Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 25-H2.71A

Date: 2025-06-10

Supplementary Information

Presentation from
Louis Bertrand

Renseignements supplémentaires

Présentation 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

Document ID: DAMZHJW66V33-166150894-1582

Canada

TRUST IS A NON-RENEWABLE RESOURCE

CNSC Hearing H2-2025
Relicensing Darlington NGS
June 24–26, 2025

Louis Bertrand P.Eng.(Ret.)
https://safecast.org/

SAFECAST

About Safecast

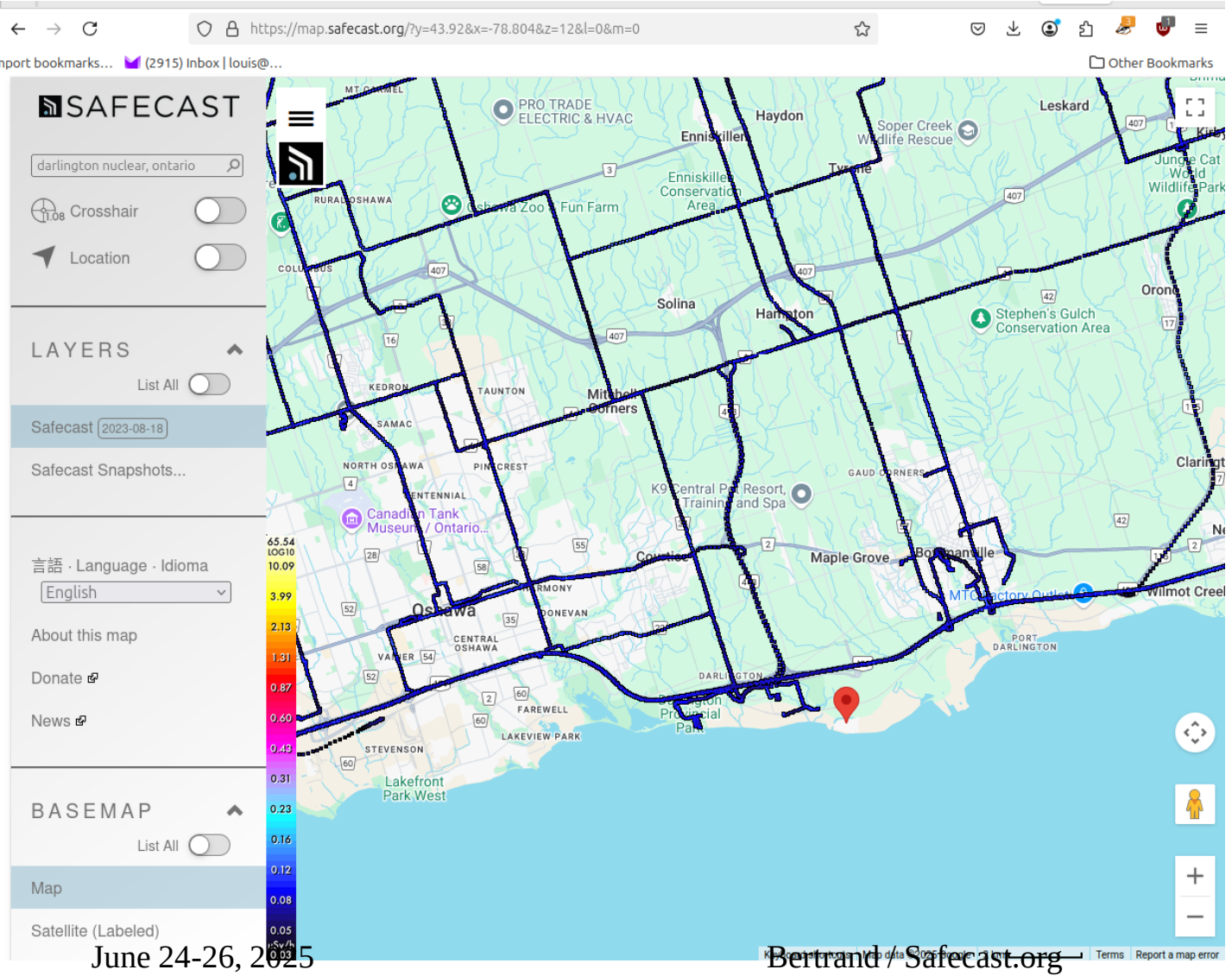
- Non-profit dedicated to transparency in nuclear
- Citizen science, independent, all-volunteer
- Worldwide mapping of background radiation

