

Land Acknowledgment

Ontario Tech University acknowledges the lands and people of the Mississaugas of Scugog Island First Nation. We are thankful to be welcomed on these lands in friendship.

The lands we are situated on are covered under the Williams Treaties and the traditional territory of the Mississauga, a branch of the great Anishinaabeg Nation, including Algonquin, Ojibway, Odawa and Pottawatomi.

These lands remain home to a number of Indigenous nations and people. We acknowledge this land out of respect for the Indigenous nations who have cared for Turtle Island, also called North America, from before the arrival of settler peoples until this day.

Most importantly, we remember the history of these lands has been tainted by poor treatment and a lack of friendship with the First Nations who call them home. This history is something we are all affected by as we are all treaty people in Canada. We all have a shared history to reflect on, and each of us is affected by this history in different ways. Our past defines our present, but if we move forward as friends and allies, then it does not have to define our future.





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Enhancing our High-Tech Nuclear Facilities: The Subcritical Assembly Project (Preliminary Phase)

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Ontario Tech University

Foundation in technology, the sciences and professional practice

11k

Graduate and undergraduate students

300+

Faculty Members

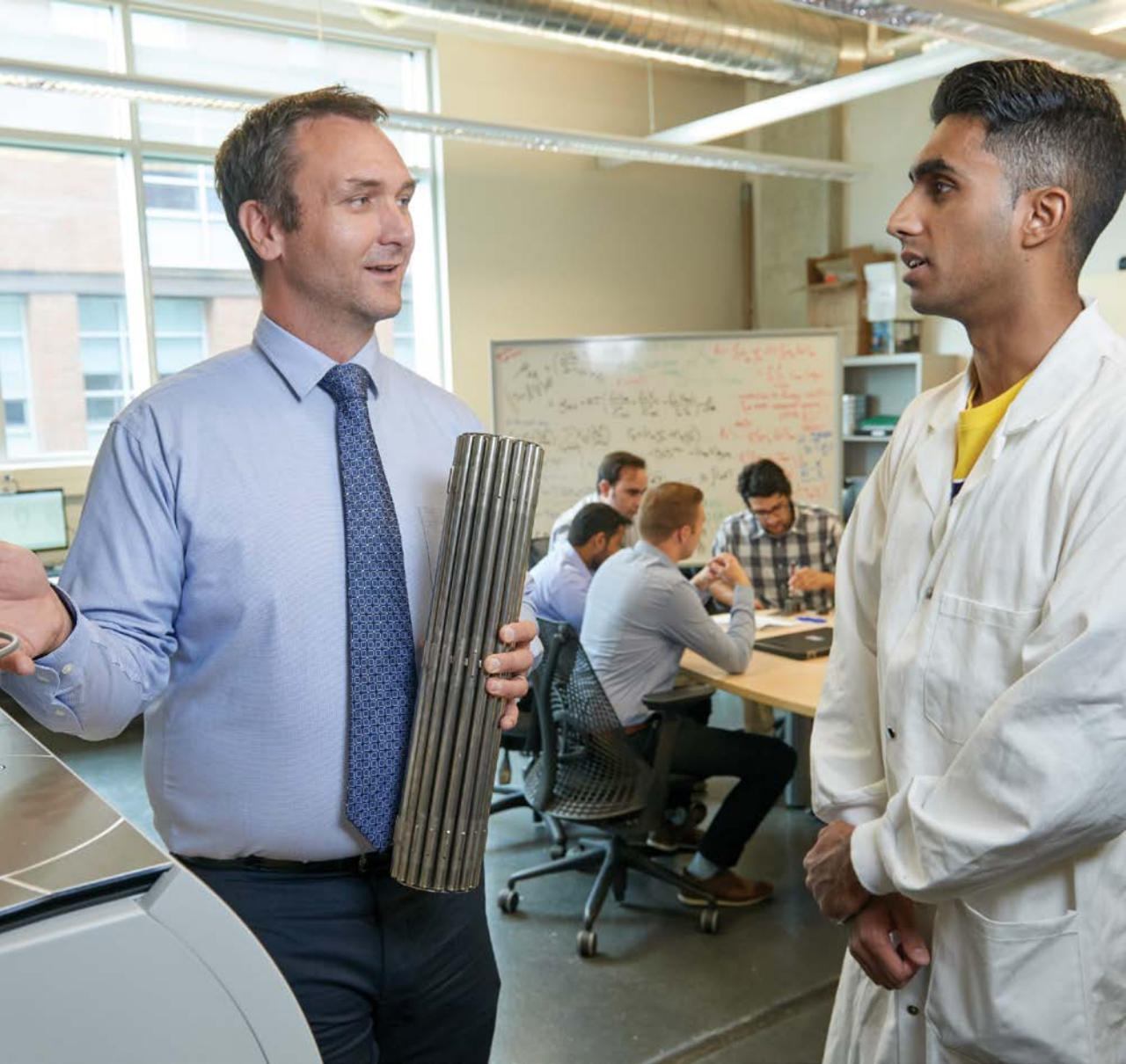
\$26+

Million Annual Research Funding

90

Specialized research labs and facilities





Faculties

- **Engineering and Applied Science**
- Business and Information Technology
- Science
- Health Sciences
- Social Science and Humanities
- Education

Department of Energy and Nuclear Engineering

