

Environmental Performance – Chalk River Laboratories, 2021 June Report
 Availability of emissions data is outlined on each graph.

As an ISO 9001:2015 Quality Management Systems and ISO 14001:2015 Environmental Management Systems registered organization, CNL is committed to both studying and continuously improving the low impact of our operations on the environment.

CNL maintains an extensive environmental monitoring program at the Chalk River Laboratories (CRL), designed to track potential contaminants throughout the different compartments of the geosphere, atmosphere, and biosphere. Monitoring is conducted on a multitude of media, including air effluent, liquid effluent, groundwater, ambient air, surface water, vegetation, soil and sediments, and game animals, at over 400 locations both on and off the site. More than 60,000 analyses are performed annually for radionuclides, major ions, trace elements, and a broad range of organic compounds. The information and data generated is used to regularly update an Environmental Risk Assessment of the CRL site, the objective of which is to quantify potential effects of operations and activities on human and non-human biota.

From direct release monitoring to contaminant pathways monitoring and biological effects monitoring, this integrated approach means that the evaluation of impacts on the environment is carried out in a logical, comprehensive manner, and is effectively used to demonstrate compliance and protection of the environment and health and safety of the public. Designed and operated according to the CSA N288 suite of environmental Standards, and subject to an extensive regulatory framework that includes the CNSC as well as Environment and Climate Change Canada and Fisheries & Oceans Canada, the monitoring results are assessed and compiled annually into reports submitted to the CNSC and available on CNL's website.

Snapshot of Emissions at CNL

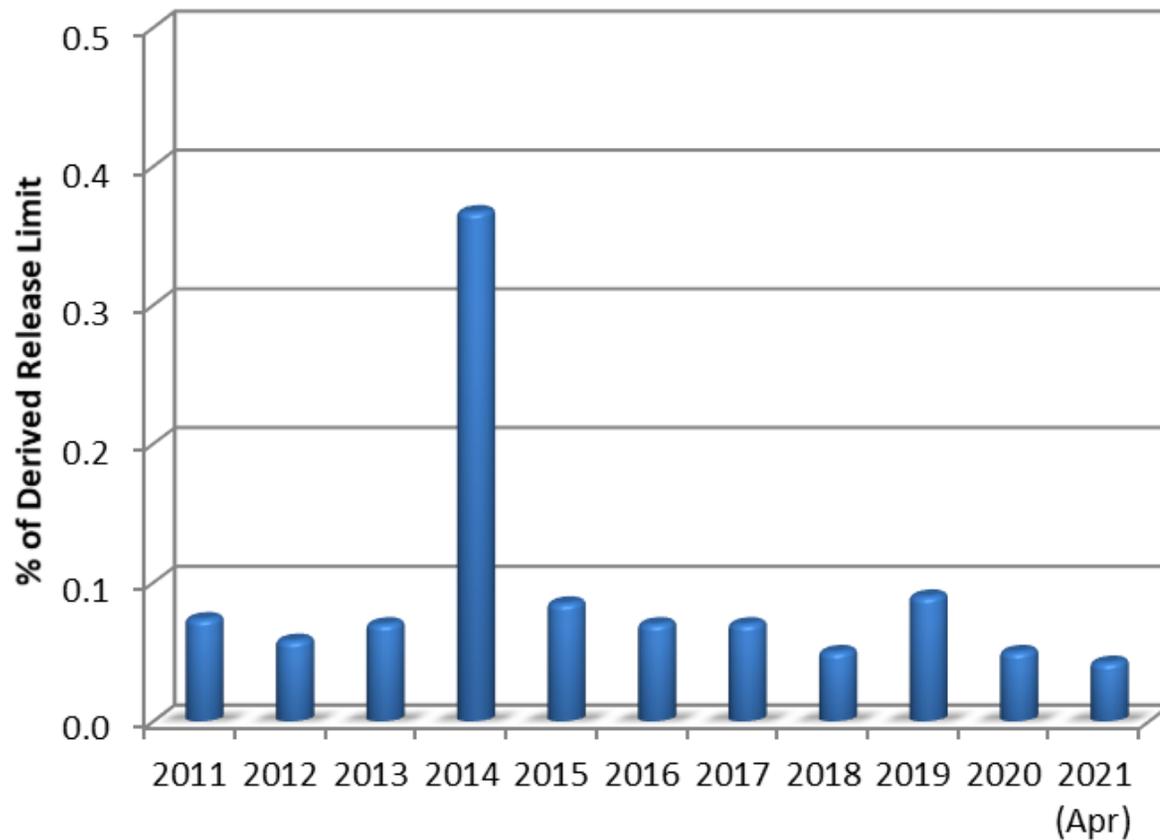
<u>Source</u>	<u>Amount</u>	<u>Units</u>	<u>Date</u>
Airborne NO _x and SO ₂	64	Tonnes	(2020 Dec)
Airborne Greenhouse Gases	26,150	CO ₂ e Tonnes	(2020 Dec)
Airborne Tritium	0.04	% DRL	(2021 May)
	0.0004	mSv	(2021 May)
Waterborne Tritium	0.0009	% DRL	(2021 Apr)
	0.000009	mSv	(2021 Apr)

