



**DARLINGTON
NUCLEAR GENERATING STATION
APPLICATION FOR LICENCE RENEWAL
– ADDENDUM –**



January 2015

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1.0 OVERVIEW

1.1 Introduction

Information submitted in original licence application remains valid for this section.

1.2 Darlington Nuclear Generating Station (NGS)

Application for Licence Renewal

The current Darlington NGS Power Reactor Operating Licence (PROL) 13.01/2015 expires on December 31, 2015. As documented in References 8 and 9, the licence had been renewed for a one-year term in July 2014.

The information contained and rationale for the requested licence term provided in Ontario Power Generation's (OPG) licence renewal application for the PROL 13.00/2014 (Reference 10) remains valid. This addendum provides updates on station performance data and progress made since the submission of the original licence renewal application. To assist the reviewer, the references in each section of this addendum are in sequential order continuing from numbering contained in the original licence renewal application.

OPG's application for a licence term that encompasses the continued safe operation of each unit up to its refurbishment outage, the refurbishment of each unit, and the return to full power operation of all four refurbished units remains unchanged.

Station Performance

Significant accomplishments for the Darlington station since the original licence application include:

- Darlington received its second consecutive excellent safety and performance rating from our industry peers, presented at the annual Institute of Nuclear Power Operations (INPO) conference in Atlanta on November 18, 2014.
- Darlington continued to sustain solid performance, making changes to align with industry best practices, including transition to Days Based Maintenance (DBM) in 2014.
- OPG was the first utility to satisfactorily complete all Canadian Nuclear Safety Commission (CNSC) Fukushima Action Items (FAIs).
- OPG exhibited strong safety performance this year. Accident Severity Rate (ASR) (i.e. the number of calendar days missed due to injury per 200,000 hours worked) is the lowest in the over 100 year history of the company.
- The number of Darlington Site Event-Free Day Resets (EFDR) and Level 1 and 2 Work Protection events have been reduced significantly this year.
- Darlington's Forced Loss Rate (FLR) went from 4.4% in 2013, to 1.5% in 2014.
- Darlington exceeded the Plant Reliability List (PRL) target of 250 items repaired and corrective/ deficient backlogs were better than target (196 items per unit vs. a target of 205).
- OPG's work in the community remains an important focus area. Darlington's efforts in the biodiversity area were recognized at the 26th Annual Wildlife Habitat

Council Symposium where Darlington was recertified for Wildlife at Work and Corporate Lands for Learning.

- Darlington was also selected as a finalist in the Community Partner of the Year Award, which recognizes the special relationship between OPG and community members in its conservation and education projects.

1.3 Refurbishment

Integrated Implementation Plan

An updated Darlington Integrated Implementation Plan (IIP) for the Refurbishment and Continued Operation of Darlington NGS was submitted to CNSC staff in Reference 11. The IIP revision was based on CNSC staff's feedback and addressed the following items:

- Specific dates have been identified for all unitized and non-unitized work;
- The majority of unit specific physical work has been scheduled for completion prior to restart of the first complete maintenance outage following the Refurbishment Outage for each respective unit;
- The majority of inspections required to confirm condition has been scheduled prior to unit restart of the Refurbishment Outage for each respective unit;
- The rationale/criteria for inclusion or exclusion of Component Condition Assessments (CCA) and Integrated Safety Review (ISR) gaps has been included;
- The majority of safety improvements applicable to the entire station have been scheduled prior to the restart of the Unit 2 Refurbishment Outage;
- For Environmental Assessment (EA) related commitments, the implementation timing is in accordance with the EA Screening Report and EA Follow-up Program Report.

In addition, an Integrated Implementation Plan procedure will be issued in 2015 to document the formal process for the control, justification and documentation of any changes to the Darlington IIP as required by Regulatory Document RD-360. While changes to the IIP are not planned, the breadth and complexity of the work could require some ongoing refinement. Once approved by the Commission as part of the renewed operating licence, there will be no fundamental changes to the intent of items listed in the IIP. In the case where refinements are necessary, these variances would be managed in accordance with IIP Change Control Principles (Reference 12).

In December 2014, CNSC staff concluded that the Darlington IIP Revision 001 met the intent of RD-360. OPG will submit an update to the IIP (Revision 002) to incorporate items that have been completed since the submission of Revision 001 (Reference 13).

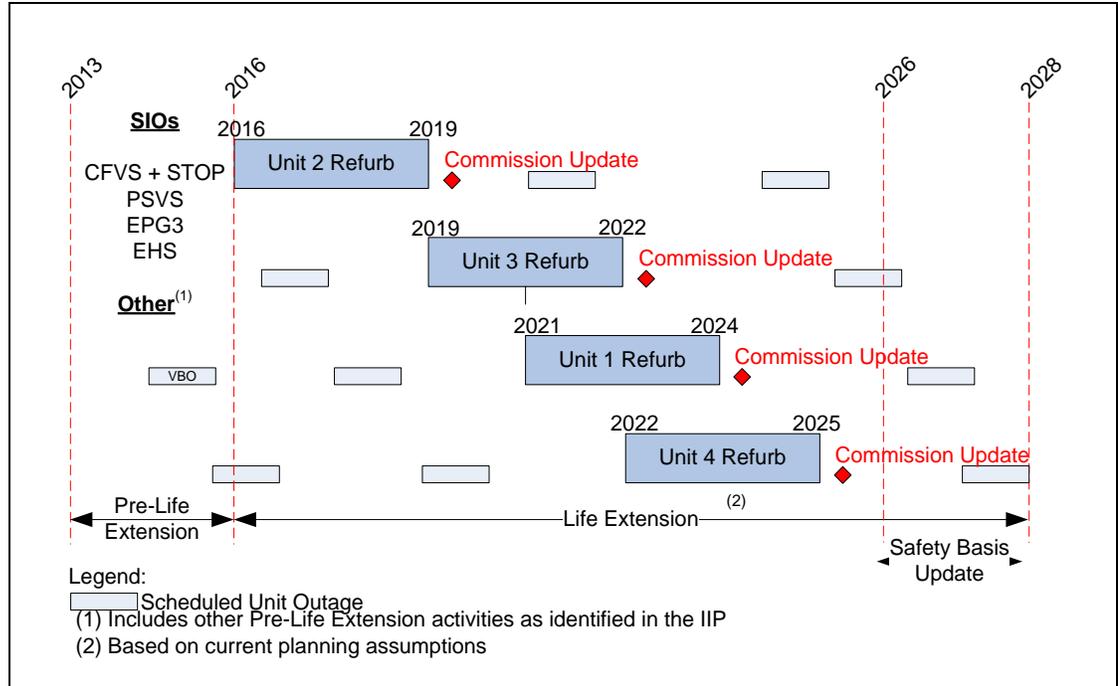
Global Assessment

CNSC staff concluded that the Darlington Global Assessment (GA) Report met the applicable requirements of RD-360 (Reference 14). OPG subsequently provided an update to five of the GA supporting documents and submitted an addendum to the GA technical basis document to CNSC staff for information in November 2014 (Reference 15). These documents were submitted to reflect revisions to modern codes and standards used in the ISR. This review concluded that there is no impact on the conclusions of the GA.

Refurbishment Timeline

The unit sequence order identified in the Darlington Life Extension Model has been updated in Figure 2 to reflect the new sequence order of Unit 2, Unit 3, Unit 1 and Unit 4 based on current planning assumptions (Reference 16). The new unit sequence order has no impact on the planned unit outage dates associated with the Nuclear Refurbishment Program.

Figure 2 - Darlington Life Extension Model (Indicative)



1.4 Post-Refurbishment Operation – Continuous Improvement

Information submitted in original licence application remains valid for this section.

References: The original licence application contained seven references. The references listed below are relevant to this addendum.

- (8) [OPG letter, B. Duncan to M. Leblanc, “Darlington NGS-Request for Amendment of the Darlington Nuclear Generating Station Power Reactor Operating Licence Expiry Date”, June 18, 2014, CD# NK38-CORR-00531-16873.](#)
- (9) [CNSC letter, L. Levert to B. Duncan, “Record of Proceedings and Licence – Ontario Power Generation Inc.”, July 29, 2014, CD# NK38-CORR-00531-16926.](#)
- (10) [OPG letter, B. Duncan to M. Leblanc, “Darlington NGS-Application for Renewal of the Darlington Nuclear Generating Station Power Reactor Operating Licence 13.00/2014”, December 13, 2013, CD# NK38-CORR-00531-16490.](#)

- (11) [OPG letter, D. Reiner and B. Duncan to F. Rinfret, "Darlington NGS-Request for CNSC Acceptance of Updated Integrated Implementation Plan \(IIP\), October 31, 2014, CD# NK38-CORR-00531-16866.](#)
- (12) [OPG letter, D. Reiner and B. Duncan to F. Rinfret, "Darlington NGS-Integrated Implementation Plan \(IIP\) Change Control Process Principles", November 7, 2014, CD# NK38-CORR-00531-16991.](#)
- (13) [CNSC letter, F. Rinfret to D. Reiner and B. Duncan, "Darlington NGS: Request for CNSC Acceptance of Updated Integrated Implementation Plan \(IIP\) Revision 001", December 22, 2014, CD# NK38-CORR-00531-17187.](#)
- (14) [CNSC letter, F. Rinfret to D. Reiner, "Request for CNSC Acceptance of the Darlington NGS Global Assessment Report \(GAR\) and Integrated Implementation Plan \(IIP\)", April 17, 2014, CD# NK38-CORR-00531-16792.](#)
- (15) [OPG letter, D. Reiner to F. Rinfret, "Darlington NGS Global Assessment Update", November 11, 2014, CD# NK38-CORR-00531-17096.](#)
- (16) [OPG letter, D. Reiner to F. Rinfret, "Darlington Refurbishment-Unit Outage Sequence Update", July 7, 2014, CD# NK38-CORR-00531-17008.](#)

2.0 MANAGEMENT SYSTEM

Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Management System		
Nuclear Management System	N-CHAR-AS-0002	R017A
Managed Systems	N-PROG-AS-0001	R016
Records and Document Control	N-PROG-AS-0006	R011
Organization		
Organizational Change Control	N-PROC-AS-0068	R007
Persons Authorized to Act on Behalf of OPG in Dealing with the CNSC	N-CORR-00531-07345	20-NOV-2014
Plant Management (including Safety Culture)		
Nuclear Safety Policy	N-POL-0001	R003
Nuclear Safety Oversight	N-STD-AS-0023	R007
Nuclear Safety Culture Assessment	N-PROC-AS-0077	R007
Self Assessment and Benchmarking	N-PROC-RA-0097	R007
Independent Assessment	N-PROG-RA-0010	R013

2.1.1 Business Planning

OPG's goal is for the Darlington NGS to be the best performing nuclear power plant in the world. Darlington's near term objective for the 2015 to 2017 business plan is to continue the station's Journey of Excellence (JOE) program while positioning the station for refurbishment and beyond.

Darlington's 2015-2017 business plan will focus on:

Vacuum Building Outage (VBO) preparation and execution

- Equipment Reliability (ER) improvement through investment in new projects and capital spares and executing ER improvement plans
- Refurbishment Integration and alignment through strategic investments/life extension
- Fuel Handling Reliability to support station operations and Refurbishment

Performance Metrics (2015-2017 Business Plan)

Table 1 highlights Darlington's report card targets for the 2015 to 2017 business plan.

Table 1 – Report Card Metrics Annual Targets

Report Card Metrics - Annual Targets	2015	2016	2017
Safety			
All Injury Rate (#/200k workhours)	0.69	0.69	0.69
Collective Radiation Exposure (person rem/unit) *	73.80	55.00	77.60
Airborne Tritium Emissions (curies) *	4,800	4,000	3,000
Environmental Infractions (#)	7	7	6
Environment Index (%)	80	80	80
Work Protection Level 1 Events	2	2	2
Reliability			
Net Electrical Production (TWh)	24.74	26.02	20.14
Forced Loss Rate (%)	1.00	1.00	1.00
Unit Capability Factor (%) *	82.3	92.0	89.9
BP-Planned Outage Performance (days)	245.6	97.0	101.2
Nuclear Performance Index (%)	88.8	94.3	93.8
On-line Deficient Maintenance Backlog (work orders/unit) *	180	175	175
On-line Corrective Maintenance Backlog (work orders/unit) *	25	25	17
Plant Reliability List (# of work orders completed)	200	200	200
T-15 Scope Survival Critical WO's (%)	80	80	80
Equipment Reliability Index (%)	85	88	88
Dry Storage Containers (#)	60	60	60
Chemistry Performance Indicator (Annual YTD)	1.01	1.01	1.01
Value for Money			
Thermal Performance Indicator (%)	99.5	99.5	99.5
Human Performance			
Training Index (%)	80	80	80
Corrective Action Program - Quality of Significance Level 1&2 Eval's (Out of 3)	2.22	2.22	2.22
Event-Free Day Resets (#)	2	1	1

* Targets based on 3-unit operation following U2 refurbishment starting October 2016.

2.1.2 Management System

The Nuclear Management System has evolved to support the OPG business model by transferring several of the nuclear programs to the centre-led business units. An update on the OPG business model implementation was submitted to CNSC staff under Reference 2.

OPG will be compliant with CSA Standard N286-12, *Management System Requirements for Nuclear Power Plants*, by December 31, 2015 to align with the new PROL renewal date following the one-year extension.

2.1.3 Nuclear Safety Policy

Minor revisions were made to N-POL-0001 to update wording to align with the latest revision of the INPO document 12-012, *Traits of a Healthy Nuclear Safety Culture*.

2.1.4 Nuclear Safety Culture

In February 2015, Darlington NGS will conduct a station wide assessment of its Nuclear Safety Culture. OPG will continue to conduct these station wide assessments periodically on a three-year cycle as per N-PROC-AS-0077, *Nuclear Safety Culture Assessment*. Results from the previous assessment of Darlington's Nuclear Safety Culture in June 2012 were submitted to CNSC staff in Reference 3.

2.1.5 Independent Assessments

The Nuclear Oversight rolling audit schedule for the period of Q4 2013 to Q4 2014 was provided to CNSC staff in Reference 3. Audit frequency of managed processes is determined using a risk-based approach, and may range from one to five years based on a risk based assessment performed for the individual programs.

Darlington's most recent industry peer review was completed in March 2014, in which Darlington received the highest possible rating for the second time in a row, once again being recognized by its peers as one of the top performing stations in the world.

2.1.6 Self Assessment and Benchmarking

Darlington continues to engage in self assessments and benchmarking in accordance with established OPG procedures. Significant self assessments planned for 2015 include Operator Fundamentals, Equipment Reliability, and Fuel Handling Reliability.

2.1.7 Organization

Organizational changes are managed following N-PROC-AS-0068, *Organizational Change Control*, and CNSC staff is provided updates annually. The most recent update was provided in Reference 4.

2.2 Refurbishment

2.2.1 Nuclear Management System

The Nuclear Refurbishment Program Management Plans were submitted to CNSC staff in Reference 3.

2.2.2 Organization

Information submitted in original licence application remains valid for this section.

2.2.3 Nuclear Safety Culture

Information submitted in original licence application remains valid for this section.

2.2.4 Nuclear Refurbishment Program Oversight

Information submitted in original licence application remains valid for this section.

2.2.5 Self-Assessment and Benchmarking

Information submitted in original licence application remains valid for this section.

References: The original licence application contained one reference. The references listed below are relevant to this addendum.

- (2) [OPG letter, G. Jager to M. Santini and F. Rinfret, "Response to CNSC Review of OPG Business Model as Documented, New Action Item 2013-OPG-4432", May 9, 2014, CD# N-CORR-00531-06485.](#)
- (3) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS-Response to CNSC Staff Technical Sufficiency Review of the Application for Renewal of the Power Reactor Operating Licence \(PROL\) 13.00/2014", February 14, 2014, CD# NK38-CORR-00531-16667.](#)
- (4) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS – Organizational Changes – Annual Update Report for 2014", January 27, 2015, CD# NK38-CORR-00531-17212.](#)

3.0 HUMAN PERFORMANCE MANAGEMENT

Those documents provided in the original licence application that have been revised are shown below.