Neither pro- nor anti-nuclear

PRO-DATA

After Fukushima Daiichi March 2011

- Information scarce from operator TEPCO, government agencies and aerial surveys
  - Averages only, over large areas; where are safe areas?
- Volunteers carrying Geiger counters in the zone posted spot measurements corresponding to precise locations
- Thereafter, developed portable logging devices with GPS
  - “bGeigie”, Geiger counter in a Bento box
  - Volunteers now collect data as they travel



Safecast Map

Database measurements mapped as a “heat map” overlay on Google Maps

Tracks show “drives” by Safecasters

Dataset placed in the public domain, available to anyone

Louis Bertrand, P.Eng. (Ret.)

- Retired from Ontario college teaching in electronics and IT technology (1999-2003)
- Previously, 20+ years in industry: electronics, IT, manufacturing
- Volunteer with Safecast
  - Carrying a *bGeigieNano* since 2014

Top-of-mind

- Serious concerns about the 30-yr licence term
  - Fewer opportunities for extensive scrutiny
  - Potential for regulator capture
- Eroding trust in public institutions
  - Boosted by politicians and online personalities
  - Lack of transparency, fear of government over-reach
  - Nuclear suffers from Cold War secrecy mindset

Longer licence? Greater obligation.

- OPG must provide timely, easily accessible emissions data
  - Many pollutants – radiological and conventional – can be continuously measured and reported
  - Those requiring lab analysis, e.g. tritium in water, can be routinely measured and reported daily (lab automation)
- Clearly posted on Web, obvious site name and URL, self-evident page layout, detailed charts to support summaries
  - Not buried in feel-good marketing materials

Why is it so hard to get OPG data?

- Five months to publish emissions data
- Averaging over time mask spikes or spills
- Report card consists of a speedometer icon
- Obscure reports meant for a technical audience
- Unfamiliar units of measure

Summary reports only

Latest EMP report
2024 Q3,
shows only averages

ONTARIO POWER GENERATION

Environmental Emissions Data for
Darlington Nuclear

Q3 2024

Table A.1: Airborne Radionuclide Releases for Darlington Nuclear Generating Station

	Elemental Tritium (Bq)	Tritium Oxide (Bq)	Carbon-14 (Bq)	Noble Gas (Bq-MeV)	Iodine-131 (Bq)	Particulate (Bq)	Gross Alpha (Bq)
SUMMARY: ANNUAL							
Release Limit (Bq/year)[(a)]	6.26×10^{17}	3.91×10^{16}	7.68×10^{15}	3.46×10^{16}	1.74×10^{12}	5.51×10^{11}	9.82×10^{11}
Total Releases as of Q3 2024	9.1×10^{13}	1.6×10^{14}	1.1×10^{12}	2.5×10^{13}	9.4×10^{7}	2.2×10^{7}	4.0×10^{6}
DETAILS: WEEKLY[(b)]							
Action Level (Bq/week)[(c)]	3.81×10^{13}	1.78×10^{13}	1.08×10^{11}	3.30×10^{12}	6.11×10^{6}	4.51×10^{6}	Not specified[(d)]
Jan. Week 1	1.2×10^{11}	3.6×10^{12}	1.4×10^{10}	1.3×10^{12}	2.3×10^{6}	3.8×10^{5}	$< 1.3 \times 10^{5}$
Week 2	1.1×10^{12}	3.1×10^{12}	1.5×10^{10}	1.8×10^{11}	2.6×10^{6}	5.6×10^{5}	$< 1.1 \times 10^{5}$
Week 35	1.0×10^{11}	3.2×10^{12}	3.2×10^{10}	4.8×10^{11}	1.9×10^{6}	1.0×10^{6}	$< 9.5 \times 10^{4}$
Sep. Week 36	5.3×10^{11}	3.4×10^{12}	3.4×10^{10}	2.7×10^{11}	2.2×10^{6}	6.0×10^{6}	$< 1.0 \times 10^{5}$
Week 37	2.5×10^{11}	2.2×10^{12}	1.9×10^{10}	2.7×10^{11}	2.1×10^{61}	6.5×10^{6}	$< 1.1 \times 10^{5}$
Week 38	5.5×10^{11}	2.6×10^{12}	5.6×10^{10}	1.1×10^{11}	2.1×10^{61}	1.2×10^{6}	$< 1.1 \times 10^{5}$
Week 39	6.4×10^{10}	2.5×10^{12}	6.4×10^{10}	1.7×10^{11}	2.0×10^{6}	1.1×10^{6}	$< 1.1 \times 10^{5}$

