Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 25-H2.71

Date: 2025-05-08

Written Submission from Louis Bertrand

Mémoire de Louis Bertrand

In the matter of the

À l'égard d'

Ontario Power Generation Inc.

Ontario Power Generation Inc.

Application to renew power reactor operating licence for the Darlington Nuclear Generating Station

Demande concernant le renouvellement du permis d'exploitation d'un réacteur de puissance pour la centrale nucléaire de Darlington

Commission Public Hearing
Part-2

Audience publique de la Commission
Partie-2

June 24-26, 2025

24-26 juin 2025

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Canada

Thursday May 8, 2025

To:
Senior Tribunal Officer, Commission Registry
Canadian Nuclear Safety Commission
280 Slater St
PO Box 1046 Stn B
Ottawa ON K1P 5S9

By email to:
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From:
Louis Bertrand P.Eng. (Ret.)

Reference: 2025-H-02

To the Commission,
Please accept this document as my submission for Part 2 of the public hearing on Ontario Power Generation's application to renew the power reactor operating licence for the Darlington Nuclear Generating Station.
I wish also to make an oral presentation in-person at the hearing, June 24–26 in Durham Region. I will be providing a presentation slide deck by June 10.
Sincerely

Louis Bertrand

Summary

The public information disclosure and transparency provisions set out in OPG's practice and the Commission's licensing requirements are inadequate to give the public a timely and complete view of the releases to the environment of radiological and conventional pollutants, as well as the progression of potential nuclear accident.
Safecast proposes that the Canadian Nuclear Safety Commission (CNSC) include as a condition of re-licensing for the Darlington Nuclear Generating Station (DNGS) the implementation of robust, real-time, publicly accessible environmental monitoring systems both on-site and beyond the facility fence line. This proposal addresses concerns regarding the unprecedented 30-year license period requested by Ontario Power Generation (OPG), which would significantly reduce opportunities for public scrutiny and engagement in the regulatory process.
A request is made to the Commission to require in the Licence and the companion Licence Conditions Handbook (LCH) that radiation measurements, radiological and conventional releases, accidents and other time sensitive data be posted on a Web-accessible dashboard and updated in real time.

About the intervenor

Louis Bertrand P.Eng. retired in 2003 as a full-time professor after a career spanning 23 years in the Ontario system of Colleges of Applied Arts and Technology, teaching a variety of courses in electronics, software development and IT security. Prior to college teaching, he worked in industry with small startups and large companies on analog and digital hardware design and manufacturing, microcontrollers and embedded systems, and firmware development. He holds a B.A.Sc. (Electrical Engineering) from the University of Waterloo (1985). He resides in the Township of Scugog.
Since retirement, he has been a volunteer contributor to Safecast on the development team for the bGeigieZen, the next generation portable radiation logging instrument.

About Safecast

> *Safecast is an international volunteer driven non-profit organization whose goal is to create useful, accessible, and granular environmental data. All Safecast data is published, free of charge, into the public domain under a CC0 designation.*
> *After the devastating earthquake and tsunami which struck eastern Japan on March 11, 2011, and the subsequent meltdown of the Fukushima Daiichi Nuclear Power Plant, accurate and trustworthy radiation information was publicly unavailable. Safecast was formed in response, and quickly began monitoring, collecting, and openly sharing information on environmental radiation – growing quickly in size, scope, and geographical reach. Before long we began monitoring Air Quality as well. Our mission is to provide citizens worldwide with the tools they*

need to inform themselves by gathering and sharing accurate environmental data in an open and participatory fashion.
Safecast has deployed an innovative model of rapid integrated development, including hardware design, software design, engineering and science, visual design and communication, and social design factors. From the start we have embraced open-source and open-data methodologies, along with new fabrication technologies, such as 3D printing, laser-cutters, and on-demand fabrication of components. We promote rapid, agile, and iterative development, and benefit from having a technically skilled pool of collaborators around the globe.
The value and credibility of Safecast data has been globally recognized. Our community is inclusive and non-partisan, comprising people of all ages and from all walks of life. Energetic outreach activities allow us to share our experiences with individuals and groups worldwide through frequent workshops, talks, and educational programs.
But most importantly, Safecast has enabled people to easily monitor their own homes and environments, and to free themselves of dependence on government and other institutions for this kind of essential information. We are happy to be playing a major continuing role in the emergence of technically competent citizen science efforts worldwide (Bonner, n.d.).

Background and Context

30-year operating licence

OPG's application for a 30-year operating licence represents a significant departure from traditional licensing periods. Such an extended time frame would effectively remove meaningful public participation in the oversight process, as the annual compliance reviews offer minimal opportunity for meaningful public intervention.

