



Darlington Licence Renewal Stakeholder Sessions

Introduction and CNSC Application Overview

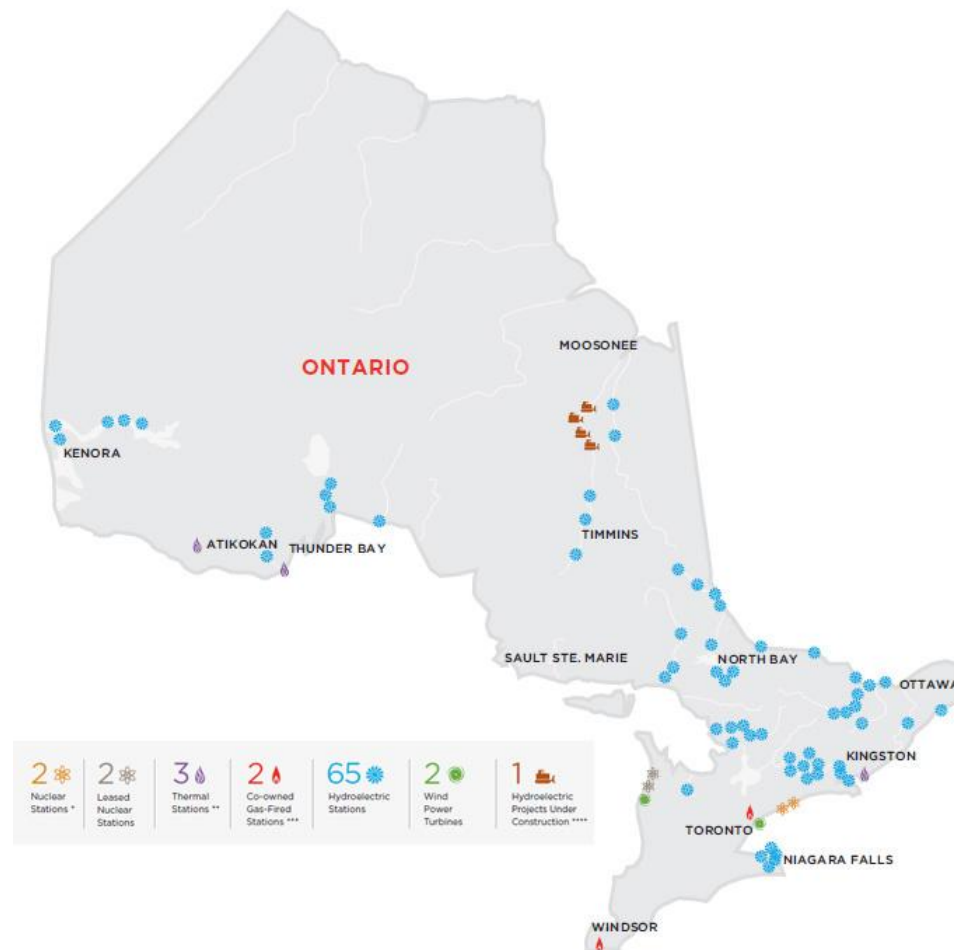
February 2015

ONTARIO **POWER**
GENERATION



Ontario Power Generation (OPG)

- 16,931 MW installed generating capacity.
 - 65 hydro, 2 nuclear, 3 thermal stations
 - 2 leased nuclear stations
 - Co-own 2 gas-fired stations
 - No longer burning coal.
 - Converted Atikokan coal station to biomass; converting Thunder Bay Generating Station
- OPG produces ~ 50 per cent of Ontario's electricity.
- About 9,700 regular employees.
- Moderate overall price of power.





Darlington Nuclear Generating Station

- In-service in the early 1990's.
- Four-unit station with a total capacity of 3,512 MW output.
- Provides about 20 per cent of Ontario's electricity needs – enough to serve a city of two million people.
- Mid-life refurbishment is one aspect of the CANDU design.





Darlington Station Performance

- Darlington has been long recognized as one of the top performing plants in the world.
 - CNSC rated Fully Satisfactory 5 years straight.
 - International peer reviews have recognized high performance last 2 reviews.
 - Excellent safety record:
 - ▶ Employee safety
 - ▶ Public safety
 - ▶ Environmental safety
 - ▶ Radiation safety

- OPG takes pride and appreciates our “social operating licence” and that public trust and confidence in our operation must be maintained.



CNSC and Commission

- Canadian Nuclear Safety Commission (CNSC) regulates nuclear power and uses in Canada (Nuclear Safety Control Act).
- 7 member Commission is independent from CNSC staff. Holds public hearings and issues various types of licences, including operating licences of nuclear power stations referred to as Power Reactor Operating Licence (PROL).
- CNSC staff includes resident site inspectors at each station:
 - Conduct routine inspections and station walk downs.
 - Verify compliance with regulations.
 - Utilities held to high standards.
- CNSC Commission can suspend, amend or revoke a PROL.



Darlington Operating Licence

- Darlington's operating licence expires on Dec 31, 2015:
 - Application for renewal was submitted in December 2013..
 - In 2014, operating licence was renewed for one year.
 - Application update (Addendum) was submitted January 30, 2015.

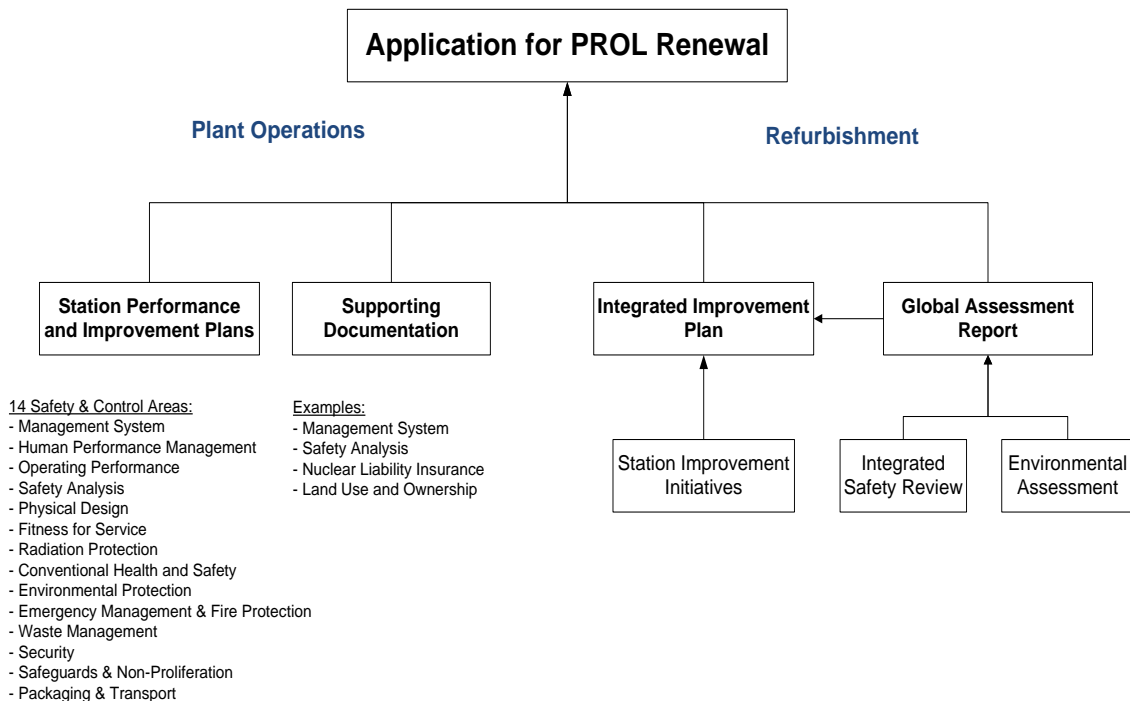
- Public hearings in 2015:
 - **Part 1:** Mid August: OPG and CNSC staff reiterate their case and answer Commission questions.
 - **Part 2:** Early November : Written and oral submissions from interveners, OPG & CNSC staff answer Commission questions.

