

December 16, 2021

CD# 00044-CORR-00531-01153

MR. MARC LEBLANC
Commission Secretary
Canadian Nuclear Safety Commission

280 Slater Street
P.O. Box 1046, Station B
Ottawa, Ontario
K1P 5S9

Dear M. Leblanc:

Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023

The purpose of this letter is to submit the licence application for the renewal of the Darlington Waste Management Facility (DWMF) Waste Facility Operating Licence, WFOL-W4-355.01/2023, for a 10-year period from May 1, 2023 to April 30, 2033, as discussed in Reference 1.

This licence renewal application is for a ten-year licence term, in order to continue operations beyond April 30, 2023. This licence renewal application contains the information necessary to demonstrate that DWMF meets all regulatory requirements of the *Nuclear Safety and Control Act*, and all other applicable regulations.

The Waste Facility Operating Licence (WFOL-W4-355.01/2023) issued to Ontario Power Generation (OPG) for the operation of the Class 1B Darlington Waste Management Facility (DWMF) will expire on April 30, 2023.

Ontario Power Generation (OPG) is an Ontario-based electricity generation company whose principal business is the generation and sale of electricity in Ontario. OPG is committed to the responsible and comprehensive management of all its radioactive waste and has been safely storing this waste at its waste management facilities located at the Bruce, Pickering, and Darlington Nuclear sites.

OPG head office is located at 700 University Avenue, Toronto, Ontario, M5G 1X6. The DWMF is located within the Darlington Nuclear site boundary and to the east of the DNGS in Bowmanville, Ontario.

Ontario Power Generation respectfully acknowledges that the Nuclear Sustainability Services – Darlington facility is located in the treaty and traditional territory of the Michi Saagiig and Chippewa Nations, collectively known as the Williams Treaties First Nations.

Ontario Power Generation respectfully acknowledges that the peoples of the Williams Treaties First Nations are the original stewards and caretakers of these lands and that they continue to maintain this responsibility to ensure their health and integrity for future generations.

As a company, OPG remains committed to developing positive and mutually beneficial relationships with the Williams Treaties First Nations and Indigenous communities across Ontario.

The DWMF provides for the safe processing and storage of used fuel produced by Darlington Nuclear Generating Station reactor operation, and the Intermediate Level Waste from the Darlington Refurbishment Project at DNGS.

The facility consists of a Dry Storage Container Processing Building, Used Fuel Dry Storage Buildings #1 and #2, and the Retube Waste Storage Building. OPG is requesting the carry-over of the future addition of two storage structures for storing containers, into the new licence term. Storage Structures #3 and #4 have a larger total capacity (an increase from 1,000 DSCs to 1,200 DSCs) to remove the need for a fifth storage structure. Storage Structures #3 and #4 will incorporate more innovative designs.

OPG has renamed its Nuclear Waste Management (NWM) division to Nuclear Sustainability Services (NSS) in Q4 2021. NSS safely accepts, transports, processes and stores nuclear by-products, while embracing the three Rs - reduce, reuse, and recycle. Nuclear Sustainability Services is a name that is aligned with OPG's Climate Change Plan.

In this application, Nuclear Waste Management (NWM) division will be replaced with Nuclear Sustainability Services (NSS) and the Darlington Waste Management Facility will be replaced with Nuclear Sustainability Services – Darlington (NSS-D).

The licence renewal application is divided into the following sections:

Attachment 1 summarizes OPG's compliance status with the codes, standards and CNSC regulatory documents, in response to the CNSC expectations provided in References 2 and 3.

Attachments 2 and 3 provide a matrix of the regulatory requirements and identifies where the information is provided in the licence renewal application.

Attachment 4 provides a table identifying changes in the information that was previously submitted, pursuant to subsection 5(b) of the General Nuclear Safety and Control Regulations.

Attachment 5 provides the programs and processes for each Safety Control Area, as well as details of current performance and future improvements.

Attachment 6 provides a list of permits, certificates and licences issued by authorities other than the CNSC, pursuant to subsection 3 (1.1) of the General Nuclear Safety and Control Regulations.

Attachment 7 provides a copy of the most current Nuclear Liability Insurance certificate for the NSS-D consistent with the requirements of the Nuclear Liability and Compensation Act.

Attachment 8 provides the NSS-D land ownership and control deed, as evidence that OPG is the owner of the site to carry on the activities to be licensed, pursuant to subsection 3 (c) of the Class I Nuclear Facilities Regulations.