Co-location of Darlington New Nuclear Project

Recent regulatory decisions affecting Darlington include granting the licence to construct one of the selected GE Hitachi BWRX-300 reactors for the Darlington New Nuclear Project and the determination that the 2012 environmental assessment conducted by a joint review panel of the CNSC and the Canadian Environmental Assessment Agency applies to the New Nuclear Project (Government of Canada 2025).

Public Information Disclosure and Transparency

OPG, in the application to renew the Darlington licence, details its public information and disclosure program in section 4.4 Public Information and Disclosure Program (Ontario Power Generation 2024b). The CNSC mandates public and Aboriginal engagement through the regulatory document “Public Information and Disclosure” REGDOC-3.2.1 (Canadian Nuclear Safety Commission 2018). In the current licence application review by CNSC Staff, section 4 details Indigenous and Public Consultation

and Engagement (Canadian Nuclear Safety Commission 2025). More generally, the Ontario Power Generation (OPG) Disclosure Policy is posted on the OPG web site (Ontario Power Generation N.D.).

Increasing distrust in public institutions

As witnessed during the Canadian general election of April 2025, the amount of dis- and misinformation circulating online chips away at the ever lowering level of trust in institutions (Proof Strategies 2025; Steinburg 2024; Edelman 2025). In the United States, the nomination of a notorious anti-vaccine influencer to one of the largest public health organizations in the world (Ahmed Aboulenein and Stephanie Kelly 2025) shows how deeply that distrust can become entrenched.

Key Issues and Concerns

Reduced Public Oversight

The proposed 30-year license would create an unprecedented gap in public scrutiny. While yearly compliance reviews would continue, these proceedings do not provide the same level of transparency, accessibility, or opportunity for meaningful public engagement as full licensing hearings. This extended period without formal public hearings raises significant concerns regarding accountability and transparency in nuclear facility operations. In the assessment of the March 2011 Fukushima Dai-Ichi accident, regulatory capture was named as a key cause of the disaster. That is, the Japanese nuclear safety regulator had become so close to the industry it regulated that it put industry interests before public safety. To prevent this, it is essential for the public to be a watchdog over Canada's nuclear safety watchdog. A 30-year licence means the public has effectively no means of keeping the regulator on its toes.

Conflating outreach and data

OPG's web site includes copious amounts of self-promotion, as you would expect from any corporate entity working to present itself to the public in a favourable light. However, the attractive presentation and marketing copy make it difficult to find hard information on the DNGS performance such as releases of pollutants to the environment.
OPG produces performance reports on a quarterly basis. The link to the latest available performance report, Q4 2024, is found at the bottom of the main page for Darlington (Fig ??). Clicking on the link brings you to some attractively formatted pie charts (Figure 1). The pie chart for Environment (Figure 2) is summarized as "2 spills", with the explanation

> *"Spills to the environment*
> *During Q4 2024, there were two spills to the environment at Darlington Nuclear reportable to a regulatory authority."*.