- Commission renders its decision before December 31, 2015.



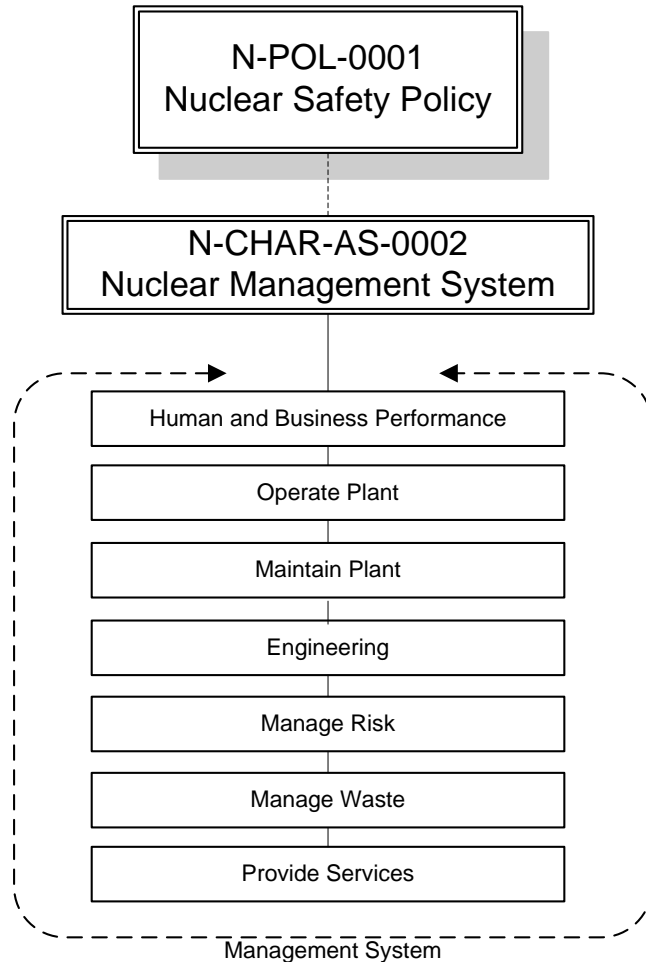
Application Summary

- OPG is applying for a renewed Operating Licence for the Darlington Nuclear Generating Station.
- Requested PROL term is from January 1, 2016 to December 1, 2028 (a licence period of ~13 years).
- The written application and other submissions forms the overall package for OPG's licence renewal request.





Nuclear Management System



- Safety is our over-riding priority.
- OPG has a Management System:
 - to ensure Darlington is operated and maintained using sound nuclear safety and defence-in-depth practices, and
 - to ensure radiological risks to workers, the public, and environment are low.
- The application and supporting documentation demonstrates that we have a robust managed system in place to ensure Darlington is safe today and will remain so throughout requested licence term.



Licence Term

- The CNSC are introducing new regulatory requirements for longer term licences based on Periodic Safety Reviews (international practice).
- RegDoc 2.3.3 “*Integrated Safety Reviews*” to be published in 2015 will form the basis for a longer term operating licence, requires the licensee to submit:
 - a) An Integrated Safety Review (ISR),
 - b) A Global Assessment Report (GAR),
 - c) An Integrated Implementation Plan (IIP), and
 - d) An Update to the ISR periodically (every 10 years).
- To achieve a longer term licence the licensee will also require:
 - Very strong safety performance [Darlington has top performance],
 - A plant that complies with regulatory requirements [Darlington has top performance],
 - ISR, GAR and IIP [Darlington has submitted these], and
 - Commitment to complete Periodic ISR updates [Darlington has committed to this].
- OPG is requesting a licence term to cover refurbishment of all four units.



Licence Renewal Application Sections

1.0 Overview

Safety Control Areas

2.0 Management System

3.0 Human Performance Management

4.0 Operating Performance

5.0 Safety Analysis

6.0 Physical Design

7.0 Fitness for Service

8.0 Radiation Protection

9.0 Conventional Health and Safety

10.0 Environmental Protection

11.0 Emergency Management & Fire Protection

12.0 Waste Management

13.0 Security

14.0 Safeguards

15.0 Packing and Transportation

16.0 Tritium Removal Facility

17.0 Darlington Site Infrastructure Improvements

18.0 Fukushima Action Plan Update

19.0 Community Relations/Public Information Program

20.0 Financial Guarantees

21.0 Nuclear Liability Insurance

22.0 Open Action Items

Appendices

1 Site description

2 Land Ownership

3 Other CNSC Licences

4 Summary of Nuclear Substances

5 Hazardous Material



Licence Renewal: 14 Safety Control Areas

Safety Control Areas

- 2.0 Management System
- 3.0 Human Performance Management
- 4.0 **Operating Performance**
- 5.0 **Safety Analysis**
- 6.0 Physical Design
- 7.0 **Fitness for Service**
- 8.0 Radiation Protection
- 9.0 Conventional Health and Safety
- 10.0 **Environmental Protection**
- 11.0 **Emergency Management & Fire Protection**
- 12.0 Waste Management
- 13.0 Security
- 14.0 Safeguards
- 15.0 Packing and Transportation

Each Section

- Why OPG is qualified to operate Darlington
- Description of OPG's programs for ensuring compliance with regulatory requirements
- Station Performance in the area
- Future Plans for the area
- Refurbishment Activities related to the area



Application Section 4: Operating Performance

- Sec 4.1 Current Operations
 - ▶ Sec 4.1.1 Safe Operating Envelope
 - ▶ Sec 4.1.2 Operations Program
 - ▶ Sec 4.1.3 Response to Transients
 - ▶ Sec 4.1.4 Chemistry Control
 - ▶ Sec 4.1.5 & 6 Fuel Handling and Fuel Reliability
 - ▶ Sec 4.1.7 System Availability
 - ▶ Sec 4.1.8 Corrective Action Program & OPEX
 - ▶ Sec 4.1.9 Regulatory Reporting
- Sec 4.2 Refurbishment



Application Section 5: Safety Analysis Probabilistic Safety Analysis (PSA)

- Two types of safety analysis:
 - Deterministic Safety Analysis (Safety Report)
 - Probabilistic Safety Analysis (PSA)
- PSA
 - A tool to estimate safety, and to identify safety improvement opportunities
 - What is changing?
 - Updating methodology
 - Providing the latest risk estimates
 - Taking account of physical plant safety improvements we've made and are making
 - Demonstrates that Darlington was already safe, and is even safer now
 - A summary report will be made available to the public



Application Section 7: Fitness for Service Program

■ Current Operations

• Major Components (Fuel Channels, Feeders, Steam Generators)

- All major components have a rigorous life cycle management strategy to assure fitness for service.
- OPG routinely inspects to confirm fitness for service and results are sent to the CNSC.
- Mitigating action is required when fitness for service can no longer be demonstrated. Examples: boiler tube plugging, feeder replacement, pressure tube replacement.
- Our aging management processes drive us to perform R&D to refine or develop new assessment methodologies for our aging plants and to fill in gaps in knowledge that may exist.

