



Fitness for
Service &
Periodic Safety
Review
February 2018

Mike Ruffolo
Manager,
Performance Engineering





Two initiatives that support Pickering's life extension:

1. Fitness for Service (FFS)

- Assessment and validation that the material condition of the plant will support safe operation into the future

2. Periodic Safety Review (PSR)

- Comprehensive assessment that the plant is safe and will operate safely in the future
- Typically performed every 10 years to support the license applications

These initiatives were completed following internationally recognized practices and requirements set out by Canada's nuclear regulator Canadian Nuclear Safety Commission (CNSC)



Fitness for Service (1)

- Consistent with industry practice, a plant's assumed end of life can be changed when the required assessments are completed
- When a plant's life needs to change, its programs require a systematic review and new investments may be required

Fitness for Service Assessment Results:

- The current material condition ensures the plant is safe today
- The reliability of Pickering has never been better and it's improving
- Comprehensive maintenance programs and continuous investments assures that the plant condition will be maintained



Fitness for Service (2)

The Key Plant Components:

1. Major Reactor Components
 2. Steam Turbines
 3. Main Output Generators
- The key components have Life Cycle Management Plans (LCMPs)
 - LCMPs identify inspection and maintenance requirements
 - The CANDU design specifies that planned outages are required to inspect key components that cannot be accessed while operating



Fitness for Service (3)

The rest of the Plant's components:

- All of Pickering's important components that are not key components have been also assessed
- These assessments are documented in Component Condition Assessments (CCAs)
- The CCAs will ensure that maintenance plans are in place to support safe and reliable operation to 2024



Fitness for Service (4)

Fitness for Service Assessment Results Summary:

- Pickering's performance continues to improve
- Pickering's material condition is very well managed
- OPG will ensure Pickering is operated safely
- Pickering is safe to operate today
- Pickering will be safe to operate to 2024



Periodic Safety Review (1)

What is a PSR?

- Comprehensive and detailed evaluation of the design, condition and operation of a nuclear power plant conducted every 10 years to support license applications
- Conducted internationally to International Atomic Energy Agency (IAEA, SSG-25) requirements
- Conducted domestically to CNSC (REGDOC-2.3.3) requirements
- Requires extensive effort and time (~2.5 years) to perform
- Assesses the:
 - extent to which the plant conforms to new plant requirements
 - programs and condition of the plant
 - ability of the plant to be operated safely into the future



Periodic Safety Review (2)

This is a PSR2 for Pickering:

- Builds on previous work at Pickering and other OPG plants.
- The previous work (termed “PSR1”) consists of:
 - Pickering B refurbishment studies
 - Pickering A Return to Service (PARTS) safety assessments
 - Darlington refurbishment studies (programmatic parts)



Periodic Safety Review (3)

A PSR is comprised of the following elements:

1. PSR Basis Document (Accepted)
 2. Safety Factor Reviews (Reviewed)
 3. Global Assessment Report (Reviewed)
 4. Integrated Implementation Plan (Acceptance Pending)
- Each of the above have been submitted to the CNSC for review
 - All CNSC comments have been addressed
 - Formal CNSC acceptance of the IIP is pending



Periodic Safety Review (4)

1. PSR Basis Document:

- Essential instrument that governs the conduct of the PSR
- Ensures the licensee and the CNSC have the same expectations

2. Safety Factor Reviews:

- Compares the plant to new design requirements
- Effectiveness review of the plant programs



Periodic Safety Review (5)

Safety Factors:

1. Plant Design
2. Actual Condition of SSCs Important to Safety
3. Equipment Qualification (Environmental and Seismic)
4. Aging
5. Deterministic Safety Analysis
6. Probabilistic Safety Assessment
7. Hazard Analysis
8. Safety Performance
9. Use of Experience From Other NPPs and Research Findings
10. Organization, the Management System and Safety Culture
11. Procedures
12. Human Factors
13. Emergency Planning
14. Radiological Impact on the Environment
15. Radiation Protection



Periodic Safety Review (6)

3. Global Assessment Report (GAR):

- Overall judgment on the acceptability of continued operation
- Presents an overall evaluation of plant safety
- Also identifies and takes into account plant strengths
- Excerpt from the Pickering GAR:
“...the Global Assessment concludes that the Pickering NGS design, operation, processes and management system will ensure continued safe operation of Units 1,4 and 5-8, both in the short term, and for extended operation.”



Periodic Safety Review (7)

4. Integrated Implementation Plan (IIP):

- A plan that is based on the GAR results that documents the actions that will be taken to enhance safety
- The IIP is a commitment to the CNSC
- IIP Conclusion:
“OPG is committed to continuous improvement in safety at all of its nuclear facilities and has robust comprehensive programs in place that are aligned with industry best practices. There are no safety issues for continued safe operation of Pickering NGS through 2024 and the actions within this IIP will further enhance safety.”



Summary of Overall Conclusions

- Pickering is fit for service today and will be fit for service to 2024
- Pickering's material condition is well managed
- OPG is committed to continuous improvement in safety
- OPG has comprehensive programs in place that are aligned with industry best practices
- Pickering has no current safety issues
- Pickering has no safety issues for operations to 2024