Spills report as a
“forest fire” graphic

Reporting annually to Environment Canada NPRI

- National Pollutant Release Inventory
  - Annual reports, and only for previous full year (2023 available as of April 2025)
  - Darlington reports hydrazine, nitrogen oxides, ammonia and sulphuric acid

What's a "Mg"?

Why does OPG report in **Mg**, megagrams?

- "2.9E-02" Mg (or 2.9×10^{-2}) of hydrazine doesn't sound like much until you realize that it's 29.230 kilograms (NPRI).

Table 2-2: DN and PN Annual Total Site Emissions of Conventional Hazardous Substances – 2022

Hazardous Material [a]	DN	PN
	Mg	Mg
AIR		
SO_2 to Air[b][c]	6.0E-02	6.0E-02
NO_2 to Air[c]	3.2E+01	3.4E+01
CO_2 to Air[b][c]	5.9E+03	6.2E+03
Ammonia to Air	1.2E+01	6.6E+00
Hydrazine to Air[d]	2.9E-02	5.4E-03
Ozone Depleting Substances (ODS) Releases[e]	2.9E-04	3.5E-05
WATER		
Ammonia to Water	1.9E+00	6.9E-01
Hydrazine to Water[d]	2.5E-01	2.7E-01

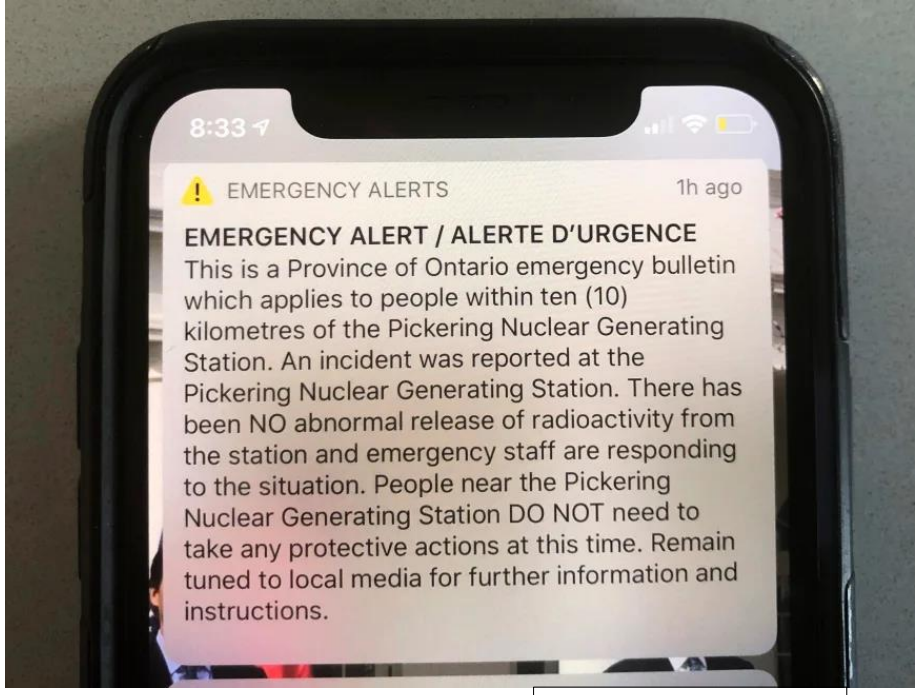
NOTES:

