

# Radio-Biological Study Findings for Port Hope, Ontario

Tuesday, November 13<sup>th</sup>, 2007

**Port Hope Community  
Health Concerns Committee**

**Uranium Medical Research  
Centre**



*Gutta Lapidem Cavat*





# Agenda

- Introduction
- Project Background
- Port Hope's Health Problems
- Biological Studies Project
- Findings
- Next Steps

**Faye More**

Chair

Port Hope Community Health

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**Asaf Durakovic**

Medical Director

Uranium Medical Research Centre

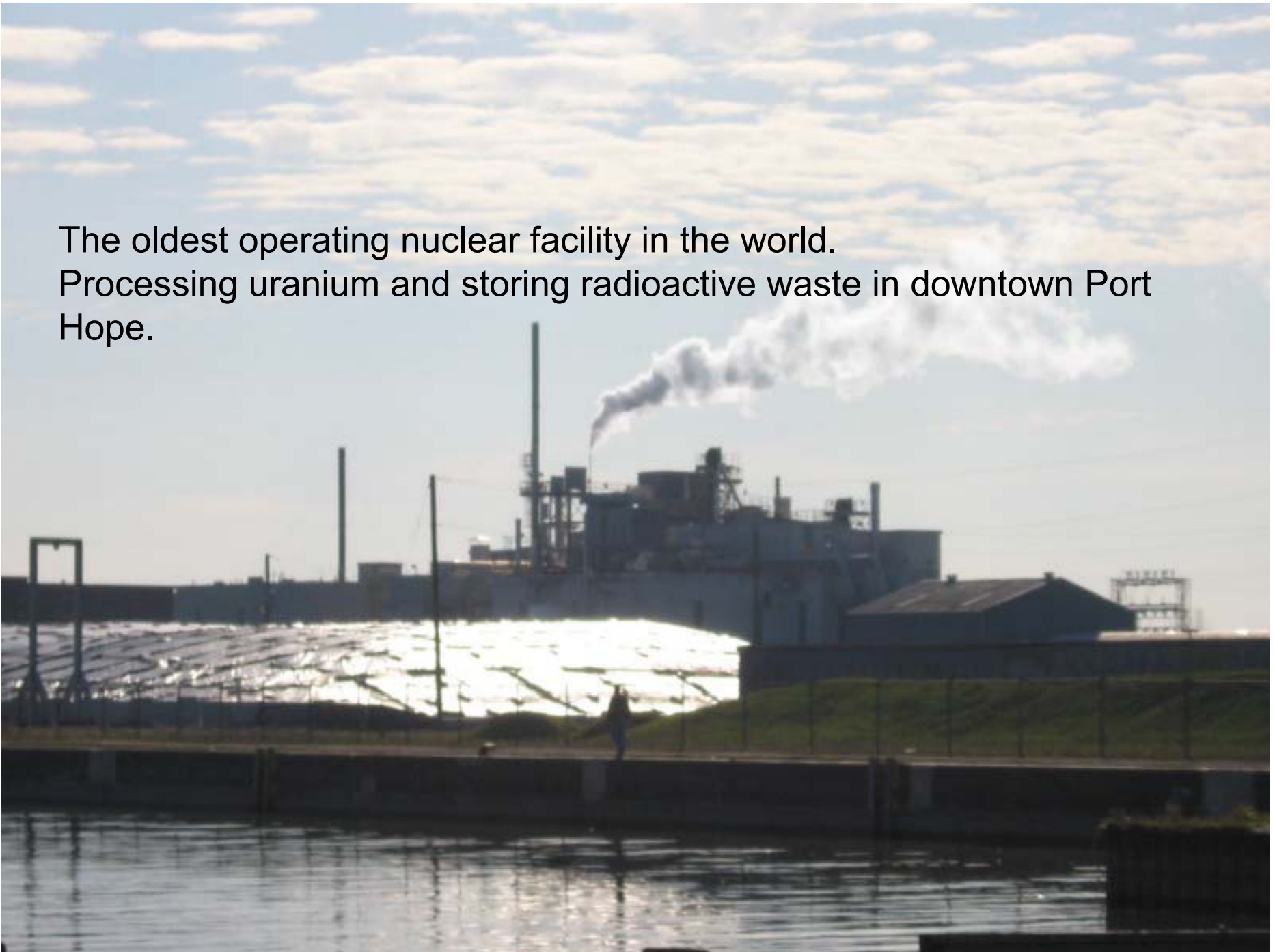
**Tedd Weyman**

Deputy Director

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The oldest operating nuclear facility in the world.  
Processing uranium and storing radioactive waste in downtown Port  
Hope.