Attachment 9 provides the Organizational Chart containing the information required, pursuant to subsection 15 (b) of the General Nuclear Safety and Control Regulations.

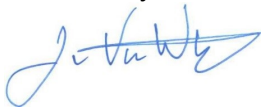
This licence renewal application contains the information necessary to demonstrate that OPG is qualified to carry on the licensed activities for the NSS-D and will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

A list of regulatory obligations undertaken in this submission is provided in the Summary Table.

Consistent with OPG's approach towards open and transparent public communications, OPG will post this application on its external website, www.opg.com.

Should you have any questions or requests for further information, please contact Mr. Ghulam Khawaja, Manager, Regulatory Programs, Strategy and Support by email at ghulam.khawaja@opg.com.

Sincerely,



Jason Van Wart
Vice President
Nuclear Sustainability Services

cc: K. Murthy - CNSC (Ottawa)
É. Fortier - CNSC (Ottawa)
S. Watt - CNSC (Ottawa)
T. Kalindjian - CNSC (Ottawa)

References:

1. OPG Letter, J. Van Wart to P. Burton, "Notice of Intent to Renew Darlington Waste Management Facility Waste Facility Operating Licence WFOL-W4-355.01/2023", March 22, 2021, e-Doc 6519476, CD# 00044-CORR-00531-01133.
2. CNSC Letter, P. Burton to J. Van Wart, "CNSC staff expectations for the licence application for the renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023", June 25, 2021, e-Doc: 6592585, CD# 00044-CORR-00531-01149.
3. CNSC Letter, P. Burton to J. Van Wart, "Implementation of Waste Management and Decommissioning Regulatory Documents", September 16, 2021, e-Doc: 6639430, CD# W-CORR-00531-01764.

List of Attachments:

1. Codes and Standards, and Regulatory Documents for Licence Renewal
2. Application Matrix for Regulatory Requirements
3. Application Matrix for Additional Regulatory Compliance Information
4. Changes Between Previous Application and Current Application
5. NSS-D Licence Renewal Application – Report
6. Permits, Certificates, other Licences, Federal, Provincial, Municipal Regulations
7. Insurance Certificate
8. Land Ownership
9. OPG Organization Chart

SUMMARY TABLE

Summary of Regulatory Obligation Actions Undertaken in this Submission

Submission Title: “Application for Renewal of Darlington Waste Management Facility Operating Licence”

Regulatory Obligation Actions (REGO):

No.	Description	Target Completion Date
1.	OPG to provide the gap analysis and implementation plan for REGDOC-2.11.2 Decommissioning to the CNSC.	March 17, 2023
2.	OPG to provide the gap analysis and implementation plan for REGDOC-3.3.1 Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities to the CNSC.	March 17, 2023
3.	OPG to provide the gap analysis and implementation plan for CNSC REGDOC-2.11.1 Waste Management, Volume I: Management of Radioactive Waste to the CNSC.	April 15, 2022
6.	OPG to implement the National Fire Code of Canada (2015).	December 1, 2022

Attachment 1 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOI-W4-355.01/2023" CD# 00044-CORR-00531-01153

ATTACHMENT 1

Codes, Standards and REGDOC for Licence Renewal

(8 pages including this coversheet)

Attachment 1 – Codes, Standards and REGDOC for Licence Renewal

Table 1:- Regulatory compliance information for NSS-D Licence Renewal Application as Documented in the Licence Conditions Handbook (LCH)

#	Section in LCH	Standards, Codes and Regulatory Documents	In current LCH	To be included in LCH for Relicensing	Implementation Date for Relicensing
1	General	CNSC REGDOC-3.5.3 Regulatory Fundamentals (2018)	X		
		CNSC REGDOC-3.2.1 Public Information and Disclosure (2018) (supersedes CNSC RD/GD-99.3)	X		
		CNSC RD/GD-99.3 Public Information and Disclosure	X		
		CSA N294-09 Decommissioning of Facilities Containing Nuclear Substances	X		
		CSA N294-19 Decommissioning of Facilities Containing Nuclear Substances	X		
		CNSC G-219 Decommissioning Planning for Licensed Activities	X (guidance)		
		REGDOC-2.11.2 Decommissioning (supersedes CNSC G-219)		X	OPG will provide the gap analysis and implementation plan for REGDOC-2.11.2 Decommissioning to the CNSC by March 17, 2023.
		CNSC G-206 Financial Guarantees for the Decommissioning of Licensed Activities	X (guidance)		
2	Management System	REGDOC-3.3.1 Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities (supersedes CNSC G-206)		X	OPG will provide the gap analysis and implementation plan for REGDOC-3.3.1 Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities to the CNSC by March 17, 2023.
		CNSC REGDOC-2.1.1 Management System (2019)	X (guidance)		
		CSA N286-12 Management system requirements for nuclear facilities (2012, reaffirmed 2017)	X		