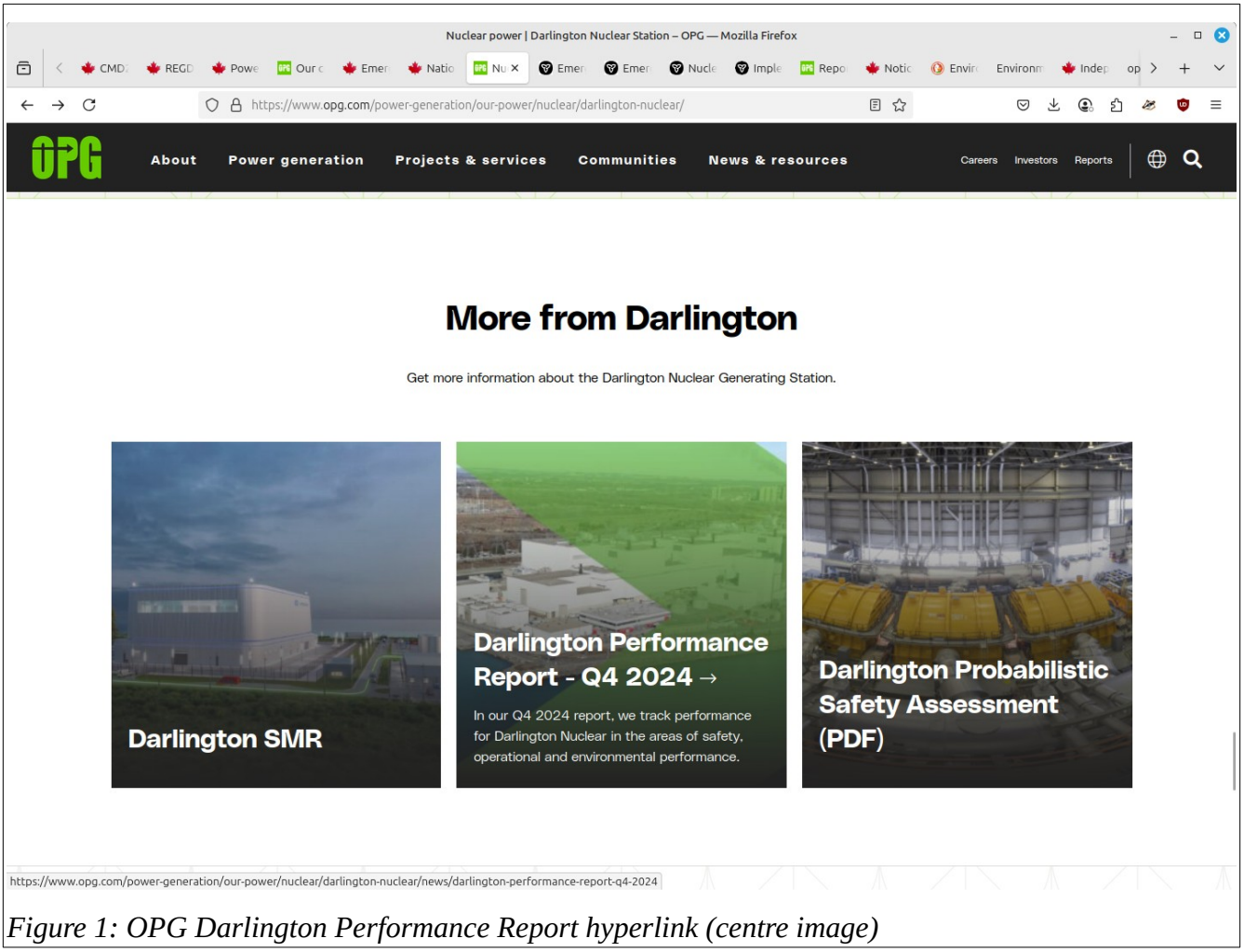

Figure 1: OPG Darlington Performance Report hyperlink (centre image)

However, there does not seem to be a straightforward way to get the details of these spills from the performance report page. Instead, the dedicated reader may notice a small “Reports” link at the top right of the page that links to “Regulatory reports” where, near the bottom of the page, one can find a list of reports (Ontario Power Generation, n.d.). Clicking on the little “+” symbol on each report type opens up a list of reports in PDF format.