- **The only** Undergraduate Nuclear Engineering program in Canada.
- **Third** in North America for Nuclear Engineering graduates produced at the Bachelor's level.
- **Internationally recognized** faculty members and experts in their field.



Ontario Tech is proud of our highly recognized Nuclear Engineering program

Enhancing our High-Tech Nuclear Facilities

- We are proposing the Addition of a **Subcritical Assembly**
 - A subcritical assembly – a type of subcritical reactor – is much smaller than power reactors.
 - The primary purpose of a subcritical assembly is research, testing, training, and teaching.

Reactor Model	Capacity (Megawatts)	# of Units in Canada
CANDU (OPG, Bruce Power)	600+ (electricity)	~20
Small Modular Reactors (SMRs)	< 300 (electricity)	0
McMaster Nuclear Research Reactor	5 (thermal)	1
SLOWPOKE-2 Research Reactor	0.02 (thermal)	2
ZED-2 Research Reactor	0.0001 (thermal)	1
Proposed Subcritical Assembly	0 (thermal)	0



Tech with a Conscience: It will support research for the nuclear industry as it delivers next-generation solutions to global challenges.

- Enrich **Research and Teaching** Opportunities.
 - Only facility of its kind in Canada
 - Will support student recruitment efforts and grow the nuclear industry talent pool
- Expand **Experiential Learning** Possibilities.
 - Hands-on experience that will provide the expertise needed to work in a Class 1 Nuclear Facility
 - Produce career-ready graduates
- Engage **Partners** within the Community.
 - Provide independent validation of nuclear industry data
 - Be a hub for nuclear awareness through community engagement



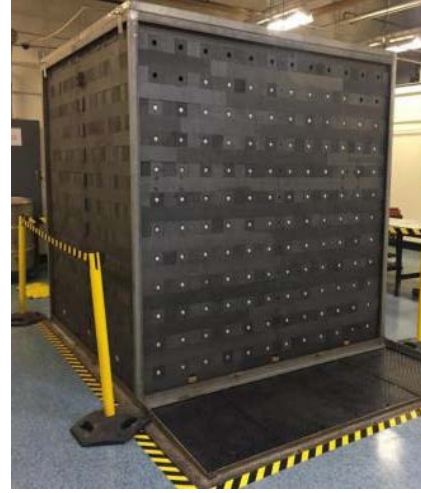
Researchers removing a graphite moderator rod



Subcritical Assemblies Around the World



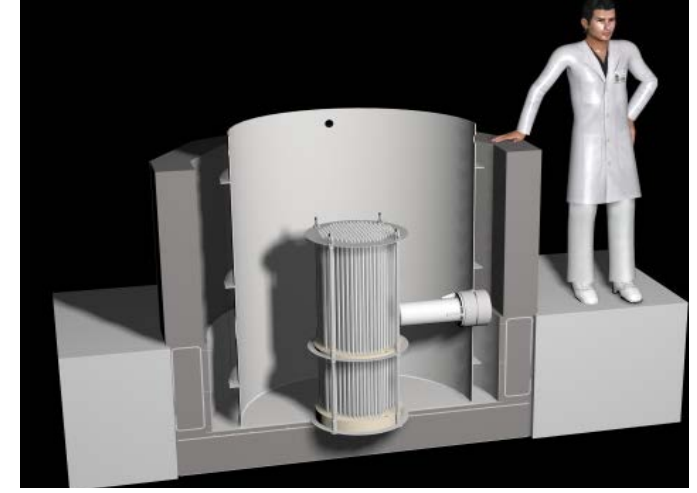
Montreal (decommissioned)