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#	Section in LCH	Standards, Codes and Regulatory Documents	In current LCH	To be included in LCH for Relicensing	Implementation Date for Relicensing
		CSA N286.0.1-21 Commentary on N286-12, Management system requirements for nuclear facilities		X (guidance)	
3	Human Performance Management	CNSC REGDOC-2.2.2 Personnel Training, Version 2 (2016)	X		
		CNSC REGDOC-2.2.5 Minimum Staff Complement (2019)	X (guidance)		
		CNSC REGDOC-2.2.4 Fitness for Duty: Managing Worker Fatigue (2017)	X		
		CNSC REGDOC-2.2.4 Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 2 (2017)	X		
		CNSC REGDOC-2.1.2 (2018) Safety Culture	X		
		CNSC REGDOC-2.2.1 Human Factors	X (guidance)		
		CNSC G-276 Human Factors Engineering Program Plans	X (guidance)		
		CNSC G-278 Human Factors Verification and Validation Plans	X (guidance)		
4	Operating Performance	CNSC REGDOC-3.1.2 Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills (2018)	X		
		CNSC REGDOC-3.2.1 Public Information and Disclosure (2018) (supersedes CNSC RD/GD-99.3)	X		
		CNSC RD/GD-99.3 Public Information and Disclosure (2012)	X		
5	Safety Analysis	CSA N292.0-14 General Principles for the Management of Radioactive Waste and Irradiated Fuel	X		
		CSA N292.2-13 Interim Dry Storage of Irradiated Fuel	X		
		CSA N292.3-14 Management of Low and Intermediate-Level Radioactive Waste	X		
		CSA N286.7-16 Quality Assurance of Analytical, Scientific, and Design Computer Programs	X		
6	Physical Design	National Building Code of Canada 2015	X		

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#	Section in LCH	Standards, Codes and Regulatory Documents	In current LCH	To be included in LCH for Relicensing	Implementation Date for Relicensing
		National Fire Code of Canada 2015	X		Compliant for new structures. For current structures, implementation will be by December 1, 2022.
		CSA N393-13 Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances (2013, reaffirmed 2018)	X		
		CNSC G-276 Human Factors Engineering Program Plans	X (guidance)		
		CNSC G-278 Human Factors Verification and Validation Plans	X (guidance)		
		CSA N290.12 Human Factors in Design for Nuclear Power Plants	X (guidance)		
		CSA N291-08 Requirements for Safety-Related Structures for Nuclear Power Plants	X (guidance)		
		CNSC REGDOC-2.5.1 General Design Considerations: Human Factors (2019) (supersedes G-276 and G-278)		X (guidance)	
		CSA N285.0-08 General Requirements for Pressure Retaining Systems and Components in CANDU Nuclear Power Plants	X		
		ASME B31.1 (2010) Power Piping	X		
		CSA B51-09 Boiler, Pressure Vessel, and Pressure Piping Code	X		
		NFPA-24 (2010) Standard for the Installation of Private Fire Service Mains and their Appurtenances	X		
		NFPA-20 Standard for the Installation of Stationary Pumps for Fire Protection	X		
7	Fitness for Service	CSA N291-08 Requirements for Safety-Related Structures for Nuclear Power Plants	X (guidance)		
		CNSC REGDOC-2.6.2 (2017) Maintenance Programs for Nuclear Power Plants	X (guidance)		
		CNSC REGDOC-2.6.3 (2014) Aging Management	X		

Attachment 1 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOI-W4-355.01/2023" CD# 00044-CORR-00531-01153