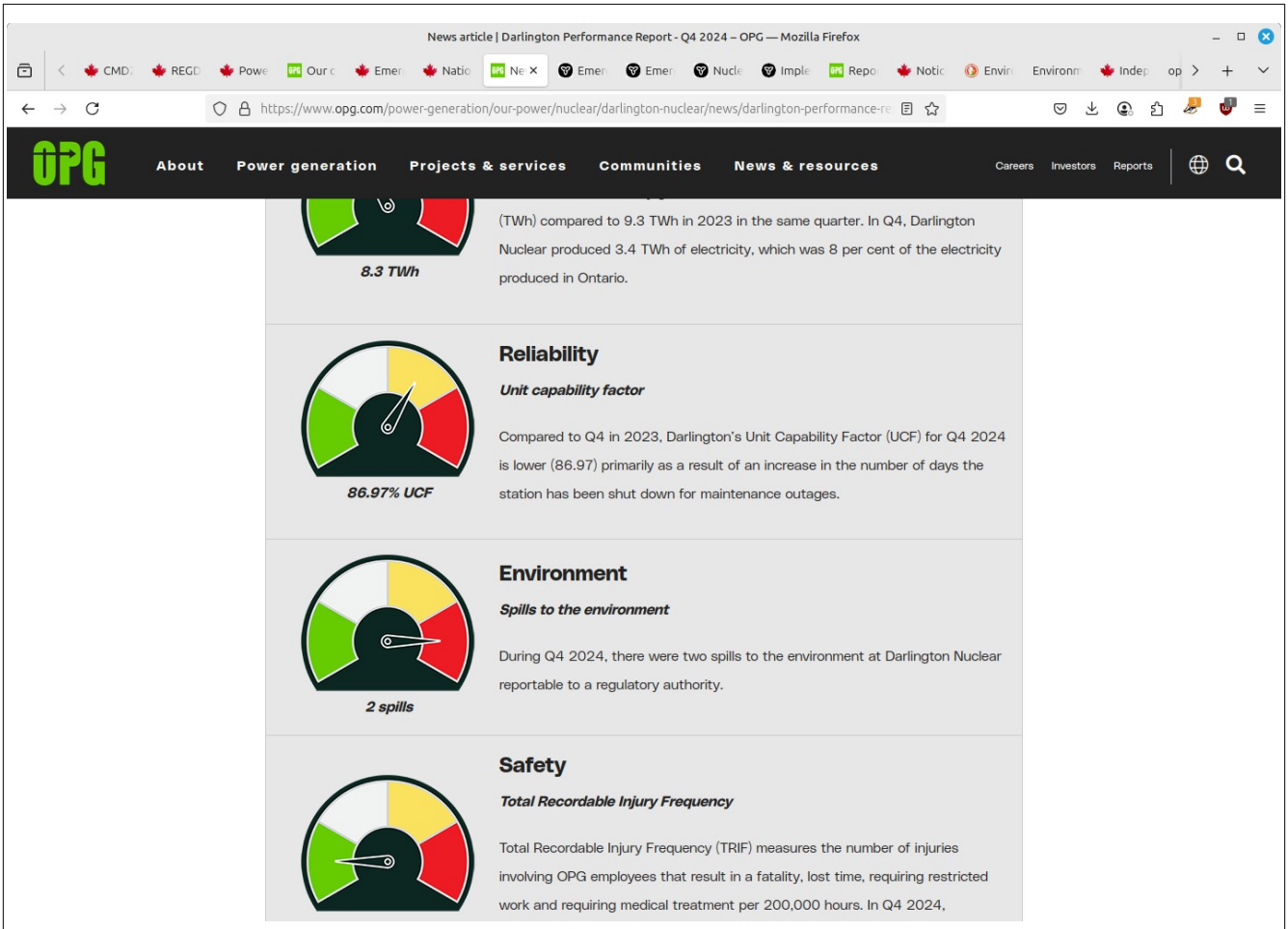

Figure 2: Performance report pie charts

Clicking the "+" for Environmental Emissions Data Reports yields a list of reports for Darlington as well as Pickering. The answer to the question about the Q4 2024 spills to the environment is not found because, as of writing, the latest report is from Q3 2024. Though it is undated, the file name suggests that the publication date was 20250304, in other words, March 4, 2025.

There are several obvious questions raised by this scavenger hunt for data:

- Why is it so hard to get to the actual data? Using a search engine to find the Environmental Emissions Data Reports is quicker than following links on the OPG web site.
- Why the delay in reporting emissions? The Q3 2024 report goes to the end of September, yet it appears to be published only in March 2025, a lag of five months.

Obsession with safety messaging

OPG's website constantly repeats that nuclear power is safe, that it provides nothing but benefits, and that OPG operates safely. One potential impact on public safety of this repetition would be to inoculate the public against believing that an accident is in progress or even that one is possible. Furthermore, residents could doubt or even disregard alerts. Instead of a public that is aware, knowledgeable and ready to act responsibly during an event, counter-intuitively, the intense marketing efforts by OPG (as

well as by the CNSC), could result in a public that is unprepared and confused. The response effort would become that much more complicated.

Mg or mg?

The conventional pollutants are reported in an Environmental Monitoring Report on a yearly basis. The latest is for 2023, published April 10, 2024 (Ontario Power Generation 2024a). The quantities of conventional pollutants is summarized for the previous year, in this case 2022, in table 2-2 D*N and PN Annual Total Site Emissions of Conventional Hazardous Substances – 2022*. The quantities are reported in units of "Mg", which ar a casual glance could be interpreted as "milligrams". However, a note below the table clarifies that Mg stands for mega-grams[1]. In more familiar terms, one mega-gram is one metric tonne. There does not seem to be any reason to use such an obscure unit of measurement. For example, the amount of hydrazine released to air is given as the apparently vanishingly small "2.9E-02" (or 2.9×10^{-2}) Mg. The corresponding figure in the National pollutant release inventory (Government of Canada 2023) is the same, but reported in the more familiar units of kilograms: 29.230 kg.
In addition to questioning the units of measurement, one must also wonder about the delay in publishing data about the release of toxic substances to the environment that could lead to health impacts, notably to more vulnerable populations – pregnant women, children, persons with compromised immune systems.

Aggregate data vs. individual data points

The reports provided by OPG aggregate data on a yearly, quarterly or, for radiological emissions, on a weekly basis. This averaging makes it impossible to notice individual large releases of materials, which in turn would make it difficult to pinpoint the environmental effects.

Case study: Pickering false alarm January 2020

At 7:24 a.m. January 12, 2020, an alert was issued province wide to mobile phones, saying an incident was reported at the Pickering nuclear generating station. Although the message included text to reassure readers that "There has been NO(sic) abnormal release of radioactivity from the station", the alert left many neighbours of the Pickering NGS is a state of confusion, as quoted in news reports (Chris Herhalt 2020; Muriel Draaisma 2020).
At 8:06 a.m., OPG tweeted (Twitter, now X) that the alert had been sent in error.
Freedom of information (FOI) requests by CTV News retrieved a flurry of emails showing that the emergency operations centre staff was unfamiliar with the alerting system, had no procedure for determining when and how to issue an "all clear" notification, and no means of receiving updates from the Pickering plant. Unbelievably, it was a fire chief who contacted the emergency operations centre from his cell phone to inform them that the situation at the plant was normal (Chris Herhalt 2020).

