction.

Each time a specific PFAS is limited by government, chemical manufacturers tend to replace it with a similar PFAS compound with similar properties. The replacement compound is often not well studied, and its human health and environmental impacts are uncertain, therefore it may take several years for a limit on the new PFAS to be imposed. There is also very little understanding of the health implications of exposure to multiple PFAS substances simultaneously ("chemical cocktail"). For this reason, Canada's approach to limiting PFAS as an entire class of substances is protective to communities and ecosystems.

b) Public Health Risks

PFAS are widely used because of their unique properties. They are found in:

- Firefighting foams
- Cosmetics
- Non-stick cookware
- Food packaging materials
- Textiles (carpet, clothing)
- Adhesives
- Electronics
- Lubricants

Humans are exposed to PFAS from various sources such as food and food packaging, cosmetics, consumer products, ambient air, indoor air and dust, and drinking water.

Certain PFAS have been found in the blood of the general population in Canada and internationally. While population exposures in Canadians for some PFAS are declining, it is unclear what the exposure trends are for the vast majority of PFAS. However, some well-studied PFAS are known to be readily absorbed into the body and are eliminated very slowly, meaning that they can accumulate and persist in the body for years. The health implications of widespread exposure to the multitude of PFAS is not currently known and evidence remains limited. PFAS may have adverse effects on the liver, kidney, thyroid, immune system, nervous system, metabolism, reproduction, and development. Studies have suggested an association between some PFAS and various cancers.

c) What is Canada Doing About PFAS?

The federal government is:

- prohibiting and restricting the manufacture, use, sale, and import of certain PFAS found toxic to the environment and most products that contain them,
- considering regulatory and non-regulatory actions to minimize release of PFAS to the environment from firefighting foams,
- collaborating with other jurisdictions to discuss science and regulations,
- monitoring for the presence of certain PFAS in humans and the environment regularly, and
- developing guidelines for the protection of the environment and human health through drinking water, soil, and groundwater.

d) US Environmental Protection Agency (USEPA) Standards

In June 2022, the US Environmental Protection Agency (USEPA) published interim Health Advisories for two PFAS: perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) with drinking water limits of 0.004 nanograms per litre (ng/L; or parts per trillion) and 0.02 ng/L respectively. However, measuring PFAS at these low concentrations requires specialized equipment and methods that are not practical for water utilities and commercial laboratories to use on a routine basis for monitoring programs. A concentration of one nanogram per litre is equivalent to one teaspoon of sugar in 5 billion litres of water.

On April 10, 2024, the USEPA announced the final National Primary Drinking Water Regulation, establishing legally enforceable limits for six (6) PFAS in drinking water. Public drinking water systems in America must monitor these six PFAS within the next three years and start reporting the results to customers beginning in 2027. Drinking water system owners will have 5 years to implement solutions that reduce PFAS if they are detected above the enforceable limits.

e) Canadian Federal and Provincial Drinking Water Standards

The Canadian federal government establishes drinking water guidelines; however, the provinces establish and enforce drinking water regulations and standards. Currently, PFAS are not listed in the *Ontario Drinking Water Standards* under the *Safe Drinking Water Act, 2002*. In 2017, Ontario developed interim advice for PFAS, recommending that potable water not exceed 70 nanograms per litre (ng/L) for eleven (11) different PFAS. The Ministry of the Environment, Conservation and Parks (MECP) is working with Health Canada and other provinces on Canadian Drinking Water Guidelines for PFAS.

PFAS monitoring in drinking water is voluntary so there is limited available data for municipal drinking water systems in Canada.

Health Canada, in early 2023, proposed a drinking water standard that would consider PFAS as an entire class of chemicals by proposing a Total PFAS limit of 30 ng/L (to be a sum of no less than 18 PFAS). Health Canada is expected to finalize this standard in

late 2024. This will not make it a mandatory test for drinking water systems but provide a basis against which to compare Peel's results until such time that it may become adopted into Ontario drinking water legislation.

f) Peel Drinking Water Treatment Processes/Technology

The USEPA research recommends the following water treatment options as the most effective in removing PFAS from drinking water:

- Granular activated carbon (GAC)
- Nanofiltration (NF)
- Reverse osmosis (RO)
- Anion exchange

Currently, there are no regulatory limits on PFAS in drinking water in Ontario. Therefore, water treatment facilities are not intentionally designed to remove PFAS currently.

Peel's municipal groundwater treatment facilities in the Town of Caledon do not use the treatment processes recommended by the USEPA for PFAS removal.