#	Section in LCH	Standards, Codes and Regulatory Documents	In current LCH	To be included in LCH for Relicensing	Implementation Date for Relicensing
8	Radiation Protection	CNSC G-129 Keeping Radiation Exposures and Doses "As Low as Reasonably Achievable (ALARA)", Revision 1 (2004)	X (guidance)		
		CNSC G-228 Developing and Using Action Levels (2001)	X (guidance)		
		CNSC REGDOC-2.7.1 Radiation Protection (will supersede G-129 and G-228)		X (guidance)	
		CNSC REGDOC-2.7.2 Dosimetry, Volume I: Ascertaining Occupational Dose		X (guidance)	
9	Conventional Health and Safety	CNSC REGDOC-2.8.1 Conventional Health and Safety (2019)		X (guidance)	
10	Environmental Protection	CSA N288.1-14 Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities	X		
		CSA N288.1-20 Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities (supersedes CSA N288.1-14)		X (guidance)	
		CSA N288.3.4 Performance Testing of Nuclear Air-Cleaning Systems at Nuclear Facilities	X		
		CSA N288.4-10 Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills (2010, reaffirmed 2015)	X		
		CSA N288.5-11 Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills (2011, reaffirmed 2016)	X		
		CSA N288.6-12 Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills (2012, reaffirmed 2017)	X		
		CSA N288.7-15 Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills	X		
		CSA N288.8-17 Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities	X (guidance, until fully implemented)		
		CSA N288.2 Guidelines for Calculating the Radiological Consequences to the Public of a Release of Airborne Radioactive Material for Nuclear Reactor Accidents	X (guidance)		

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WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

#	Section in LCH	Standards, Codes and Regulatory Documents	In current LCH	To be included in LCH for Relicensing	Implementation Date for Relicensing
		CNSC REGDOC-2.9.1 Environmental Protection: Environmental Principles, Assessments and Protection Measures	X		
		CNSC REGDOC-2.9.1 Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.1	X Compliant by Dec. 31, 2022		
		CNSC G-228 Developing and Using Action Levels	X (guidance)		
11	Emergency Management and Fire Protection	National Building Code of Canada 2015	X		
		National Fire Code of Canada 2015	X		Compliant for new structures. For current structures, implementation will be by December 1, 2022.
		CNSC REGDOC-2.10.1 Nuclear Emergency Preparedness and Response, Version 2 (2017)	X		
		CSA N393-13 Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances (2013, reaffirmed 2018)	X		
		CSA N294-09 Decommissioning of facilities containing nuclear substances (2009, reaffirmed 2014)	X		
12	Waste Management	CSA N294-19 Decommissioning of facilities containing nuclear substances	X		
		CNSC G-219 Decommissioning Planning for Licensed Facilities (June 2000)	X (guidance)		
		CSA N292.0-19 General principles for the management of radioactive waste and irradiated fuel	X		
		CSA N292.2-13 Interim Dry Storage of Irradiated Fuel	X		
		CSA N292.0-14 General Principles for the Management of Radioactive Waste and Irradiated Fuel	X		
		CSA N292.3-14 Management of Low- and Intermediate-Level Radioactive Waste	X		
		CSA N292.3-19 Management of Low- and Intermediate-Level Radioactive Waste (2019)		X (guidance)	

Attachment 1 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

#	Section in LCH	Standards, Codes and Regulatory Documents	In current LCH	To be included in LCH for Relicensing	Implementation Date for Relicensing
		CNSC REGDOC-2.11 Framework for Radioactive Waste Management and Decommissioning in Canada, Version 2 (2018)	X (guidance)		
		CNSC REGDOC-2.11.1 Waste Management, Volume I: Management of Radioactive Waste		X	OPG will provide the gap analysis and implementation plan for CNSC REGDOC-2.11.1 Waste Management, Volume I: Management of Radioactive Waste to the CNSC by April 15, 2022.
		CNSC REGDOC-2.11.2 Decommissioning (supersedes CNSC G-219)		X	OPG will provide the gap analysis and implementation plan for REGDOC-2.11.2 Decommissioning to the CNSC by March 17, 2023.
		CNSC G-206 Financial Guarantees for the Decommissioning of Licensed Activities (June 2000)	X (guidance)		
		CNSC REGDOC-3.3.1 Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities (supersedes CNSC G-206)		X	OPG will provide the gap analysis and implementation plan for REGDOC-3.3.1 Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities to the CNSC by March 17, 2023.
13	Security	CNSC REGDOC-2.12.3 Security of Nuclear Substances: Sealed Sources and Category I, II, and III Nuclear Material, Version 2	X (guidance)		
		CNSC REGDOC-2.12.3 Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1 (2020)		X (guidance)	
		CNSC RD-363 Nuclear Security Officer Medical, Physical, and Psychological Fitness	X		
		REGDOC-2.2.4 (2018) Fitness for Duty, Volume III: Nuclear Security Officer Medical, Physical and Psychological Fitness	X		