1 In the SI system of units, the prefix capital 'M' stands for "mega" or one million, while minuscule 'm' stands for "milli" or one one-thousandth.

OPG staff briefly considered sending an all-clear with OPG's own alerting system but ultimately decided against it.
The investigation by the Ministry of the Solicitor General for Ontario revealed deficiencies in the alerting system:

> *"The findings revealed procedural gaps, lack of training, lack of familiarity with the Alert Ready system and communication failures. These findings can provide context to the error and the length of time – 108 minutes – that elapsed between the alert issued in error and the second clarifying alert."* (Office of the Provincial Security Advisor 2021)

Residents in the vicinity of Pickering, even if they were familiar with nuclear emergency planning, were unsure as to where to get further information that was up-to-date and reliable. Radio? Local television? News sources on the Web? It's important to realize that those media outlets depend for their reporting entirely on OPG and the Provincial emergency management office to provide information. There was no independent means of confirming that it was a false alarm or if there really was an emergency.

Case study: The Safecast map

Safecast developed portable radiation measurement devices, notably the bGeigieNano (Figure 3) to submit radiation measurements to a global database. Data points are geolocated using a GPS receiver, date-time stamped, then submitted through a web service or uploaded directly from the device with a WiFi hardware module (bGeigieCast). The data is displayed as an overlay on Google Maps (Figure 4), colour coded by the equivalent dose in microsieverts (µSv). The database is published on the web and all data is in the public domain under a Creative Commons CC0 licence.

Figure 3: bGeigieNano portable radiation logging instrument.

The mapping effort is ongoing with citizen scientists carrying the next generation device, the bGeigieZen (Fig.??). The Zen is easier to assemble for kit builders than the Nano, is based on a more powerful controller module, and has more flexible user modes.
Safecast has also deployed the PointCast sensor system in the vicinity of Fukushima Dai-Ichi to provide longitudinal data from fixed locations.