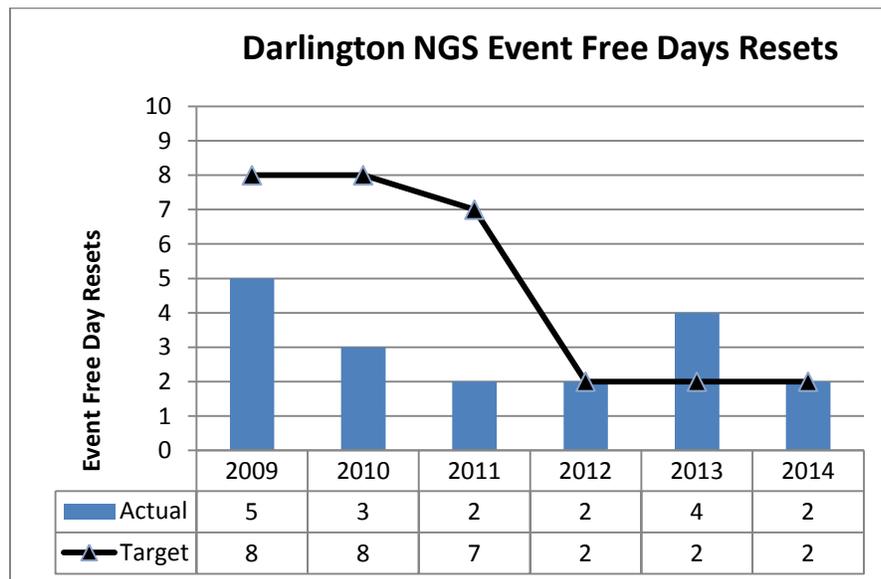
Document Title	Document Number	Revision #
Human Performance		
Human Performance	N-PROG-AS-0002	R014
Procedural Use and Adherence	N-STD-AS-0002	R014
Communications	N-STD-OP-0002	R003

Document Title	Document Number	Revision #
Self-Check	N-STD-OP-0004	R004
Observation and Coaching (Superseded)	N-STD-OP-0015	R015
Observation and Coaching	N-INS-09030-10004	R000
Second Party Verification	N-STD-RA-0014	R006
Minimum Shift Complement		
Station Shift Complement	D-PROC-OP-0009	R013
Training, Certification and Examination Program		
Systematic Approach to Training	N-PROC-TR-0008	R019
Written and Oral Initial Certification Examination for Shift Personnel	N-INS-08920-10004	R005

3.1.1 Human Performance Program

Figure 6 shows how performance at Darlington NGS has consistently met industry excellence during the last six years. In 2014 Darlington NGS had set a target of two Event Free Day Resets (EFDRs), which is consistent with industry best performance.

Figure 6 – Darlington NGS EFDRs



In 2014 Darlington experienced two EFDRs, which represents a 50% improvement from the 2013 results. This is a result of Darlington's rigorous focus and application of Human Performance tools and initiatives in 2014. Additionally, OPG recognized the benefits for a Central Functional Area Manager (CFAM) in the area of Human Performance to drive best practices and ensure consistency across the organization.

Key initiatives for the Darlington station are:

- INPO conducted Human Performance enhanced training for department “Advocates”, who assist with development and implementation of initiatives within the departments and facilitate cross-functional collaboration.
- Dynamic Learning Activity (DLA) training conducted with staff focusing on error prevention tools based on department needs.
- Conduct self-assessment on leadership observation and coaching quality.
- Develop and implement a human performance specific communication program.
- Plan effectiveness reviews for improved standards.

The Human Performance Strategic Plan and additional details documenting the situational awareness campaign and the two minute job site drill were submitted to CNSC staff in Reference 1.

3.1.2 Minimum Shift Complement

Days Based Maintenance Initiative

Implementation of the DBM initiative has been completed, with the transition of most maintenance resources from a shift schedule to a predominantly days-based structure. This transition has increased ownership, quality and efficiency of equipment repairs. OPG continues to monitor key metrics and will provide an update to CNSC staff in June 2015, one year after full implementation.

3.1.3 Limits of Hours of Work

The internal assessment conducted on the hours of work program in 2013 was submitted to CNSC staff in Reference 1.

3.1.4 Training, Certification and Examination Program

Table 2 shows the success rate for certification testing over the past four years, including 2014.

Table 2 - Re-qualification Tests Results

Year	Success Rate %	Number of Candidates	Number of Passes
2011	100%	38	38
2012	96%	66	63 *
2013	100%	48	48
2014	100%	35	35

* All unsuccessful candidates were successfully remediated

The 10 year estimated projection of certified staff levels was provided to CNSC staff in Reference 1.

3.1.5 Personnel Training

For Operations, the 2014 continuing training program included Supervising Nuclear Operator Professional Development sessions and work protection DLAs. Additional emphasis was also placed on reinforcing the operator fundamentals in all training settings.

In 2015, the Operator Continuing Training plans will include changes and enhancements to the Severe Accident Management Guidelines (SAMG)/ Emergency Mitigating Equipment (EME) procedures, a continued focus on operator fundamentals, evolutions associated with the VBO as well as the normally scheduled items from the approved five-year training plan.

In 2015, Maintenance continuing training will continue to focus on addressing station equipment changes associated with the Refurbishment project and Station performance issues which include: Bolted Joint refresher, Concurrent Component Verification (CCV), supplemental oversight support, coaching for improved performance, and Human Performance DLAs.

There have been improvements made to the engineering training program to better align with industry best practice. For example, additional training will be provided on design basis in 2015. The Conduct of Engineering workshops continue to provide an avenue for senior leaders to shape continuing training for engineers. In 2014, two Conduct of Engineering sessions were held focussing on nuclear safety and vendor oversight.

A robust leadership development and training program is provided to all new supervisors and managers including Nuclear Safety Culture training. Additionally all supervisors and managers participate in the annual Leadership Continuing Training program. The continuing training is comprised of annual leadership skills refresher training, such as coaching or observation skills, and biannual leadership training that reviews industry operating experience and reinforces the leadership behaviours to promote and maintain a strong Nuclear Safety Culture. High potential section managers and senior department managers attend Nuclear Professional Development Seminar (NPDS) training or Senior Nuclear Plant Manager (SNPM) training along with other international nuclear leaders. The Advanced Operations Overview for Managers (AOOM) is a six month program providing technical training on plant operation for managers.

3.2 Refurbishment

3.2.1 Human Performance Program

The training and mock-up facility in the Darlington Energy Complex (DEC) in support of the Retube and Feeder Replacement project was officially opened in 2014 and is currently being used for testing and commissioning of specialized tooling, training of personnel, confirmation of logistics, and validation of procedures.

3.2.2 Personnel Training

The Nuclear Refurbishment Training Qualification Description was established for the Refurbishment Program and submitted to CNSC staff in Reference 2.

References:

- (1) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS-Response to CNSC Staff Technical Sufficiency Review of the Application for Renewal of the Power Reactor Operating Licence \(PROL\) 13.00/2014", February 14, 2014, CD# NK38-CORR-00531-16667.](#)
- (2) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS-Licence Application-Submission of Nuclear Refurbishment Training and Qualification Description", October 1, 2014, CD# NK38-CORR-00531-17029.](#)

4.0 OPERATING PERFORMANCE

Those documents provided in the original licence application that have been revised are shown below.

Document Title	Operations Program	Revision #
Operations Program		
Operating Policies and Principles	NK38-OPP-03600	R030
Operational Safety Requirements: Powerhouse Steam and Flooding Protective Provisions	NK38-OSR-08131.02-10019	R002
Nuclear Operations	N-PROG-OP-0001	R006
Chemistry	N-PROG-OP-0004	R007
Severe Accident Management	N-STD-MP-0019	R001
Operating Experience Process	N-PROC-RA-0035	R018
Processing Station Conditions Records	N-PROC-RA-0022	R032
Corrective Action	N-PROG-RA-0003	R010
Response to Transients	N-STD-OP-0017	R009
Control of Fuelling Operations	N-STD-OP-0021	R003
Written Reporting to Regulatory Agencies	N-PROC-RA-0005	R014A
Preliminary Event Notification	N-PROC-RA-0020	R018B

4.1.1 Safe Operating Envelope

A self-assessment of the Safe Operating Envelope (SOE) Implementation was completed in 2013 and was submitted to CNSC staff in Reference 1. The self-assessment found that OPG SOE governance and implementation process meet the requirements of CSA standard (N290.15) on SOE.

4.1.2 Operations Program

On-going initiatives are driving improvements in leadership behaviours and standards. For example, future Shift Managers, and other leaders, are being selected by assessing candidates specifically for their leadership potential. OPG's 'Emerging Talent' and 'ACCELERATE High Potential' programs are aligned and supportive of this work within the Operations department. Formal succession planning is an area of emphasis, being executed in close alignment with engineering staffing activities. Rotations of staff to INPO are also being used as a channel to bring first-hand experience with the wider industry's best practices to OPG.

In the focus area of Human Performance/Operator Fundamentals, we remain aligned with industry best practices, including an emphasis on Operator Fundamentals. Crew Management Review Boards are an example of industry best practice that is being used as a strategic driver. We are continually striving to reduce human performance events since success in Operations is vital to the station's continuing improvement.

The *Operational Excellence Plan* for continuous improvement in Human Performance/Operator Fundamentals, as well as the *Rapid Human Performance Event Analysis and Communication* document, were provided to CNSC staff in Reference 1.

Work Protection

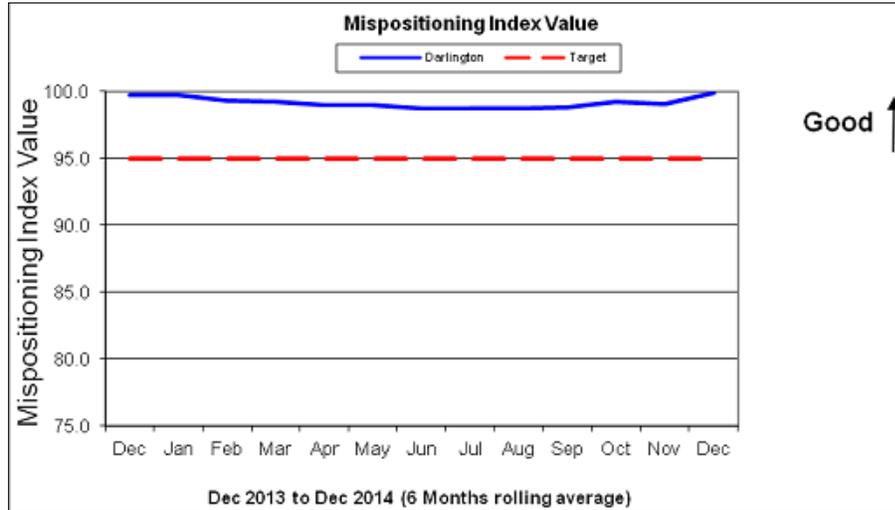
Additional measures taken during 2014 to improve oversight and focus on Work Protection include the formation of the Darlington Local Work Protection Working Committee. This committee is led by the Operations Manager and was added to ensure that oversight of work protection performance is provided, with input from various stakeholders on site. A new procedure has also been created to provide clarity on the rating of significant work protection events which aligns with industry best practices.

Plant Status Control

In 2014, expectations for return to service alignment checks of plant equipment were formalized and are being reinforced by operations management for the effective use of error reduction tools to achieve the desired behaviours.

Figure 7 shows Darlington's excellent performance in the last year, in maintaining a low number of mispositioning events.

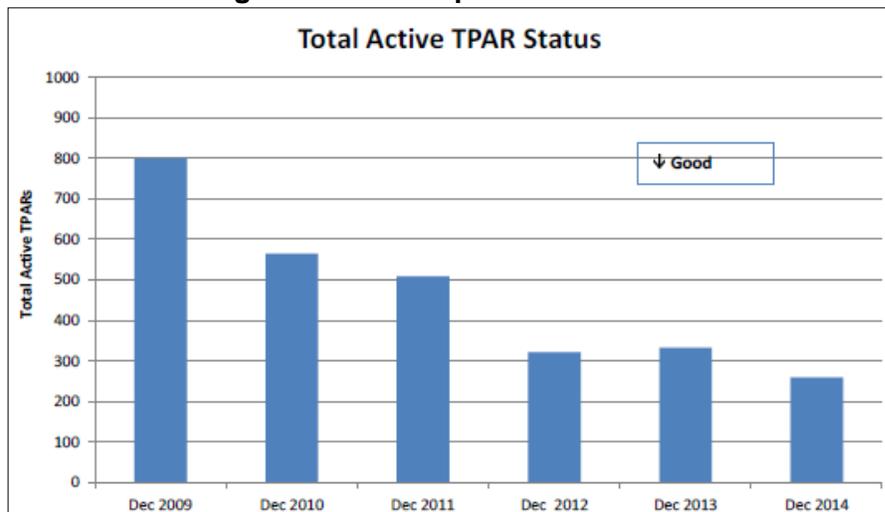
Figure 7 – Mispositioning Index Value 2013 to 2014



Operations Procedures

In 2013 and 2014, a high number of Technical Procedure Action Requests (TPARs) were processed (over 1,000 each year), and the TPAR backlog continued to be reduced, maintaining the positive trend from 2009.

Figure 8 – Total Operation’s TPARs



4.1.3 Response to Transients

During the current licence period, there have been no serious process system failures.

Table 3 shows the number of unplanned transients experienced at Darlington NGS for four operating units during the licensing period.

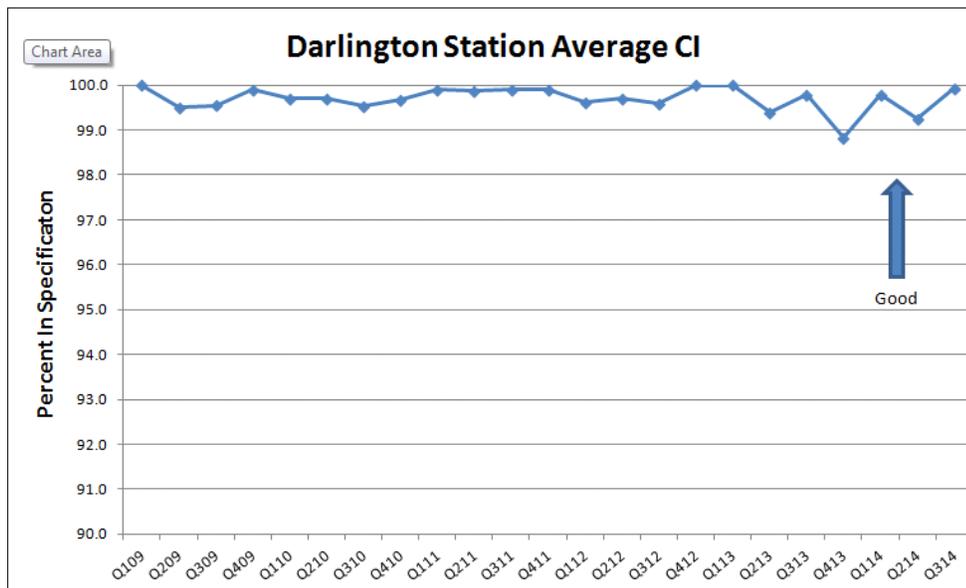
Table 3 - Number of Unplanned Transients

Year	Unplanned Reactor Trips	Step-backs	Setbacks
2011	1	1	3
2012	1	0	2
2013	2	1	1
2014	1	2	1

4.1.4 Chemistry Control

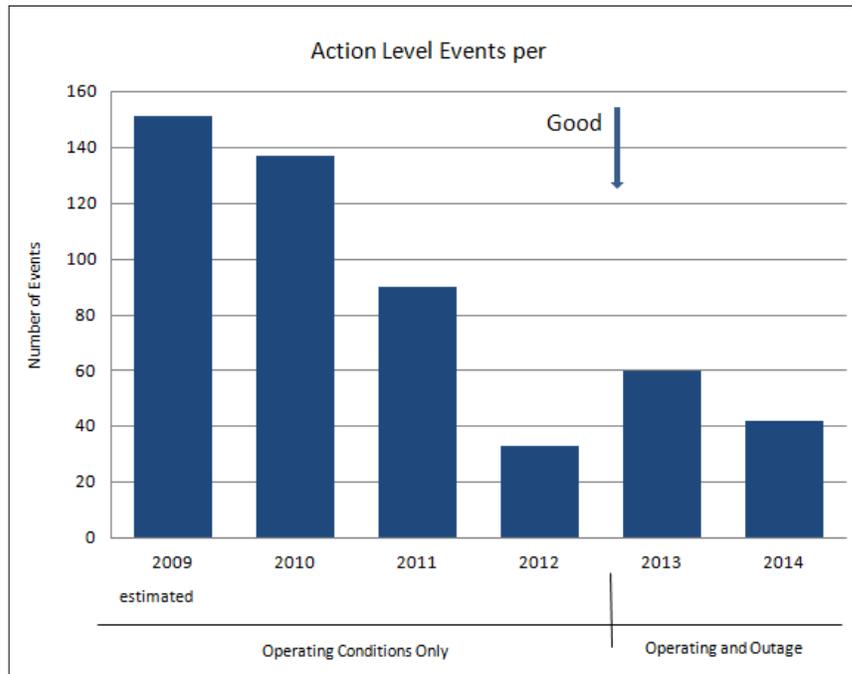
As shown in Figure 9, station performance has been excellent, and for 2014 the station average Chemistry Index (CI) was 99.7% within specification. Recent variations in performance were driven by outage related increases in corrosion product transport.

