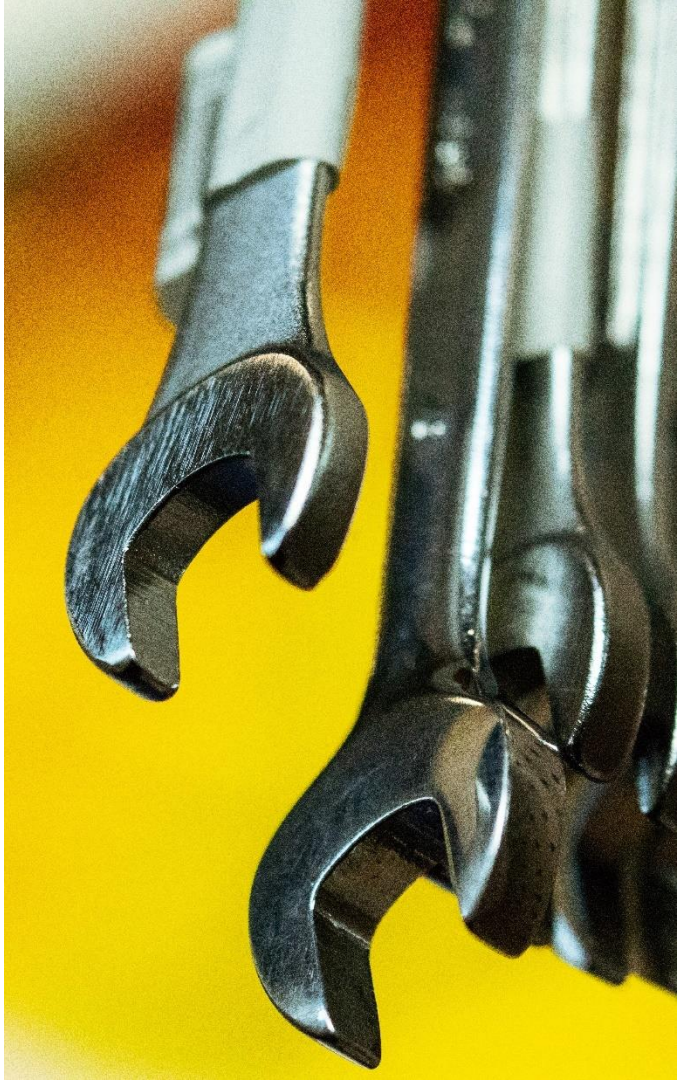
2022 Results of OPG's Darlington Environmental Monitoring Programs

