



Tritium Removal Facility

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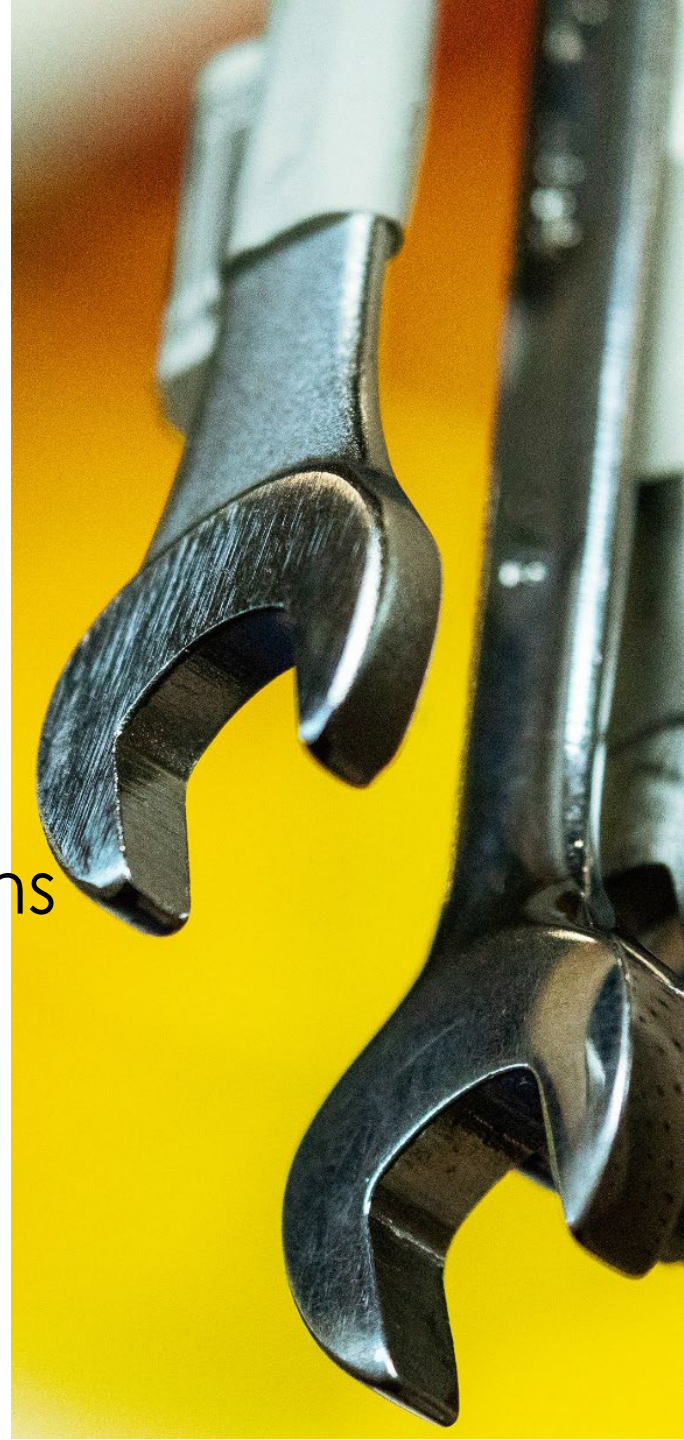


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Agenda

- Tritium Facts
- Description of Tritium Removal Facility
- Services
- Results of Radiological Emissions Monitoring
- Environmental Benefits





Tritium Facts

- Tritium is a radioactive form of hydrogen that occurs both naturally and as a by-product of the operation of nuclear reactors.
- One of the more common uses of tritium involves glow-in-the-dark lighting and signs.
- Tritium exposure can pose a health risk if it is ingested through drinking water or food, inhaled or absorbed through the skin in large quantities.
- The CNSC regulates releases of tritium from nuclear reactors and tritium processing facilities to ensure the health and safety of workers and the public, and the protection of the environment.
- A spill of Primary Heat Transport water at 1 Ci/kg would result in ~1000 MPCa and Moderator water at 10 Ci/kg would result in ~10,000 MPCa



Description of Tritium Removal Facility Upgrader

- increase the isotopic of heavy water
 - Unit operation within licensing limits (RM)
 - Economic efficiencies of reactor

Removal facility

- Remove the tritium from the heavy water
- Key to maintaining
 - Unit operation within licensing limits
 - Keeping dose ALARA
 - Minimizing tritium emissions



Services

Detritiation

- Largest facility in the world
- 100 000 curie of tritium removed per day of operation

Commercial Services

- Provide services to other facilities (US, Japan, Norway, Denmark, Germany, Italy, France)
- Tritium sales (exit signs, in biomedical research, nuclear fusion research)

2020 Results of Radiological Emissions Monitoring

Site Emissions ^(d)	DN		PNA & PNB (Units 1-8) ^(e)	
	Bq	% DRL	Bq	% DRL
AIR				
Tritium Oxide	1.9E+14	0.38	6.5E+14	0.64
Elemental Tritium ^(a)	1.5E+13	<0.01	NA	NA
Noble Gas ^(b)	2.4E+13	0.06	4.5E+13	0.17
I-131 ^(c)	1.5E+08	<0.01	1.0E+07	<0.01
Particulate	3.1E+07	<0.01	5.8E+06	<0.01
C-14	8.3E+11	0.07	2.3E+12	0.10
WATER				
Tritium Oxide	1.2E+14	<0.01	4.3E+14	0.05
Gross Beta/Gamma	2.5E+10	0.07	3.2E+11	17.11
C-14	3.8E+08	<0.01	1.8E+09	<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.

(e) As of 2019 PN DRLs and emissions are for PNA and PNB combined rather than separate as in the past.



Environmental Benefits

- Reducing the concentration of tritium in the Primary Heat Transport and Moderator Systems helps to reduce tritium emissions, worker and public dose.
- In Canada, members of the public receive annual doses of radiation from tritium of 0.0001 to 0.013 millisieverts (mSv)
- Near nuclear facilities, where tritium levels are slightly higher, the average annual dose to the public is about 0.0015 mSv.
- These doses are well below the public dose limit of 1 mSv as set in the Radiation Protection Regulations, and the average Canadian dose due to natural background radiation of 1.8 mSv.

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