# Port Hope's Health Problems

- Port Hope elevated for selected periods and cohorts for: Overall death rate, circulatory disease, leukemia, non-Hodgkins lymphoma, cancers including childhood cancer deaths, and cancers of the lung, brain, nasal/sinus, esophageal, lip, bone, and colorectal.

**2000, 2002 Health Canada/CNSC Data for Port Hope (Reassessed by Mintz, 2004)**

- Causes of death 1986-92 significantly higher than Ontario include: hereditary, neurological, cardiovascular, respiratory diseases; cancers, including lip and oral cavity, pharynx, gallbladder, lung, trachea, bronchus, bone.

**1998 Health Canada Great Lakes Health Effects Program Health Study on the Population Around Port Hope Harbour**

# Project Background

- 2004 - Port Hope Community Health Concerns Committee asked Uranium Medical Research Centre to provide medical and scientific support to the Committee.
- Dr Asaf Durakovic, UMRC's Medical Director, was appointed a Medical Advisor to the PHCHCC. UMRC donated its services to the Committee.
- A joint project was undertaken to conduct radio-biological testing of Port Hope residents.
- The federal government, the municipality and the industry declined to support the project or provide funding.
- Through local fundraising efforts, \$11,000 was raised to cover the radio-chemistry lab costs, overseas.

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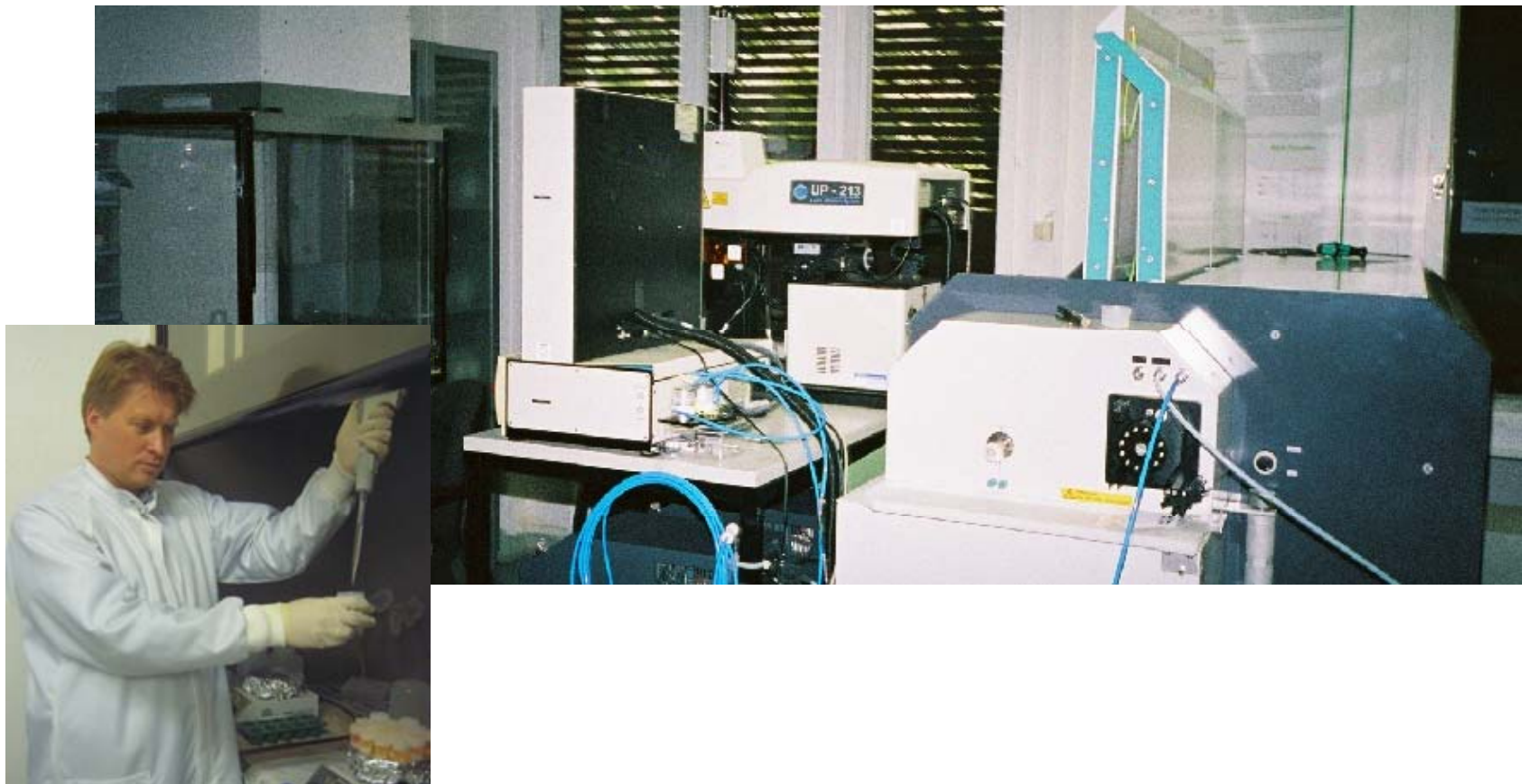
**U M R C**