• Refurbishment

- Fuel Channel Pressure Tubes and Feeders will be replaced.
- Steam Generators are fit for service for additional 30 years.



Darlington Licence Renewal Stakeholder Sessions

Environmental Protection Program and
Performance

February 2015

ONTARIO **POWER**
GENERATION



SCA: Environmental Protection Section 10.0 of the Application

- Overview (Key Policies/Programs)
 - Environmental Policy
 - Environmental Management Program
 - ▶ Corporate Wide Environmental Management System (EMS)
 - ▶ Environmental Protection Program
- Current Operations - Darlington Performance
 - Groundwater Monitoring
 - Radiological Emissions
 - Conventional Emissions
 - Environmental Monitoring
 - Unplanned Releases
 - Program Improvements/Future Plans
- Refurbishment
 - Environmental Management Program
 - Control and Monitor Releases of Nuclear Substances
 - Control and Monitor Releases of Hazardous Substances



Overview

OPG's Environmental Policy

- Policy Statement:

Ontario Power Generation (OPG) shall meet all legal requirements and any environmental commitments that it makes, with the objective of exceeding these legal requirements where it makes business sense

- OPG Environmental Management System (EMS)

- Corporate-wide EMS which was registered under the ISO 14001 2004 standard in August 2013.
- Environmental Protection Program:
 - ▶ Effluent Monitoring Program
 - ▶ Groundwater Monitoring Program
 - ▶ Environmental Monitoring Program



Environmental Protection Program

- Comprehensive Environmental Protection Programs at our nuclear stations continually minimize impacts of station operation to the environment and human health.
- Nuclear Environmental Programs are regulated by the CNSC, MOE, and Environment Canada.
- Multiple barriers, checkpoints, and monitoring are in place to ensure radioactive emissions to the environment are within acceptable release limits.
- Contingencies and response procedures are in place to mitigate accidental liquid effluent releases. Routine review and practices ensure effective response.



Framework to Control Emissions

- Based on the guiding principle of As Low As Reasonably Achievable (ALARA) to minimize radiation impacts to the environment and the public.
- ALARA drives continual improvement to reduce emissions.
- Station radioactive emissions are routinely verified against the control framework:
 - Derived Release Limits (DRLs)
 - Action Levels (ALs)
 - Internal Investigation Levels (IILs)



Current Operations – Groundwater Monitoring

- Darlington Nuclear has an established groundwater monitoring program which is designed to meet the following objectives:
 - Verify predominant groundwater flow characteristics.
 - Monitor changes to on-site groundwater quality to ensure timely detection of inadvertent releases of nuclear and hazardous substances to groundwater.
 - Confirm that there are no adverse off-site impacts from contaminants in groundwater.

- Program Performance
 - The 2013 groundwater monitoring results were as expected and did not differ from the 2012 results.
 - Tritium concentrations have remained nearly constant or have decreased; this indicates stable or improved environmental performance.



Current Operations – Radiological Emissions

- 2013 radioactive emissions to air and to water were below 0.5% of station DRLs

Site Emissions	DN	
	Bq	%DRL
AIR		
Tritium Oxide	2.1E+14	0.35
Elemental Tritium (a)	1.8E+13	<0.01
Noble Gas (b)	3.2E+13	0.07
I-131	1.4E+08	<0.01
Particulate	2.9E+07	<0.01
C-14	1.0E+12	0.29
WATER		
Tritium Oxide	1.1E+14	<0.01
Gross Beta/Gamma	2.8E+10	0.04
C-14	3.2E+08	<0.01

NOTES: NA = Not Applicable, Bq = Bequerels
 (a) Emissions from Darlington Tritium Removal Facility
 (b) Units for noble gas emissions are γ Bq-MeV

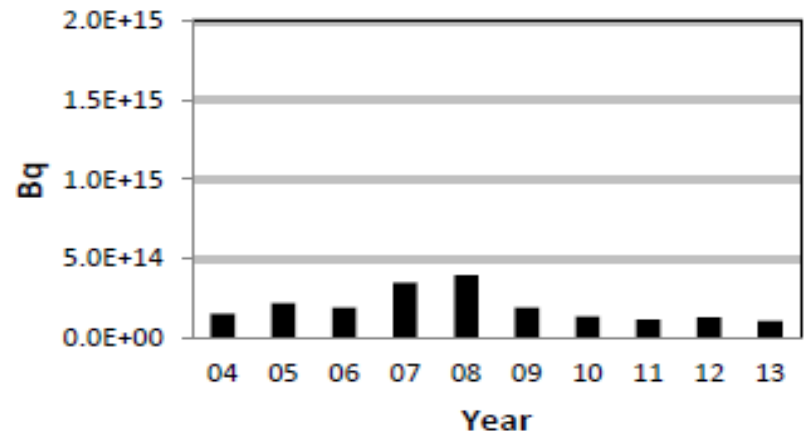
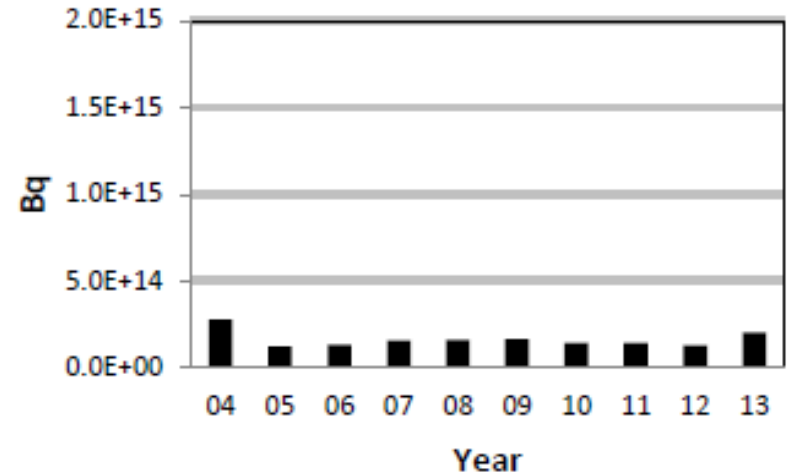


Current Operations – Radiological Emissions

2013 Results of Tritium to Air and Water

- DN Tritium Oxide to Air (HTO)
 - Emissions increased slightly in 2013 due to outage activities and dryer performance. Overall emissions have been relatively stable over the last 10 years.