Figure 9 - CNSC Chemistry Index



Aggressive targets are set to reduce action level occurrences for all operating states as shown in Figure 10. Self assessments are conducted to identify trends and any actions required to address specific issues relating to chemistry action level events.

Figure 10 – Chemistry Action Level Events



4.1.5 Fuel Handling

Fuelling machine reliability has shown an improving trend since Q4 2013. Focused effort on improving equipment reliability has resulted in significant reduction in degraded equipment/backlog, and improved Average Zone levels (AZL). For comparison purposes, unplanned unavailability decreased from 13.6% in Q4 2013 to 10.6% in Q4 2014; over the same period, average AZL increased from 32% to 40%. Refer to original licence application for details on Fuel Handling system operation.

With the organization focused on Fuel Handling reliability, opportunities to perform maintenance have increased with a significant amount of power track chain (450 feet in 2014) and other equipment and components replaced to improve the aggregate health of Fuel Handling systems. A new fleetwide metric for ER has been developed specific to Fuel Handling, recognizing the unique elements contributing to reliable operation of Fuel Handling equipment.

A Fuel Handling ER/Refurbishment schedule has been developed that integrates the priority ER initiatives and the refurbishment pre-requisites.

4.1.6 Fuel Reliability

Overall, steady-state iodine levels remained below shutdown limits during the licensing period. Six fuel defects were detected and removed from Darlington units between January and September 2014, after which all units have operated defect-free. One incident on Unit 1 resulted in iodine levels exceeding the action limits, but the heat transport purification system was sufficient to avert shutdown iodine limit from being exceeded.

Measures taken to prevent the potential of fuel defects include: a slight manufacturing adjustment of fuel density (within the current specification, presently being fuelled in-core) and reduction of pellet diameter (reception of fuel in 2015), close monitoring of existing fuel bundle inventory and core load, refined fuel loading procedure that considers internal bundle clearances with respect to in-core bundle position, and modified fuelling strategy for channels that are more susceptible to fuel defects.

4.1.7 System Availability

Availability of Systems Important to Safety (SIS) was maintained at a high level during the past year. Details on system availability in 2014 will be reported to CNSC staff in the scheduled report to be submitted by March 31, 2015 as per Regulatory Standard S-99. Subsequent reports will be submitted pursuant to Regulatory Document REGDOC-3.1.1.

4.1.8 Corrective Action Program and OPEX

Quarterly Station Condition Record (SCR) Trending and Performance Improvement Reports, as well as Operating Experience (OPEX) monthly score cards, were provided to CNSC staff in Reference 1.

10,700 SCR's were generated and processed at Darlington in 2014, which reflects good performance measured against the industry and is indicative of a culture of raising concerns.

4.1.9 Regulatory Reporting

In 2014, 93 events were reported to CNSC staff under the unscheduled reporting requirements of Regulatory Standard S-99. This is consistent with 2013 reporting numbers.

Darlington has maintained a consistent approach for the timely submission of all regulatory reports, and is currently in compliance with REGDOC-3.1.1, which replaced S-99 in the Darlington PROL effective January 1, 2015. The change management process included the updating of applicable governance and communication rollout sessions with key station personnel, which have been completed.

4.2 Refurbishment

4.2.1 Operations Program

Information submitted in original licence application remains valid for this section.

4.2.2 Safe Operating Envelope

Information submitted in original licence application remains valid for this section.

4.2.3 Chemistry Control

Information submitted in original licence application remains valid for this section.

4.2.4 Corrective Action Program

Information submitted in original licence application remains valid for this section.

4.2.5 OPEX

Information submitted in original licence application remains valid for this section.

References:

- (1) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS-Response to CNSC Staff Technical Sufficiency Review of the Application for Renewal of the Power Reactor Operating Licence \(PROL\) 13.00/2014", February 14, 2014, CD# NK38-CORR-00531-16667.](#)

5.0 SAFETY ANALYSIS

Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Darlington NGS Safety Report: Part 1 and 2	NK38-SR-03500-10001	R004
Darlington Analysis of Record	NK38-REP-00531.7-10001	R030
Safety Analysis Program		
Severe Accident Management	N-STD-MP-0019	R001
OPG Probabilistic Risk Assessment (PRA) Guide-Level 1 (At Power)	N-GUID-03611-10001 Volume 1	R004
Submission of OPG Probabilistic Risk Assessment (PRA) Computer Codes	N-CORR-00531-04548, 04761, 04961	N/A

5.1.1 Safety Analysis

In October 2014, OPG requested an amendment to the Darlington PROL to incorporate Regulatory Documents REGDOC-2.4.1 and REGDOC-2.4.2, superseding Regulatory Standards S-310 and S-294, respectively (Reference 2). Darlington's PROL was amended accordingly in December 2014.

RegDoc-2.4.1, *Deterministic Safety Analysis* Implementation

Details for OPG's graded approach for REGDOC-2.4.1 compliance is provided References 2 and 3.

RegDoc-2.4.2, *Probabilistic Safety Assessment for Nuclear Power Plants* Compliance

The Darlington station currently has in place a Darlington Probabilistic Risk Assessment (DARA) that was completed in late 2011 in accordance with Regulatory Standard S-294 and CNSC staff accepted methodology.

This risk assessment concludes that the risk to public health of living and working in the vicinity of Darlington NGS is very low in comparison to other potential risks to which the population is normally exposed.

As documented in Reference 4, the following key Darlington PSA (Probabilistic Safety Assessment) related deliverables will be completed prior to the Part 1 public hearing:

- Updated DARA results including impact of SIO's and EME
- An assessment of aggregation across risk hazards
- An action plan should the updated DARA results exceed OPG's safety goal targets
- An update on OPG's and industry plans for multi-unit PSA's

OPG will also complete and make publically available a summary report for the 2015 DARA update. This report will be posted on opg.com well in advance of the Part 2 public hearing.

5.1.2 Design and Analysis Computer Codes and Software

Information submitted in original licence application remains valid for this section.

5.2 Refurbishment

5.2.1 Safety Analysis

An interim update to the 2015 DARA results will be completed to reflect the SIOs and isolation of the unit from common containment. The purpose of this update will be to demonstrate that plant risk continues to meet OPG safety goals as refurbishment progresses.

After all units have been refurbished, the DARA will be updated to reflect the detailed design and "as-installed" configurations. The EA follow-up program includes preparation of a report to compare the updated probabilistic risk assessment results from installed SIO equipment with the EA predicted improvements, to confirm the actual reduction in accident probabilities and the corresponding increase in safety.

5.2.2 Hazard Analysis

Information submitted in original licence application remains valid for this section.

5.2.3 Design and Analysis Computer Codes and Software

Information submitted in original licence application remains valid for this section.

References: The original licence application contained one reference. The references listed below are relevant to this addendum.

- (2) [OPG letter, B. Duncan to M. Leblanc, "Darlington NGS - Request for a Licence Amendment to Darlington PROL 13.00/2015 to Implement New Regulatory Documents REGDOC-2.4.1 and REGDOC-2.4.2", October 31, 2014, CD# NK38-CORR-00531-17057.](#)

- (3) [OPG Letter, W.M. Elliott to M. Santini and F. Rinfret, "Progress Report on OPG Safety Analysis Improvement and REGDOC-2.4.1 Implementation Activities – Action Item 2014OPG-5461," October 24, 2014, CD# N-CORR-00531-06506.](#)
- (4) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS- Additional Information to Support Darlington Request for Licence Amendment to Incorporate REGDOC 2.4.2 on Probabilistic Safety Assessment", December 10, 2014, CD# NK38-CORR-00531-17143.](#)

6.0 PHYSICAL DESIGN

Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Design Program		
Engineering Change Control	N-PROG-MP-0001	R014
Design Management	N-PROG-MP-0009	R011
Pressure Boundary Program		
System and Item Classification	N-PROC-MP-0040	R009
Design Registration	N-PROC-MP-0082	R011
Pressure Boundary Program Manual	N-MAN-01913.11-10000	R015

6.1.1 Design Management and Conduct of Engineering Programs

OPG and the University of Ontario Institute of Technology (UOIT) have combined to offer a graduate diploma in Nuclear Design Engineering, which provides staff with continuing technical training as well as interaction and networking within academic and power generation communities. As recognized by experts in the nuclear industry this diploma program increases the capability of Design staff by broadening their knowledge of nuclear systems and industry standards while encouraging a questioning attitude. This has resulted in enhanced quality in design products and services and has allowed for the reduction of consequential design errors, leading to improvements in the Engineering Change Control (ECC) site index: 94.3% in the last half of 2013 to 98.5% in the last half of 2014, with a target of greater than 95% for 2015.

Self assessments and audits completed through 2013 and 2014 found an improving trend in design quality and overall compliance with ECC requirements which is consistent with the ECC site index. The high ranking is due to many initiatives such as continued use of the Design Review Board, fleet-wide communication of lessons learned through the Design Managers Working Group and the Design Summit led by the Chief Nuclear Engineer and Chief Nuclear Officer. Additional initiatives include the formation of a Design Training Committee, the use of the Design Authority Grading Sheet and the use of the Design Verification Checklist and Observation and Coaching database.

Along with the programs mentioned above, OPG has recently assigned dedicated resources for ECC closeout activities and has been continuously tracking the closeout backlog reduction. OPG is working to improve identification and communication of changes to procedures with all staff to ensure awareness of all roles and responsibilities within the ECC process and ensure compliance.

OPG, through self assessments in 2014, has identified vendor documents as an area for improvement of design quality. Through the Conduct of Engineering program, Vendor Oversight training was provided to all staff with a focus on a collaborative approach. This training included review of oversight procedures which assisted in clearly identifying roles, responsibilities and accountabilities of both the vendor and OPG employees.

The transition plan for CSA standard N290.0-11, *General Requirements for Safety Systems of Nuclear Power Plants*, was submitted to CNSC staff in References 2 and 3. Darlington will be in compliance with N290.0-11 for future modifications by December 2015.

6.1.2 Pressure Boundary Program

The Certificate of Authorizations (C of As) for Pressure Boundary (PB) activities at OPG stations are renewed every three years. This renewal is based on satisfactory audit by the Authorized Inspection Agency (AIA), which was completed in 2014. OPG's contract with the AIA was renewed effective January 2015.

OPG will update the PB Program document based on Annex N of CSA N285.0-12 and Update No. 1 and submit to CNSC staff by July 2015.

6.1.3 Environmental Qualification Program

In November 2014, CNSC staff conducted a Type II Compliance Inspection on the Darlington Environment Qualification (EQ) program (Reference 4). The final report has been issued by CNSC staff and concludes that Darlington meets regulatory requirements.

6.2 Refurbishment

6.2.1 Design Management Program

Information submitted in original licence application remains valid for this section.

6.2.2 Pressure Boundary

Information submitted in original licence application remains valid for this section.

6.2.3 Equipment Qualification

Information submitted in original licence application remains valid for this section.

References: The original licence application contained one reference. The references listed below are relevant to this addendum.

- (2) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS – Updated Application Requirements for Renewal of the Darlington Nuclear Generating Station Power Reactor Operating Licence – Transition Plans for New and Revised Standards and Regulatory Documents", May 1, 2014, CD# NK38-CORR-00531-16780.](#)
- (3) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS – Transition Plan for CSA Standard N290.0-11, "General requirements for safety systems of nuclear power plants", September 30, 2014, CD# NK38-CORR-00531-16985.](#)
- (4) [CNSC letter, F. Rinfret to B. Duncan, "CNSC Type II Compliance Inspection – Darlington NGS Environmental Qualification Program", September 10, 2014, E DOC# 4488497, CD# NK38-CORR-00531-16989.](#)

7.0 FITNESS FOR SERVICE

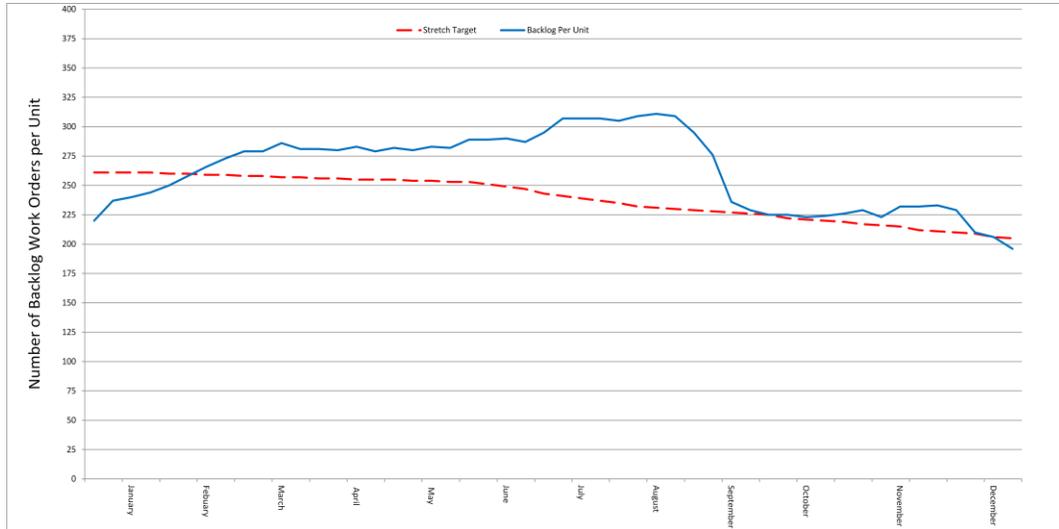
Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Maintenance and Outages		
Component and Equipment Surveillance	N-PROG-MA-0017	R007
Production Work Management	N-PROG-MA-0019	R009
Forced Outage Maintenance	N-PROC-MA-0049	R005
Equipment Reliability	N-PROG-MA-0026	R001
Major Components		
Feeders Life Cycle Management Plan	N-PLAN-01060-10001	R016
Darlington Nuclear Unit 1 Fuel Channel Feeder Pipes Periodic Inspection Program Plan	NK38-PIP-33160-10001	R001
Darlington Nuclear Unit 2 Fuel Channel Feeder Pipes Periodic Inspection Program Plan	NK38-PIP-33160-10002	R001
Darlington Nuclear Unit 3 Fuel Channel Feeder Pipes Periodic Inspection Program Plan	NK38-PIP-33160-10003	R001
Darlington Nuclear Unit 4 Fuel Channel Feeder Pipes Periodic Inspection Program Plan	NK38-PIP-33160-10004	R001
Steam Generators Life Cycle Management Plan	N-PLAN-33110-10009	R005
Darlington Units 1-4 Steam Generators Life Cycle Management Plan	NK38-PLAN-33110-00001	R007
Fuel Channels Life Cycle Management Plan	N-PLAN-01060-10002	R015
Reactor Components and Structures Life Cycle Management Plan	N-PLAN-01060-10003	R012
Containment		
Inspection of Post Tensioning Tendons on DNGS Vacuum Building	NK38-TS-03643-10001	R002
Administrative Requirements for In-Service Examination and Testing for Concrete Containment Structures	N-PROC-MA-0066	R005

7.1.1 Maintenance

Darlington's goal is to ensure that maintenance backlogs levels are in line or better than industry benchmark targets. As shown in Figure 11, the volume of these combined maintenance backlogs has been reduced in 2014 and the station target of 205 work orders per unit was met by year end (actual result 196 work orders per unit).