Mg = Megagrams

(a) Hazardous Materials as calculated for NPRI reporting requirements

January 12, 2020: Pickering false alarm

- Routine test message inadvertently went “live” across Ontario
- Inquiry revealed flaws in emergency notification protocols
- No independent sources to corroborate or refute alert
- Could realtime radiation measurements have helped?



Robert Gillies/AP

“Shock and disbelief”

- Trust in authorities has eroded – emergency planners must consider the public’s reaction
- Has the “It’s Safe!” messaging “inoculated” the public against the belief that a nuclear accident is even possible?
- Reaction to a surprise announcement of a developing accident would be unpredictable

Counter-example: Hurricanes

- Hurricanes are catastrophic events,
  but not unexpected

  Residents in Florida expect hurricanes;
  they will (mostly) heed warnings and obey evacuation orders

- Major storms are *credible*:
  big and scary, but not surprising

Black swans in risk theory

- “Swans only ever have white feathers”; then Europeans in Australia were surprised to discover black swans
- *Black swans* are catastrophic events caused by unexpected event chains or combinations of factors
  - *A priori*, they are dismissed as “not credible”
  - Undeniably, they happen
  - In hindsight, they could have been predicted

From “black swans” to “credible”

To prepare a better reception of emergency alerts and compliance with orders, industry and regulator communications must present a more realistic view of nuclear risk to society.

Shift perception of accidents from “black swans” to “yes, it can happen here”

Frank and timely disclosures of small releases would prepare for real emergencies

A call for timely disclosure

- OPG has the labs and resources to analyze samples and publish results promptly
- Spills and accidental releases > action limits
- Routine monitoring of radiological and conventional pollutants

