



Pickering Nuclear Generating Station Licence Renewal

Commission Hearing (Part 2),
June 25-29, 2018
CMD 18-H6.C



CNSC Staff Presentation



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

PURPOSE OF PRESENTATION



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Purpose of CNSC Staff Presentation

- Summarize OPG safety performance during the current licence period
- Present CNSC staff position on issues raised in public interventions
- Present updates to proposed Power Reactor Operating Licence (PROL) and draft Licence Condition Handbook (LCH)
- Provide CNSC staff conclusions and recommendations



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

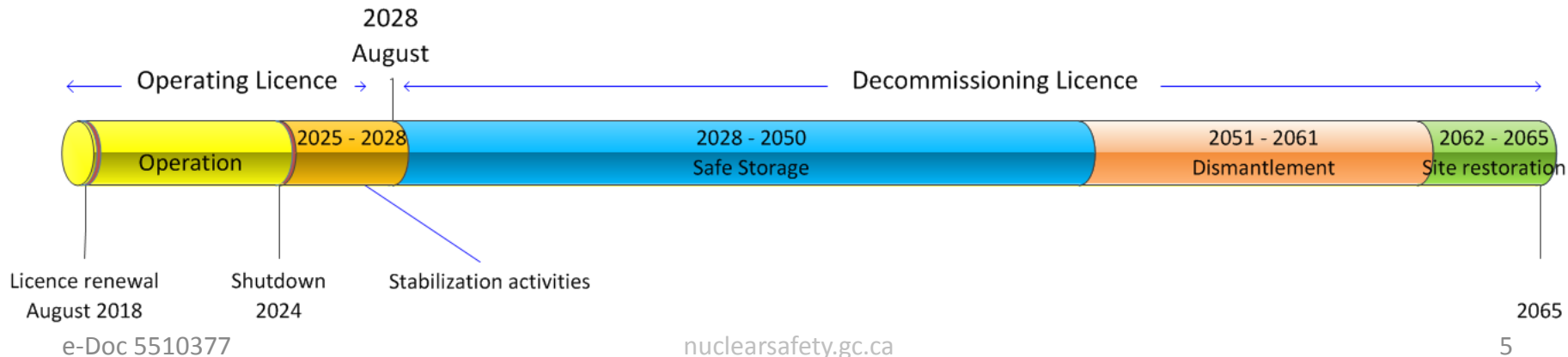
OPG Request for Licence Renewal

- Current Pickering NGS Licence expires on August 31, 2018
- OPG has requested
 - Licence renewal for a period of 10 years, to August 31, 2028
 - Authorization to operate Units 5-8 up to a maximum of 295,000 EFPH
- Periodic Safety Review support the licence application
- Part 1 Hearing held in Ottawa, April 4, 2018

Commission Hearing, 25-29 June 2018
CMD 18-H6.C

OPG Request for Licence Renewal

- The requested 10-year licence period will include three stages
 - Continued commercial operation to the end of 2024
 - Stabilization activities (e.g., post-shutdown defueling and dewatering)
 - Beginning of safe storage with surveillance





Commission Hearing, 25-29 June 2018
CMD 18-H6.C

SCA Performance Assessments

SAFETY AND CONTROL AREA	PICKERING RATING				
	2013	2014	2015	2016	2017
Management System	SA	SA	SA	SA	SA
Human Performance Management	SA	SA	SA	SA	SA
Operating Performance	SA	SA	FS	FS	FS
Safety Analysis	SA	SA	FS	FS	FS
Physical Design	SA	SA	SA	SA	SA
Fitness for Service	SA	SA	SA	SA	SA
Radiation Protection	FS	FS	FS	SA	SA
Conventional Health and Safety	SA	SA	FS	FS	FS
Environmental Protection	SA	SA	SA	SA	SA
Emergency Management and Fire Protection	SA	SA	SA	SA	SA
Waste Management	SA	SA	FS	FS	FS
Security	FS	FS	SA	SA	SA
Safeguards and Non-Proliferation	SA	SA	SA	SA	SA
Packaging and Transport	SA	SA	SA	SA	SA



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

SUMMARY OF WHAT WE HEARD



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Participation in Commission Hearing Process

- Notice of Public Hearing posted September 29, 2017
- 156 submissions received by May 7, 2018
- Participant Funding of \$100K made available to support public participation
 - Canadian Environmental Law Association
 - Durham Nuclear Awareness
 - Jerry Cuttler
 - Lake Ontario Waterkeeper
 - Mohawks of the Bay of Quinte First Nation
 - Northwatch
 - Ontario Clean Air Alliance
 - Paul Sedran
 - Women in Nuclear