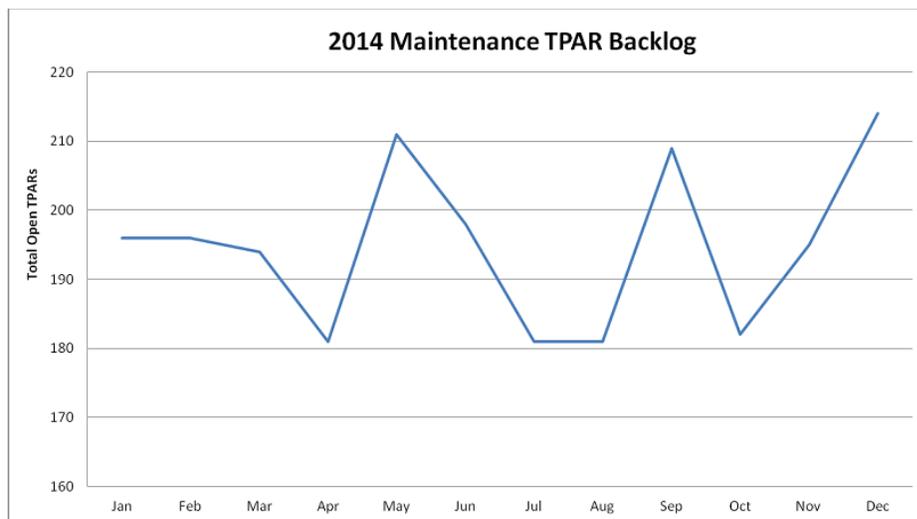
Figure 11 – Corrective Critical/ Corrective Normal/Deficient Critical/Deficient Normal Backlogs



Procedures

The number of outstanding maintenance TPARs is shown in Figure 12.

Figure 12 – Maintenance TPAR Backlog



In early 2014, the number of maintenance TPARs increased significantly due to a change in processing/ recording incoming TPARs. An action plan is being developed to address the backlog, including an initiative to centralize the maintenance procedures group to improve efficiency and effectiveness of resources.

Preventive Maintenance Work Orders

The number of Preventive Maintenance (PM) work orders completed during the second half of the grace period was reduced from 429 in Q1 2014 to 272 in Q3 2014.

7.1.2 Outages

Planned Outages

There has been one planned outage completed in 2014, which was on Unit 4 (D1411). Highlights in the area of planned outage management include:

- Internal dose uptakes during planned outages are decreasing as a result of proactive efforts to minimize dose.
- A new initiative for planned outages is tracking and reporting tritium emissions on a daily basis.
- In addition to inspections of feeders, fuel channels, steam generators, and turbine/generator overhauls, major outage work programs now include Refurbishment prerequisite inspections.

Preparation for the VBO is ongoing and the schedule remains on track for execution in the second quarter of 2015.

Forced Outages

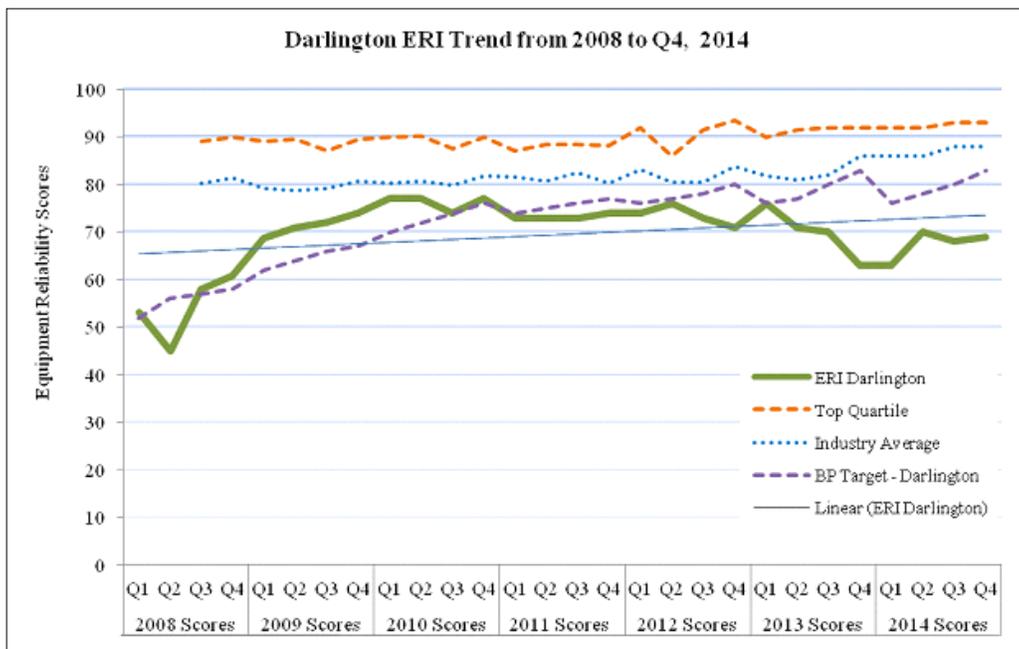
There have been four forced outages at Darlington NGS since the original licence application was submitted. They were all completed safely and the units returned to service after minor repairs and testing were completed.

7.1.3 Reliability

The focus on ER improvements is provided via the JOE meetings.

Figure 13 below depicts the ER Index (ERI) score trend from 2008 to 2014 Q4 for Darlington in comparison with industry-best-practice scores. The 2014 year end ERI score for Darlington is 70 which is an improvement from 2013 Q4 score. This will be a focus area in the coming year, with an aggressive target of 85 set for 2015. Key actions include formation of a Backlog Reduction Action Team, additional oversight on systems requiring reliability improvements, reviewing PM sustainability, and improvements to scheduling of PM work orders to optimize use of resources.

Figure 13 – ERI Trend from 2008 to Q4 2014



7.1.4 Major Components

Periodic Inspection

The latest edition of CSA N285.4 was issued in 2014. OPG provided the transition plan for CSA N285.4-14 to the CNSC staff in Reference 9.

Fuel Channels

All work identified in the second fuel channel protocol has been completed and submitted to CNSC staff as per the agreed upon schedule.

Table 3.1 provides the Equivalent Full Power Hours (EFPH) projections for Darlington units at the start of their planned Refurbishment outages per the latest revision of the Fuel Channels Life Cycle Management Plan. The fuel channel service life for Darlington NGS is planned for 235,000 EFPH. OPG will continue to confirm Fitness For Service (FFS) of pressure tubes and spacers as part of our on-going inspection and maintenance programs.

Table 3.1 - Approximate EFPH at Planned Refurbishment Outage

Darlington Unit	Approximate EFPH at Planned Refurbishment Outage*
Unit 1	222,000
Unit 2	188,000
Unit 3	208,000
Unit 4	227,000

* Assuming the current inspection and maintenance outage schedule and business plan Forced Loss Rate (FLR).

Pressure Tubes

Findings from research and development work have resulted in changes to fracture toughness modelling at hydrogen equivalent levels expected on the Darlington pressure tubes prior to refurbishment. OPG has implemented changes to the plant pressure-temperature operating envelope to improve margins in fracture protection assessments. OPG is planning for future updates to the operating envelope to maintain margin at higher hydrogen equivalent levels.

OPG is transitioning from a deterministic Leak Before Break (LBB) methodology to probabilistic LBB assessments. OPG has committed to ongoing updates to assessments for compliance with CSA N285.8, as inputs change with new inspection and research information.

Pressure tube material surveillance programs monitor material conditions and will be used to validate the Heat Transport System operating envelope and pressure tube fitness for service. Changes to material conditions will be addressed through ongoing updates to FFS assessments.

Fuel Channel Spacers

The results of Fuel Channel Lifecycle Management (FCLM) project have improved knowledge of the fuel channel annulus spacer condition and aging mechanisms. A revision to the Long Term Spacer Lifecycle Management Plan (LTSLMP) has been issued to align planned activities with the current Darlington Refurbishment schedule and reflect FCLM research and development initiatives, including results from the Darlington Unit 2 spacer material surveillance testing performed in 2014.

Examination and testing of fuel channel annulus spacers removed during the 2013 planned Unit 2 outage has shown that the spacers are in good condition and continue to perform their design function with margins.

Feeders

Inspections continue to support that the wall thinning rate of the Darlington feeders is low enough that feeder replacements prior to unit refurbishment shutdown dates will unlikely be required.

Steam Generators

OPG continues to inspect steam generators every planned outage. Results from these inspections continue to support that the steam generators will not require replacement during refurbishment.

Reactor Components and Structures

Baseline inspection of Calandria Tube (CT) to Liquid Injection Shutdown System (LISS) nozzle as well as CT to Horizontal Flux Detector (HFD) clearance was executed during the D1411 outage. Assessment results demonstrate that neither CT-LISS nor CT-HFD contact in Unit 1 is expected to occur until well beyond the planned

refurbishment date for this unit. Additional inspections are planned for Unit 3 and 4 during their respective 2015 and 2016 planned outages

Concrete Containment

N-PLAN-01060-10004, *Aging Management Plan for Containment Structures*, has been prepared in accordance with Regulatory Document RD-334 (superseded by REGDOC-2.6.3). The plan provides a road map of programs and practices currently in place at OPG stations to create a systematic and integrated approach to management of containment structures. OPG will provide a transition plan to CNSC staff for compliance with REGDOC-2.6.3 by June 15, 2015 as per Reference 10.

All inspection reports and findings, produced under CSA N287.7-08 are submitted to CNSC staff as per agreed schedules.

In April 2015, during the VBO, OPG will complete inspections and a positive pressure test of the Main Containment System. As documented in Reference 11, pending successful results from this and semi-annual on-power containment inspections and leakage rate testing, the frequency of future Main Containment System positive pressure testing will be changed to align with the 12-year Vacuum Building pressure testing frequency.

Aging Management

Regulatory Document REGDOC-2.6.3 was published in March 2014, superseding RD-334, *Aging Management for Nuclear Power Plants* (2011). Details of the OPG transition plan were submitted to CNSC staff in Reference 10.

7.2 Refurbishment

7.2.1 Maintenance

Information submitted in original licence application remains valid for this section.

7.2.2 Outage Scope

Information submitted in original licence application remains valid for this section.

7.2.3 Outage Management

A planned outage management procedure, NK38-MAN-09701-10005, *Nuclear Refurbishment Planned Outage Management*, has been issued to capture the specific details of roles and responsibilities required to establish an outage management process within the refurbishment project structure.

7.2.4 Systems Important to Safety

Information submitted in original licence application remains valid for this section.

7.2.5 Equipment Surveillance and Testing

Information submitted in original licence application remains valid for this section.

7.2.6 Return to Service

Information submitted in original licence application remains valid for this section.

7.2.7 Aging Management

Information submitted in original licence application remains valid for this section.

7.2.8 Periodic Inspection Program

Information submitted in original licence application remains valid for this section.

References: The original licence application contained eight references. The references listed below are relevant to this addendum.

- (9) [OPG letter, W. M. Elliott to M. Santini and F. Rinfret, "OPG Transition Plan to 2014 Edition of CSA Standard N285.4-Periodic Inspection of CANDU Nuclear Power Plant Components", September 17, 2014, CD# N-CORR-00531-06613.](#)
- (10) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS-Updated Application Requirements for Renewal of the Darlington Nuclear Generating Station Power Reactor Operating Licence-Transition Plans for New and Revised Standards and Regulatory Documents", May 1, 2014, CD# NK38-CORR-00531-16780.](#)
- (11) [CNSC letter, F. Rinfret to B. Duncan, "Darlington NGS – Request for Approval to Change the Main Containment System Positive Pressure Test frequency", May 5, 2014, CD# NK38-CORR-00531-16817.](#)

8.0 RADIATION PROTECTION

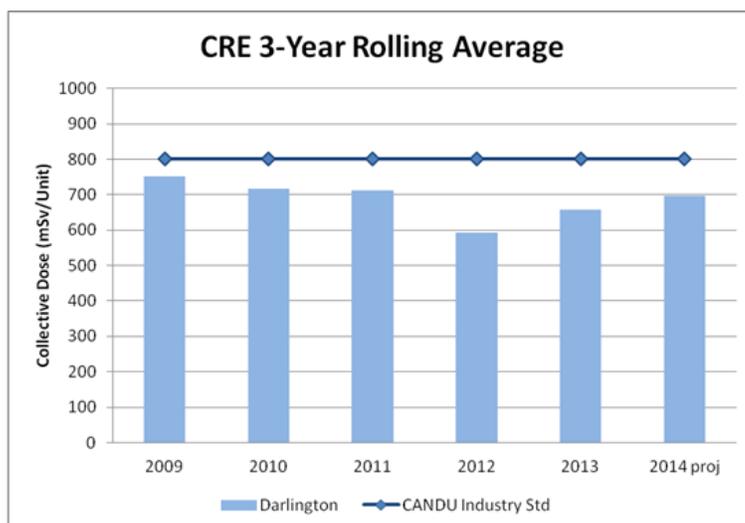
Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Radiation Protection	N-PROG-RA-0013	R009
Controlling Exposure As Low As Reasonably Achievable	N-STD-RA-0018	R007

8.1.1 Radiation Protection Program

Figure 14 below shows Darlington's collective dose performance of below 700 mSv/unit (70 rem/unit) from 2012 to 2014, which is significantly better than the CANDU industry benchmark of 800 mSv/unit (80 rem/unit).

Figure 14 – Collective Radiation Exposure (CRE), 3-Year Rolling Average



The projected 2014 CRE above is influenced by higher than expected dose in 2013 since the data is averaged over three years. Factors affecting higher dose in 2013 included discovery work in the planned Unit 3 outage (D1321) as well as there being two major planned outages.

In addition to dose reduction initiatives identified in the original licence application, in 2014 the introduction of high level drain state was used to further minimize D₂O leakages during outages.

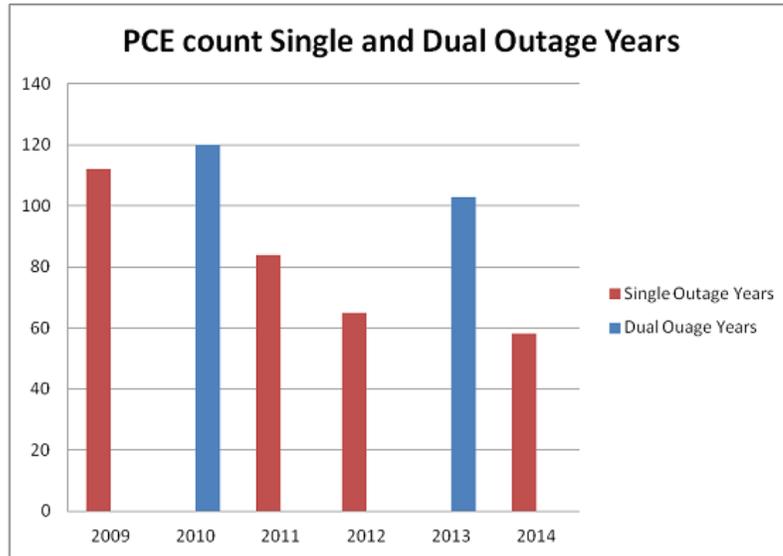
Magnetized tungsten shielding will be used on selected systems to minimize dose expenditure during installation and removal of the shielding.

Strategic outage scope control management has been used previously in order to optimize work inside containment when tritium is expected to rise. Similar work control strategy will continue to be used, along with lessons learned being incorporated for future outages to improve dose control.

