Assessment of the Effects of Long Term Storage on Spent Nuclear Fuel

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Objective

Assess any changes in the condition of CANDU fuel stored wet or dry for long periods of time

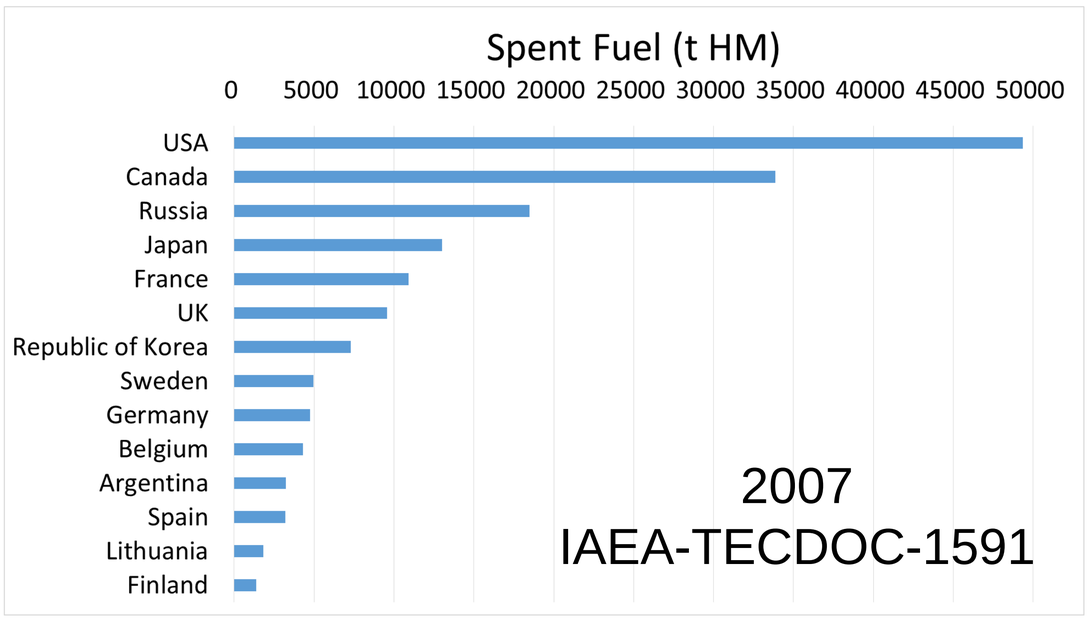
Federal Stakeholders

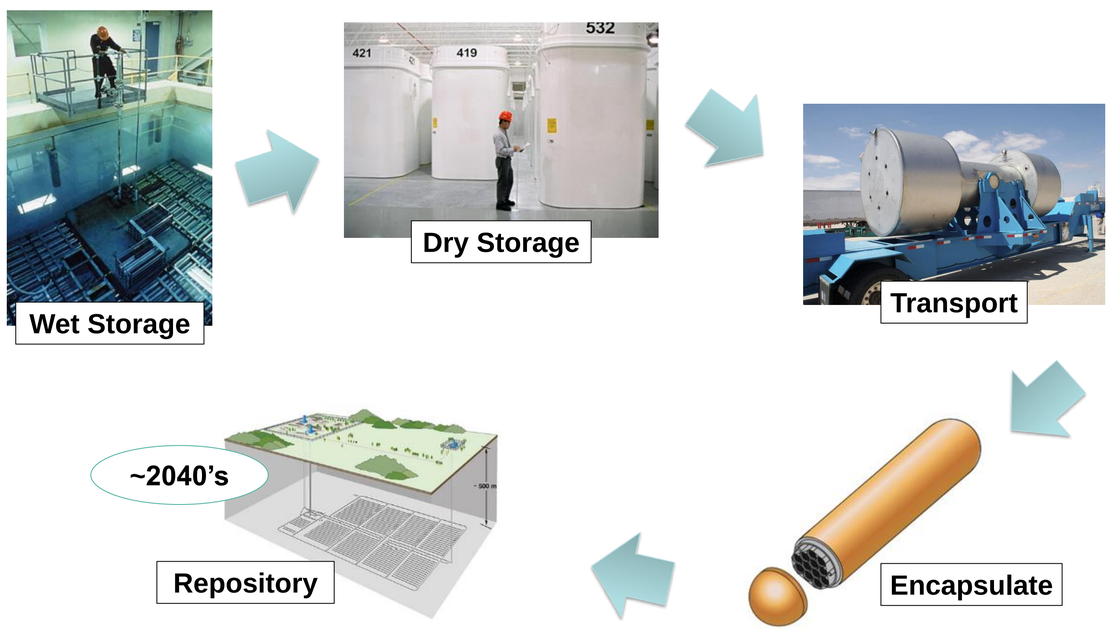
- Canadian Nuclear Safety Commission
- Atomic Energy of Canada Limited
- Natural Resources Canada