Peel's large water treatment plants, Arthur P. Kennedy Water Treatment Plant and Lorne Park Water Treatment Plant, supply drinking water to 1.5 million Peel residents in Mississauga, Brampton, and some parts of Caledon (Bolton and Mayfield West). Some of the treatment processes at both plants employ granular activated carbon (GAC), specifically tailored to remove organic compounds responsible for taste and odour, not PFAS. If PFAS reduction becomes mandatory to comply with future regulations, the current GAC processes may prove inadequate, potentially requiring significant capital investment.

Arthur P. Kennedy Water Treatment Plant and Lorne Park Water Treatment Plant employ ultrafiltration (UF) filters with 0.02-micron pores. The USEPA recommends nanofiltration (NF) filters, which have 0.001-micron pores. The average diameter of human hair is 70 microns. Some research has demonstrated that UF filters may also reduce PFAS, however much more evidence is needed. Upgrading Peel's large water treatment facilities to NF filters or reverse osmosis would require a large capital investment. Anion exchange is not practical for the scale of Peel Region's treatment facilities. Studies on the capital cost impact that PFAS may have on water treatment have not been completed to date.

g) Voluntary Monitoring of PFAS

Peel Region participated in PFAS studies led by the MECP from 2016 to 2019. Fourteen (14) PFAS compounds were tested in twenty-five (25) drinking water systems in Ontario and the highest average PFAS compound detected in these drinking water systems was 2.4 ng/L. Additional PFAS testing by the MECP on 635 drinking water samples collected from thirteen (13) drinking water systems in Ontario did not detect concentrations above 10 ng/L in any sample.

Regular annual testing for PFAS of Peel's source water (Lake Ontario and municipal groundwater wells) began in 2020. Since November 2022, staff have been testing both source water and treated drinking water semi-annually at Peel Region municipal wells and water treatment plants.

2. Findings

a) Peel Drinking Water Quality Results

Peel’s standard PFAS testing suite does not include one of the compounds (HFPO-DA) that is part of the USEPA’s new PFAS monitoring requirements. Peel will be adjusting its testing suite, going forward, to include all USEPA-limited PFAS compounds for drinking water samples.

To date, the PFAS levels detected through Peel’s water testing program are below Health Canada’s proposed total PFAS limit and the new USEPA limits for the parameters we test. It must be noted that, with just a few sampling events since inception of this monitoring program in late 2022, Peel’s analytical dataset is not complete enough to confidently understand PFAS levels and make informed decisions.

In addition to the PFAS listed in Table 1 below, Peel frequently detects three additional PFAS compounds (PFBA, PFPeA, and PFHxA), in drinking water, all of which are common components of aqueous firefighting foam. Test results for these three PFAS and any others that may be detected are included in the Total PFAS calculation methodology proposed by Health Canada. This demonstrates how Health Canada’s proposed approach of limiting PFAS as an entire class of substances is more stringent than the USEPA standard that limits only a few specific PFAS.

Table 1. Peel PFAS Test Results vs. Health Canada and USEPA Standards

Parameter	Peel Drinking Water Results [1]	Health Canada Guideline	USEPA Enforceable Limit
PFOS	<2 to 4 ng/L	600 ng/L	4 ng/L
PFOA	<2 to 3 ng/L	200 ng/L	4 ng/L
PFHxS	<2 to <2 ng/L	Not applicable	10 ng/L
PFNA	<2 to <2 ng/L	Not applicable	10 ng/L
HFPO-DA [2]	<2 to <2 ng/L	Not applicable	10 ng/L
Hazard Index [2,3]	0.0 to 0.0	Not applicable	1.0 (no unit)
Total PFAS	<2 to 15 ng/L	30 ng/L [4]	Not applicable

[1] < means “less than”, indicating results below the laboratory’s reporting limit.

[2] Since HFPO-DA was not part of Peel’s standard PFAS test suite for 2023 to April 2024, the results provided are based on a sampling event in late 2022 (17 drinking water samples) and one in April 2024 (2 drinking water samples).

[3] Hazard Index calculates summed exposure to 2 or more of: PFHxS, PFNA, HFPO-DA, and PFBS. Where HFPO-DA was not tested, Peel’s Hazard Index calculations are based only on 3 of the 4 PFAS included in this index.

[4] This is a proposed standard at this time; expected to become finalized late 2024.

b) Other Contaminants of Emerging Concern (CEC)

In early 2023, Peel Region established a Contaminants of Emerging Concern (CEC) Committee that includes staff from Water and Wastewater Regulatory Compliance, Operations and Optimization, Public Health, and Environmental Control. The Committee developed a surveillance program for Peel's water and wastewater to be analyzed for several CECs, including PFAS. The Committee meets quarterly to review findings and discuss new and evolving studies and industry information.