Attachment 1 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

#	Section in LCH	Standards, Codes and Regulatory Documents	In current LCH	To be included in LCH for Relicensing	Implementation Date for Relicensing
		REGDOC-2.12.1 (2018) High-Security Facilities, Volume II: Criteria for Nuclear Security Systems and Devices	X		
		CNSC REGDOC-2.12.2 (2013) Site Access Security Clearance	X		
		CSA N290.7 Cyber Security for Nuclear Power Plants and Small Reactor Facilities	X (guidance)		
14	Safeguards and Non-proliferation	CNSC REGDOC-2.13.1 Safeguards and Nuclear Material Accountancy (2018)	X		
15	Packaging and Transport	CNSC REGDOC-2.14.1 Information Incorporated by Reference in Canada's Packaging and Transport of Nuclear Substances Regulations, 2015, Version 2 (2021)		X (guidance)	
16	Facility Specific	CSA N393-13 Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances	X		
		NRC National Building Code of Canada (2015)	X		
		NRC National Fire Code of Canada (2015)	X		Compliant for new structures. For current structures, implementation will be by December 1, 2022.

Attachment 2 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOI-W4-355.01/2023" CD# 00044-CORR-00531-01153

ATTACHMENT 2

Compliance Matrix for Regulatory Requirements

(15 pages including this coversheet)

Attachment 2 –Compliance Matrix for Regulatory Requirements

Table 1: NSS-D Application Matrix - General Nuclear Safety and Control Regulations

<i>General Nuclear Safety and Control Regulations</i>			
LICENCES - GENERAL APPLICATION REQUIREMENTS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
3.(1) An application for a licence shall contain the following information:			
(a)	the applicant's name and business address.	General	Ontario Power Generation Inc. 700 University Avenue, Toronto, Ontario M5G 1X6 Mailing Address c/o: Mr. Jason Van Wart, Vice President Nuclear Sustainability Services, 177 Tie Road, B21, Tiverton, Ontario, N0G 2T0
(b)	the activity to be licensed and its purpose.	General	Cover Letter – OPG letter, J. Van Wart to M. Leblanc, "Licence Application for Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023", March 22, 2021, CD# 00044-CORR-00531-01153.
(c)	the name, maximum quantity and form of any nuclear substance to be encompassed by the licence.	General	Attachment 5 - Section 1.5
(d)	a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence.	General Security	Attachment 5 - Section 1.0 Attachment 5 – Section 2.12

General Nuclear Safety and Control Regulations			
LICENCES - GENERAL APPLICATION REQUIREMENTS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
(e)	the proposed measures to ensure compliance with the <i>Radiation Protection Regulations</i> , the <i>Nuclear Security Regulations</i> and the <i>Packaging and Transport of Nuclear Substances Regulations</i> , 2015;	Radiation Protection Security Packaging & Transport	Attachment 5 - Section 2.7 Attachment 5 - Section 2.12 Attachment 5 - Section 2.14
(f)	any proposed action level for the purpose of section 6 of the <i>Radiation Protection Regulations</i> ;	Radiation Protection Environmental Protection	Attachment 5 - Section 2.7 Attachment 5 - Section 2.9
(g)	the proposed measures to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment or prescribed information;	Security	Attachment 5 - Section 2.12
(h)	the proposed measures to prevent loss or illegal use, possession or removal of the nuclear substance, prescribed equipment or prescribed information;	Security Safeguards	Attachment 5 - Section 2.12 Attachment 5 - Section 2.13
(i)	a description and the results of any test, analysis or calculation performed to substantiate the information included in the application;	All Safety and Control Areas	Attachment 5 - Sections 2.1 to 2.14
(j)	the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activity to be licensed, including waste that may be stored, managed, processed or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste;	General Waste Management	Attachment 5 - Sections 1.5, 1.6 Attachment 5 - Section 2.11

General Nuclear Safety and Control Regulations			
LICENCES - GENERAL APPLICATION REQUIREMENTS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
(k)	the applicant's organizational management structure insofar as it may bear on the applicant's compliance with the <i>Act</i> and the regulations made under the <i>Act</i> , including the internal allocation of functions, responsibilities and authority;	Management System	Attachment 5 - Section 2.1 Attachment 9
(l)	a description of any proposed financial guarantee relating to the activity to be licensed; and	Waste Managements (Decommissioning)	Attachment 5 - Section 6.0
(m)	any other information required by the <i>Act</i> or the regulations made under the <i>Act</i> for the activity to be licensed and the nuclear substance, nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence.	All Safety and Control Areas	Attachment 5 - Sections 2.1 to 2.14
*(1.1)	The Commission or a designated officer authorized under paragraph 37(2)(c) of the <i>Act</i> , may require any other information that is necessary to enable the Commission or the designated officer to determine whether the applicant: (a) is qualified to carry on the activity to be licensed, or (b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.	General	Refer to Attachment 3, Table 1 for a detailed matrix.
(2)	Subsection (1) does not apply in respect of an application for a licence to import or export for which the information requirements are prescribed by the <i>Nuclear Non-Proliferation Import and Export Control Regulations</i> , or in respect of an application for a licence to transport while in transit for which the information requirements are prescribed by the <i>Packaging and Transport of Nuclear Substances Regulations</i> .		Not Applicable.