In 2014, further improvements in Darlington's contamination control program were achieved through benchmarking industry best practices in regards to exit monitor programs and lowering the alarm set points on exit whole body monitors from the plant. In addition, calibration of all accessible Fixed Area Alarming Gamma Monitors (FAAGMs) was completed in 2014, and procedures have been updated to calibrate relevant FAAGMs on an annual basis moving forward.

Figure 15 shows 2014 data and an overall improving trend in Personal Contamination Event (PCE) occurrences for both single and dual outage years.

Figure 15 – PCE Single and Dual Outage Years



Notes: There was a VBO in 2009; 2014 data projection from end of November 2014 data

8.2 Refurbishment

8.2.1 Radiation Protection Program

Information submitted in original licence application remains valid for this section.

9.0 CONVENTIONAL HEALTH AND SAFETY

Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Work Protection	N-PROG-MA-0015	R010
Health and Safety Policy	OPG-POL-0001	R007
Conventional Safety (Superseded) Health and Safety Management System Program	N-PROG-HR-0004 OPG-PROG-0010	R003 R002
Respiratory Protection (Superseded) Respiratory Protection	N-STD-RA-0037 OPG-PROC-0132	R001 R000

9.1.1 Conventional Safety Program

Darlington's Conventional Safety performance for both Accident Severity Rate (ASR) and Accident Frequency Rate (AF) is shown in Figures 16 and 17, respectively. In 2013 for the third straight year, the Canadian Electricity Association (CEA) recognized OPG's safety performance – presenting the company with the President's Bronze Award for Safety Excellence.

Figure 16 – Accident Severity Rate

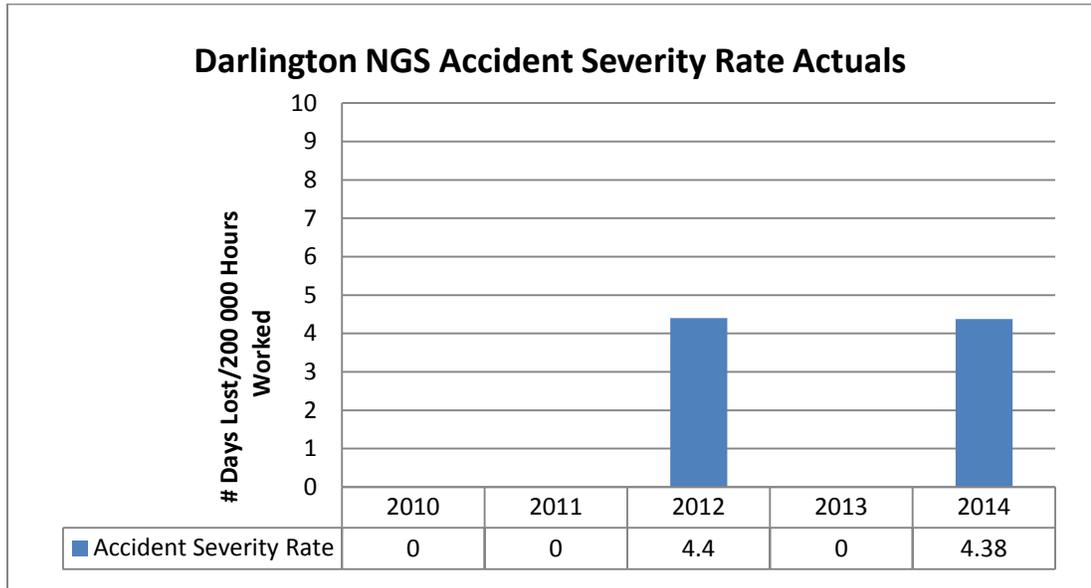
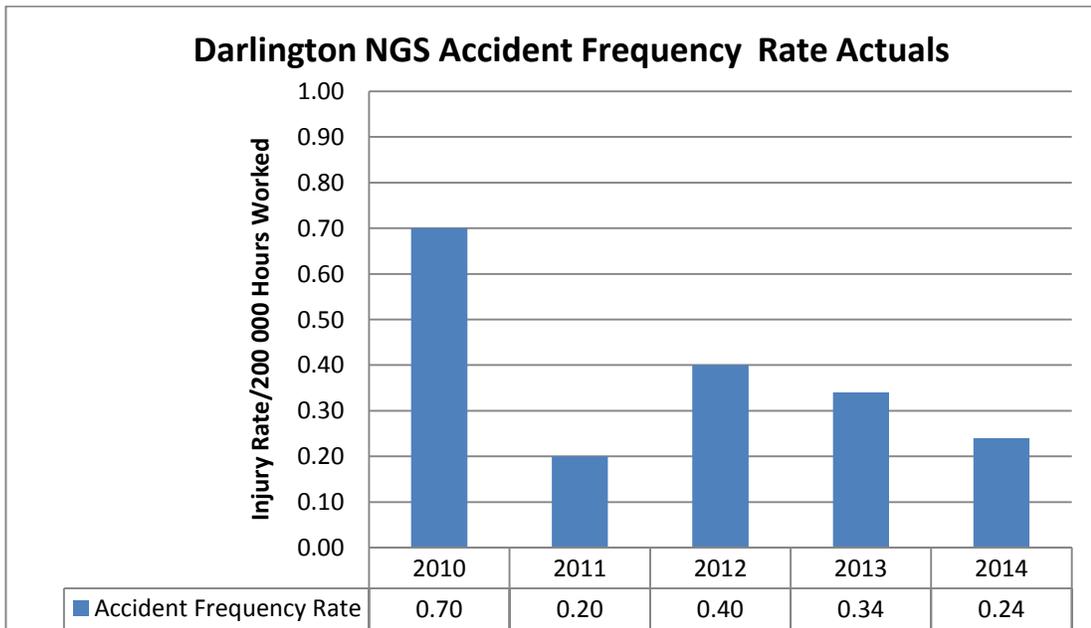


Figure 17 – Accident Frequency Rate



The lost time event impacting ASR in 2014 was a double knee injury that occurred while descending stairs and resulted in a total of 91 days lost.

The 2014 target number for AF is 0.89 and for ASR is 1.55. These targets are set at industry leading levels based on the CEA top quartile performance in related industries.

For 2014 Darlington focused on improvements in situational awareness and prevention of slips, trips and falls.

The situational awareness initiative was a multi-faceted plan that included training, awareness communications, and face to face roll outs at the supervisor and crew level. The goal is to have all staff performing a quality 2-Minute Job-Site Drill using the Safety Basics principles, which requires employees to confirm that all hazards surrounding their work locations are eliminated or have adequate controls in place before commencing work.

The 2014 JOE action plan for situational awareness saw the successful completion of several actions including:

- Implementation of immediate hazard walkdown and mitigation strategy for all SCRs documenting impact injuries.
- Development of two videos demonstrating “what good looks like” for a 2-Minute Job-Site Drill (one for typical Maintenance activities, one for Operations activities).
- Incorporation of Situational Awareness and the 2-Minute Job-Site Drill into training activities and Contractor Safety Plans for the 2014 Unit 1 planned outage (D1411).

The slips, trips and falls initiative concentrates on preventing slips during the winter season in parking lots and entrance ways as well as preventing slips and trips in the powerhouse. It includes snow and salting plans for the winter months, observation and coaching for appropriate footwear and walking behaviours as well as a housekeeping focus during outage periods.

In September 2014, OPG Health and Safety launched the Total Health webpage. This webpage provides a host of resources and information to support OPG employees and their families in their efforts to achieve an optimal level of health and functioning, primarily through health education, health promotion, disease and injury prevention, and crisis intervention.

The 2015 self assessment plan is in development and will be finalized in Q1 2015. The plan will include the following risk areas: Falling Objects; Struck/crushed by powered equipment; Power/Hand Tools; Struck by Flying Objects; and Situational Awareness.

The Health and Safety Management System will undergo a Third Party Audit for the first time since implementation of a single Health and Safety Management System across OPG.

9.2 Refurbishment

9.2.1 OPG Personnel

Information submitted in original licence application remains valid for this section.

9.2.2 Refurbishment Contractors

Information submitted in original licence application remains valid for this section.

10.0 ENVIRONMENTAL PROTECTION

Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Environmental Policy	OPG-POL-0021	R004
Environmental Management	N-PROG-OP-0006	R017
Environmental Manual	NK38-MAN-03480-10001	R015
Radiological Environmental Monitoring Programs	N-PROC-OP-0025	R010A
Monitoring of Radioactivity in Effluents	N-STD-OP-0031	R006
Hazardous Material Control (Superseded) Hazardous Materials Management	N-INS-07080-10000 OPG-PROC-0126	R003 R000
Management of the Environmental Monitoring Programs	N-PROC-OP-0025	R010

10.1.1 Environmental Management Program

In 2014, Darlington NGS was once again re-certified by the Wildlife Habitat Council (WHC) under its Wildlife at Work program, and also obtained re-certification in 2014 for its WHC Corporate Lands for Learning Program, which focuses on community partnerships, enriching environmental educational opportunities, and increased community use of the Waterfront Trail.

10.1.2 Radiological Releases

The public dose resulting from Darlington operation remains essentially unchanged over the licensing period and has been consistently less than 0.1% of the legal limit (see Table 4).

Table 4 - Public Dose from Darlington NGS*

Year	2010	2011	2012	2013
Legal Limit ($\mu\text{Sv}/\text{year}$)	1000	1000	1000	1000
Darlington Public Dose (μSv)	0.6	0.9	0.6	0.6
% Legal Limit	0.06	0.09	0.06	0.06

* 2014 data currently unavailable

The new revision to the Darlington Derived Release Limits (DRLs) in 2016 will incorporate changes to CSA N288.1 (revised in 2014), as well as changes to the locations and characteristics of potential critical groups that were determined from the most recent Darlington Site-Specific survey conducted in 2012.

Overall station tritium emissions in 2014 were higher than in previous years, however were less than 0.5% of the regulatory DRL. A Tritium Reduction High Impact Team was formed to evaluate interim and long-term actions to be put in place to mitigate overall tritium emissions from the station. These include daily tritium monitoring enhancements, prioritized leak repair strategy, repair of Containment and Confinement Dryers, and an optimization plan for dryer operation.

Through implementation of interim actions, Darlington tritium levels were better than the station target for the month of December 2014. With corrective work planned in the 2015 outages, emissions are expected to decrease back to previous levels associated with station operation.

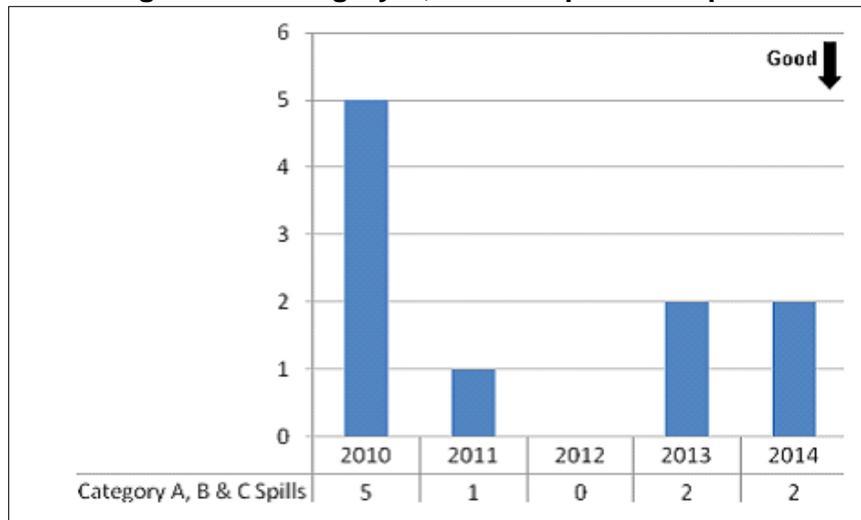
10.1.3 Conventional Releases

Information submitted in original licence application remains valid for this section.

10.1.4 Unplanned Releases

Figure 18 shows the total number of Category ‘A’, ‘B’ and ‘C’ spills from 2010 to 2014 inclusive, all of which were reportable to the Ministry of the Environment.

Figure 18 - Category A, B & C Reportable Spills



In 2014, Darlington NGS experienced two category ‘C’ spills, both of which had negligible environmental impact:

- On May 7, 2014, the Tritium Removal Facility (TRF) experienced a refrigerant leak due to a failed solenoid valve, which was subsequently repaired.
- On August 6, 2014, a leak occurred within Unit 3 generator seal oil heat exchanger, which was subsequently isolated and is scheduled for repair during the 2015 planned outage.

Program Improvements

An update was submitted to the Commission on the following environmental items as auctioned in the EA record of decision (Reference 2):

- A study completed in 2014 concluded that the environmental effect of the 2009 Injection Water Storage Tank (IWST) spill was very low and continues to decrease. The total activity released from the spill was less than one percent of OPG's licensing limit.
- OPG continues to participate in the Round Whitefish Action Plan, under the leadership of the Ontario Ministry of Natural Resources and Forestry. Samples of Round Whitefish in the vicinity of the Darlington and Pickering nuclear generating stations will be assessed as part of a meta-population study to better understand the population dynamics of this Lake Ontario species.
- A study conducted by the CANDU Owners Group (COG) on thermal effects on Round Whitefish was completed in 2014 and the final report submitted to the CNSC, Environment Canada and Department of Fisheries and Oceans Canada staff (Reference 3). The results of the study confirm low risk on Round Whitefish eggs and larvae from normal operation of cooling water discharge systems at the Darlington NGS.
- In August 2014, OPG submitted an Application for Authorization under the revised Canadian Fisheries Act (2012) Section 35 (2)(b), to address the potential effects of ongoing operation on fish and fish habitat in the vicinity of the DNGS site. The detailed application for the Department of Fisheries and Oceans (DFO) Fisheries Act authorization was submitted in the summer of 2014. DFO has confirmed that OPG's application is complete as submitted, and a decision will be forthcoming in early 2015.

Updates on additional environmental items, including program improvements from the original licence application, are included below.

- To address public interest in environmental emissions data, OPG now provides quarterly reports on environmental emissions for Darlington NGS on its public website.
- Darlington site sanitary sewage lines were connected to the municipal sewage treatment system in Q4 of 2013. The site sewage treatment plant operation was terminated and safe-stated and will remain so until the project proceeds with decommissioning. Darlington is compliant with the Regional Municipality of Durham Sewer Use By-Law.
- Darlington is in compliance with CSA N288.4-10, *Environmental Monitoring Program*. Transition plans for CSA N288.5-11, *Effluent monitoring programs at [Class I nuclear facilities and uranium mines and mills]* and CSA N288.6-12, *Environmental Risk Assessment* were provided to CNSC staff in Reference 4.

10.2 Refurbishment

10.2.1 Environmental Management Program

Information submitted in original licence application remains valid for this section.

10.2.2 Control and Monitor Releases of Nuclear Substances

Information submitted in original licence application remains valid for this section.

10.2.3 Control and Monitor Releases of Hazardous Substances

Information submitted in original licence application remains valid for this section.

References: The original licence application contained one reference. The references listed below are relevant to this addendum.

- (2) [OPG letter, B. Duncan to M. Leblanc, "Darlington NGS-2014 Update on Ongoing Environmental Activities Arising from DNGS Refurbishment EA Decision 2013", December 22, 2014, CD# NK38-CORR-00531-17173.](#)
- (3) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS-Thermal Plume Impacts on Round Whitefish", December 17, 2014, CD# NK38-CORR-00531-17087.](#)
- (4) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS – Updated Application Requirements for Renewal of the Darlington Nuclear Generating Station Power Reactor Operating Licence – Transition Plans for New and Revised Standards and Regulatory Documents", May 1, 2014, CD# NK38-CORR-00531-16780.](#)

11.0 EMERGENCY MANAGEMENT AND FIRE PROTECTION

Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Emergency Preparedness Program		
Consolidated Nuclear Emergency Plan	N-PROG-RA-0001	R013
Fire Protection Program		
Fire Protection	N-PROG-RA-0012	R010

11.1.1 Emergency Management Program

In May 2014, OPG completed the Exercise Unified Response to assess the preparedness of OPG and government agencies (Federal, Provincial, and municipal levels) to respond to a nuclear event at Darlington. This exercise involved over 2000 participants and 50 agencies.