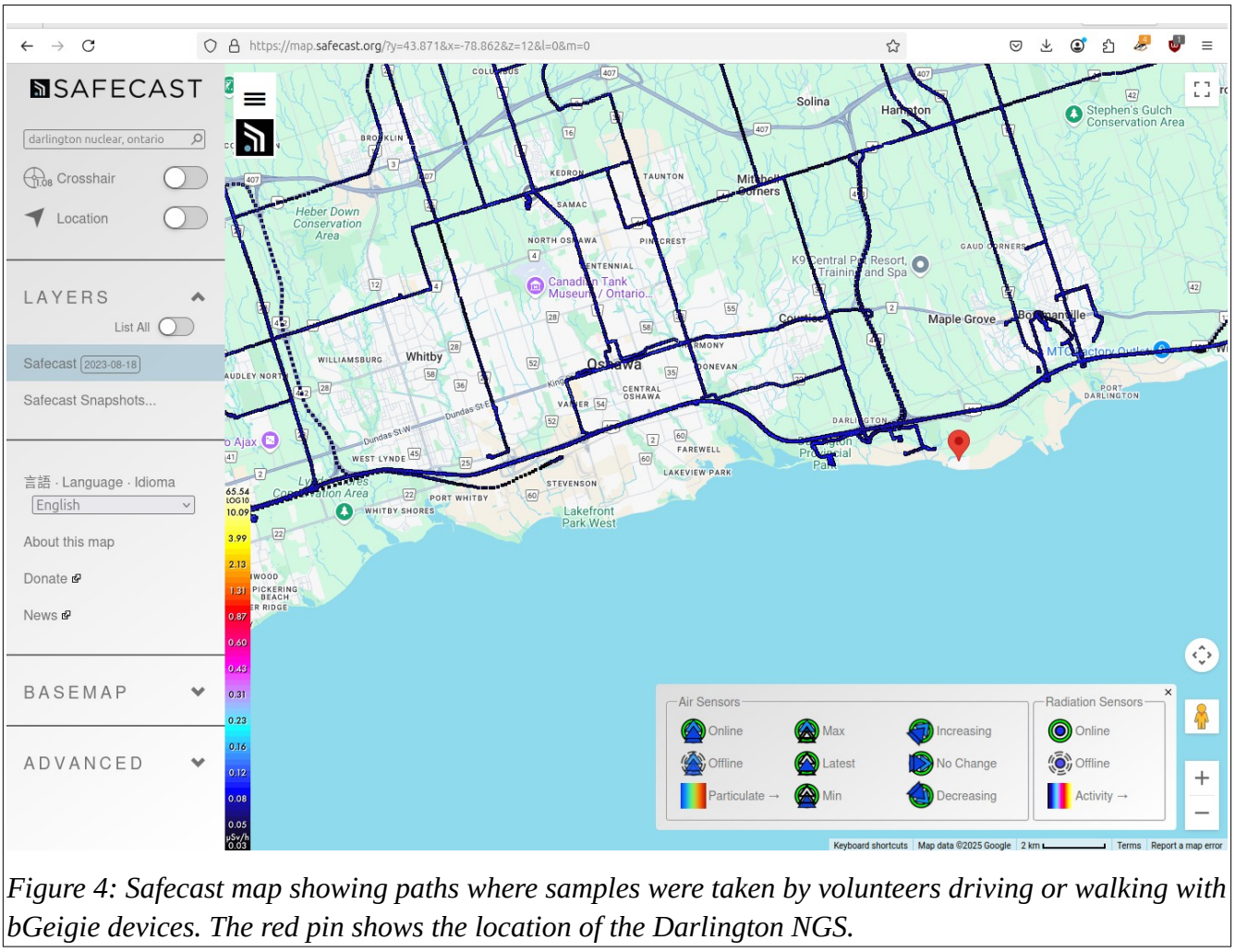

Figure 4: Safecast map showing paths where samples were taken by volunteers driving or walking with bGeigie devices. The red pin shows the location of the Darlington NGS.

Case study: SaveDnipro

Surveys of the radiation background in Ukraine were developed in the aftermath of the Chornobyl nuclear disaster by the NGO SaveDnipro. More recently a network of radiation sensors is viewable as a map (Figure 5) hosted on the website SaveEcoBot.com (SaveEcoBot.com, n.d.). Safecast, in cooperation with Blues Inc., began supplementing this effort in 2024 with the RadNote instrument that reports over the cellular phone network or via satellite. Readings are taken every hour and integrated into points on the map that can be queried for an hourly history over the past week. This effort builds on Safecast's experience with the PointCast fixed sensors in Fukushima near the Dai-Ichi NPP.
The goal for SaveDnipro and SaveEcoBot is "to deploy Radnotes throughout Ukraine to establish reliable, independent radiation background monitoring near nuclear facilities and in population centers."(SaveEcoBot.com, n.d.).

Dnipro is Ukraine's fourth-largest city, with about one million inhabitants, on the banks of the Dnieper river. One particular concern is the Zaporizhzhya NPP, located approximately 100 km to the south. Over and above the constant attacks by aerial drones and glide bombs, the risk of a nuclear accident is ever present. The plant has been shelled on several occasions, and the plant's cooling pond was depleted after the Kakhovka dam on the Dnipro river was breached in June 2023.