General Nuclear Safety and Control Regulations			
LICENCES - GENERAL APPLICATION REQUIREMENTS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
LICENCES - APPLICATION FOR RENEWAL OF LICENCE			
5. An application for the renewal of a licence shall contain			
(a)	the information required to be contained in an application for that licence by the applicable regulations made under the Act; and	General	Cover Letter, Attachment 1 – Attachment 9
(b)	a statement identifying the changes in the information that was previously submitted.	General	Attachment 4
OBLIGATIONS - REPRESENTATIVES OF APPLICANTS AND LICENSEES			
15. Every applicant for a licence and every licensee shall notify the Commission of:			
(a)	the persons who have authority to act for them in their dealings with the Commission;	Management System	Attachment 5 - Section 2.1
(b)	the names and position titles of the persons who are responsible for the management and control of the licensed activity and the nuclear substance, nuclear facility, prescribed equipment, or prescribed information encompassed by the licence; and		Attachment 9
(c)	any change in the information referred to in paragraphs (a) and (b), within 15 days after the change occurs.		

*Refer to Attachment 3, with respect to any other information required pursuant to subsection 3(1.1) of the *General Nuclear Safety and Control Regulations*

Table 2: NSS-D Application Matrix – Class I Nuclear Facilities Regulations

<i>Class I Nuclear Facilities Regulations</i>			
LICENCE APPLICATIONS - GENERAL REQUIREMENTS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
3. An application for a licence in respect of a Class I nuclear facility, other than a licence to abandon, shall contain the following information in addition to the information required by section 3 of the <i>General Nuclear Safety and Control Regulations</i> :			
(a)	a description of the site of the activity to be licensed, including the location of any exclusion zone and any structures within that zone;	General	Attachment 5 – Section 1.0
(b)	plans showing the location, perimeter, areas, structures and systems of the nuclear facility;	General	Attachment 5 – Section 1.2
(c)	evidence that the applicant is the owner of the site or has authority from the owner of the site to carry on the activity to be licensed;	General	Attachment 8
(d)	the proposed quality assurance program for the activity to be licensed;	Management System	Attachment 5 - Section 2.1
(d.1)	The proposed human performance program for the activity to be licensed, including measures to ensure workers' fitness for duty.	Human Performance	Attachment 5 - Section 2.2
(e)	the name, form, characteristics and quantity of any hazardous substances that may be on the site while the activity to be licensed is carried on;	General	Attachment 5 - Section 1.3, 1.4, 1.5, 1.6
(f)	the proposed worker health and safety policies and procedures;	Conventional Health & Safety Radiation Protection	Attachment 5 - Section 2.8 Attachment 5 - Section 2.7

Class I Nuclear Facilities Regulations			
LICENCE APPLICATIONS - GENERAL REQUIREMENTS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
(g)	the proposed environmental protection policies and procedures;	Environmental Protection	Attachment 5 - Section 2.9
(h)	the proposed effluent and environmental monitoring programs;	Environmental Protection	Attachment 5 - Section 2.9
(i)	if the application is in respect of a nuclear facility referred to in paragraph 2(b) of the <i>Nuclear Security Regulations</i> , the information required by section 3 of those Regulations;	Security	Attachment 5 - Section 2.12
(j)	the proposed program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the activity to be licensed; and	Indigenous Community Engagement Community Relations and Public Information	Attachment 5 - Section 4.0 Attachment 5 - Section 5.0
(k)	the proposed plan for the decommissioning of the nuclear facility or of the site.	Waste Management	Attachment 5 - Section 2.11
LICENCE APPLICATIONS - LICENCE TO OPERATE			
6. An application for a licence to operate a Class I nuclear facility shall contain the following information in addition to the information required by section 3:			
(a)	a description of the structures at the nuclear facility, including their design and their design operating conditions;	General Operating Performance	Attachment 5 - Sections 1.0 Attachment 5 – Section 2.3
(b)	a description of the systems and equipment at the nuclear facility, including their design and their design operating conditions;	General Physical Design	Attachment 5 - Sections 1.0 Attachment 5 – Section 2.5