As part of Exercise Unified Response, the Emergency Worker Centre at Orono was activated with OPG staff performing monitoring and decontamination as well as dose control functions.

OPG, with the support of the Province and Durham Region, issued a new emergency preparedness public information document in the form of a 'flashlight' to residences and businesses located in the primary zone of Darlington in May 2014. This information document was well received by the public.

CSA standard N1600, *General Requirements for Nuclear Emergency Management Programs*, was issued in 2014 and is now under review for further improvements. OPG is participating in the working group to update the standard.

Emergency Response Organization (ERO) Training documentation is now in full compliance with the Systematic Approach to Training (SAT) methodology. A CNSC Type II Compliance Inspection of the ERO training program was conducted in late 2014.

11.1.2 Fire Protection Program

OPG has submitted Fire Hazard Assessment (FHA) and Fire Safe Shutdown Analysis (FSSA) Reports to CNSC staff for acceptance in Reference 4.

A Third Party Evaluation was conducted of an OPG Industrial Fire Brigade Turbine Generator Fire Drill at Darlington. Observations made during the On-Site Fire Drill showed that the exercise met all of the objectives that were incorporated into the fire scenario.

11.2 Refurbishment

11.2.1 Emergency Management

Information submitted in original licence application remains valid for this section.

11.2.2 Fire Protection

Information submitted in original licence application remains valid for this section.

References: The original licence application contained three references. The reference listed below is relevant to this addendum.

- (4) [OPG letter, B. Duncan to F. Rinfret, "Darlington NGS – Request for Acceptance of the Fire Hazard Assessment \(FHA\) and Fire Safe Shutdown Analysis \(FSSA\) Reports and Closure of FHA Action Item 201313-4190", November 19, 2014, CD# NK38-CORR-00531-16859.](#)

12.0 WASTE MANAGEMENT

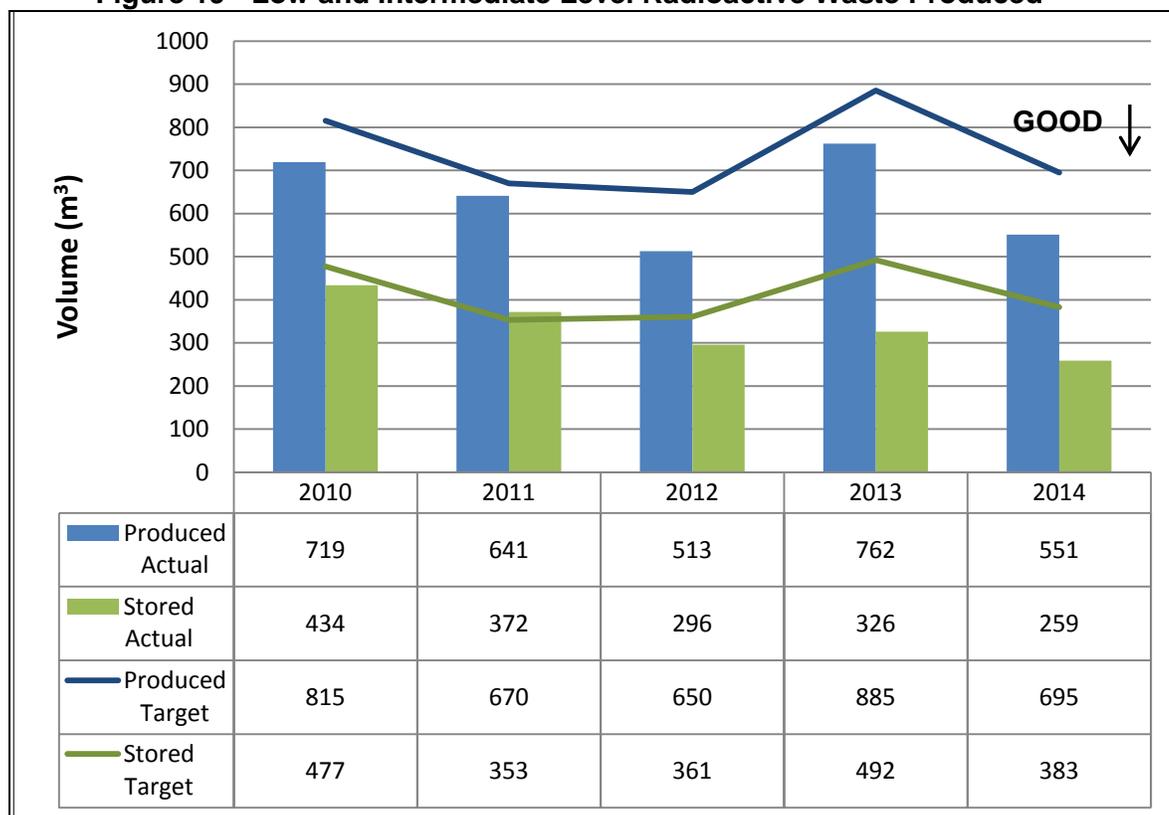
Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Waste Management		
Environmental Management	N-PROG-OP-0006	R017
Waste Management	N-PROC-OP-0043	R004
Segregation and Handling of Radioactive Wastes	N-PROC-RA-0017	R007
Decommissioning Planning		
Decommissioning Planning (Superseded)	W-PROC-WM-0090	R001
Planning for Decommissioning	W-PROC-WM-0093	R001

12.1.1 Waste Management Program

Figure 19 shows the volume of Low and Intermediate Level Radioactive Waste (L&ILRW) both produced and stored on an annual basis from 2010 to 2014 year to date, as compared to their respective targets. Volume reductions have been achieved over the last five years, particularly in stored waste, with the largest contributor being the expansion of the re-washable radioactive personal protective equipment program.

Figure 19 - Low and Intermediate Level Radioactive Waste Produced



12.1.2 Program for Planning the Decommissioning of the Nuclear Facility

Information submitted in original licence application remains valid for this section.

12.2 Refurbishment

12.2.1 Waste Management Program

Information submitted in original licence application remains valid for this section.

13.0 SECURITY

Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Darlington Nuclear Generating Station Security Report	8300-REP-61400-10003	R006
Nuclear Security	N-PROG-RA-0011	R006
Threat and Risk Assessment	NK38-REP-08160.3-00001	R008

13.1.1 Security Program

As required by the Nuclear Security Regulations, OPG submits Threat and Risk Assessment Reports annually to the CNSC. An update to 8300-REP-61400-10003, *Darlington Nuclear Generating Station Security Report*, was submitted to CNSC staff in 2014.

Nuclear Security has replaced its current personnel screening equipment as it reaches end of life. The new screening equipment ensures a higher level of search rigour is applied, allowing OPG to remain compliant with the Nuclear Security Regulations.

Nuclear Security is in full compliance with Regulatory Document REGDOC-2.12.2, *Site Access Security Clearance (2013)*.

13.2 Refurbishment

13.2.1 Security Program

The construction of a "Sally Port" extension is complete and is now being utilized. A secondary ingress/egress portal has been implemented for vehicle screening and is in operation east of the main security building. The extension and secondary portal will increase the capacity of vehicles that can be searched at one time in accordance with the requirements of the Nuclear Security Regulations ensuring detailed searches are conducted and continuity of searches maintained.

Construction of the Refurbishment Project Office began in 2014 and is on track for completion in 2015. This building will host an additional search area for Refurbishment staff.

14.0 SAFEGUARDS

There were no revisions to the documents provided in the original licence application.

14.1.1 Safeguards Program

The International Atomic Energy Agency (IAEA) conducted a Physical Inventory Taking (PIT) at Darlington in 2014.

The IAEA Core Discharge Monitors (CDM) and associated cables, which have reached the end of life, have been replaced in Units 1 and 2. Installation on Units 3 and 4 will take place during their respective refurbishment outages.

Darlington has obtained approval from the IAEA and CNSC to remove all of the irradiated fuel storage bays stacking frame seals. The seals removal have started in both the East and West fuel storage bays and is being done in advance of a Non-Destructive Assay (NDA) based method for fuel accounting in the bays, which will be introduced later in 2015 by the IAEA. Darlington in the meantime has obtained design approval for installation of the IAEA equipment mounting bracket in the bays to facilitate the new NDA technique.

The long fuel bundle modules used by Darlington cannot fit into the old standard stacking frames and require new long stacking frames in the storage bays. Therefore all 72 standard stacking frames will be replaced with long stacking frames in the East and West fuel storage bays, starting from mid-2015 to 2023. The stacking frame replacements will be aligned with transfer of fuel to dry storage canisters.

14.2 Refurbishment

14.2.1 Safeguards Program

Information submitted in original licence application remains valid for this section.

15.0 PACKAGING AND TRANSPORT

Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Radioactive Material Transportation	W-PROG-WM-0002	R009

15.1.1 Packaging and Transport Program

OPG has been shipping radioactive material for over 40 years and there have been no incidents resulting in a radioactive release or a personal injury.

15.2 Refurbishment

15.2.1 Packaging and Transport Program

Information submitted in original licence application remains valid for this section.

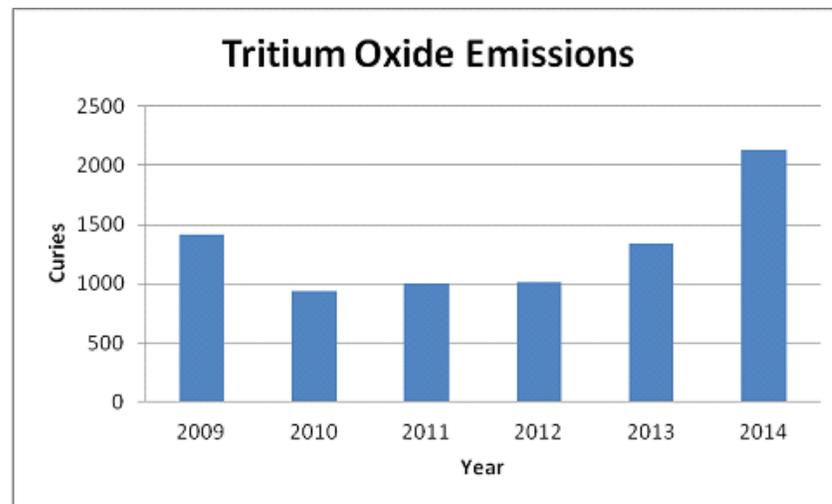
16.0 NUCLEAR FACILITY SPECIFIC – TRITIUM REMOVAL FACILITY

Those documents provided in the original licence application that have been revised are shown below.

Document Title	Document Number	Revision #
Darlington Nuclear Operating Policies and Principles	NK38-OPP-03600	R030
Heavy Water Management Plan	N-PROG-AS-0008	R004

Figure 20 below shows tritium oxide emissions from the TRF over the past several years, including 2014 data.

Figure 20 – Tritium Oxide Emissions from TRF



After return to service from the 2013 planned outage, impurity ingress in the Cryogenic Refrigeration System (CRS) impacted the availability of the TRF. The increased number of restarts due to the degraded operability of the TRF resulted in higher emissions in 2014. Targeted maintenance in the planned 2015 TRF outage is expected to address this issue.

Engineering modifications pertaining to the TRF/Heavy Water Management Building (HWMB) are planned for longer-term tritium reduction in order to implement recommendations from industry peers. This includes installing a dryer system after the existing chilled-water cooled vent condensers to reduce tritium oxide emissions from the HWMB and short-term bridging strategies in the interim.

17.0 DARLINGTON SITE INFRASTRUCTURE IMPROVEMENTS

Significant progress was made in 2014 on the SIOs. The current status of the SIO projects is as follows:

Emergency Power Generator (EPG3): Factory acceptance tests were completed and accepted by OPG in November 2014. Excavation and construction is currently in progress with installation expected to occur in Q3 2015. The planned in-service date for EPG3 is scheduled for early 2016.

Containment Filtered Venting System (CFVS): Detailed design has been completed and major components, including the filter units, have been ordered. The first of two containment tie-ins have been completed and evacuation work adjacent to the vacuum building has started. The planned in-service date for the CFVS is scheduled for mid 2016.

Powerhouse Steam Venting System (PSVS): Detailed design has been completed and installation is scheduled to start in mid 2015. The planned in-service date for the PSVS is scheduled for late 2015.

Independent Water Supply to Heat Transport System: There are three elements which make up this safety improvement: replacement of the Emergency Service Water (ESW) piping; installation of diesel Fire Water Pumps; and permanent connection of ESW to the Heat Transport System. Detailed design is in progress for the diesel Fire Water Pumps.

Shield Tank Overpressure Protection (STOP): Detailed design has been completed. The schedule for installation and in-service dates on each unit is as follows:

- Unit 3: D1531 Planned Outage in May 2015
- Unit 4: D1641 Planned Outage in April 2016, and
- Unit 1: D1711 Planned Outage in February 2017
- Unit 2: Prior to restart from refurbishment outage (2019)

In 2014, construction was progressed on the following key refurbishment and site infrastructure related projects:

- Refurbishment Project Office. This building will host an additional search area and offices for Refurbishment staff.
- Retube and Feeder Replacement Island Support Annex: This building will provide final staging of the reactor components prior to installation on the unit.
- Auxiliary Heating System: This facility will replace the existing Auxiliary Building Heating Plant to provide heating steam in the absence of operating units.

18.0 FUKUSHIMA ACTION PLAN UPDATE

In October 2014, OPG provided its latest FAI progress update to CNSC staff, and requested closure of the final three open FAIs (Reference 4). On January 21, 2015, CNSC staff accepted closure of all 101 FAIs tracked for OPG (Reference 5).

The following are noteworthy since the original licence application was submitted:

- Significant FAIs closed over the past year included: SAMG, Instrumentation and Equipment Survivability, Containment Integrity, Cooling Make-up, and Habitability.
- Installation of hydrogen mitigating Passive Autocatalytic Recombiners (PARs), which are in addition to hydrogen igniters but do not rely on electrical power, has been completed on all units.
- EME “quick-connects” are being installed to ease connection of the portable equipment to station electrical and process systems. Available for Service (AFS) meetings and turnovers to Operations for these modifications will continue per project schedules.
- Design is complete and field work is underway on additional provisions to strap down equipment stored in the EME storage building to withstand severe wind conditions.
- SAMG Project Phase 4 progressed per schedule. CANDU SAMG Topical Reports and Technical Basis Documents have been issued. Project acceptance of the Phase 4 SAMG enhancements has been completed (including multi-unit and low power enhancements).
- A major Emergency Preparedness exercise – Exercise Unified Response – involving utility, government and support agencies was executed in May 2014, demonstrating the capability of the station to respond to a beyond design basis event.

OPG is committed to ensure that the lessons learned from the Fukushima event and CNSC FAIs are implemented in a timely manner. Through supporting analysis, and modifications and additions to station equipment and procedures, our defence in depth capability to respond to beyond design basis accidents including severe accidents has been improved. Further enhancements to maximize support from available resources during a Beyond Design Basis Accident and to reduce complexity of mitigating actions and response time will be implemented.

References: The original licence application contained three references. The references listed below are relevant to this addendum.

- (4) [OPG letter, W. M. Elliott to M. Santini and F. Rinfret, “OPG Progress Report No. 6 on CNSC Action Plan – Fukushima Action Items”, October 31, 2014, CD# N-CORR-00531-06704.](#)

- (5) [CNSC letter, M. Santini and F. Rinfret to W. M. Elliott, "Darlington and Pickering NGS: CNSC Review of OPG Status Update #6 on Fukushima Action Items", January 21, 2015, E-DOCS# 4595113, CD# N-CORR-00531-07373.](#)

19.0 COMMUNITY RELATIONS AND PUBLIC INFORMATION PROGRAM

19.1 Nuclear Operations and Refurbishment

OPG ensures timely, open and transparent communication to maintain positive and supportive relationships and the confidence of key stakeholders. OPG is committed to being an ethical and credible company in its relationships with employees, suppliers, customers, the public and in the communities in which it operates.