Spent Fuel in Canada

Canada has:

- Currently 2.9 million spent fuel bundles (57 000 t HM)
- Projected 3.5-5.4 million spent fuel bundles (70 000 – 108 000 t HM) (current fleet)



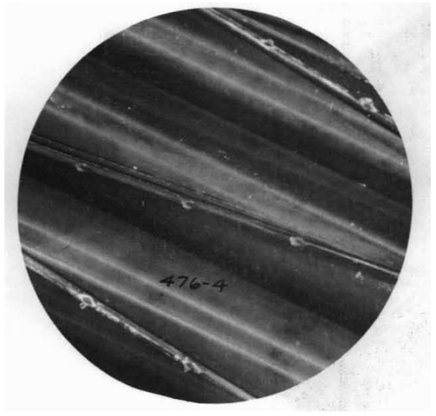


Previous Work

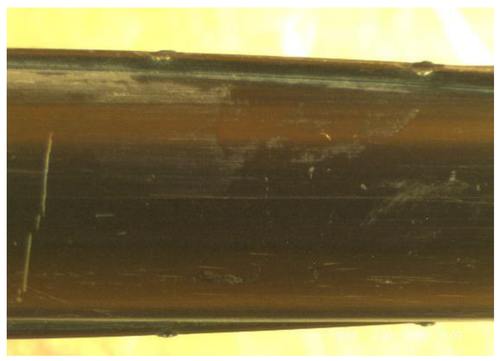
Wet Storage Experiment

"How long can CANDU fuel be safely stored wet?"

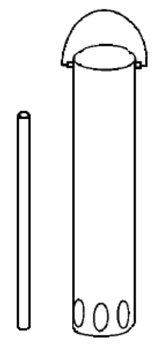
Pre-1977	1977	1978-1981	1988-1990	2016-
Fuel Irradiated Partial PIE	Project Initiated	1st Examination / Baseline	2nd Examination	3rd Examination



1963
<1 year storage



2016
52 years storage



Storage Tube and Can

Dry Storage Experiment

"How long can CANDU fuel be safely stored dry?"

ERB	
Dry Seasonal Temperatures	
1978	Loaded
1982	Exam 1 ~44 months
1997	Exam 2 ~224 months
1999	"Shutdown"

CEX-1	
Dry 150 °C	
1980	Loaded
1984	Exam 1 ~41 months
1989	Exam 2 ~99.5 months
	"Unlimited" air
1993	Exam 3 ~140 months
1997	Exam 4 ~184 months
1999	"Shutdown"

CEX-2	
Moisture-saturated 150 °C	
1981-2	Loaded
1984	Exam 1 ~30 months
1987-8	Exam 2 ~58 & 69 months
1990	Exam 3 ~93 months
"Unlimited" air	
1994	Exam 4 ~9.5 years
1999	"Shutdown"

Likely the oldest characterized fuel in wet and dry storage in the world!

Scope of Project

- PIE of the wet storage fuel (30-56 years)
- Plan PIE of the dry storage fuel (40-43 years)
- Model fuel in storage
- Develop collaborations

Progress to Date

- Year 1 of 3 year project
- IAEA Conference on Spent Fuel Management
- Wet Storage Gas Puncture PIE Plan
- Wet Storage History and Recommended PIE Report
- Fuel Storage Modelling Feasibility Study

IAEA