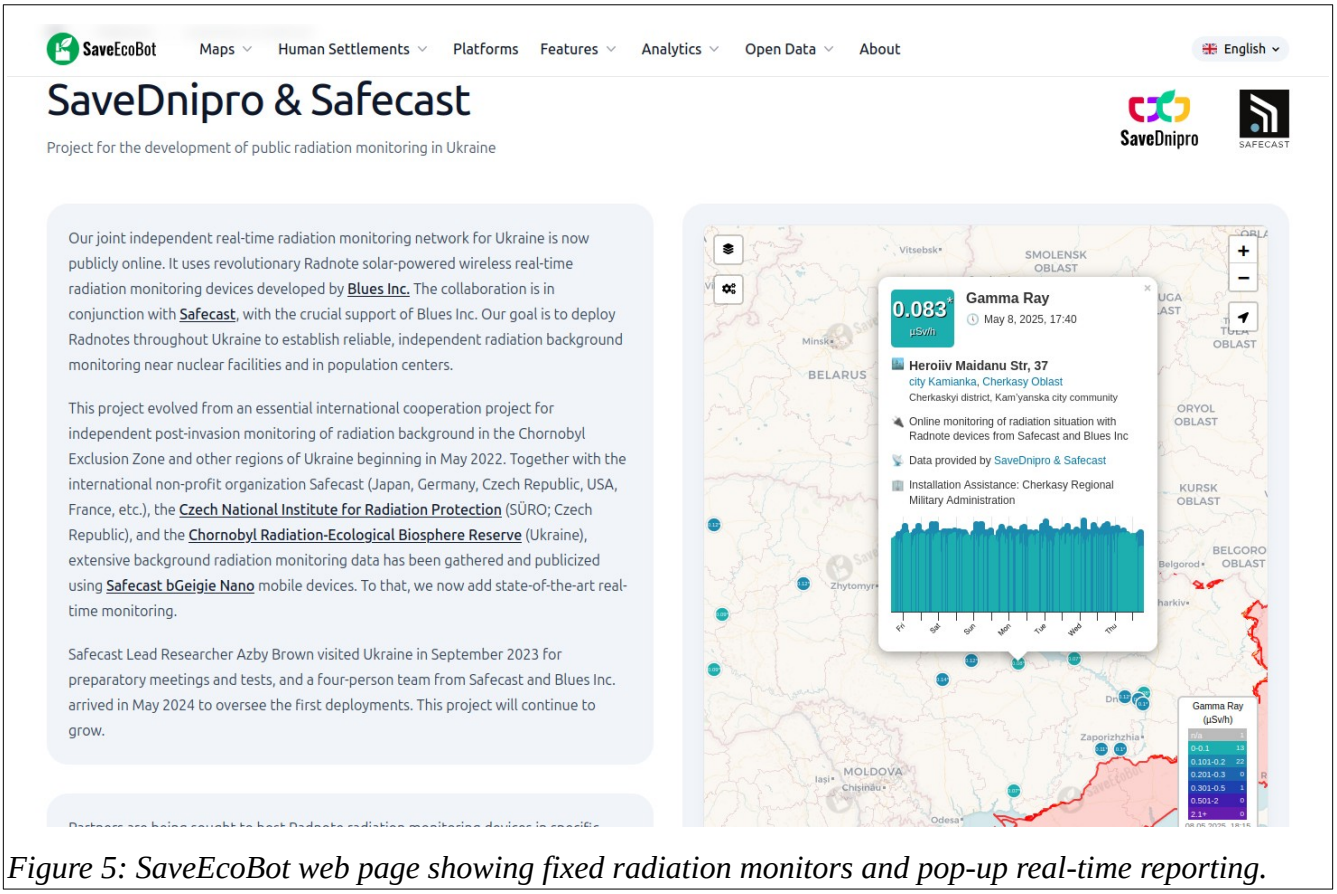

Figure 5: SaveEcoBot web page showing fixed radiation monitors and pop-up real-time reporting.

Although the threats to DNGS are nowhere near the scale faced by Ukraine, a country at war, the ability to view unfiltered and un-gated information at a glance is essential here in Ontario for public confidence in the event of an emergency or even, as we saw previously, in case of a false alarm.

Proposed real-time monitoring and publication

The overall goal of this intervention is to address the five month lag and inconsistencies in reporting emissions. Safecast proposes that the Commission include as a condition of licensing the implementation and maintenance of:

1. A comprehensive network of real-time radiation and environmental monitoring stations at and beyond the fence line of DNGS.
2. Web-accessible public interface providing unrestricted access to monitoring data.
3. Open data protocols allowing independent verification and analysis.
4. Standardized alert thresholds and automatic public notifications.

This system would model the successful Safecast approach to environmental monitoring, which provides transparent, citizen-accessible data visualization and supports informed public engagement.

Enhanced Public Trust

Real-time, accessible monitoring data would significantly improve public confidence in both regulatory oversight and operator transparency. By eliminating information delays, the public can be assured that environmental impacts are being continuously monitored rather than selectively reported.

Improved Emergency Response

In the event of an incident or unplanned release, real-time monitoring provides immediate detection, enabling faster emergency response and protective actions for surrounding communities. The ability to visualize the intensity and extent of the plume of gaseous and particulate emissions would help to promptly decide whether to order shelter-in-place or selective evacuations. In the case of Fukushima, the plume was not dispersed evenly (Figure 6) and significant contamination occurred well over 50km away.