Since the submission of the original licence application OPG regularly and proactively provided information to the public regarding on-going Darlington site activities including the refurbishment project.

Specifically, OPG:

- Launched new Darlington Station and Refurbishment web pages on [opg.com](#).
- The Darlington Station "home page" included updated information about the relicensing process and new, one year extension to the existing licence.
- The Darlington Refurbishment "home page" which provides an overview of the projects and links to other key areas including:
 - A Smart Investment, with links to videos, fact sheets, backgrounders and Frequently Asked Questions (FAQ);
 - Mock Up and Training, describing our innovative training facility, mock-ups and tooling;
 - Project News, with links to documents designed to keep our community, partners and stakeholders informed every step of the way;
 - Semi-Annual Report page with project updates and links to the latest DNGS performance report;
 - Project Management, describing how OPG has direct oversight of all aspects of the refurbishment project and is the project manager;
 - Reports, including links to the Environmental Impact Statement summary, other reference material, and OPG's recent submissions to CNSC staff;
 - Our People— information on the Project team, our Contracting partners, and OPG careers;
 - FAQ page, with some of the most common questions people have about the Project; and
 - Multimedia Gallery page which acts as a virtual repository to refurbishment related videos and photographs that people can use.
- In addition, individual pages have links to additional material, including:
 - Refurbishment News, the latest issue of Darlington Refurbishment Newsletter;
 - Community Briefings, for community groups and agencies to request a briefing or presentation on Darlington Refurbishment; and
 - "Achieving Balance, Ontario's Long-Term Energy Plan";

- Issued a project specific community newsletter, and two Darlington Neighbours newsletters;
- Issued two project performance report cards, focused on the status of the project;
- Moved the Darlington NGS Information Centre, to a new facility located in the DEC.
- Established new displays in the new Public Information Centre including a replica of a calandria, a replica of an exposed fuel channel and feeder pipe;
- Presented at or hosted five community based events focused on economic development opportunities associated with the Refurbishment project;
- Maintained a constant stream of social media updates through YouTube and Twitter; and
- Held the first of what will be an annual “Open Doors” at the DEC on four days in November 2014, to provide employees and residents an opportunity to visit the newly refurbished Darlington Information Centre, and to see the recently completed Darlington Refurbishment Training Centre which houses the full scale reactor mock-up. Over 3,500 people attended.

19.2 Public Information and Disclosure Efforts for Darlington Licence Renewal Process

OPG will continue to develop and inform host community residents, stakeholders and interested parties about the CNSC federal approvals process as per the OPG public information communications plan for 2015. For example, OPG has launched a new Darlington Licence Renewal web page on opg.com, which provides updated information on the licensing process and copies of OPG’s submissions related to licence renewal.

19.3 First Nation and Métis Engagement

OPG is committed to ensuring that the Nuclear Refurbishment Project, DNGS’ ongoing operations and other future related projects do not have any adverse impacts on Aboriginal or Treaty rights and to discuss with First Nation and Métis communities, opportunities for them to participate in the economic benefits of these projects and operations.

OPG has a record of contact and dialogue with First Nations, Métis councils and organizations who have a possible interest in the Project or the land associated with Darlington Refurbishment that began in 2010 and into 2015. In 2014 this included:

Date	First Nation	Purpose
February 13, 2014	Hiawatha First Nation, Curve Lake First Nation and Alderville First Nation.	Information sharing regarding the Darlington Nuclear Generating Station Power Reactor Operating Licence Renewal and the Darlington Refurbishment Applications.
May 22, 2014	Joint Implementation Team, Mohawk Council of Akwesasne.	Information sharing regarding a description of the project, an overview of the project phases and information regarding work currently being undertaken (regulatory approvals, facilities and infrastructure, safety improvement projects, reactor mock up and tooling, and planning). The details of the DNGS licence application were presented,

Date	First Nation	Purpose
		with a description on the logic behind the 14 year term
June 17, 2014	Williams Treaty First Nations (WTFN)	Status of regulatory approvals, facilities and infrastructure projects, safety improvement projects, reactor mock up and training, and detailed work planning. The presentation also included an overview of the interests and concerns of WTFN members regarding the refurbishment project.
June 18, 2014	Mississauga's of New Credit First Nation	Darlington Refurbishment project update including status of regulatory approvals, facilities and infrastructure projects, safety improvement projects, reactor mock up and training, and detailed work planning to the Mississauga's of New Credit First Nation. The presentation also included an overview of the interests and concerns of Mississauga Ojibwa members regarding the refurbishment project.
July 14, 2014	Haudenosaunee Confederacy Chiefs Council and Haudenosaunee Development Institute (not completed)	Introduction about the Darlington Refurbishment project, including status of regulatory approvals, facilities and infrastructure projects, safety improvement projects, reactor mock up and training, and detailed work planning to the Haudenosaunee Confederacy Chiefs Council and Haudenosaunee Development Institute.
September 16, 2014	Aboriginal Apprenticeship Board of Ontario Clarington GTA LINK Committee	Overview of the Darlington Refurbishment Project status, regulatory approvals progress, facilities and infrastructure activities, and project schedule with preliminary anticipated labour expectations.
November 12, 2014	OPG/WTFN Information Sharing Committee	Update on the Darlington Refurbishment project, including status of regulatory approvals, facilities and infrastructure projects, three key project updates (Fuel Handling, Turbine Generators, Retube and Feeder Replacement tooling and warehousing), a preliminary labour profile, and the recent Open Doors program.

20.0 FINANCIAL GUARANTEES

Information submitted in original licence application remains valid for this section.

21.0 NUCLEAR LIABILITY INSURANCE

A copy of the most current Nuclear Liability Insurance certificate is attached, confirming that the appropriate insurance is in place.



Certificate of Insurance

No.: 2015-1

Dated: January 05, 2015

This document supersedes any certificate previously issued under this number

This is to certify that the Policy(ies) of insurance listed below ("Policy" or "Policies") have been issued to the Named Insured identified below for the policy period(s) indicated. This certificate is issued as a matter of information only and confers no rights upon the Certificate Holder named below other than those provided by the Policy(ies).

Notwithstanding any requirement, term, or condition of any contract or any other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the Policy(ies) is subject to all the terms, conditions, and exclusions of such Policy(ies). This certificate does not amend, extend, or alter the coverage afforded by the Policy(ies). Limits shown are intended to address contractual obligations of the Named Insured.

Limits may have been reduced since Policy effective date(s) as a result of a claim or claims.

Certificate Holder: Canadian Nuclear Safety Commission Headquarters 280 Slater Street P.O. Box 1046 Station B Ottawa, ON K1P 5S9	Named Insured and Address: Ontario Power Generation Inc. 700 University Avenue, H18-J18 Toronto, ON M5G 1X6
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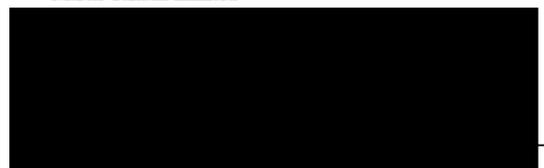
This certificate is issued regarding:

Evidence of Insurance

Type(s) of Insurance	Insurer(s)	Policy Number(s)	Effective/Expiry Dates	Sums Insured Or Limits of Liability	
NUCLEAR LIABILITY • Darlington Nuclear Generating Station	Nuclear Insurance Association of Canada	OF021	Jan 01, 2015 to Jan 01, 2016	Limit of Liability	\$ 50,000,000 as part of \$75,000,000
NUCLEAR LIABILITY • Darlington Nuclear Generating Station	European Liability Insurance for the Nuclear Industry(ELINI)	EL031CA15	Jan 01, 2015 to Dec 31, 2015	Limit of Liability	\$ 25,000,000 as part of \$75,000,000
NUCLEAR LIABILITY • Pickering Nuclear Generating Station	Nuclear Insurance Association of Canada	OF002	Jan 01, 2015 to Jan 01, 2016	Limit of Liability	\$ 50,000,000 as part of \$75,000,000
NUCLEAR LIABILITY • Pickering Nuclear Generating Station	European Liability Insurance for the Nuclear Industry(ELINI)	EL032CA15	Jan 01, 2015 to Dec 31, 2015	Limit of Liability	\$ 25,000,000 as part of \$75,000,000
NUCLEAR LIABILITY • Waste Management Inc.	European Liability Insurance for the Nuclear Industry(ELINI)	EL036CA14	Jan 01, 2015 to Dec 31, 2015	Limit of Liability	\$ 6,000,000

Notice of cancellation:

The insurer(s) affording coverage under the policies described herein will not notify the certificate holder named herein of the cancellation of such coverage.

Marsh Canada Limited 161 Bay Street, Suite 1400 Toronto, ON M5J 2S4 Telephone: 416-868-2143 Fax: 416-868-2526 	Marsh Canada Limited 
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22.0 OPEN ACTION ITEMS

The following is a list of open CNSC Action Items specific to Darlington, followed by a list of open CNSC Action Items that are generic to OPG (Darlington and Pickering). Note: Shaded areas indicate closure has been requested by OPG.

Action Item #	Title/ Description	Status
2043 (20101307)	Path Forward on HTS Liquid Relief Valve (LRV) Waterhammer Issues - Replace LRV's during refurbishment. Inspections are performed during each unit outage until LRV's replaced.	Unit 3 inspection scheduled for 2015 Planned Unit 3 Outage. Final due date depends on Refurbishment project evolution and was agreed in principle for end of October of 2018.
3219 (20111305)	Outlet Feeder Dissimilar Metal Weld Leak-Before-Break Assessment - N285.4-05 PIP Revision for Fuel Channels and Feeders.	Project update to be submitted end of November 2015.
201213-3167	Concession Request to Operate Moisture Separator Drains System to a Pressure Higher than the Design Pressure	Closure requested in October 2014.
201213-3300	Request for Approval for Full Core Implementation of Modified 37 Element Fuel Bundles - Issues identified by CNSC staff need to be discussed with OPG staff to gain a better understanding and to chart a path forward for resolution of these concerns with the objective of obtaining full credit for the safety margin benefits of the improved 37M fuel.	Meeting to be scheduled before end of 2013. This Action Item will be addressed under Action Item 20111305 (3219) for Outlet Feeder Dissimilar Metal Weld Leak-Before-Break Assessment.
201313-4037	Reclassification of Category 3 CANDU Safety Issues IH6: "Need for systematic assessment of high energy line break effects" to Category 2 for Darlington	Next update on this Action Item is targeted to be completed by April 2015.
201313-4056	Request Concurrence to Complete Installation and Commissioning of Primary HTS Liquid Relief Valves (LRV) in Refurbishment Outages	This action item was entered by CNSC staff for Primary HTS LRV Waterhammer Inspection Plan Revision. OPG is to provide CNSC staff with an update by August 15, 2016.
201313-4059	Request for Information Related to Premature Exercise Termination of the January 16, 2013 Operations Minimum Shift Complement Validation Exercise	Closure requested in April 2014.

Action Item #	Title/ Description	Status
201313-4134	Status Update for Logic Module Failsafe Modification Proposal - Closure of Action Item 201013-09 and Opening of New Action Item 201313-4134	Project execution plan, including installation schedule will be available in 2016. OPG will provide CNSC staff with annual updates on progress.
201313-4190	Fire Hazard Assessment -Action Item 201313-4190 Directive	Closure requested in November 2014.
201313-4398	CNSC Type II Inspection Report, Darlington NGS 'A' -Quarterly Field Inspection, Second Quarter Report # DRPD-A-2013-014	Closure requested in March 2014.
201313-4505	Type II Compliance Inspection Report, "Maintenance Oversight Planning and Scheduling", Report # DRPD-A2013-015	Closure requested in February 2014.
201413-4577	Darlington NGS 'A'- 2012 Safety Report Part 3 Update Action Item 201413-4577	Based on the new REGDOC-2.4.1 and REGDOC-3.1.1 the new Safety Report Part 3 will be updated in 2017.
201413-4788	Notification of Implementation of Revision 013 of D-PROC-OP-0009, <i>Station Shift Complement</i> , New Action Item 201413-4788	Update will be provided by end of June 2015.
201413-4793	Type II Compliance Inspection Report, "Quarterly Field Inspection Report, Quarter 3 Fiscal Year 2013-2014", Report #DRPD-A-2013-022, New Action Item 201413-4793	Closure requested in May 2014.
2014-13-4874	Type II Compliance Inspection Report - Main Control Room and Secondary Control Areas Heating, Ventilation and Air Conditioning Systems, Report # DRPD-A-2013-023, Action Item 2014-13-4874	Update is scheduled to be provided by end of April 2015.
2014-13-4913	Darlington NGS -Effluent Release Data for 2012 -Request for Additional Information -New Action Item 2014-13-4913	Closure requested in June 2014.
2014-13-4926	Modified 37-Element Fuel Bundle CHF/PDO Test Results and CHF Correlation Development New Action Item 2014-13-4926	Closure requested in October 2014.
2014-13-5107	Type II Compliance Inspection Report, "Liquid Zone Control System", Report # DRPD-2014-005, Action Item 2014-13-5107	Update is targeted to be provided by end of January 2017.
2014-13-5108	Type II Compliance Inspection Report, "Supply Management", Report # DRPD-2014-004, Action Item 2014-13-5108	Closure requested in December 2014.
201413-5154	CNSC Inspection Report, Darlington NGS -Quarterly Field Inspection, Fourth Quarter Report # DRPD-2014-003, Action Item 2014-13-5154	Closure requested in August 2014.
201413-5144	Type II Compliance Inspection Report – Darlington NGS Emergency Coolant Injection System DRPD-2014-002 – Action Item 2014-13-5144	Update to be provided by end of March 2015.

Action Item #	Title/ Description	Status
201413-5193	Type II Compliance Inspection Report, "Radiation Protection – Occupational ALARA Planning and Control	Closure requested in December 2014.
201413-5271	Darlington NGS – Heavy Water Management Building West Annex: Submission of Radiological Hazards Analysis	Closure requested in January 2015.
201413-5341	Type II Compliance Inspection Report, "Unit 1 D1411 Planned Maintenance Outage", Report# DRPD-2014-006	Update to be provided by end of March 2015.
201413-5349	Type II Compliance Inspection Report: OPG Darlington Nuclear Generating Station DRPD-2014-009 – Quarterly Field Inspection Report First Quarter Fiscal year 2014 – 2015	Closure requested in November 2014.
201413-5392	Submission of Preliminary Inconel X-750 Spacer Test Results from Darlington Unit 2 Channel M09 -	Update to be provided by end of March 2015.
201413-5464	Type II Compliance Inspection on Darlington's Scaffolding Program,	Update to be provided by end of March 2015.
201413-5475	Probabilistic Seismic Hazard Assessments, CNSC/NRCan sufficiency review of OPG Response to CNSC Staff's Actions from February 7, 2014 Meeting	Closure requested in November 2014.
2014-13-5538	Type II Compliance Inspection Report – DRPD-2014-012 Chemistry Control Program	Closure requested in December 2014.
2014-13-5539	Type II Compliance Inspection Report DRPD-2014-013, Electrical Power Systems	Update to be provided by June 2015.
2014-13-5486	Type II Compliance Inspection Report: Reactor Operator Simulator-Based Initial Certification Examination, Report DRPO-2014-016	Closure requested in December 2014.
2014-13-5660	Type II Compliance Inspection Report, DRPD-2014-015, Planned Fire Response Exercise	Update to be provided by end of February 2015.
2014-13-5743	OPG Type II Compliance Inspection Report, OPG-2014-004, OPG Emergency Response Organization Training Program	Update to be provided by end of March 2015.
2009-OPG-06	NOP Protection Methodology - CNSC staff to further verify the adequacy of the mitigating measures and of OPG compliance with them while work continues to permit final acceptance of the enhanced NOP methodology.	All tasks tracked under this AI are complete. OPG will revisit the request for AI closure in a meeting with CNSC staff.