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Participation in Commission Hearing Process

- CNSC staff reviewed each of the intervenor submissions
- Wide range in submissions scope, approach, premises, topics
- Approximately half of interventions raised issues
- Main themes of concerns summarized in CNSC staff's CMD and linked to CNSC Safety and Control Areas

Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Summary of What We Heard (1/2)

Key issues raised by intervenors	Safety and Control Area
<ul style="list-style-type: none">Continued operation of aging components	Fitness for Service
<ul style="list-style-type: none">Exposure to low doses of radiation	Radiation Protection
<ul style="list-style-type: none">Environmental Assessment under NSCATritium in environment	Environmental Protection
<ul style="list-style-type: none">Standards for emergency preparednessAdequacy of provisions under PNERPPublic awareness	Emergency Preparedness



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Summary of What We Heard (2/2)

Key issues raised by intervenors	Safety and Control Area
<ul style="list-style-type: none">• Regulatory framework for nuclear waste• Long-term radioactive waste disposal• On-site waste storage facilities• Decommissioning strategy	Waste & Decommissioning
<ul style="list-style-type: none">• Post-Fukushima lessons• Containment integrity in a severe accident• 10-year licence & public involvement	Other Matters



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Fitness for Service

Aging of Major Components

- CNSC staff verify conclusions from OPG inspections and assessments
- OPG maintains Life Cycle Management Plans (LCMPs) for all major components
 - OPG submission describes activities to support demonstration of fitness for service
- Fuel Channel Readiness Plan describes research activities to enhance understanding of fuel channel aging-related degradation mechanisms

OPG has adequate capabilities to assess, verify and manage the aging of major components through the remaining operational life

Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Fitness for Service

Predicted EFPH and H[eq] of Pressure Tubes

Unit	EFPH, April 2018	EFPH, December 2024	Inlet Rolled Joint H[eq] in 2024, ppm	Outlet Rolled Joint H[eq] in 2024, ppm
1	136,927	192,000	35.8	84
4	110,082	167,500	34.3	64
5	231,895	287,500	48.5	97
6	236,952	295,000	47.9	90
7	230,856	287,000	48.1	91
8	218,765	274,000	47.9	86

EFPH - Effective Full Power Hours, H[eq] - equivalent hydrogen concentration



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Radiation Protection

Exposure to Low Doses of Radiation

- CMD 17-M46 *Biological Mechanisms Acting at Low Doses of Radiation*, provides current scientific understanding of health risk from exposure to doses below 100 mSv
- No epidemiological or medical evidence of a measureable effect
- Any additional unknown cancer risks are further minimized with the application of the ALARA principle
- Canadian radiation protection framework informed by Linear Non-Threshold Model

Canadian framework is robust and workers and public are protected



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Environmental Protection

CNSC Environmental Assessment

- Environmental Assessment (EA) under the NSCA as rigorous as EA under CEAA 2012
- Part of ongoing regulatory and environmental oversight
- Incorporates new knowledge and allows for adaptive management

CNSC EA concluded public and environment protected from Pickering NGS releases

Environmental Assessment Report considered the following sources of information

Pickering Environmental Protection Program	Pickering Environmental Risk Assessment
Results of CNSC's Independent Environmental Monitoring Program	Results of Other Regional Monitoring
Annual Compliance Reports	Preliminary Decommissioning Plan



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Environmental Protection

Tritium in Drinking Water

- Canadian guideline of 7000 Bq/L is based on international recommendations
- 2017 Pickering Environmental Monitoring Program
 - Tritium averages at water supply plants were below Ontario Drinking Water Advisory Council recommendation of 20 Bq/L
- Public dose from tritium releases is very small fraction of the regulatory dose limit

*Adequate regulatory mechanisms to protect Canadians
from exposure to tritium releases*



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Environmental Protection

Tritium in Groundwater

- Tritium concentrations in groundwater within site have remained constant or decreased
- Spike of tritium concentrations in monitoring wells of Unit 5 and 6 Reactor Building areas observed in 2016
 - Source identified and repaired (sealant degradation in concrete foundation joints)
- Monitoring results confirmed site perimeter concentrations remain low

No off-site impacts indicated



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Emergency Preparedness:

Regulatory Framework for Emergency Preparedness

- REGDOC-2.10.1 consistent with modern national and international standards and guidelines
- Modern, risk-informed approach to the categorization of accidents





Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Emergency Preparedness

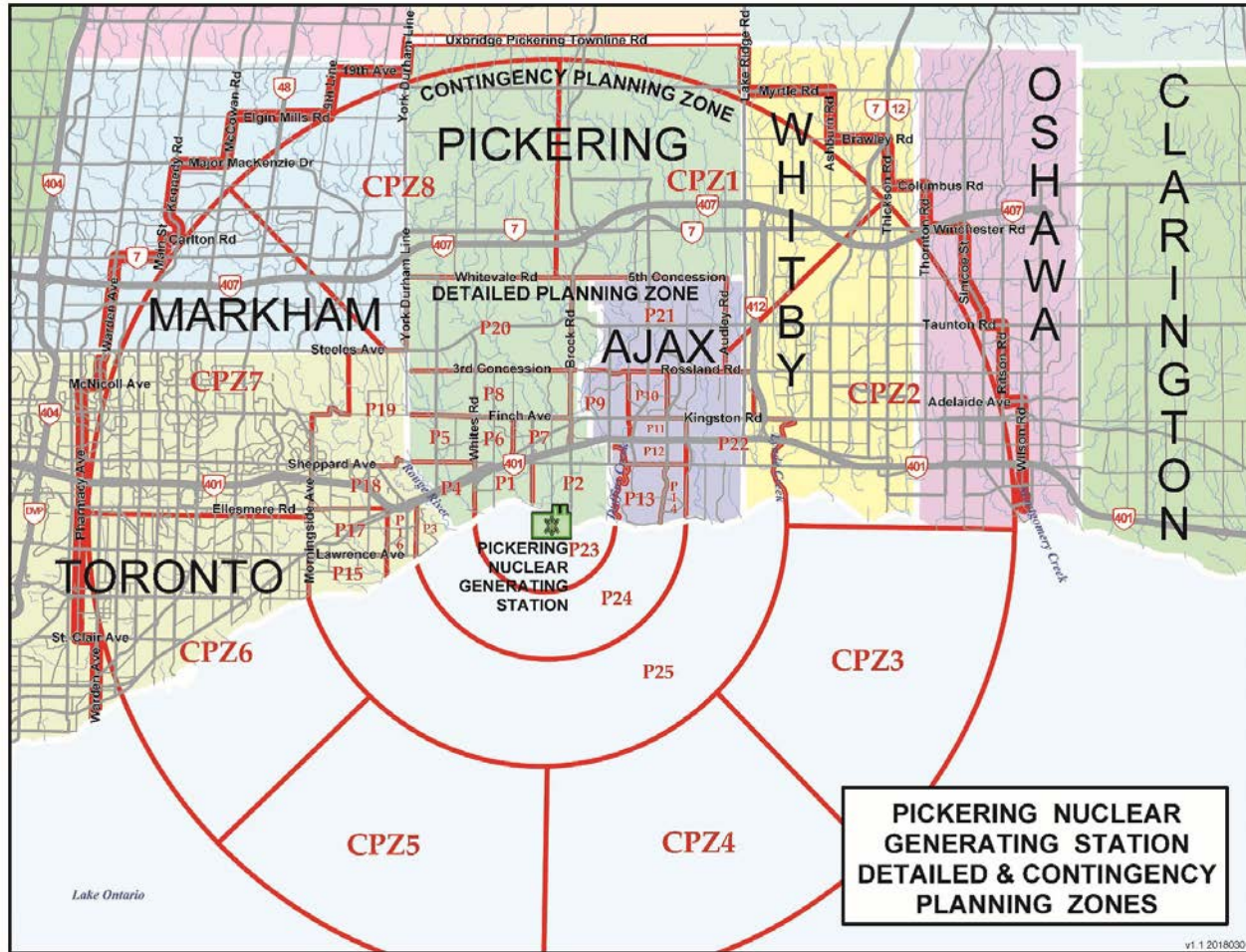
Provisions Under the Revised PNERP

- Revised Provincial Nuclear Emergency Response Plan (PNERP) planning zones adequate to address protective actions to minimize public health risks
 - Conforms with CSA N1600 *General Requirements for Nuclear Emergency Management Programs*
- Thyroid blocking Protective Action Levels align with provincial, federal and international guidance
- PNERP implementing plan for Pickering NGS available on OFMEM website: www.emergencymanagementontario.ca