- DN Tritium to Water
 - Emissions have been relatively stable since 2010. Increases from '04 to '08 were due to apparent contamination of samples in the auto samplers and preparations for the 2009 Vacuum Building Outage.





Current Operations - Conventional Emissions

Darlington Nuclear complies with numerous regulatory requirements for controlling and monitoring releases of hazardous substances to the environment.

- Releases to Air
 - Sulphur dioxide, nitrogen dioxide and carbon dioxide are generated from the testing and operation of standby generators and emergency power generators.
 - Releases were well below the threshold for routine annual reporting to Environment Canada.
- Releases to Water
 - There were no Environmental Compliance Approval (ECA) non-compliances from the use of sodium hypochlorite for zebra mussel control in the condenser cooling water intake structures.
 - During the licensing period Darlington Nuclear met all of the regulatory effluent release requirements and reported routine planned discharges for hydrazine, ammonia and morpholine to the Ministry of the Environment and Climate Change (MOECC) in the annual ECA compliance reports.



Current Operations – Environmental Monitoring Program

Objectives

- Demonstrate station radioactive emissions are properly controlled.
- Obtain environmental data to estimate public dose.
- Use data to evaluate transportation models used to calculate station DRLs and public dose
- Sampling of environmental media at site boundary and critical group locations:

Air	Drinking Water	Milk
Lake Water	Fruits/Vegetables	Fish
Beach Sand	Animal Feed	Soil (every 5 yrs)
	Eggs/ Poultry	Sediment (every 5 yrs)

- Sampling at background locations in Ontario to determine net impact of DN operations.
- Monitor results and estimate public doses reported to the regulator (CNSC) on an annual basis.
- With the submission of the 2013 Annual EMP Report in April 2014, OPG is in full compliance with all the requirements of CSA N288.4-10



Objectives :

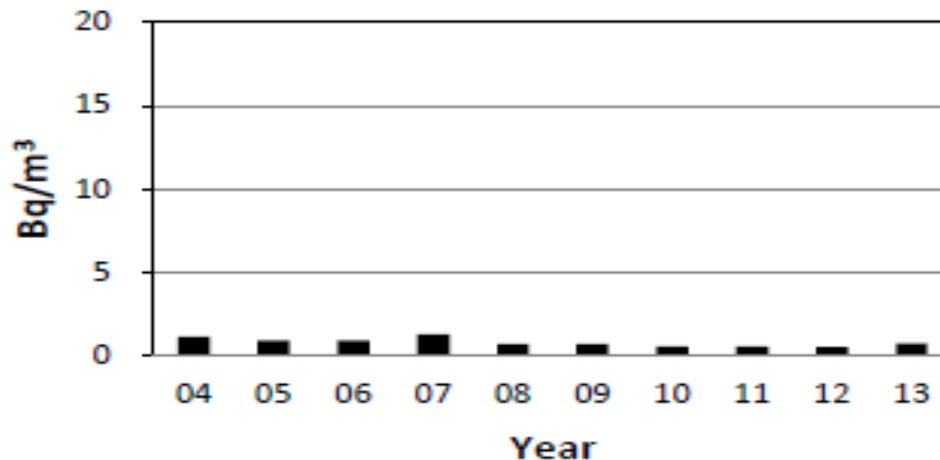
- Obtain environmental data to estimate public dose.
- Use data to evaluate of transport models used to calculate station DRLs and public dose.
- Sampling of environmental media at site boundary and critical group locations:
 - Sampling at background locations in Ontario to determine net impact of DN operations.
- Monitoring results and estimated public dose reported to the regulator (CNSC) on an annual basis
- With the submission of the 2013 Annual EMP Report in April 2014, OPG is in full compliance with all the requirements of CSA N288.4-10



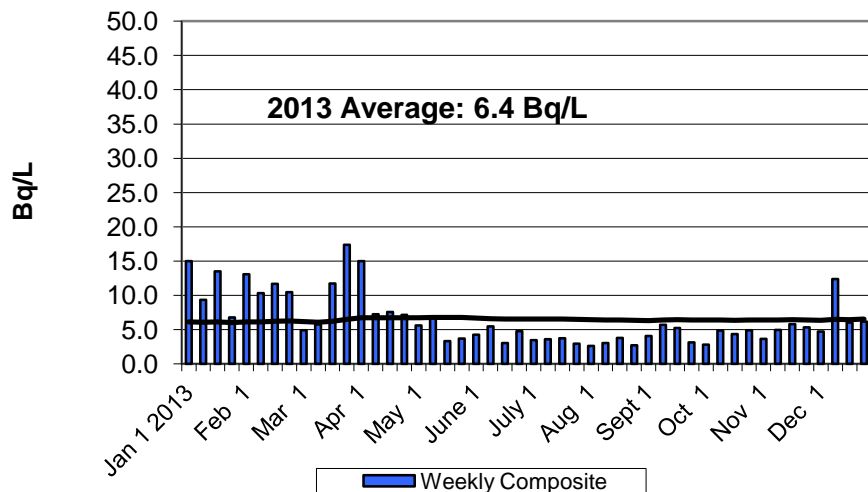
Current Operations -Environmental Monitoring Program

DN Tritium in Air

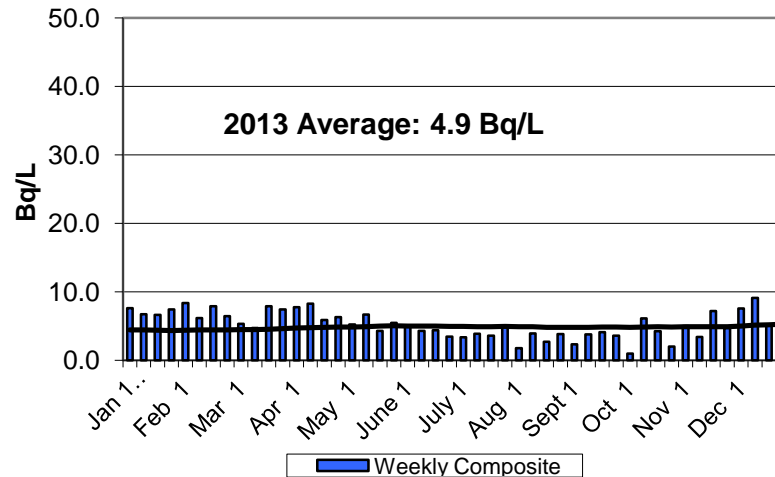
- Consistent with values seen over the last 10 years.