Comparison of Radiation Sources

<u>Source</u>	<u>Amount Per Year (mSv)</u>
Inside the Body (air—radon)	2
Outer Space [Cosmic Rays] (5,000-6,000 ft)	0.55
Inside the Body (food and water)	0.40
Medical X-Ray	0.40
Outer Space [Cosmic Rays] (sea level)	0.26
Living in stone, brick, or concrete building	0.07
Airline Flight (round-trip cross-country)	0.05
Airline Flight (per 1,000 miles flown)	0.01
Coal-Fired Power Plant (living within 50 miles)	0.0003
Nuclear Power Plant (living within 50 miles)	0.00009
Smoke Detector	0.00008

Sources: National Council on Radiation Protection & Measurements (NCRP), U.S. Environmental Protection Agency (EPA) and Nuclear Energy Institute (NEI).

Liquid Effluents

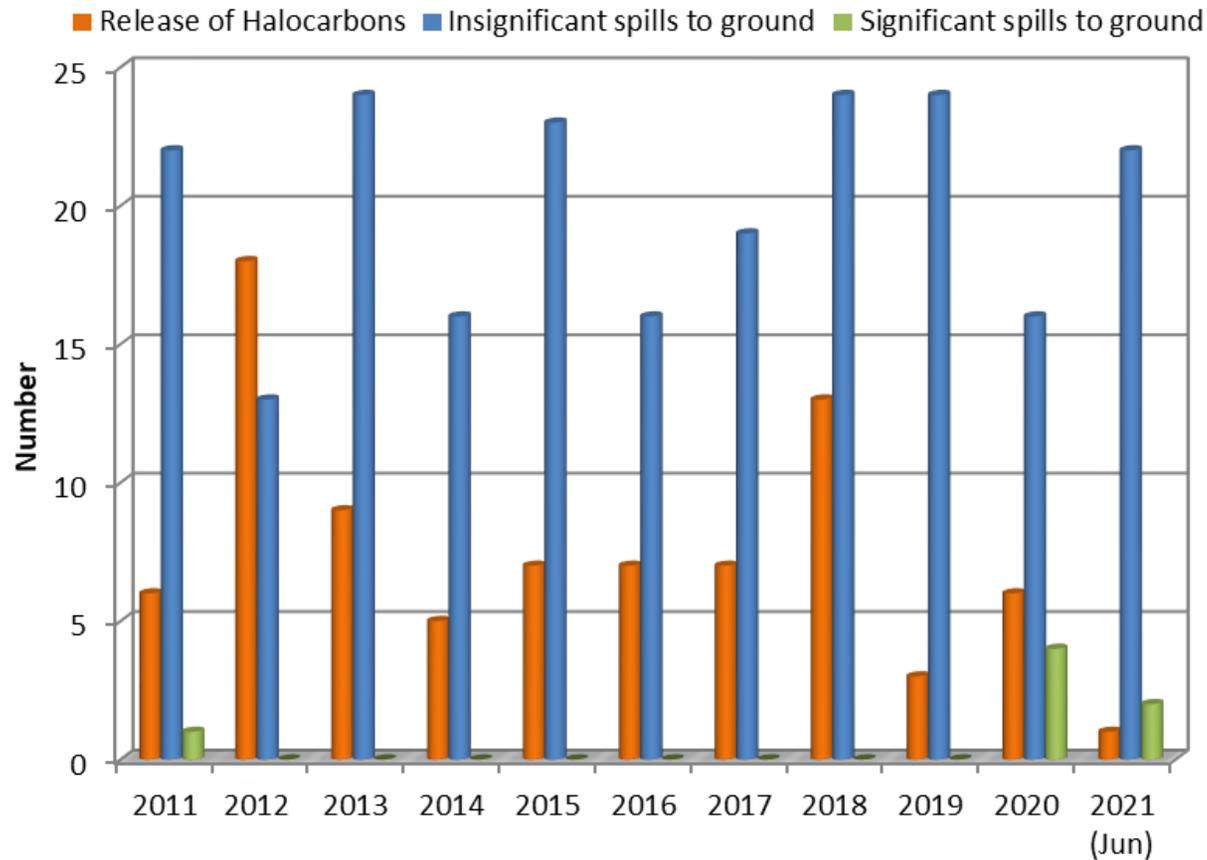


The increase in liquid effluents was related to a known event that occurred at the end of August 2014. The event was not reportable to the CNSC, there were no limit exceedances and negligible impact to the public or to the environment.

Environmental Spills

The types of spills onsite at CRL include: Halocarbon Releases (as reported to Environment Canada under the Federal Halocarbon Regulations), insignificant radiological or non-radiological spills, and significant radiological or non-radiological spills to ground (reportable with some resulting effect on the environment). Insignificant Spills to Ground are spills that are easily remediated with no negative effect on the public or the environment. Significant spills are generally those that require reporting to external regulatory bodies and potentially require some effort to remediate. All significant spills to ground are reported to the Canadian Nuclear Safety Commission and Environment and Climate Change Canada as required. Immediate actions are taken in response to all spills in order to minimize the impact to the environment. All areas have been remediated and corrective actions are implemented as appropriate and CNL strives to use the lessons learned from these events to continually improve our performance.