September 26, 2023
DN Community Advisory Council Meeting

ONTARIO POWER GENERATION

Agenda

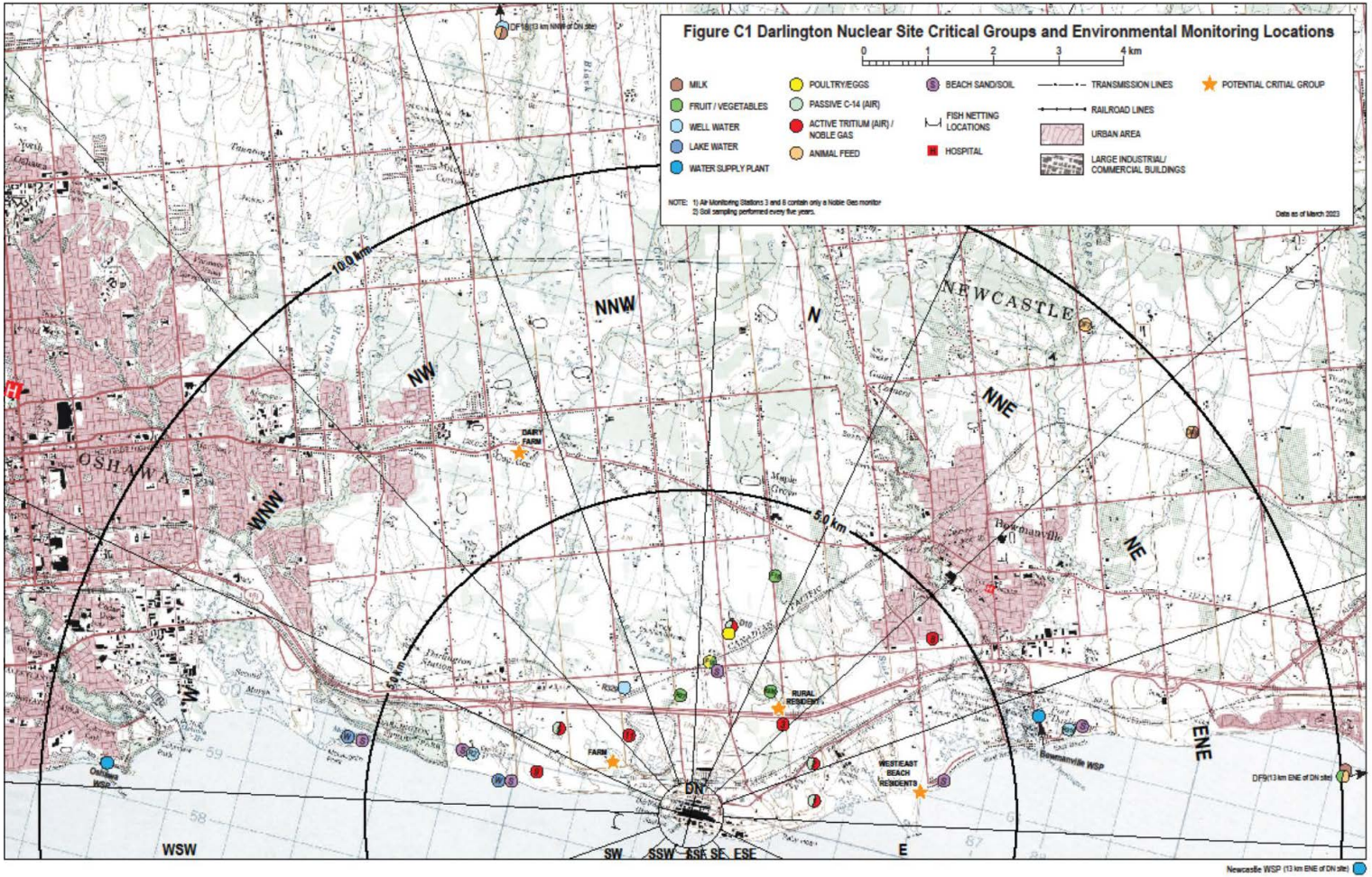


Environmental Monitoring Programs

Key Objectives

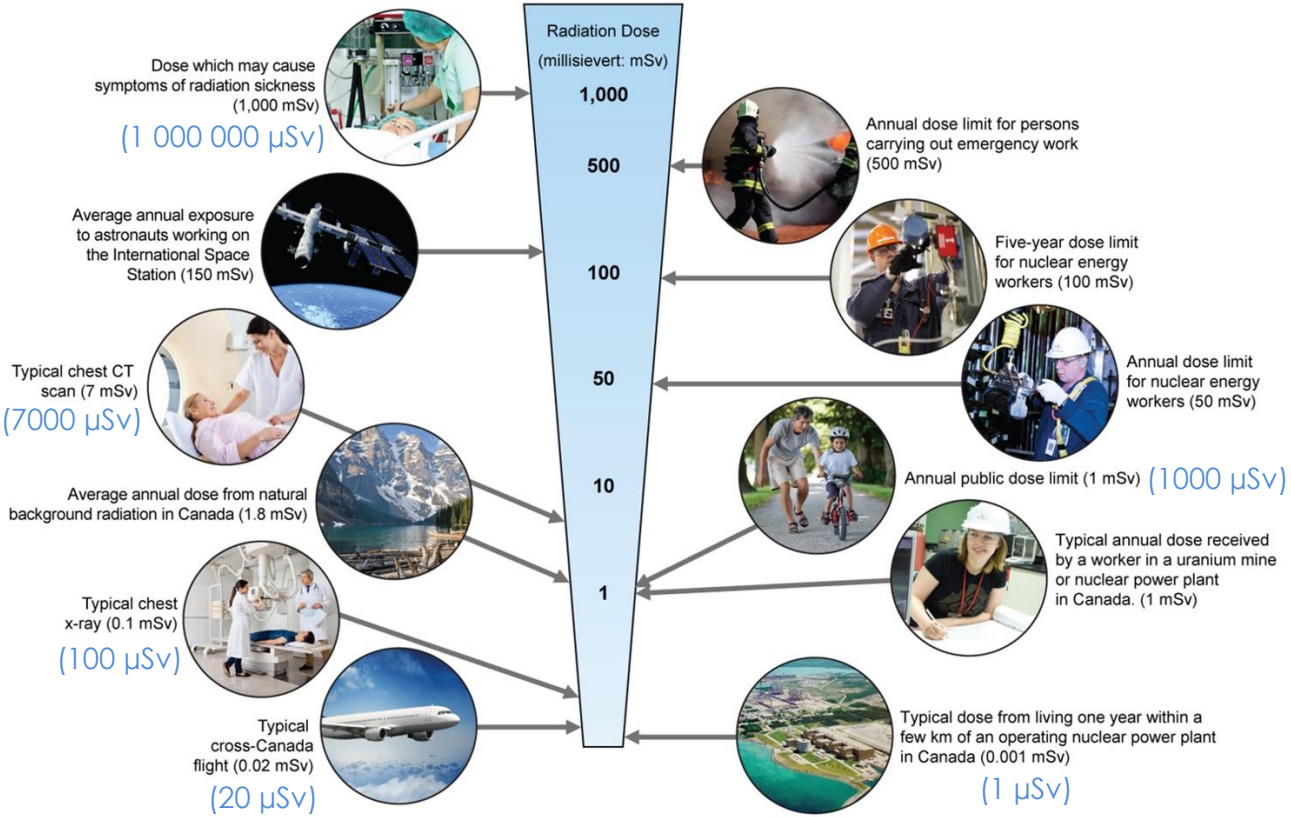
- Demonstrate, independent of effluent monitoring, the effectiveness of containment and effluent control
- Demonstrate compliance with limits on the concentration/intensity of contaminants/physical stressors in the environment
- Provide data to assess the level of risk on human health and the environment and/or to confirm predictions made by environmental risk assessments