**Oshawa Water Supply Plant
Tritium Concentration**



**Bowmanville Water Supply Plant
Tritium Concentration**

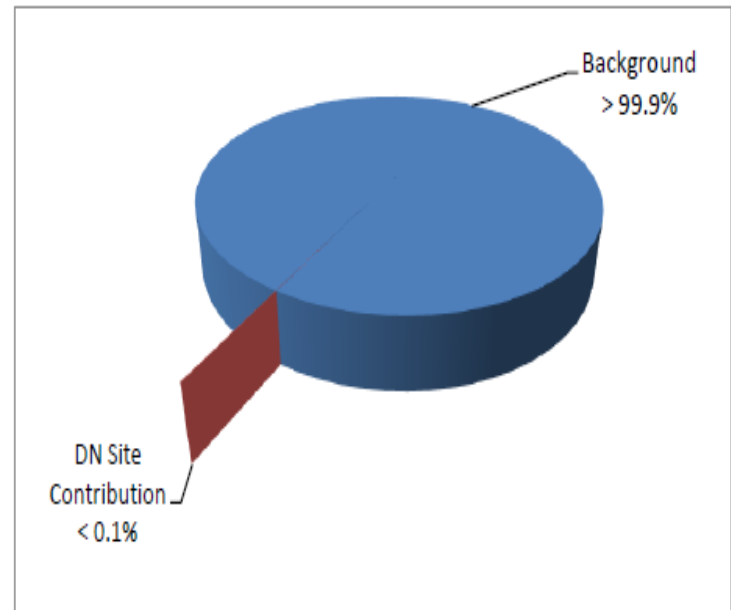




Current Operations - Darlington Station 2013 Public Dose

- Darlington public dose continues to be very low and is consistent with the 2012 dose
- 2013 public dose was 0.6 μSv - represented by the Farm Adult- HTO and C-14 are the major dose contributors
- 0.1% of the annual regulatory limit of 1000 μSv and <0.1% of annual natural background radiation of 1,400 μSv

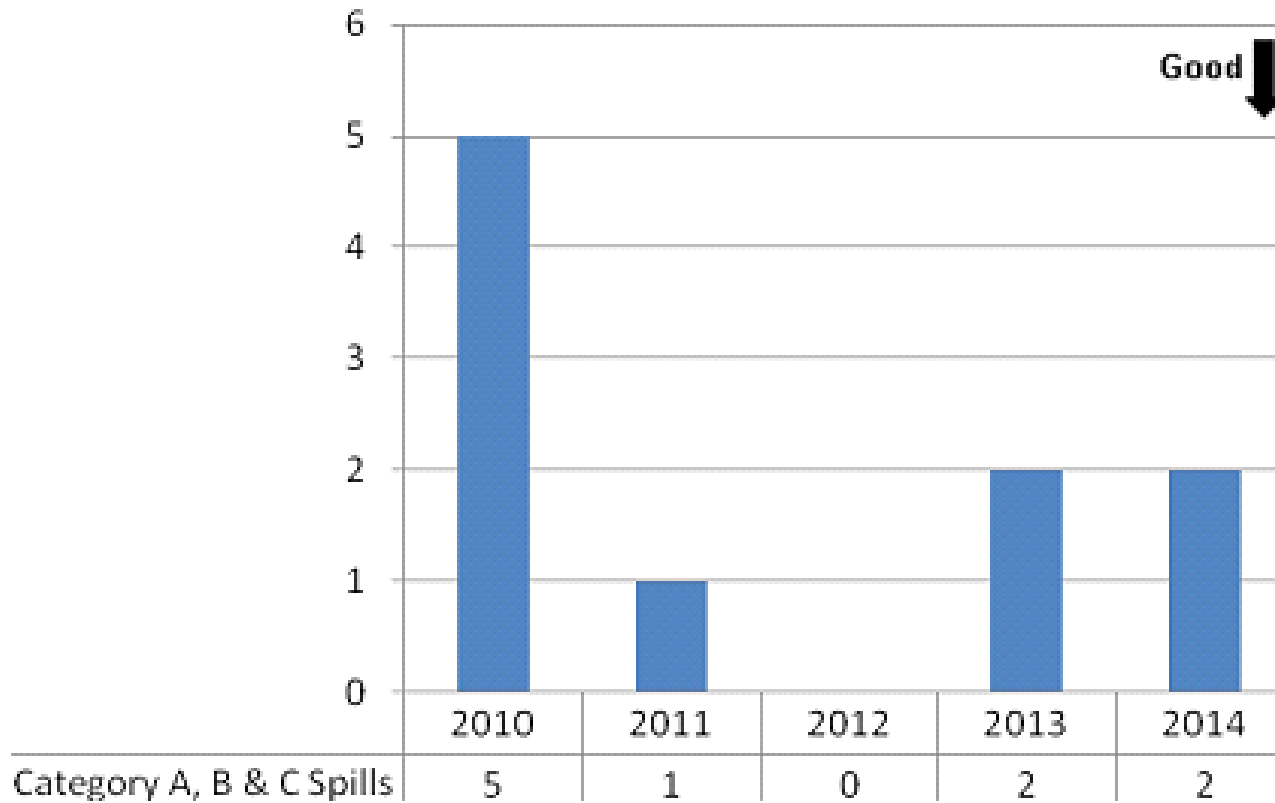
Year	2009	2010	2011	2012	2013
Legal Limit (uSv/year)	1000	1000	1000	1000	1000
Public Dose (uSv)	0.7	0.6	0.9	0.6	0.6
% legal limit	0.07	0.06	0.09	0.06	0.06
% of Background Radiation around the Darlington Facility	<1	<1	<1	<1	<1





Current Operations - Unplanned Releases

Category A, B & C Reportable Spills





Current Operations – Program Improvements /Future Plans

- The implementation of new chillers in 2012 eliminated the use of CFC-11 and CFC-12 in accordance with the Federal Halocarbon Regulation and Ontario Refrigerants Regulations O. Reg. 189/94.
- A dechlorination system was installed in 2011 to ensure that the final discharge from the condenser cooling water system does not exceed any ECA limits
- OPG participated in a collaborative with the CNSC, Fisheries and Oceans Canada, Environment Canada and Ministry of Natural Resources to collect round whitefish as part of the Round Whitefish Action Plan.
- The 1980's study on thermal effects on round whitefish was repeated and the report submitted to the CNSC in 2014. The results of the study confirm low risk on round whitefish eggs and larvae from normal operation of the cooling water discharge system
- To address public interest in environmental emissions data, OPG now provides quarterly reports on environmental emissions for the Darlington Nuclear station on its public website.
- Transition plans for compliance with CSA N288.5-11, Effluent Monitoring Programs at Class 1 Nuclear Facilities and Uranium Mines and Mills, and CSA N-288.6-12, Environmental Risk Assessment were provided to the CNSC.



Refurbishment

- Environmental Management Program
 - To maintain good environmental performance, a guideline document has been issued outlining the required actions for all work groups including contractors.
 - The Darlington Refurbishment EA Follow-up Monitoring Program activities have started and a number of the sampling plans have been submitted to the CNSC for review and approval.
 - OPG has applied for a FA Authorization for the Darlington Facility.