# Radio-Biological Studies Project

- Volunteers/applicants. Selected by history of exposure and health issues.
- Patients' motives: unexplained illnesses, chronic and congenital medical problems, history of family health problems.
- "Clinical study": patient support and published research.
- 9 subject and 2 controls; 4 nuclear industry workers and 5 civilians.
- Exposed to Eldorado Nuclear, Cameco Uranium Conversion Facility, and Zircotec Precision Industries.
- Non-workers are PH residents. Live in the plume pathway of the nuclear facilities.
- 24-hr urine specimens taken; radionuclides and heavy metal toxins removed by kidneys.
- Uranium isotope analysis by Plasma Ionization Mass Spectrometry.

Dr. Axel Gerdes Ph.D.  
Institute for Mineralogy, J.W. Goethe University, Frankfurt,  
Germany.



# Examples of Health Problems of Participants

## Subject A

- nose bleeds/ runny nose
- irritation , stinging sensations in throat, nasal passages, mouth
- skin or eyes irritated and burning
- dry upper respiratory cough
- cold and flu-like symptoms lasting for weeks
- disabling fatigues
- intermittent fevers
- headaches
- recurring or continuous pain in joints
- recurring nerve, muscle, soft tissue pain
- short-term memory loss
- mental confusion
- depression
- chest pain
- frequent or persistent unproductive dry cough
- pain in neck, basal skull area, cervical column
- lower back pain, kidney pain
- unexplained GI problems.
- pulmonary alveolar proteinosis,
- emphysema
- blood disorder - not producing red blood cells
- enlarged liver
- multiple intestinal problems,
- nightly sweats – discharge/perspiration that removes colour from material

## Subject B

- recurring or continuous pain in joints
- defeated immune system
- non-malignant thyroid nodular disease
- prostate cancer (hormone therapy and radiation post-surgery)
- blood disorder – anemic
- leg and back problems, diagnosis spinal stenosis

## Subject C

- irritation and stinging sensations in throat, nasal passages, moth
- unusual tiredness, weakness
- recurring or continuous pain in joints
- recurring nerve, muscle and soft tissue pain
- depression and loss of initiative
- pain in neck, basal skull area, cervical column
- lower back, kidney pain
- respiratory disease

## Mass spectrometry lab data:

### $^{238}\text{U}/^{235}\text{U}$ Isotopic Ratio, Total Uranium, and $^{236}\text{U}$ Concentration

Subject	$^{238}\text{U}/^{235}\text{U}$	2 SD	U ng/L	$^{236}\text{U}$ fg/L
1	137.97	0.31	8.5	< 1
2	137.99	0.57	24.8	1.7
3	147.11	1.42	7.0	31
4	138.75	1.12	5.1	< 1
5	139.26	1.52	2.7	< 1
6	137.71	0.67	9.4	517
7	138.22	0.83	8.8	< 1
8	138.49	1.79	3.0	< 1
9	137.34	0.78	3.7	< 1
Control 1	138.74	0.41	5.6	< 1
Control 2	138.15	1.54	2.1	< 1