DN Critical Groups and Sampling Locations



Note: 1 mSv = 1000 µSv

Radiation Dose Examples



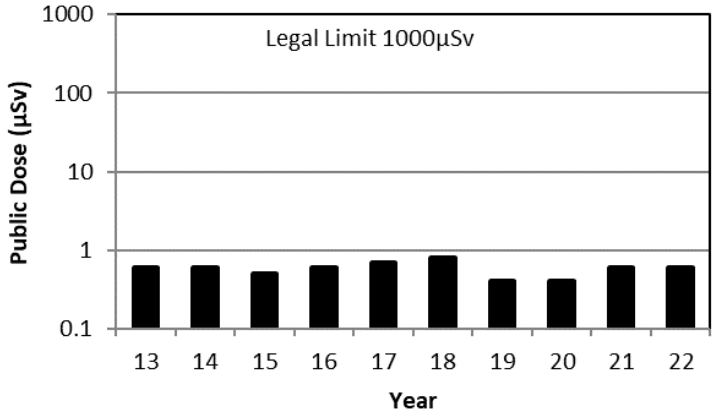
Taken from http://www.cnsc-ccsn.gc.ca/eng/resources/radiation/introduction-to-radiation/radiation-doses.cfm

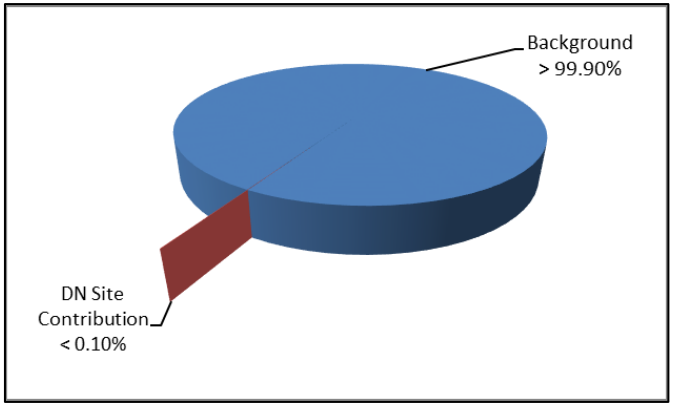
2022 EMP Summary

- Annual public doses resulting from DN operations was 0.6 µSv respectively; and < 0.1% of the annual regulatory limit for DN
- Station radiological emissions remained at very small fractions of their respective Derived Release Limits (DRLs)
- Dose calculations and annual report were reviewed and verified by an independent third party
- 2022 EMP report was submitted to CNSC on April 19, 2023 and is available on www.opg.com

Darlington Station 2022 Public Dose

- 2022 public dose was 0.6 µSv, represented by the Farm adult
- Darlington public dose continues to be very low and is consistent with the 2021 dose
- HTO, C-14, and noble gases are the main dose contributors
- < 0.1% of annual regulatory limit of 1000 µSv and < 0.1% of annual natural background radiation of 1,400 µSv