- Control and Monitor Releases of Nuclear Substances
 - During the planning phase, all projects are required to have a completed environmental impact assessment.
 - All installation or execution plans associated with these activities will require environmental emissions controls.

- Monitor Releases of Hazardous Substances
 - Spill prevention and contingency plans will be established to address potential unplanned.
 - Chemical control program will be established to control releases of chemical products planned for use or products that are present at the facility.



Summary

- Darlington Nuclear has a comprehensive Environmental Protection Program designed to continually minimize impacts of station operation to the environment and human health.
- Regulatory oversight and reporting requirements.
- Multiple barriers, checkpoints, and monitoring are in place to ensure radioactive emissions to the environment are within acceptable release limits.
- Given OPG's robust processes that are in place, it is expected that this program area will continue to meet or exceed regulatory requirements and expectations over the 13 year licensing period being sought.



Darlington Licence Renewal Stakeholder Sessions Emergency Preparedness

February 2015

ONTARIO **POWER**
GENERATION



Nuclear Emergency Response

Darlington's emergency response plans meet and exceed Regulatory requirements. The plans are robust and frequently exercised, the staff are well trained, and the equipment and facilities required to respond are poised.

Agenda:

- Nuclear Emergency Response Overview
- KI Pre-distribution and Public Information
- Exercise Unified Response



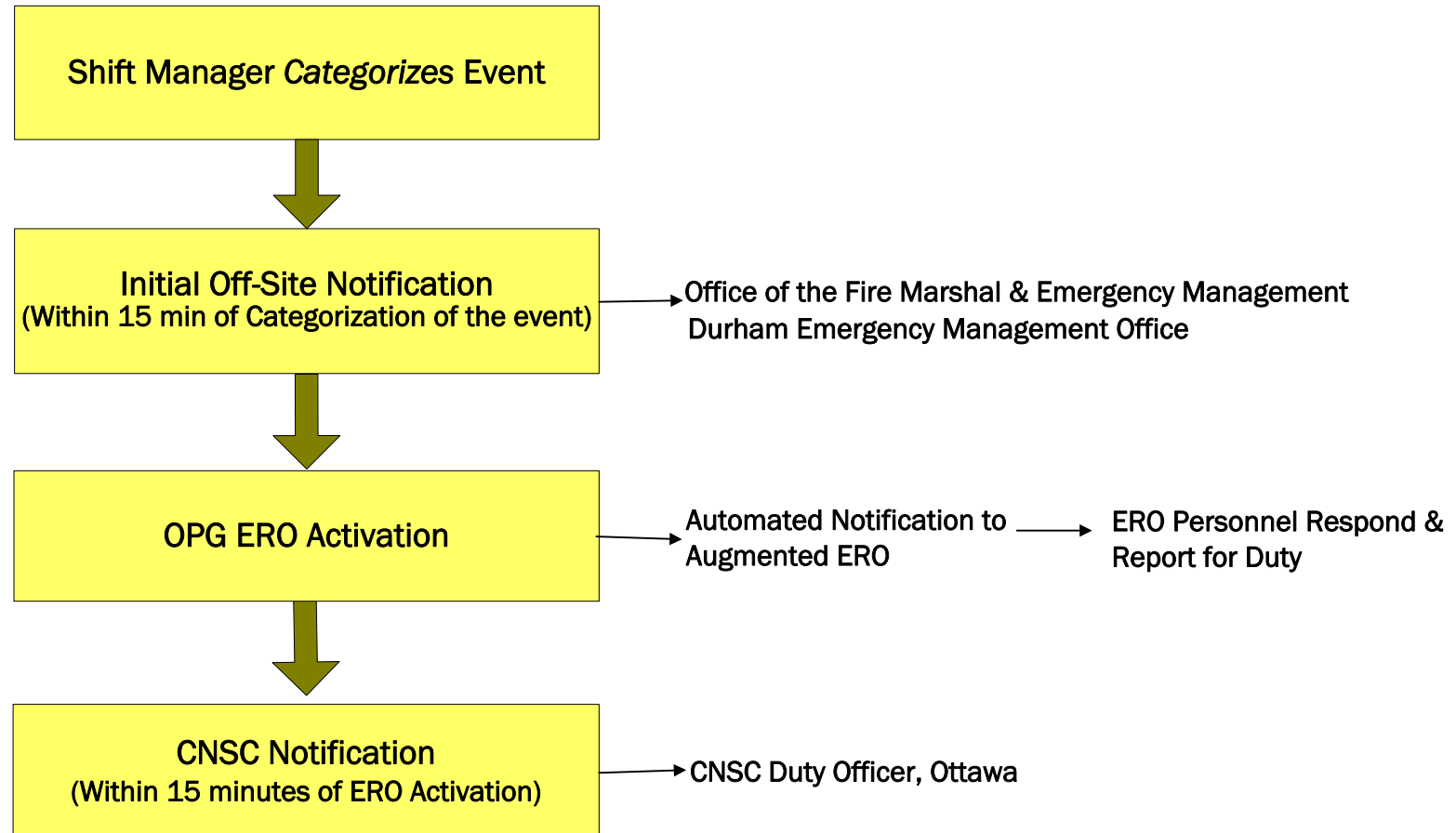
Onsite Emergency Response

- Highly trained operators, certified by the CNSC.
- Extensive emergency procedures that are practiced regularly using reactor simulators.
- Layers of redundancy and diversity in safety and emergency systems and components.
- On-site Emergency Response Organization (ERO) trained to implement the Emergency Plan requirements including notifications, staff protection, surveys, and coordination of emergency tasks.





Emergency Notifications





Public Alerting & Communication of Emergency Information

- The PEOC Commander decides on activation of Public Alerting except in a General Emergency where it is a default action.
- Public alerting for the **3 km zone** is within 15 minutes of initiation, with warning to practically 100% of the people in that zone, both indoors and outdoors.
- Durham Region and the City of Toronto have systems in place to alert the public within the 10 km zone.
- The Province has an emergency public warning system which can be activated to notify the public within the 10 km area and beyond.
- The Province issues all advisories to the affected public on protective measures they are directing via Emergency Bulletins.



Radiological Surveys

- In-plant and off-site survey data are transmitted to the Province and CNSC to aid in public protective action decision making.
- Off-site gamma monitors provide continual measurements and immediate data.





KI Pre-distribution

- KI pre-distribution to all households, businesses, and institutions in the 10 km radius of the nuclear facilities by the end of 2015.
- OPG is working with the Region of Durham, the City of Toronto, Office of the Fire Marshal & Emergency Management (OFMEM), Ministry of Health and Long Term Care (MOHLTC), Health Canada, and others.
- Plans to put KI in additional pharmacies around the Pickering and Darlington Stations for easy access for those who wish more or who are new to the areas.



KI – what does it do?

- Potassium iodide contains stable iodine, which when taken just prior to or shortly after exposure to radioactive iodine, saturates the thyroid and prevents uptake of harmful levels of radioactive iodine.
- For more information on KI, reference the Government of Ontario Radiation Health Response Plan :
<http://www.health.gov.on.ca/en/pro/programs/emb/rhrp/>



Public Information

- In May 2014, new 'Flashlight' public information brochures were distributed to households in the primary zone, with an excellent public response.
- Additional public information, including specific information on KI will accompany the KI distribution in 2015.