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Emergency Preparedness Provisions Under the Revised PNERP – Response Zones





Commission Hearing, 25-29 June 2018
CMD 18-H6.C

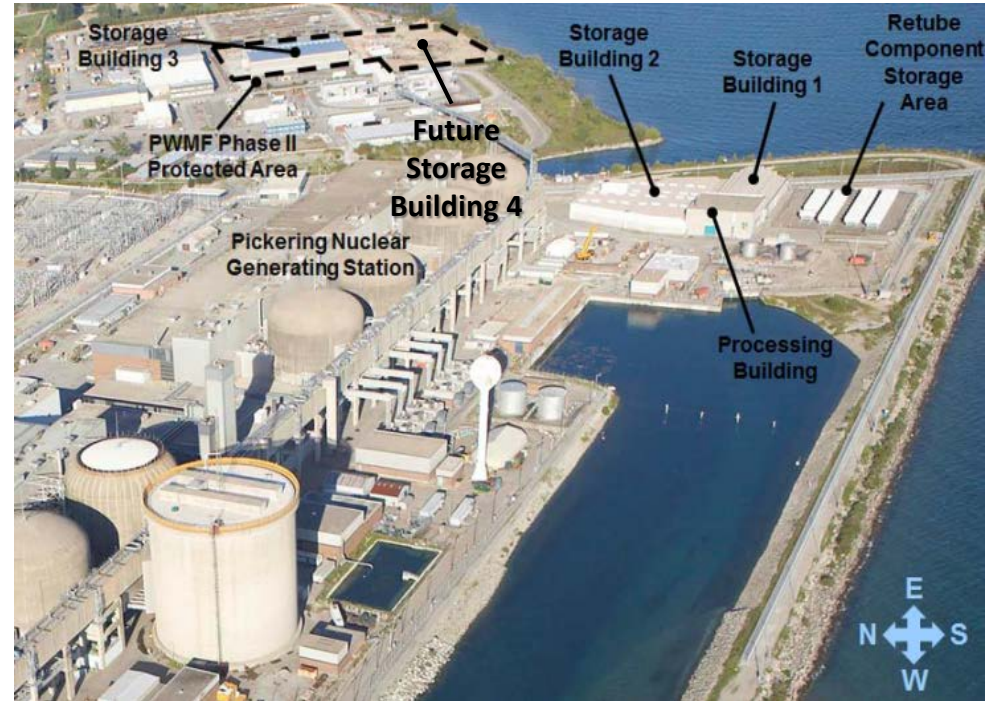
Waste Management Framework and Strategy Pickering Waste Management Facility Phase I

- Processing building
- Storage buildings 1 and 2

Phase II

- Storage building 3, future building 4
- Future new processing building

All on-site waste safely stored



Pickering Waste Management Facility Phase I and Phase II



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Waste Management

Inventory of On-Site High Level Radioactive Waste

Timeline	Wet Storage (No. of bundles)	Dry Storage (No. of bundles)	Total Storage (No. of bundles)	Dry Storage Containers in Storage
Current (June 30, 2017)	399,703	337,114	736,817	867
Projected (Dec 31, 2024)	418,453 + 27,600 (end of life defueling)	481,114	927,167	1,242
Irradiated Fuel Bays fully unloaded (~2038)	0	927,167	927,167	2,415



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Waste Management

Inventory of On-Site Radioactive Waste

Intermediate and Low Level Radioactive Waste (ILW and LLW)

Facility	ILW (m ³)		LLW (m ³)	
	Current	Projected	Current	Projected
Pickering Waste Management Facility	1,012	1,012	0	0

The Retube Component Storage Area is closed to further ILW
All LLW is stored at the Western Waste Management Facility

Source – Natural Resources Canada



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Waste Management On-site Waste Storage



Pickering Waste Management Facility Phase I with retube component storage area (left) and used fuel dry storage buildings (right).



Used fuel Dry Storage Containers, Pickering Waste Management Facility.