## Mass spectrometry lab data:

### $^{234}\text{U}/^{238}\text{U}$ and $^{236}\text{U}/^{238}\text{U}$ Isotopic Ratios

Subject	$^{234}\text{U}/^{238}\text{U}$	2 SD	$^{236}\text{U}/^{238}\text{U}$	2 SD
1	$6.71 \times 10^{-5}$	$8.88 \times 10^{-6}$		
2	$5.65 \times 10^{-5}$	$1.11 \times 10^{-6}$	$6.53 \times 10^{-8}$	$8.6 \times 10^{-9}$
3	$5.17 \times 10^{-5}$	$5.03 \times 10^{-6}$	$4.38 \times 10^{-6}$	$4.3 \times 10^{-7}$
4	$6.78 \times 10^{-5}$	$9.43 \times 10^{-6}$	$7.48 \times 10^{-8}$	$4.3 \times 10^{-8}$
5	$6.81 \times 10^{-5}$	$5.06 \times 10^{-6}$		
6	$5.97 \times 10^{-5}$	$4.69 \times 10^{-6}$	$5.53 \times 10^{-5}$	$3.9 \times 10^{-6}$
7	$6.01 \times 10^{-5}$	$4.50 \times 10^{-6}$		
8	$5.56 \times 10^{-5}$	$7.09 \times 10^{-6}$		
9	$7.07 \times 10^{-5}$	$3.16 \times 10^{-6}$		
Control 1	$4.80 \times 10^{-5}$	$9.82 \times 10^{-7}$		
Control 2	$4.62 \times 10^{-5}$	$5.50 \times 10^{-6}$		

# Summary of Port Hope Radio-biological Study Findings

1. Chronic, long-term uranium contamination. Workers bodies releasing industrial and Depleted Uranium 23, 17 and 11 years since exposure.
2. Unexplained contamination by a man-made isotope  $^{236}\text{U}$  (Uranium 236) – a waste and spent fuel product of nuclear reactors .
3. Enriched levels of the  $^{234}\text{U}$  isotope in both retired workers and civilian Port Hope subjects, including a child.
4. A worker releasing Depleted Uranium >23 years since exposure – patient history refers to Eldorado Nuclear extruding DU metal rods for US weapons in 1980's.
5. One adult subject's uranium elevations 8 X's over average concentrations of the study's controls.

## Summary of Port Hope Radio-biological Study Findings

6. A child with uranium elevations  $\approx 3$  X's the controls' average concentrations of Uranium.
7. Exposure history, types of uranium and medical problems indicate contamination by inhalation.
8. Signatures of the uranium isotopes suggest exposure to recycled and blended uranium.
9. No health, radiological or industry reports identify the radioactive materials found to be in the bodies of the study subjects.
10. CNSC approved radiation protection standards (civilian and worker) do not include exposure to the toxic materials identified.

# Study Conclusions

- The history of uranium contamination in Port Hope is well documented. Our results provide the first objective analytical study of long-term contamination and possible association with adverse health effects in the current population of Port Hope.