Number of Spills

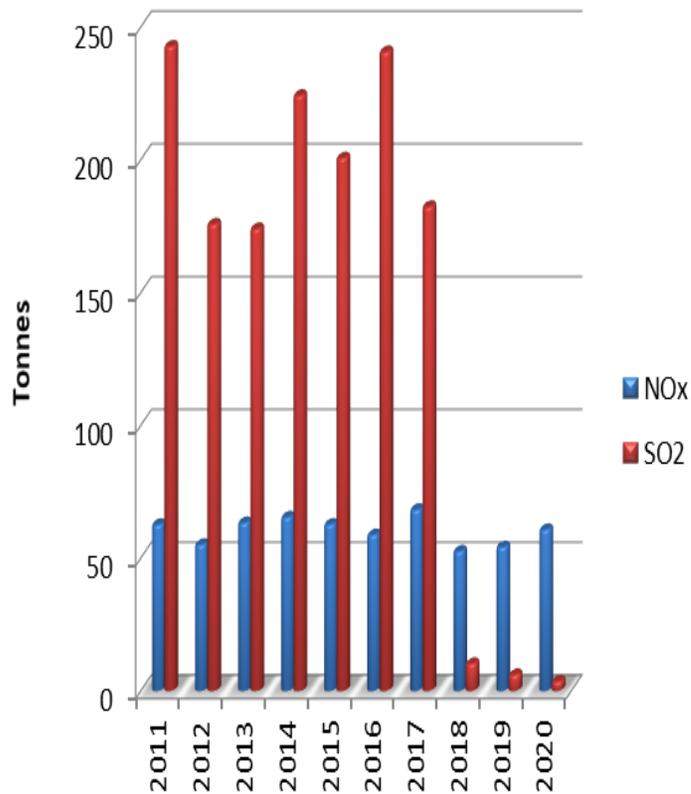


National Pollutant Release Inventory (NPRI) – Criteria Air Contaminants

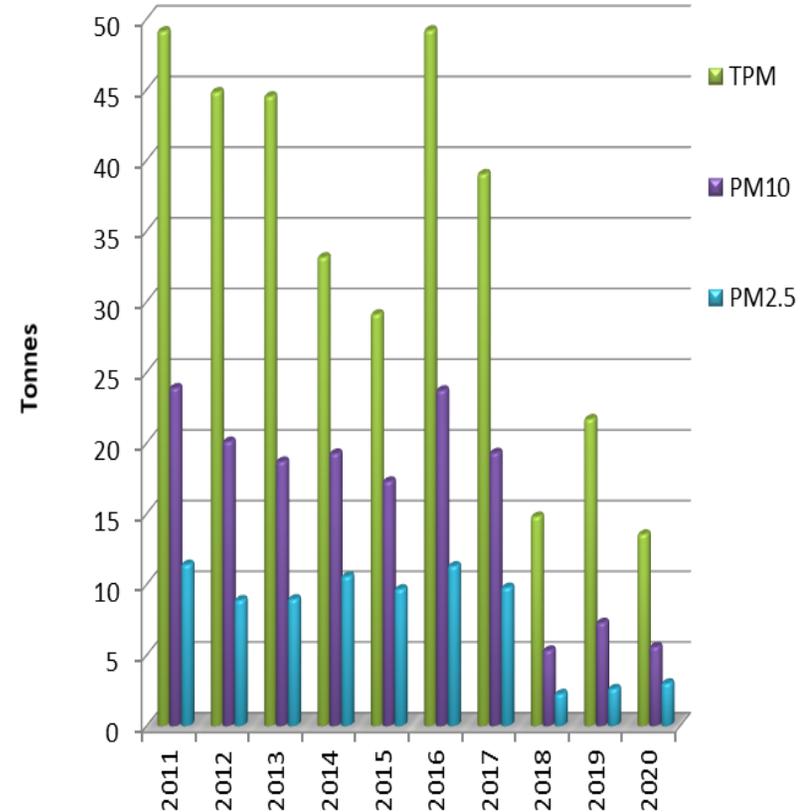
CRL reports annually to the National Pollutant Release Inventory (NPRI) as required under the Canadian Environmental Protection Act (CEPA). Criteria Air Contaminants (CACs) of interest under the NPRI which are released by CRL include: Oxides of Nitrogen (NO_x); Sulphur Dioxide (SO₂); Total Particulate Matter (TPM); Particulate Matter of 10 micron or less (PM₁₀); Particulate Matter of 2.5 micron or less (PM_{2.5}); Carbon Monoxide (CO); and, Volatile Organic Compounds (VOCs). CO and VOCs have consistently been released in quantities below NPRI reporting thresholds; whereas the other CACs either meet or historically have met NPRI reporting thresholds for CRL.

Releases are a result of: the burning of fuels on site for heating and steam production; road dust emissions; diesel generator use; solvent use, and the storage of petroleum fuel. Note: The significant decreases in CACs seen starting in 2018 are the result of (1) the switch from primarily burning #6 fuel oil on site to primarily burning Natural Gas and (2) reduced particulate emissions from unpaved road dust.