Timely, accessible, hard data

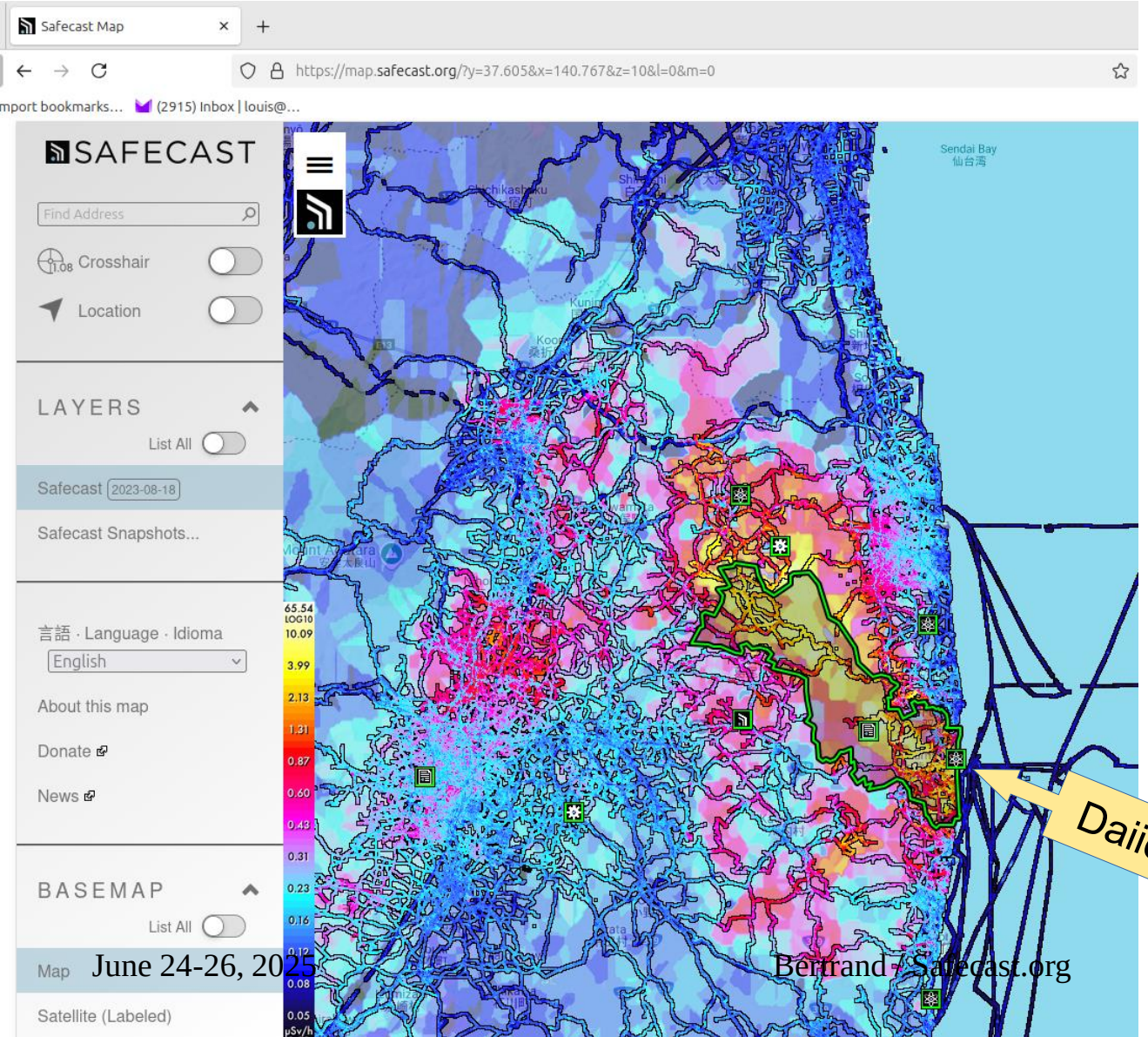
- Many gaseous pollutants can be monitored in realtime or near-realtime (minutes or hours)
- Automated daily routine tests for “wet lab” pollutants (e.g. tritiated water)
- Immediate automated publishing to Web

Fixed locations, consistent methods

- Consistent methodology over time
- Water samples from Lake Ontario and groundwater wells from fixed locations
- Continuous air sampling and reporting
- Establish history, promote improvements

Detecting and mapping fallout?

- In a radiological accident, how would we know how or where the fallout is dispersing?
- What means do OPG and the authorities have of detecting fallout of radioactive materials around Darlington?
- How would the public receive that information? (Would it even be made public?)