Action Item #	Title/ Description	Status
2012-OPG-3465-	Closure of Generic Action Item GAI01G01 Fuel management and Surveillance Software Upgrade - New Action Item for OPG to implement a monitoring program to periodically confirm the adequacy of the various approximations in the station core model and fuel management code method and accuracy of code predictions of safety-related core neutronic parameters.	Closure requested in July 2014.
2012-OPG-3519 (see also Darlington specific 2894)	Hydrogen Issues at Darlington and Pickering NGS - CNSC staff have opened new Action Item 2012-OPG-3519 with the closure criteria for Darlington and Pickering.	OPG will provide periodic updates on the progress of remaining work in Q1 and Q3 of 2015.
2013-OPG-4114	TUBRUPT-IST - CNSC staff have closed initial AI 2009OPG-04 and issued new AI 2013OPG-4114. Additional work on industry's behalf is needed-OPG to resolve issues.	Closure requested in February 2014.
2013-OPG-4163	Opening of New OPG specific AIs Related to Closed Fukushima AIs - Evaluation of bleed condenser/degasser condenser relief capacity.	Closure requested in September 2014. Submission of supporting documents subsequently requested by CNSC staff in January 2015.
2013-OPG-4126	Further follow up to closed Fukushima AI's providing specific closure criteria. Evaluation of existing emergency plans and programs and plan and schedule address gaps.	OPG requests to close AN1, however additional work remains to satisfy the AI. For clarity, OPG is suggesting that the remaining work be assigned additional AN numbers.
2013-OPG-4127	Further follow up to closed Fukushima AI's providing specific closure criteria. Evaluation of adequacy of back-up power for emergency facilities and plan and schedule to address gaps.	OPG to submit Progress Report of Fukushima AIs by March 31, 2015.
2013-OPG-4286	New Action Item opened to monitor execution of the proposed plan to improve multi-unit severe accident modeling.	OPG to submit Progress Report of Fukushima AIs by March 31, 2015.
2013-OPG-4432	CNSC review of OPG business Model.	CNSC review pending submission of OPG documents.

Action Item #	Title/ Description	Status
2013-OPG-4472	<p>“Darlington NGS and Pickering Units 1 to 8: Training and Deployment of Shift Managers (SM) and Control Room Shift Supervisors (CRSS), Closure of AI 2011-OPG-2390, New Action Item 2013-OPG-4472”.</p> <p>Proposal for Single supervisory Certification at Multi-Unit Nuclear Power Plants</p>	Closure requested in October 2014.
2014-OPG-4695	<p>Darlington and Pickering NGS: CNSC Desktop Review Report of the Train-the-Trainer Training Program, New Action Item 2014-OPG-4695</p> <p>OPG’s program is compliant with SAT-based licence requirements, but some deficiencies have been identified.</p> <p>Nine recommendations have also been raised</p>	Update on completion of AN1, and Darlington Full Scope Simulator Instructor documents submitted to CNSC staff in January 2015.
2014-OPG-4782	<p>Approach to Fitness for Service Assessment for Pressure Tubes- New Action Item 2014-OPG-4782</p> <p>CNSC requests semi-annual updates on the approach to Fitness-for-Service Assessment for Pressure Tubes</p>	First semi-annual updated provided in August 2014. Second semi-annual update to be sent by February 13, 2015. Industry/CNSC meeting under consideration for Q1 2015.
2014-OPG-4862	<p>Darlington and Pickering NGS: OPG Revised CSA N285.8 Compliance Plan</p> <p>CNSC provided comments on OPG’s Revised CSA N285.8 Compliance Plan. In assessments submitted to CNSC staff for acceptance, OPG shall follow N285.8-10-standard. CNSC have outlined sections to pay particular attention to.</p>	OPG to submit an updated CSA N285.8 Compliance plan by November 2015.
2014-OPG-4907	<p>Darlington and Pickering NGS: CNSC Type II Compliance Inspection Report, Non-Licensed Operators Training Program, Report #OPG-2014-002, New Action Item 2014-OPG-4907 and Closure of Action Item 2011-OPG-2299</p> <p>CNSC have raised 9 Action Notices and 2 Recommendations as a result of this Type II Inspection.</p>	A video conference was held on January 14, 2015 to provide an update on the progress of each corrective action. A follow-up meeting will be arranged by March 30, 2015.

Action Item #	Title/ Description	Status
2014-48-5074	Pickering NGS: CANDU Owners Group (COG) Report on Development of a Whole-Site Probabilistic Safety Assessment (PS) Methodology, New Action Item 2014-48-5074 OPG to address CNSC comments regarding the proposed site safety goals	OPG provided the Industry responses to CNSC staff comments. Awaiting CNSC staff response.
2014-OPG-5250	CNSC Type II Compliance Inspection-OPG Shift Manager and Control Room Shift Supervisor Training Program, CNSC have raised 2 Action Notices as a result of the Darlington NGS-Pickering NGS CNSC Type II Compliance Inspection	OPG to provide a status update on AN1 and AN2 by February 27, 2015.
2014-OPG-5248	Pickering NGS and Darlington NGS: OPG Specific Action Items Related to Closed Fukushima Action Items, New Action Item 2014-OPG-5248 as follow-up to FAI 1.7.1 closure. The purpose of the AI is to track the implementation of Emergency Mitigating Equipment (EME) enhancement modifications. It is expected that OPG will provide semi-annual updates to the CNSC until the EME enhancement modifications as identified in enclosure 4a have been implemented.	OPG to provide semi-annual updates to CNSC staff. Next update due March 31, 2015.
2014-OPG-5461	Progress Report on OPG Safety Analysis Improvement and REGDOC-2.4.1 Implementation Activities In order to consider amendment request, OPG to provide implementation plan in advance of intended amendment date.	CNSC staff concurrence with OPG's overall plan is requested in order to formally complete the LOMHS analysis and update the relevant sections of Darlington Safety Report Appendix 9. OPG to submit the updated Darlington Loss of Moderator Heat Sink Analysis Report, and provide an update on Safety Analysis Improvement and REGDOC-2.4.1 by September 30, 2015. Closure requested in October 2014.

Action Item #	Title/ Description	Status
2014-OPG-5550	Pick/ Darl NGS: Request for Detailed Implementation Plans for Compliance with CSA Standard N288.4-10 and N288.5-11, New AI 2014-OPG-5550 and Closure of AI 2014-48-3425 CNSC request OPG's detailed implementation plans for compliance with CSA standard N288.420	Closure requested in January 2015.
2014-OPG-5632	Darlington and Pickering NGS: Request for re-categorization of CANDU Safety Issue AA3: Computer Code and Plant Model Validation CANDU Safety Issue AA3 can be re-classified from Category 3 to Category 2 – New Action Item raised to monitor completion of proposed activities.	OPG to provide a response on February 6, 2015.
2014-13-5743	Darlington and Pickering NGS: OPG Type II Compliance Inspection Report, OPG-2014-004, OPG Emergency Response Organization Training Program CNSC have found minor non-compliances as a result of the Type II Inspection.	OPG to provide a response March 6, 2015.

APPENDIX 1

Site Description and Plan

The Darlington NGS facility site is described in the Darlington NGS Safety Report, NK38-SR-03500-10001-R04 (Reference 2):

Part 1 – Plant/ Site Description – Section 1 Introduction and Description of Plant

Part 2 – Design Description – Structures, Systems and Components

References: The original licence application contained one reference. The reference listed below is relevant to this addendum.

- (2) [OPG Letter, B. Duncan to F. Rinfret, "Darlington NGS `A' – Safety Report Update, Part 1 and Part 2", December 20, 2013, CD# NK38-CORR-00531-16612.](#)

APPENDIX 2

Land Ownership Control

The latest revision of Volume 1, Parts 1 and 2, of the Darlington Safety Report, NK38-SR-03500-10001-R003, submitted to CNSC staff (Reference 3) captures the information provided above. Furthermore, OPG confirms that no change or amendment has taken place with respect to such material since the issue of the updated Safety Report.

References: The original licence application contained two references. The reference listed below is relevant to this addendum.

- (3) [OPG Letter, B. Duncan to F. Rinfret, "Darlington NGS `A' – Safety Report Update, Part 1 and Part 2", December 20, 2013, CD# NK38-CORR-00531-16612.](#)

APPENDIX 3

Other CNSC Licences and Internal Authorizations

Only changes to licences and authorizations submitted in the original licence application are provided below.

Nuclear Substance and Radiation Devices Licence
Industrial Radiography (812), 12861-1-15.2, May 23, 2013 to March 31, 2015
Consolidated Licence (815), 12861-2-15.4, February 27, 2014 to March 31, 2015
Development and Testing (817), 12861-16-14.0, April 11, 2013 to March 31, 2014 (no longer in use)
Class II Nuclear Facilities and Prescribed Equipment Licences
CNSC Licence 12861-7-24 Class II Irradiator Operating Licence, April 1, 2014 to March 31, 2024
Licence to Transport
Licence to Transport (up to one bundle of nuclear fuel), TL-S-12861-06.00/2018, June 26, 2014 to May 31, 2018
Internal Authorizations
N-CERT-00531.1.RL-10080 – Internal Authorization #29 issued under the terms and conditions of CNSC Licence 12861-1-15 Industrial Radiography expires March 15, 2015
N-CERT-00531.1.RL-10081 – Internal Authorization #29A issued under the terms and conditions of CNSC Licence 12861-2-15 Consolidated Uses expires March 31, 2015
N-CERT-00531.1.RL-10087 – Internal Authorization #30A issued under the terms and conditions of CNSC Licence 12861-2-15 Consolidated Uses expires March 31, 2015
N-CERT-00531.1.RL-10085 – Internal Authorization #69A issued under the terms and conditions of CNSC Licence 12861-2-15 Consolidated Uses specific for the Darlington Learning Centre expires March 31, 2015

APPENDIX 4

Summary of Nuclear Substances

The only change to Appendix 4 is as follows:

In support of reactor restart and post refurbishment operation, Fission Chambers will be used for neutron flux detection. OPG will be seeking as part of the renewed PROL an additional licensed activity to permit the possession, usage, storage and handling of enriched Uranium.

Nuclear Substance	Form/ Location	Maximum Quantity
Enriched Uranium	Fission Chambers	24 Fission Chambers*

* The exact quantity and enrichment percentage of Uranium contained within the Fission Chambers is not known at this time; however, it is expected to be bounded by what is currently licensed at Pickering NGS. The average U-235 content in each fission chamber is 3.56 g, 93% enriched.

APPENDIX 5

Hazardous Substances

Only changes to hazardous substances submitted in the original licence application are provided below.

Name	Form	Characteristics	Where Used (System)	Purpose	Storage	Disposal	Quantity (inventory)	Quantity (In system)
Helium gas	Compressed Gas	Compressed gas, simple asphyxiant, lighter than air	Cover gas for moderator; LZC; HTS storage tank, TRF	Cover gas to prevent air ingress	Gas cylinders	Periodically purged to reactor building exhaust for chemistry control	12 tubes, total 2832 m ³ for station 3 tubes, total 708 m ³ for TRF Additional trailer on site, capacity 3000 m ³	Normally none. Used when needed.
Nitrogen gas	Compressed gas	Asphyxiant	HTS oxygen removal, Nitrogen purges of generator lines	Exclude oxygen from HTS in outage	Outdoor tank (as liquid) or gas cylinders in the station	Vented to the air	32,000 L bulk supply, approx 40 cylinders (304 ft ³)	N/A. Used when needed.
Standby Generator Lube oil Teresso 32	Liquid	Non-toxic during normal use	Standby Generator Lube Oil	Lubrication and sealing	One tank inside each Standby Generator building (total of four tanks)	Reused or removed by contractor	300L/tank (1200 L total)	Short pipe runs. Negligible amount.

Name	Form	Characteristics	Where Used (System)	Purpose	Storage	Disposal	Quantity (inventory)	Quantity (In system)
Standby Generator Lube oil Turbo Oil 2380	Liquid	Non-toxic during normal use.	Standby Generator Lube Oil	Lubrication and sealing	Three tanks inside each Standby Generator building (total of 12 tanks)	Reused or removed by contractor	3420L in each Standby Generator building (13680L total)	Short pipe runs. Negligible amount.
Sodium Meta-bisulphite 38% aqueous	Liquid	Corrosive acid, toxic	Condensate water discharge duct	Dechlorination	Outdoor tanks with secondary containment	Consumed	6 x 1000 US Gallon Storage Tanks	N/A. Diluted into system water.

Legend: HTS – heat transport system, LZC – liquid zone control, TRF – tritium removal facility

ACRONYMS
(to be interpreted in context)

Acronym	Definition
AF	Accident Frequency
AFS	Available For Service
AIA	Authorized Inspection Agency
AOOM	Advanced Operations Overview for Managers
ASR	Accident Severity Rate
AZL	Average Zone Level
CANDU	Canadian Deuterium Uranium (trademark of AECL)
CEA	Canadian Electricity Association
CC	Corrective Critical
CCA	Component Condition Assessment
CCV	Concurrent Component Verification
CFAM	Central Functional Area Manager
CFVS	Containment Filtered Venting System
CI	Chemistry Index
CN	Corrective Normal
CNSC	Canadian Nuclear Safety Commission
COG	CANDU Owners Group
C of A	Certificate of Authorization
CRE	Collective Radiation Exposure
CRS	Cryogenic Refrigeration System
CSA	Canadian Standards Association
CT	Calandria Tube
DARA	Darlington Risk Assessment
DBM	Days Based Maintenance
DC	Deficient Critical
DEC	Darlington Energy Complex
DFO	Department of Fisheries and Oceans
DLA	Dynamic Learning Activity
DN	Deficient Normal
DRL	Derived Release Limit
EA	Environmental Assessment
ECC	Engineering Change Control
EFDR	Event Free Day Resets
EFPH	Effective Full Power Hours
EME	Emergency Mitigating Equipment
EPG3	Emergency Power Generator 3
EQ	Environmental Qualification

Acronym	Definition
ER	Equipment Reliability
ERI	Equipment Reliability Index
ERO	Emergency Response Organization
ESW	Emergency Service Water
FAAGM	Fixed Area Alarming Gamma Monitor
FAI	Fukushima Action Items
FAQ	Frequently Asked Questions
FCLM	Fuel Channel Lifecycle Management
FFS	Fitness for Service
FHA	Fire Hazard Assessment
FLR	Forced Loss Rate
FSSA	Fire Safe Shutdown Analysis
GA	Global Assessment
HFD	Horizontal Flux Detector
HTS	Heat Transport System
HWMB	Heavy Water Management Building
IAEA	International Atomic Energy Agency
IIP	Integrated Implementation Plan
INPO	Institute of Nuclear Power Operators
ISR	Integrated Safety Review
IWST	Injection Water Storage Tank
JOE	Journey Of Excellence
L&IRW	Low and Intermediate Level Radioactive Waste
LBB	Leak Before Break
LISS	Liquid Injection Shutdown System
LTSLMP	Long Term Spacer Lifecycle Management Plan
LZC	Liquid Zone Control
NGS	Nuclear Generating Station
NPDS	Nuclear Professional Development Seminar
OPEX	Operating Experience
OPG	Ontario Power Generation
OSR	Operating Safety Requirement
PAR	Passive Autocatalytic Recombiners
PB	Pressure Boundary
PCE	Personnel Contamination Event
PIP	Periodic Inspection Program

PIT	Physical Inventory Taking
PM	Preventive Maintenance
PROL	Power Reactor Operating Licence
PSA	Probabilistic Safety Assessment
PSVS	Powerhouse Steam Venting System
PRA	Probabilistic Risk Assessment
PRL	Plant Reliability List
RD	Regulatory Document
REGDOC	Regulatory Document
SAMG	Severe Accident Management Guidelines
SAT	Systematic Approach to Training
SCR	Station Condition Record
SIO	Safety Improvement Opportunities
SIS	Systems Important to Safety
SNPM	Senior Nuclear Plant Manager
SOE	Safe Operating Envelope
STOP	Shield Tank Overpressure Protection
TPAR	Technical Procedural Action Request
TRF	Tritium Removal Facility
UOIT	University Of Ontario Institute of Technology
VBO	Vacuum Building Outage
WHC	Wildlife Habitat Council
WTFN	Williams Treaty First Nations
WTP	Water Treatment Plant