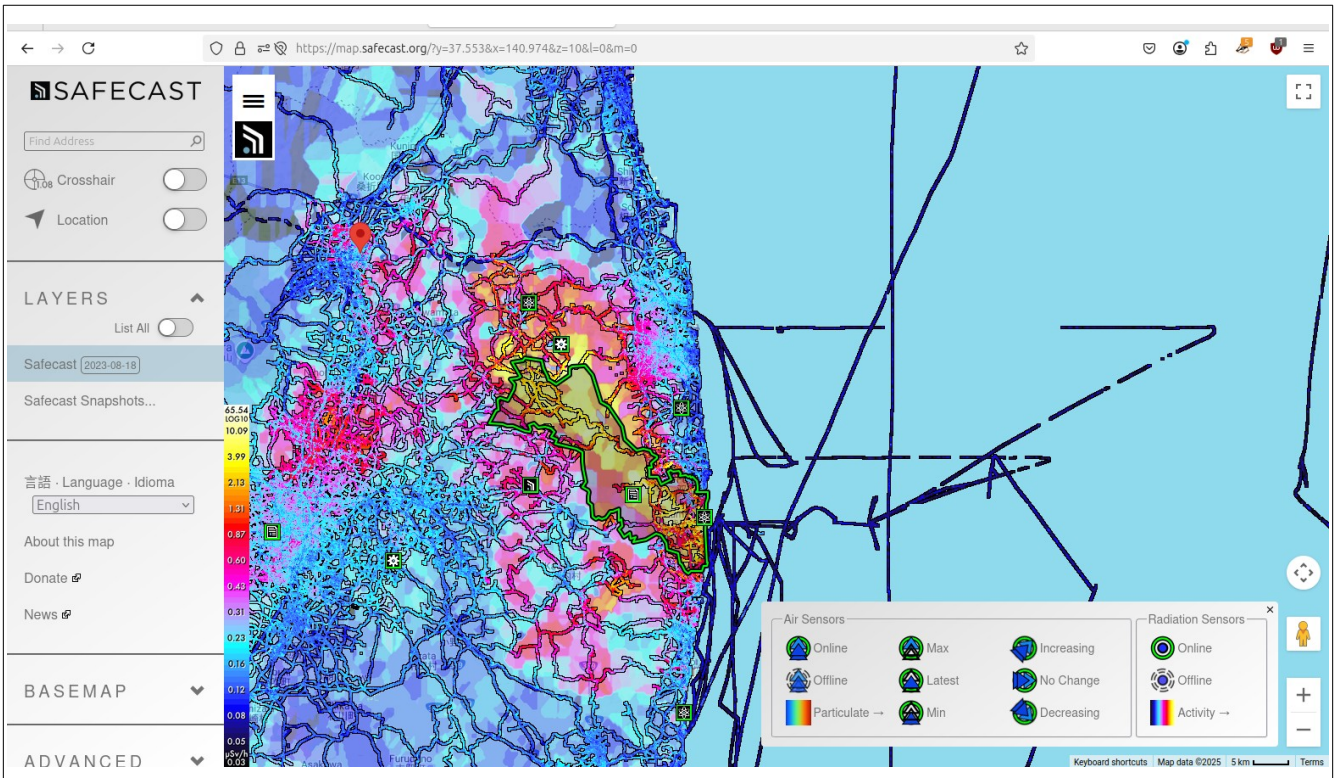

Figure 6: Safecast map of the vicinity of the Fukushima Dai-Ichi NPP. The plume of fallout is not evenly distributed.

Mitigation of extended licence concerns

While a 30-year license remains concerning from a public oversight perspective, robust real-time monitoring would provide an ongoing mechanism for public awareness and engagement, partially offsetting the reduced frequency of formal licence hearings.

Mock-up radiation map for Durham Region

As an example of a map in the vicinity of the Darlington and Pickering stations, Safecast developed a live map prototype consisting of three fixed locations using the Grafana Labs data visualization platform (Figure 7). The most recent counts per minute (CPM) number is displayed at the sensor location with a heat map graphic. In fixed locations, the bGeigies report at 5 minute intervals. The pane below the map shows a history – in this case over 24 hours – of the measurements. The measurement plots are colour coded, and clicking on the colour bar in the legend hides the other plots. In this screenshot, it becomes immediately obvious that the south Ajax sensor has failed and needs attention.

Figure 7: Prototype of fixed sensor display for Durham Region (Rob Oudendijk/Safecast)

Implementation Framework

Safecast proposes that:

5. OPG be required to establish the monitoring network within a specific timeline.
6. An independent scientific advisory panel oversee monitoring protocols.
7. Annual timely public reports evaluate monitoring system implementation and performance.
8. The CNSC retain authority to expand monitoring requirements as international standards evolve or to address emerging environmental conditions.

In the case of radiation and most conventional gaseous pollutants, instrumentation already exists to provide immediate real-time results. However, there are several other substances such as tritium in water that require laboratory analysis. For these, a regular schedule of sampling from a consistent set of shoreline locations and groundwater wells would supplement the radiation map.

It is important to monitor emissions on-site for the protection of OPG staff, but also beyond the fence line. In the case of a serious release of radiation, the community needs to know the extent and severity of the plume.

Conclusion

The implementation of real-time environmental monitoring represents a reasonable and proportionate condition for an extended operating license. This intervention balances OPG's desire for regulatory stability with the public's right to ongoing environmental transparency and information access.

By adopting this proposal, the CNSC would establish a progressive standard for nuclear facility monitoring in Canada while demonstrating its commitment to public safety and environmental protection. Safecast respectfully requests that the Commission incorporate these monitoring requirements as formal conditions within any renewed operating license for the Darlington NGS.

Safecast remains available to provide further technical specifications or consultation regarding implementation of these monitoring systems, drawing on our extensive international experience in radiation monitoring networks and public data platforms.

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