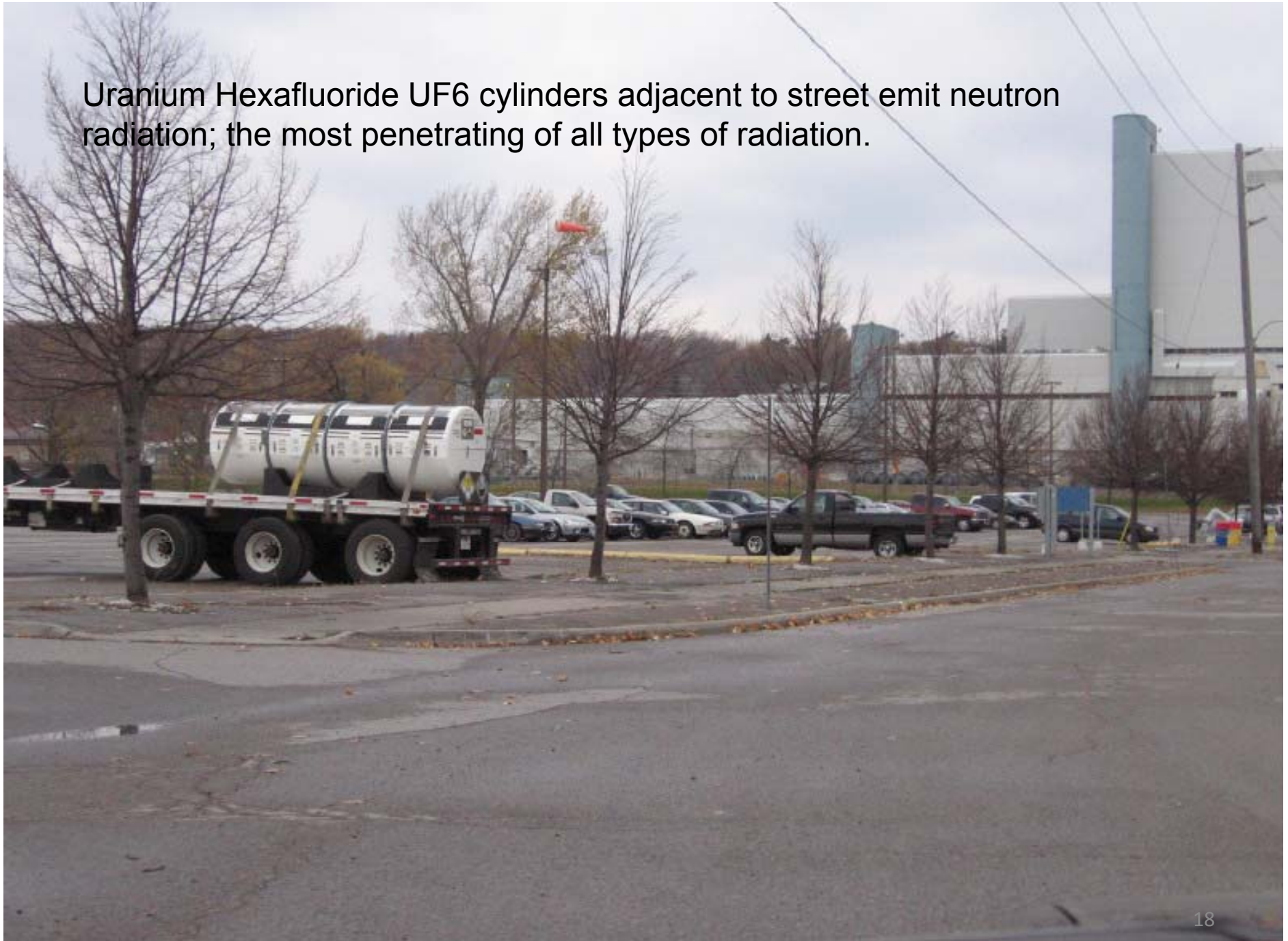
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# Responsible Agencies

- Natural Resources Canada
  - Minister – Honorable Gary Lunn
    - Canada Nuclear Safety Commission
    - Atomic Energy of Canada Limited
    - Low-level Radioactive Waste Management Office
  
- Health Canada
  - Minister – Honorable Tony Clement
  
- Environment Canada
  - Minister – Honorable John Baird
  - Canadian Environmental Assessment Agency

Uranium Hexafluoride UF<sub>6</sub> cylinders adjacent to street emit neutron radiation; the most penetrating of all types of radiation.