Boston



Ukraine



Czech Republic



Netherlands



Jordan



Philippines



Subcritical Assembly: Distinct Design Features

Loading fuel into MIT's subcritical assembly



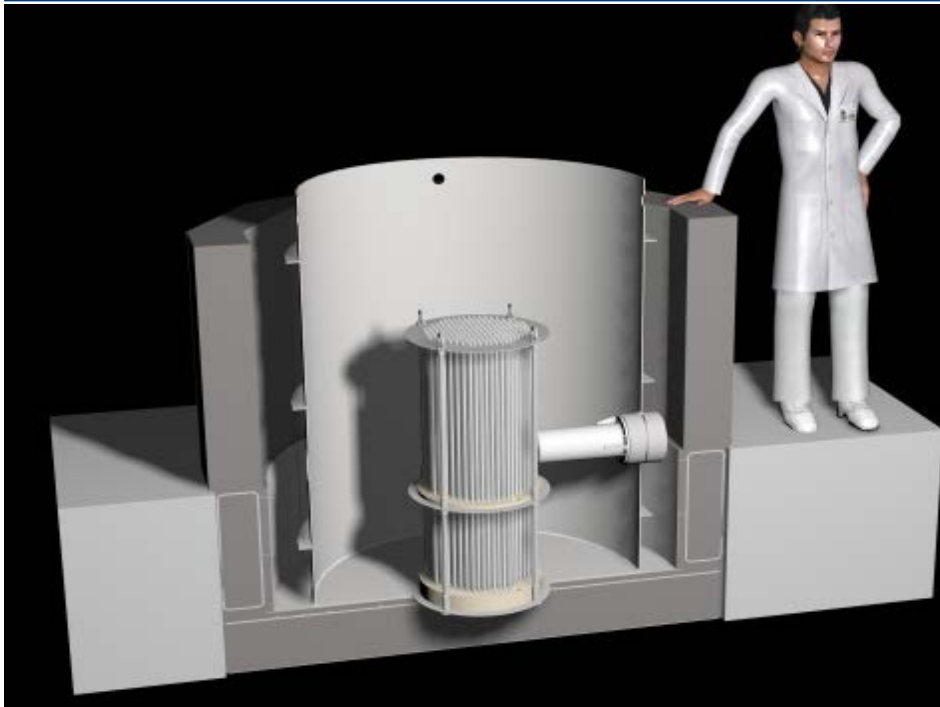
<https://news.mit.edu/2017/75th-anniversary-first-nuclear-fission-reactor-mit-re-enacts-seminal-experiment-1204>

Very Simple Design

- No meaningful power can be generated in a subcritical assembly; as a result, there is little to no fuel burn up.
- No measurable heat or pressure is generated in a subcritical assembly; as a result, they do not need cooling systems.
- A self-sustaining fission chain reaction cannot occur in a subcritical assembly; as a result, emergency shutdown systems are not required due to this intrinsic safety by design.

Subcritical Assembly: Distinct Design Features

VR-2 Subcritical Reactor at Czech Technical University in Prague



<http://www.reaktor-vr1.cz/en/about-us/vr-2>

An External Radioactive Source is Required

- A subcritical assembly **only** works if a radioactive source is actively inserted into the core.
- A subcritical assembly “amplifies” the **radioactive source**.
- When the radioactive source is removed, the fission chain reaction process stops naturally: criticality is impossible.
- Can turn off the system like a light switch controlling a bulb.



Nuclear Facility Complex

35+

Authorized Users
allowed to work with
nuclear substances
and radioactive
devices

8

Faculty Experts
using the Facility

7

Laboratories are
purpose built for
nuclear substances
and radioactive
devices

14

On-going nuclear
projects requiring
regular safety review

- Built and operational in 2011.
- A secure area of laboratories in the basement of Energy Research Centre (ERC) dedicated to nuclear research and teaching.
- Specifically designed to allow the safe and secure use of nuclear substances and radioactive devices (NSRDs) for research and teaching.