Exercise Unified Response

- OPG led, three day full scale nuclear emergency response exercise.
- Primary purpose was to test the preparedness and integration of the nuclear emergency plans.
- Over 50 agencies and 2000 participants were engaged in the exercise.



Federal Organizations



Agriculture and Agri-food Canada (AAFC)	Employment and Social Development (ESDC)
Atomic Energy of Canada Ltd (AECL)	Environment Canada (EC-CMC)
Canada Border Services Agency (CBSA)	Health Canada (HC)
Canadian Food Inspection Agency (CFIA)	Industry Canada (IC)
Canadian Nuclear Safety Commission (CNSC)	Natural Resources Canada (NRCan)
Department of Justice (DOJ)	Public Health Agency Canada (PHAC)
Department of National Defense (DND/CF)	Public Safety Canada (PS) & Government Operations Center (GOC)
Department of Fisheries and Oceans (DFO)/Canadian Coast Guard (CCG)	Privy Council Office (PCO)
Department of Foreign Affairs , Trade & Development (DFATD)	Transport Canada (TC)

Provincial Organizations



Ministry of Agriculture and Food (MAF)/
Ministry of Rural Affairs (MRA)

Ministry of Government Services (MGS)

Ministry of Community Safety and Correctional
Services (MCSCS)

Ministry of Health and Long Term Care
(MOHLTC)

Office of the Fire Marshal and Emergency
Management (OFMEM)

Ministry of Labour (MOL)

Ministry of Transportation (MTO)

Ontario Provincial Police (OPP)

Ministry of Municipal Affairs and
Housing (MMAH)

Ministry of Community and Social Services
(MCSS)

Ministry of Natural Resources (MNR)

Ministry of Energy (ENERGY)

Independent Electricity System Operator
(IESO)

Ministry of Environment (MOE)

Ontario Power Generation (OPG)



Municipal Organizations

City of Oshawa (includes Fire)	Durham Regional Police Service
City of Peterborough	Durham Social Services
City of Pickering (includes Fire)	Durham Transit
City of Toronto	Durham Works Department
Conseil Scolaire Viamonde	Durham Health Department
Durham Chief Administrative Officer	Kawartha Pine Ridge District School Board
Durham Corporate Communications Durham Corporate Services	Lakeridge Health (Bowmanville Hospital)
Durham District School Board	Municipality of Clarington (Includes Fire)
Durham District Separate School Board	Durham Planning & Economic Development
Durham Emergency Medical Services	Regional Fire Coordinator
Durham Emergency Management Office (DEMO)	Town of Ajax



Scenario

- Large Loss of Coolant Accident coincident with multiple system failures and a tornado which causes a station blackout.
- Emergency Mitigation Equipment deployed to the units to restore cooling and critical parameter monitoring.
- A severe accident occurs on one unit due to significant fuel failure, and the Severe Accident Management Guidelines are executed by responders.

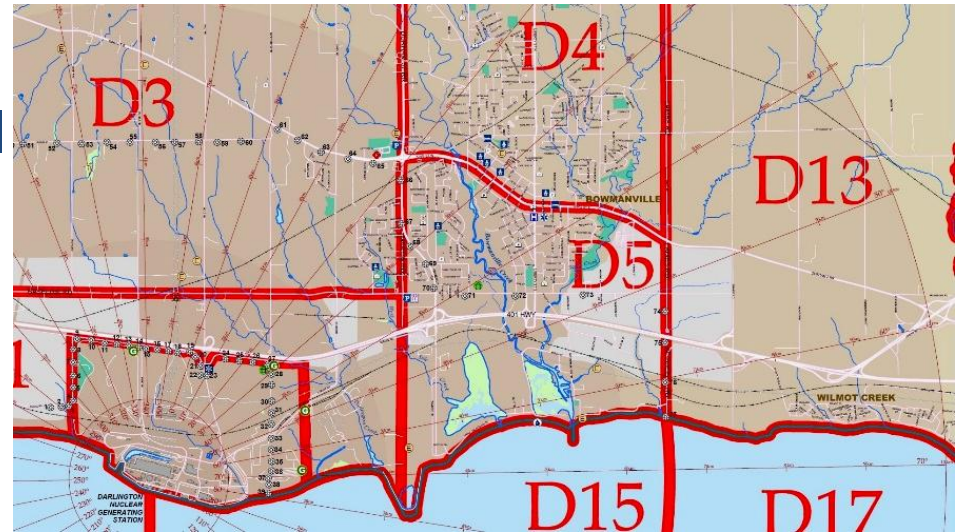


26/05/2014 14:14



Scenario – Continued

- Provincial Emergency Operations Centre (PEOC) full activation of the emergency response organizations due to an anticipated radiological release.
- Discussions and decision making regarding a release to the public and public protective actions.
- A release of radioactive material from the site was simulated on the evening of day two.





Scenario – Continued

- Station emergency power was restored to the units during the night of day two.
- Day three focused on off-site radiation monitoring and emergency worker centre activation at Orono.





Exercise Unified Response

- Exercise Unified Response was very successful in testing the participating agencies' plans and exercise objectives.
- The response demonstrated that our plans are robust, and that the agencies are able to respond to a significant nuclear event in Ontario.
- Lessons learned will be used to improve plans and overall interoperability.