Staff thoroughly evaluated many CECs in the environment and have developed a surveillance program that best reflects the risks specific to Peel Region. The made-for-Peel plan was developed considering numerous factors such as local CEC prevalence, CEC environmental fate and movement, laboratory capabilities, anticipated regulatory changes, and efficiencies such as using one CEC as an indicator of the presence of others to trigger more in-depth testing.

Many CECs of interest to Peel cannot be tested by commercial laboratories, or their analysis is cost-prohibitive. Peel gains information on some of these substances through participation in academic studies. Two such studies are highlighted below, as examples of some of the work being done.

i) Microplastics

Peel Region is actively participating in a study at the Arthur P. Kennedy and Lorne Park Water Treatment Plants with the University of Toronto related to microplastics in drinking water. The goal of the study is to develop a standard laboratory method for quantifying the occurrence of microplastics in drinking water and to determine the removal efficacy through the drinking water treatment processes. Preliminary data indicates the Arthur P. Kennedy and Lorne Park Water Treatment Plants are removing greater than 98 percent of the microplastics in the study.

ii) Biologically Activate Carbon Study

Peel also supports industry partners for research and development studies. The ozone acclimated biologically active carbon used in the filtration process at the Arthur P. Kennedy Water Treatment Plant will be collected and assessed at bench-scale for removal of CECs, including 1,4-dioxane, which is one of the CECs Peel monitors. This study, conducted in partnership with one of Peel's treatment product suppliers, will provide valuable insight on the CEC removal capabilities of the biologically active carbon filtration at the Arthur P. Kennedy Water Treatment Plant.

3. Next Steps

a) Drinking Water Quality Monitoring

Peel will continue monitoring for PFAS and other CECs to establish a baseline dataset adequate for interpretation and decision-making. Thereafter, Peel will continue monitoring to maintain awareness of PFAS levels in Peel's waters and recognize when changes occur to water sources or within Peel's treatment processes. In this way, staff have current, local results from which to determine when or if changes to operational practices or additional treatment intervention is appropriate.

Through Peel's Contaminants of Emerging Concern (CEC) Committee, Peel staff developed a CEC monitoring program for drinking water and wastewater systems for numerous contaminants that are unregulated at present time but are suspected (emerging) as risks to human health and/or the environment. In 2023, staff retained a consultant (CDM Smith) to further refine the CEC sampling program based on future regulatory projections, laboratory maturity, and Peel-specific likelihood of contaminant presence. The updated sampling program will be initiated in 2025; however, some immediate changes to PFAS sampling frequencies and test suite have already been put in place.

b) Drinking Water Research

The CEC Committee also participates in studies with government and academia, providing samples from within Peel and receiving results in return. This partnership gives us access to analyses not commercially available, and insights into Peel's water quality that go beyond the mandates of provincial and federal legislation.

c) Collaboration

Peel collaborates with other municipalities and research partners, sharing information, experiences, and insights to cooperatively expand Canada's PFAS knowledge base for the betterment of all Canadian communities.

Peel's CEC Program is unique and has garnered attention from various regulatory agencies, municipalities, and industry associations. Staff are sharing program information with interested parties with the goal of advancing overall knowledge of CECs in water and wastewater systems.

d) Remain Connected to Learning Opportunities

Peel staff attend topically relevant seminars, workshops and conferences, and review industry publications and the findings of credible studies to expand subject matter expertise.

Peel Public Health and Public Works staff perform weekly checks of federal and provincial government websites for updates on relevant new, altered, or proposed legislation changes on the horizon. This activity allows us to perform an impact analysis from the outlook of Peel's systems and processes and contribute a response on proposals that are open for public comment, and advocate for adjustments that benefit municipalities, public health, and the environment. Awareness of proposed legislation changes provides advanced notice, before new requirements take force, to perform data review or testing to understand where Peel stands in relation to coming standards. This proactive approach helps Peel position itself operationally, administratively, and financially to comply with coming legislation in advance of the enforcement date and respond to media or resident enquiries.

e) Future Capital and Operating Impact Study

Once the Canadian drinking water guidelines for PFAS and other CECs become clear, Peel staff will complete a detailed study of the feasible treatment technology options for Peel's drinking water facilities, including any potential capital expenditures needed and associated operations and maintenance costs.

f) Future Regional Council Update

Health Canada is expected to announce a Total PFAS Guideline later this year. A report will be provided to Council in 2025, following Health Canada's release of the revised Guidelines for Canadian Drinking Water Quality. At that time, Peel will know whether Canada has adopted the proposed Total PFAS guideline or an alternative framework and will have adjusted Peel's monitoring program to assess Peel's water against the new guideline.