Knowledge and Experience: Radiation Safety Program

2

CNSC Licenses for teaching and research with nuclear substances and radioactive devices

14

On-going nuclear projects requiring regular safety review

10

Experts on the Radiation Safety Committee

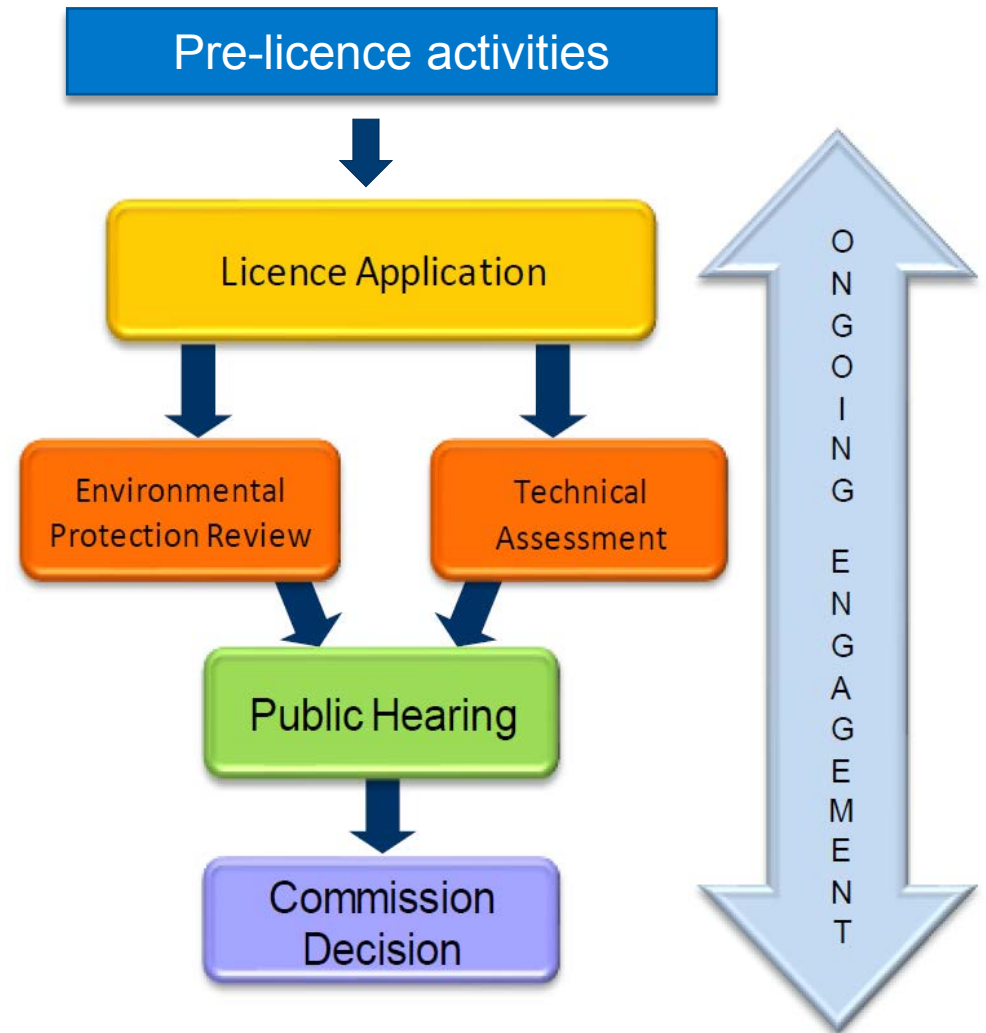
20

Years of safety using nuclear substances and radioactive devices

- **Program established 2003** to support teaching and research with Nuclear Substances and Radioactive Devices.
- **Radiation Safety Committee:** subject matter experts who provide program oversight of all work with NSRDs.
- **CNSC Certified Radiation Safety Officer:** manages program to ensure safety and compliance.

Many Steps Ahead - CNSC Licencing Required

- Currently in the preliminary planning stage of pre-license activities with many steps ahead.
- Ongoing efforts to engage Indigenous communities, the public, and other interest groups.
- Operating license is required from the CNSC to assemble and operate the device.
- Involves an in-depth review of all safety, technical and environmental data by CNSC technical experts.
- Commission will consider our application at a public hearing. Public has opportunity to participate.



Thank You

For More Information:

Subcritical Assembly Project

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Feedback Welcome!