<i>Class I Nuclear Facilities Regulations</i>			
LICENCE APPLICATIONS - GENERAL REQUIREMENTS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
(c)	a final safety analysis report demonstrating the adequacy of the design of the nuclear facility;	Safety Analysis	Attachment 5 - Section 2.4
(d)	the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility;	Operating Performance	Attachment 5 - Section 2.3
(e)	the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances;	Radiation Protection	Attachment 5 - Section 2.7
		Packaging & Transport	Attachment 5 - Section 2.14
(f)	the proposed measures to facilitate Canada's compliance with any applicable safeguards agreement;	Safeguards	Attachment 5 - Section 2.13
(g)	the proposed commissioning program for the systems and equipment that will be used at the nuclear facility;	Physical Design	Attachment 5 – Section 2.5
(h)	the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, and the measures that will be taken to prevent or mitigate those effects;	Environmental Protection	Attachment 5 - Section 2.9
			Attachment 5 - Sections 3.1, 3.2
(i)	the proposed location of points of release, the proposed maximum quantities and concentrations, and the anticipated volume and flow rate of releases of nuclear substances and hazardous substances into the environment, including their physical, chemical and radiological characteristics;	Environmental Protection	Attachment 5 - Section 2.9
			Attachment 5 - Sections 3.1, 3.2
(j)	the proposed measures to control releases of nuclear substances and hazardous substances into the environment;	Radiation Protection	Attachment 5 – Section 2.7
		Environmental Protection	Attachment 5 - Section 2.9
			Attachment 5 - Sections 3.1, 3.2

<i>Class I Nuclear Facilities Regulations</i>			
LICENCE APPLICATIONS - GENERAL REQUIREMENTS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
(k)	the proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security, including measures to (i) assist off-site authorities in planning and preparing to limit the effects of an accidental release, (ii) notify off-site authorities of an accidental release or the imminence of an accidental release, (iii) report information to off-site authorities during and after an accidental release, (iv) assist off-site authorities in dealing with the effects of an accidental release, and (v) test the implementation of the measures to prevent or mitigate the effects of an accidental release;	Emergency Management	Attachment 5 - Section 2.10
(l)	the proposed measures to prevent acts of sabotage or attempted sabotage at the nuclear facility, including measures to alert the licensee to such acts;	Security	Attachment 5 - Section 2.12
(m)	the proposed responsibilities of and qualification requirements and training program for workers, including the procedures for the requalification of workers; and	Human Performance	Attachment 5 - Section 2.2
(n)	the results that have been achieved in implementing the program for recruiting, training and qualifying workers in respect of the operation and maintenance of the nuclear facility.	Human Performance	Attachment 5 - Section 2.2

Table 3: NSS-D Application Matrix – Nuclear Substances and Radiation Devices Regulations

<i>Nuclear Substances and Radiation Devices Regulations</i>			
LICENCE APPLICATIONS – GENERAL REQUIREMENTS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
3. (1) An application for a licence in respect of a nuclear substance or a radiation device, other than a licence to service a radiation device, shall contain the following information in addition to the information required by section 3 of the <i>General Nuclear Safety and Control Regulations</i> :			
(a) to (o)	Not Applicable.	Radiation Protection Security	OPG holds several licences under the Nuclear Substances and Radiation Devices Regulations, as listed in Attachment 3, Sections 2.7 and 2.12. However, OPG is not applying for these activities under this licence application.