BILL 112 RISKS AND IMPLICATIONS

On June 8, 2023, the Province passed Bill 112, the *Hazel McCallion Act (Peel Dissolution), 2023*, which was initially intended to dissolve the Region of Peel and provided for a Transition Board to make recommendations to the province on how to implement the restructuring. On June 6, 2024, Bill 185 took effect, amending Bill 112 and reversing the decision to dissolve the Region of Peel. Bill 185 changed the name of the legislation to the *Hazel McCallion Act (Peel Restructuring), 2023* and recalibrated the Transition Board's mandate to focus on making recommendations on land use planning; water and wastewater; storm water; highways; and waste management. Final details of the Transition Board's recommendations, any associated provincial decision and impacts on Peel services are not known at this time and will be addressed in future reporting to Regional Council.

FINANCIAL IMPLICATIONS

There are no immediate financial implications resulting from the report. However, there are potential future financial implications for the 2025 Budget should Peel move forward with enhancing the Contaminants of Emerging Concern (CEC) surveillance program.

Research and Monitoring Program Budget (Operating)

Peel's voluntary Contaminants of Emerging Concern (CEC) surveillance program is forecasted to spend $113,000 on analytical testing of water and wastewater samples in 2024. Approximately half of the cost is allocated to PFAS testing (at nearly $600 per sample), with $22,000 of this cost being treated drinking water (semi-annual) PFAS testing.

If Peel were to adopt the new USEPA monitoring requirement, which includes only treated drinking water samples, it would cost Peel $40,000 for the initial 12 months of quarterly monitoring. Based on the initial monitoring results, the ongoing cost would range from $5,000 to $55,000 per year, due to higher frequency testing required where any PFAS is detected above its trigger level. With trigger levels set at half the USEPA enforceable limit for each parameter, the higher frequency (thus higher cost) testing regimen is likely for at least some of Peel's drinking water sampling points.

In 2025, Peel proposes to expand PFAS testing on drinking water to an extended PFAS list (at a significantly higher cost per sample) and increasing to a quarterly sampling frequency, which will allow Peel to compare water quality results against the USEPA requirements. Additionally, Peel is investing in monitoring for additional CECs that have been identified as potentially locally relevant through recent research and consultant recommendations. CEC surveillance program cost forecast for 2025 is approximately $450,000, as Peel expands the sampling frequency for CECs of higher priority and reduces the frequency of lower priority compounds. This level of

investment will put Peel at the forefront, among a small handful of Canadian municipalities who are proactively assessing CEC presence and impact in their communities.

While these projections provide analytical costs, the additional financial resources must be considered associated with additional staff time invested in sampling, data input and management, results review and interpretation, collaborative evaluation, and informed decision-making. With Peel's proactive approach to monitoring for non-regulated substances in the interest of protecting Peel's communities, and with the growing wealth of scientific data coming to light about many CECs, it is likely that Peel may require additional staff resources and operating budget to maintain this trajectory.

Potential Treatment Upgrades (Capital and Operating Budget)

Although Peel's PFAS test results to date suggest that treatment upgrades may not be required, more monitoring is needed to confidently understand PFAS levels in Peel.

If the MECP introduces Ontario drinking water standards for PFAS and Peel's future PFAS monitoring results exceed those standards, the potential capital cost could be significant to implement treatment processes designed to meet the limits. Funding for drinking water treatment upgrades will be sourced from the Water Capital Stabilization Reserve R0241. The availability of the reserve will be evaluated based on the scale of projects undertaken. As the capital expenditure will not be related to growth, the cost may significantly impact future rate-based contribution.

The capital and operating costs related to addressing treatment and monitoring needs cannot be determined at this time and will be subject to assessing regulatory limits and available technologies. Staff will assess costs when more information on regulatory limits is made available by the province. This will also include resource implications. Depending on the technology selected, cost considerations include:

- Addition or replacement of existing treatment process assets,
- Additional land and building expansions necessary to house the added treatment process assets,
- Installation or expansion of process control and automation system, including monitoring devices and digital data records management,
- Ongoing operating costs, including energy, treatment chemicals, treatment media/product replacement, disposal of spent media/products, and
- Operating and maintenance staff resources.

CONCLUSION

Despite the absence of regulatory standards for PFAS for drinking water in Ontario, Peel Region has taken proactive steps including participating in provincial studies, implementing a surveillance program to assess PFAS levels, and initiating studies aimed at understanding and mitigating the risks associated with PFAS and other contaminants of emerging concern. Looking ahead, it is imperative that Peel Region remains vigilant in its efforts, staying abreast of evolving scientific understanding and regulatory developments, to ensure the continued protection of public health.

Further detailed study is warranted to assess future capital and operating related cost impacts.

APPENDICES

Appendix I – Additional Information Resources

Kealy Dedman, Commissioner of Public Works

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