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Waste Management

Decommissioning

- Pickering decommissioning strategy
 - Safe storage with surveillance from 2028 to 2050
 - Station dismantling and demolition from 2051 to 2061, and
 - Site restoration from 2061 to 2065
- Pickering Preliminary Decommissioning Plan (PDP) complies with CSA N294-09
- Serves as basis for decommissioning cost estimate and financial guarantee
- Current consolidated financial guarantee for all OPG-owned nuclear facilities ~ \$21 B



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Other Matters

Fukushima Actions

- Fukushima Action Items are closed – resulting safety enhancements include
 - Increased reliability of safety significant equipment,
 - Multiple means to supply power and cooling water to key components,
 - Strengthened heat sinks to remove energy from containment,
 - Measures to prevent hydrogen combustion in containment,
 - Options for controlled filtered containment venting,
 - Portable equipment stored on- and off-site
 - Implementation of robust accident management
- Multiple design and procedural modifications to prevent and mitigate severe accidents
 - Probabilistic Safety Analysis shows reduced likelihood of accidents



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Other Matters

Containment Integrity

- Periodic Safety Review (PSR) identified additional actions to enhance safety
 - Strengthen provisions for controlled filtered venting to protect containment integrity
 - to be completed in 2019
 - Upgrades to make up cooling
 - Increase redundancy in power supply to air cooling and igniters

OPG implementing additional safety enhancements



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Other Matters

End of Commercial Operation (ECO)

- Periodic Safety Review in support of 10-year licence and encompasses the end of commercial operation
- Licence condition LC 15.4 imposes ECO requirements
- Commission approval would be required to operate any unit beyond December 31, 2024
- Sustainable Operations Plan and Stabilization Activity Plan will be in place
- Opportunity for public comment during public proceedings of annual Canadian Nuclear Power Plants Regulatory Oversight Report



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Developments since Part 1 Hearing

- No outstanding regulatory issues or concerns regarding 2017 Pickering Environmental Risk Assessment
- CNSC acceptance of the revised Derived Release Limits and Environmental Action Levels for Pickering in accordance with CSA N288.1
- Provincial Nuclear Emergency Response Plan – updated Pickering implementation plan available
- Observations and recommendations following Exercise Unified Control confirm response capability



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

UPDATES TO PROPOSED PROL AND DRAFT LCH



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Updates to Proposed PROL

- Licence condition (LC) 15.3 language strengthened following Part 1 Hearing in April
- LC 15.3 assures presence of adequate compliance verification criteria if projected hydrogen equivalent concentration in pressure tubes exceeds 120 ppm before the end of commercial operation

Old proposed LC 15.3

The licensee shall maintain pressure tube fracture toughness sufficient for safe operation.

New proposed LC 15.3

Before hydrogen equivalent concentrations exceed 120 ppm, the licensee shall demonstrate that pressure tube fracture toughness will be sufficient for safe operation beyond 120 ppm



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Changes to draft Licence Conditions Handbook

- Clarified compliance verification criteria (CVC) for revised LC 15.3
 - At least one year prior to any pressure tube reaching an Heq concentration of 120 ppm, OPG shall submit a technical basis document for the Fracture Toughness Model that is intended to support operation of pressure tubes with Heq predictions in excess of 120 ppm.
- Added remaining implementation dates for new REGDOCs and CSA standards
- Clarified and corrected CVC where necessary



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

CONCLUSIONS AND RECOMMENDATIONS



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Conclusions

CNSC staff conclude that OPG:

- Is qualified to carry on the activity authorized by the licence.
- Will, in carrying out that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Recommendations (1/2)

CNSC staff recommend that the Commission:

1. Renew the Pickering licence to authorize OPG to carry out the activities listed in Part IV of the licence, from September 1, 2018 to August 31, 2028
2. Authorize OPG to operate Pickering NGS Units 5-8 up to a maximum of 295,000 EFPH
3. Authorize delegation of authority for a person authorized by the Commission for LC 3.2 - restart after a serious process failure
 - Director, Pickering Regulatory Program Division
 - Director General, Directorate of Power Reactor Regulation
 - Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch



Commission Hearing, 25-29 June 2018
CMD 18-H6.C

Recommendations (2/2)

4. Accept the station-specific conditions requiring OPG to:

- Implement the Integrated Implementation Plan (LC 15.1)
- Maintain Units 2 and 3 in a safe storage state (LC 15.2)
- Before hydrogen equivalent concentrations exceed 120 ppm, demonstrate that pressure tube fracture toughness will be sufficient for safe operation beyond 120 ppm (LC 15.3)
- Implement and maintain plans for the end of commercial operation (LC 15.4)
- Implement and maintain a Cobalt 60 program (LC 15.5)
- Limit the activities of import and export of nuclear substances to those occurring as contaminants in laundry, packaging, shielding or equipment (LC 15.6)

Connect With Us



nuclearsafety.gc.ca