2022 Results of Radioactive Emissions Monitoring

Site Emissions[d]	DN	
	Bq	% DRL
AIR		
Tritium Oxide	2.2E+14	0.45
Elemental Tritium [a]	9.3E+13	0.01
Noble Gas [b]	2.2E+13	0.06
I-131[c]	1.4E+08	<0.01
Particulate	2.9E+07	<0.01
C-14	1.2E+12	0.10
WATER		
Tritium Oxide	2.1E+14	<0.01
Gross Beta/Gamma	9.3E+09	0.03
C-14	9.7E+08	<0.01

NOTES: NA = Not Applicable, Bq = Bequerels

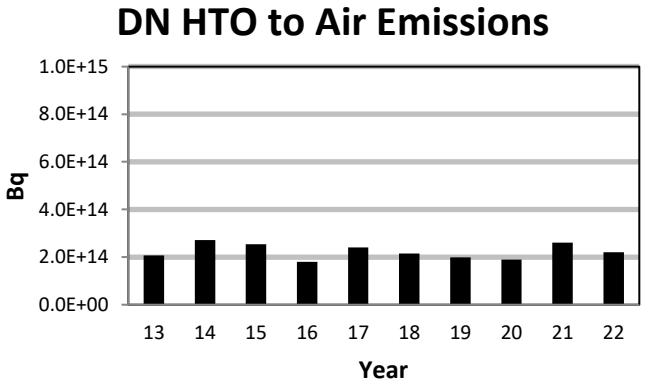
(a) Emissions from Darlington Tritium Removal Facility

(b) Units for noble gas emissions are Bq-MeV

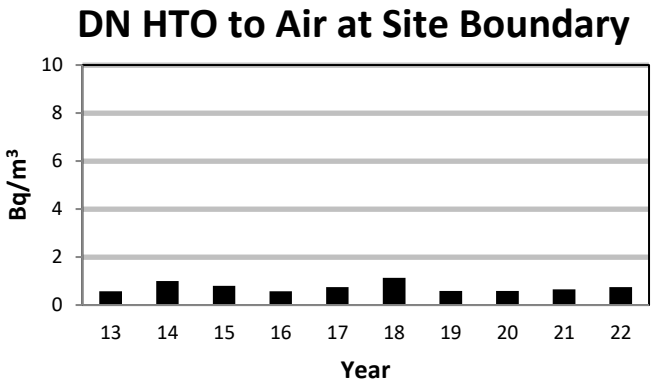
(c) Weekly samples are usually < Method Detection Limit (MDL)

(d) Annual air emissions are the sum of continuous samples analysed weekly.
Note that if interim Noble Gas sampling is in place, samples may not be continuous.
Annual water emissions are the sum of monthly composite samples for C-14, and weekly composite samples for tritium oxide and gross beta/gamma.