Airborne Emissions of NO_x and SO₂

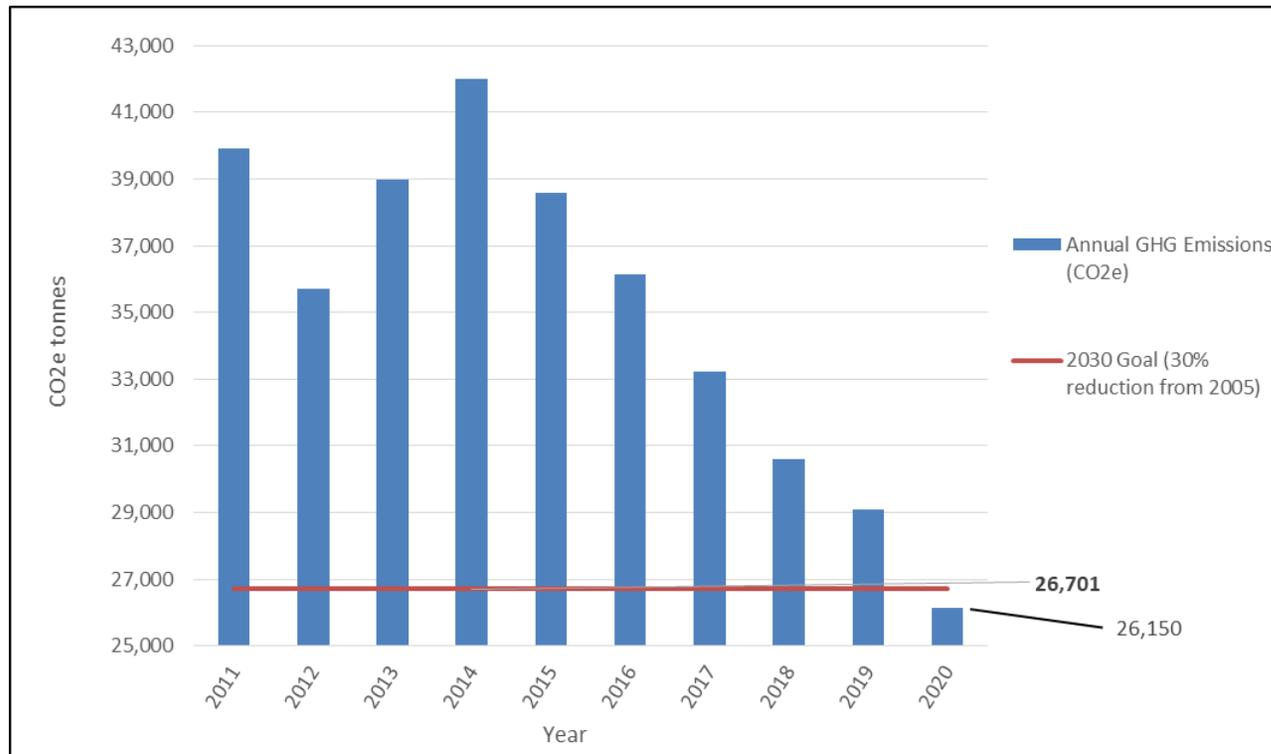


CRL Particulates Reportable Under the NPRI



Greenhouse Gases (GHGs)

The Government of Canada has identified climate change as one of the defining challenges of the 21st century, and is implementing measures to reduce greenhouse gas emissions across Canada, moving the country towards a more sustainable, low-carbon future. As part of this work, the Government of Canada has set a target to reduce the country's carbon emissions by 30% relative to 2005 levels, and CNL is doing its part to help Canada meet this national target. By the end of 2020, CNL had realized a 31% reduction in its emissions from the Chalk River Laboratories compared to 2005 levels, successfully meeting our target 10 years ahead of schedule. In April 2021, the Government of Canada announced that it has established a new goal to achieve a 40% reduction in emissions by 2030, an updated target which CNL will incorporate into our own planning.



CO₂e (Carbon Dioxide Equivalent): A unit of measure used to compare between gases that have different Global Warming Potentials (GWP). For example, the GWP for methane is 25. This means that an emission of one tonne of methane is equivalent to the emission of 25 tonnes of carbon dioxide.