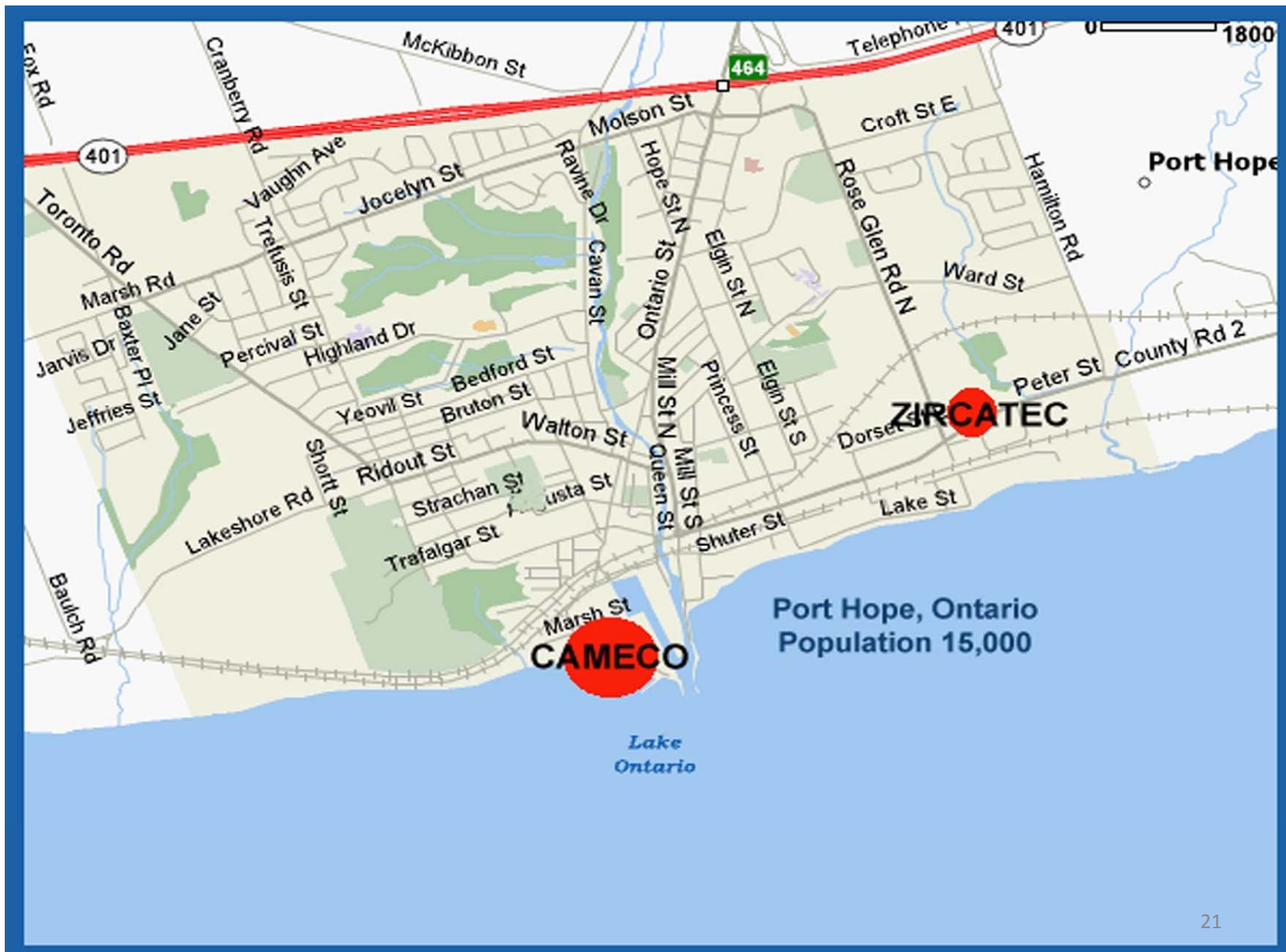
Site 2 - Highest level of Gamma radiation emitted into the town found on this residential street; tens of meters from homes.





## Next steps for Port Hope

1. Health Canada - multi-disciplinary health studies, arms-length, community-based non-governmental management.
2. Natural Resources Canada - (1) full disclosure of all contaminated sites (public and private properties); (2) routine monitoring and reporting of emissions and accumulations.
3. Environment Canada - Review Panel EA of nuclear projects and operations; including handling the 3.5 million cubic meters of radioactive wastes in our community.
4. Cameco/Zircatec ordered to permanently cease emissions of airborne and waterborne radiotoxins; including radioactive wastes flushed into town water treatment system, storm sewers, and fertilizers on Ontario farm fields.
5. Investigation of the Canadian Nuclear Safety Commission's failure to monitor the industry and protect the health in Port Hope.



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