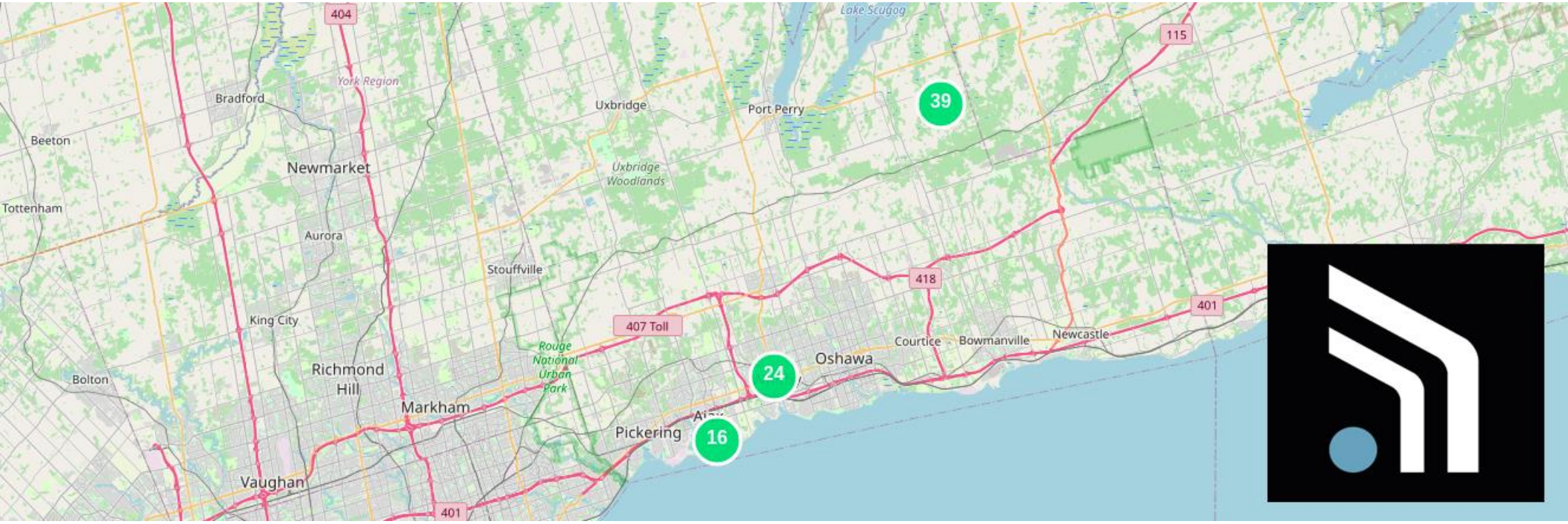


Fukushima Daiichi fallout plume

- Uneven dispersion
- Was there any way of predicting the radiation levels during the crisis?

(Mapping done by Safecasters since the accident)

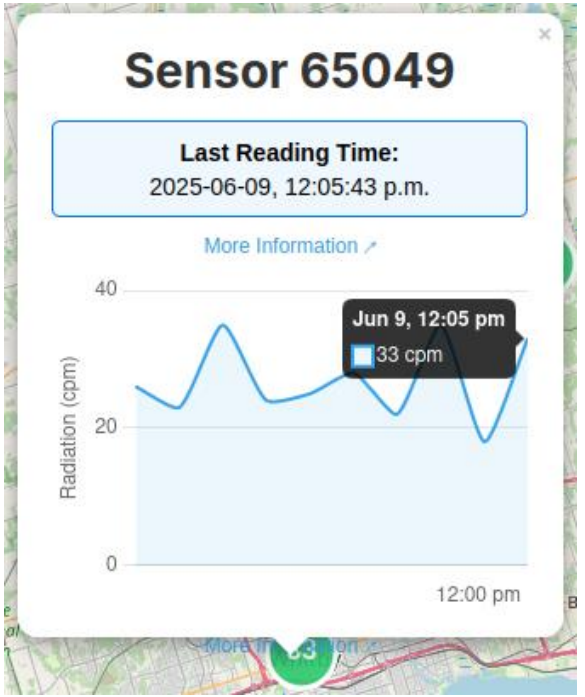
A realtime radiation map for Durham



https://rt-ca.safecast.org

Safecast realtime map

- *bGeigieZen* and *bGeigieCast* reporting through volunteer host's home WiFi
- Radiation CPM submitted to Safecast database at 5-minute intervals



Click a marker for history

The Safecast Canada map...

1 - Demonstration of what OPG *could* be doing

- If volunteers can deploy sensors and servers, what could OPG do with their considerable resources?

2 - Independent source of measurements

Safecast request to the public

- Become a Safecaster!
  - Many talents needed (not just technical!)
- Host or sponsor a bGeigieZen sensor
- Help build the local organization

Safecast requests to the Commission

- 10 years licence term or shorter = better
- Require in the Licence Conditions Handbook:
  - Realtime monitoring and publication of emissions
  - Realtime monitoring of radiation off-site
  - Near-realtime publication of “wet lab” results
  - Clearly accessible on WWW
  - Third party advisory panel for data collection

Thank you

https://safecast.org

https://rt-ca.safecast.org

Questions?

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