Darlington Licence Renewal Stakeholder Sessions

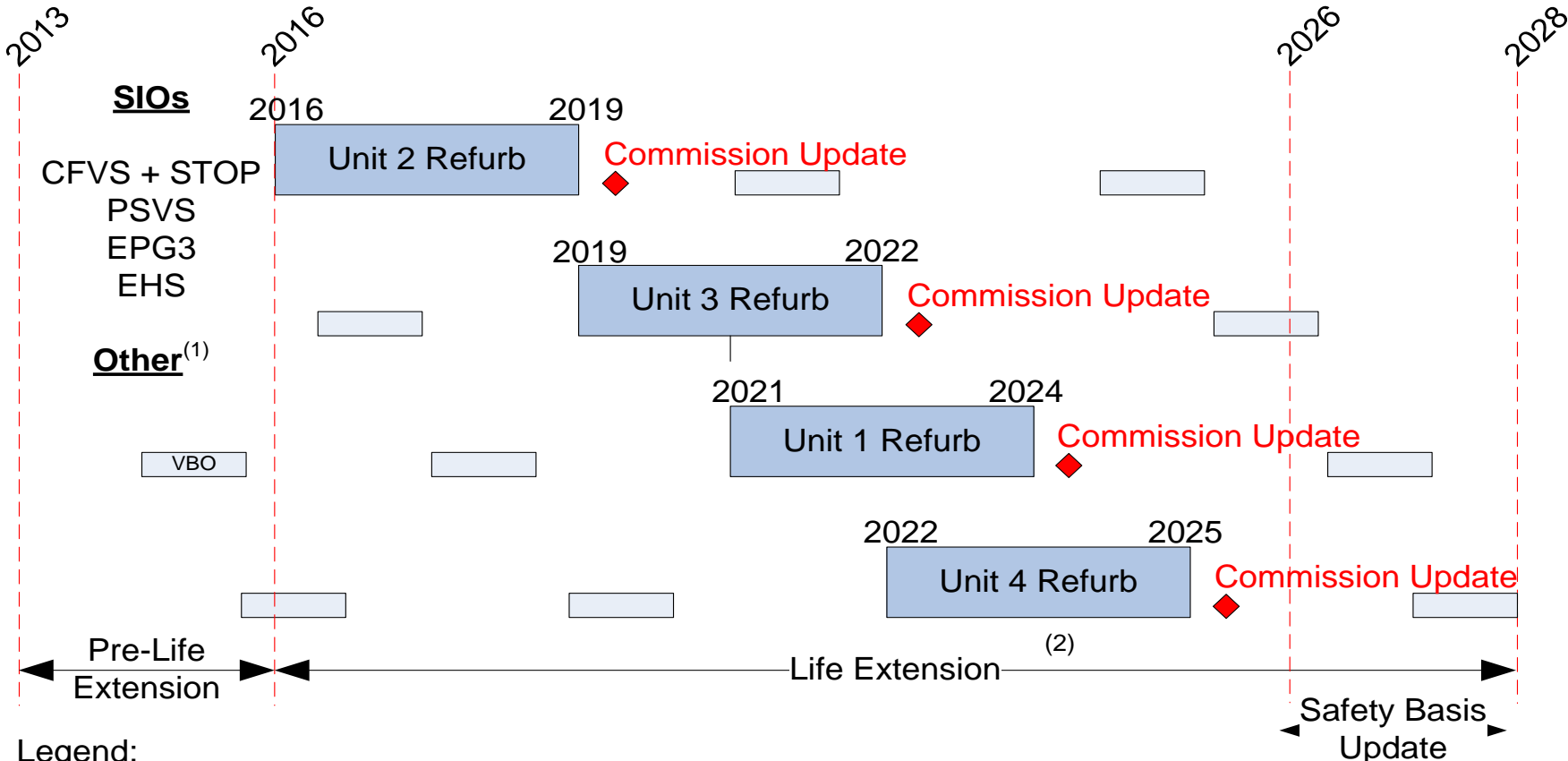
Darlington Refurbishment Overview

February 2015

ONTARIO **POWER**
GENERATION



Refurbishment Timeline



Legend:

- ☐ Scheduled Unit Outage
- (1) Includes other Pre-Life Extension activities as identified in the IIP
- (2) Based on current planning assumptions



Refurbishment

- CANDU reactors require a mid-life refurbishment to replace pressure tubes and other major components at about 30 years.
- CNSC requirements are provided in Regulatory Document RD-360, “*Life Extension of Nuclear Power Plants*”. Specifically:
 - Environmental Assessment (EA)
 - Integrated Safety Review (ISR)
 - Global Assessment (GA)
 - Integrated Implementation Plan (IIP)
 - Return to Service Plan



Environmental Assessment (EA)

- Assessed the environmental effects of refurbishment and continued operation for an additional 30 years.
- Concluded that the project, taking into account the mitigation measures identified in the EA, is not likely to cause significant adverse environmental effects.
- Identified Mitigating Measures & Follow-up Monitoring Program Activities:
 - Includes Design Enhancements (i.e., Safety Improvement Opportunities) to mitigate severe accidents.



Integrated Safety Review (ISR)

- Systematic assessment of the existing plant to determine if the plant conforms to modern codes, standards and practices (including Component Condition Assessments).
- Demonstrated Darlington complies closely with modern codes and standards.
- Identified activities to enhance component and condition of the station.



Global Assessment Report (GAR)

- Global Assessment Report (GAR):
 - Provides an overall risk judgment on the acceptability of continued operation.
 - Includes an assessment to determine the extent to which the safety requirements of Defence in Depth identified in RD337 have been fulfilled.
 - Verified the existence of multiple levels of barriers between radioactive materials and the environment.



Integrated Implementation Plan (IIP)

- Identifies the schedule for implementation of the safety improvements from Environmental Assessment (EA) and Integrated Safety Review (ISR).
- Work will be implemented during the Retube Outages and during normal plant operation during the Life Extension period.
- Ensures additional 30 years of safe and reliable plant operation.
- Brings the plant into alignment with the modern codes, standards and practices.
- Ensures operation of the plant continues to pose minimal risk to health, safety, security and the environment:
 - IIP Revision 0: Submitted: December 2013
 - IIP Revision 1: Submitted October 2014, further refined the schedule
 - IIP Revision 2: To be submitted in May 2015, goes to the CNSC Commission



Return To Service (RTS)

- Return to Service covers the range of activities from completion of installation work to reactor power at 100%.
 - Including modification commissioning and system restart activities.
- Return to Service is accomplished through phases.
- Test program will integrate:
 - normal start-up testing,
 - non-standard tests that are unique to a refurbishment outage, and
 - outstanding modification commissioning tests.
- The “Return to Service Management Plan” outlines the processes that will be used to manage the commissioning and restart activities and demonstrate that all licence conditions have been met.



Regulatory Hold Points for Return to Service and Continued Operations

- OPG as the licensee is required to obtain approval prior to the removal of established regulatory hold points.
- There are four (4) regulatory hold points for which CNSC approval will be sought prior to proceeding to the subsequent commissioning phase:
 - Phase A – Prior to **Fuel Load**
 - Phase B – Prior to removal of **Guaranteed Shutdown State**
 - Phase C – Prior to exceeding **1% Full Power**
 - Phase D – Prior to exceeding **35% Full Power**



Investments Being Made at Darlington

Safety Improvement (EA) Projects

- 12 3rd Emergency Power Generator
- 13 Containment Filtered Venting System
- 14 Power House Steam Venting System
- 15 Shield Tank Overpressure Protection
- 16 Fire Water and Emergency Cooling

Refurbishment Projects

- 1 Darlington Energy Complex (DEC)
- 3 Re-tube and Feeder Replacement Island Support Annex
- 17 Re-tube Waste Storage Building
- 11 Re-tube Waste Processing Building
- 4 Refurbishment Project Office (RPO)
- 10 Heavy Water Storage

Site Infrastructure Projects

- 7 Electrical Power Distribution
- 2 Operations Support Building Refurbishment
- 9 Water and Sewer
- 6 Holt Road Interchange Improvements
- 5 Vehicle Screening Facility
- 8 Auxiliary Heating System
- 18 Used Fuel Dry Storage Building



Reactor Mock-up and Training Facility



- Reactor Mock-up In-service 2014
 - Full scale replica of a Darlington reactor.
 - Floor models.
- Will be used for:
 - Training of workers in a life-like environment.
 - Tool development and commissioning.
 - Procedures development and verification.
 - Verification of logistics.
 - Will incorporate lessons learned to subsequent refurbishments.



Thank you.

We welcome your questions!