Emissions and EMP Data

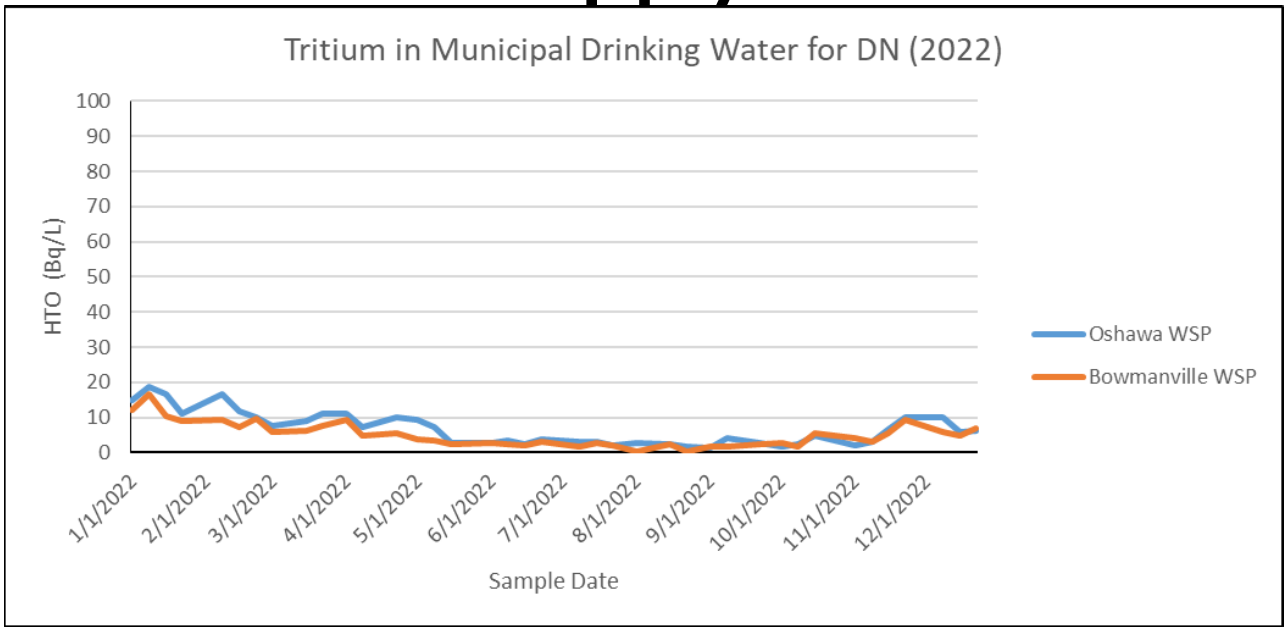


2022 = 2.2 x 10^{14} Bq



2022 = 0.76 Bq/m^3

Tritium at Water Supply Plants near DN



- Average HTO Concentrations: Oshawa = 6.7 Bq/L , Bowmanville = 5.2 Bq/L
- Ontario Drinking Water Quality Standard is 7000 Bq/L
- Water Supply Plant annual average concentrations far below OPG's commitment of < 100 Bq/L

Results of Non-Radiological Emissions Monitoring

Hazardous Material [a]	DN
	Mg
AIR	
SO_2 to Air[b][c]	1.6E-02
NO_2 to Air[c]	9.6E+00
CO_2 to Air[b][c]	1.7E+03
Ammonia to Air	1.1E+01
Hydrazine to Air[d]	2.2E-02
Ozone Depleting Substances (ODS) Releases[e]	1.4E-01
WATER	
Ammonia to Water	2.2E+00
Hydrazine to Water[d]	2.0E-01

NOTES:

Mg = Megagrams

(a) Hazardous Materials as calculated for NPRI reporting requirements

(b) Reported in OPG Sustainable Development Report as an OPGN aggregate value.

(c) Based on annual fuel consumption.

(d) Based on annual consumption.

(e) Based on estimated quantity when a release occurs.

- 2022 emissions continue to be reported through 2023, therefore the 2022 EMP Report summarized the complete set of emissions for 2021.
- In 2021, there were no ODS releases in excess of 100kg at DN. Any ODS releases between 10 kg and 100 kg are reported to Environment Canada in semi-annual halocarbon release reports.
- In 2021, there were no regulatory non-compliances associated with the sulphur dioxide, nitrogen oxides, carbon dioxide, hydrazine or ammonia emissions.

2022 Environmental Monitoring Program Results

- Site emissions remained at a very small fraction of their respective DRLs.
- 607 laboratory analyses performed for the 2022 dose calculation.
- The 2022 site public doses remains a small fraction of both the annual legal dose limit and the annual natural background radiation in the area.
- Tritium in drinking water measured at local water supply plants remained at a small fraction of the Ontario Drinking Water Quality Standard of 7000 Bq/L and OPG's voluntary commitment of 100 Bq/L.
- Two self-assessments were completed this year for the EMPs. No significant findings were identified.
- The overall EMPs encompass other programs that are reported separately.

Audits & Inspections

- The Ministry of the Environment, Conservation and Parks (MECP) performed an audit of the Health Physics Laboratory (HPL) in June, 2022. There was one finding indicating that the lab was unable to identify the start time of instrumentation for tritium analysis at the time of the inspection. To address this finding, HPL implemented changes to identify each sample's start and end times on the instrument data printout. MECP was satisfied that the implemented changes have met all regulatory requirements relating to the required actions. Overall, the Final Inspection Rating was 100%.

- MECP conducted an unannounced inspection at HPL in November 2022. There were no non-compliant findings during this inspection. The Final Inspection Rating was 100%.

- The CNSC performed a Type II compliance inspection on the DN and PN EMPs from November 7-10, 2022. CNSC identified twelve compliant findings and 2 non-compliant findings, which were associated with documentation. All actions are currently under review and will be addressed accordingly. CNSC staff did not find evidence of unsafe operation that would result in undue risk to the health and safety of persons, or the environment.

Looking Ahead

- In 2022, no major changes to the routine sampling program were identified. A routine review and revision of the Management of the Environmental Monitoring Programs procedure document was completed in 2022.
- No supplementary studies are planned in 2023 as part of the EMP.
- The site specific surveys, which identify the potential critical groups for DN and PN EMPs, are currently under review and will be revised accordingly.
- Changes to the EMP as a result of the latest ERA will be identified and captured in the next EMP design review, which will be undertaken in 2024.

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