Table 4: NSS-D Application Matrix - Nuclear Security Regulations

<i>Nuclear Security Regulations</i>			
PART 2 SECURITY OF NUCLEAR FACILITIES LISTED IN SCHEDULE 2 – LICENCE APPLICATIONS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
<p>41. An application for a licence in respect of a nuclear facility shall contain, in addition to the information required by sections 3 to 8 of the <i>Class I Nuclear Facilities Regulations</i>, a description of the physical protection measures to be taken to ensure compliance with sections 42 to 48.</p>			
<p>42. Access Control at Nuclear Facilities</p>			
(1)	<p>No licensee shall permit any person to enter or remain in a nuclear facility unless the person has a facility-access security clearance or is</p> <ul style="list-style-type: none"> (a) escorted at all times by a person who has a facility-access security clearance; (b) a member of an off-site response force, a peace officer or a member of another external emergency response force who requires access for the purpose of carrying out their duties at the site of the nuclear facility; or (c) an inspector who is designated under section 29 of the Act to carry out inspections at a nuclear facility. 	Security	Attachment 5 - Section 2.12
(2)	<p>Before granting a facility-access security clearance to a person, a licensee shall verify the following information:</p> <ul style="list-style-type: none"> (a) a record emanating from the Canadian Police Information Centre or from a police service serving the locality where the facility is located, showing the results of a criminal record name check on the person; (b) the person's personal history, composed of their educational achievement, professional qualifications, employment history and character references, unless the person has been employed for more than 10 years at the facility; and (c) if a person's personal history cannot be established for at least the last five years, information relating to the trustworthiness of the person 	Security	Attachment 5 - Section 2.12

<i>Nuclear Security Regulations</i>			
PART 2 SECURITY OF NUCLEAR FACILITIES LISTED IN SCHEDULE 2 – LICENCE APPLICATIONS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
	including, where available, a criminal record name check on that person from each country in which the person has resided for one or more years in the last five years.		
(3)	A facility-access security clearance may be granted for any term not exceeding five years and shall be subject to any terms and conditions necessary to minimize the risk to the security of the nuclear facility.	Security	Attachment 5 - Section 2.12
(4)	For the purposes of subsection (1), a licensee may accept a facility-access security clearance granted by another licensee or an authorization referred to in subsection 17(1) or section 18.	Security	Attachment 5 - Section 2.12
43. List of Authorized Persons			
(1)	Every licensee shall establish and maintain a list of all persons to whom a facility-access security clearance has been granted under section 42.	Security	Attachment 5 - Section 2.12
(2)	Every licensee shall, upon request, provide the list to the Commission or a person who is designated as an inspector under section 29 of the Act.	Security	Attachment 5 - Section 2.12
44. Revocation of Facility-access Security Clearance			
(1)	A licensee may revoke a facility-access security clearance if (a) there are reasonable grounds to believe that the person who has the facility-access security clearance poses or could pose a risk to the security of a nuclear facility; (b) the person is no longer employed by or otherwise under contract to the licensee; (c) the duties or functions of the person have been completed, suspended or	Security	Attachment 5 - Section 2.12

<i>Nuclear Security Regulations</i>			
PART 2 SECURITY OF NUCLEAR FACILITIES LISTED IN SCHEDULE 2 – LICENCE APPLICATIONS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
	otherwise terminated; or (d) the facility-access security clearance is no longer required by the person in order for them to perform their duties.		
(2)	A licensee shall immediately notify the Commission in writing of any revocation made under paragraph (1)(a).	Security	Attachment 5 - Section 2.12
45. Entry of Land Vehicles			
	No licensee shall permit a land vehicle to enter a nuclear facility unless (a) there is an operational requirement for it to be there and it is searched for explosive substances, weapons and unauthorized persons; or (b) it is used by a member of an off-site response force, a peace officer or a member of another external emergency response force for the purpose of carrying out their duties.	Security	Attachment 5 - Section 2.12
46. Security of Nuclear Substances			
(1)	Every licensee shall process, use and store nuclear substances and other radioactive material in an area within a nuclear facility that is under the visual surveillance of the licensee, or is designed and constructed to prevent persons from gaining unauthorized access to those substances and that material.	Security	Attachment 5 - Section 2.12
(2)	Subject to subsection (3), a licensee shall ensure that the area is equipped with devices that (a) detect any intrusion into it; (b) detect any tampering that may cause any of the devices to malfunction or cease to function; and	Security	Attachment 5 - Section 2.12

<i>Nuclear Security Regulations</i>			
PART 2 SECURITY OF NUCLEAR FACILITIES LISTED IN SCHEDULE 2 – LICENCE APPLICATIONS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
	(c) when an event referred to in paragraph (a) or (b) is detected, set off a continuous alarm signal that is both audible and visible to a person in the service of the licensee or of an alarm monitoring service under contract to the licensee.		
(3)	A licensee need not comply with subsection (2) if it takes physical protection measures in respect of the area that provide the same level of protection as the devices referred to in that subsection.	Security	Attachment 5 - Section 2.12
47. Arrangements with Off-site Response Force			
(1)	Every licensee shall make or cause to be made written arrangements with an off-site response force that is capable of making an effective intervention at the nuclear facility.	Security	Attachment 5 - Section 2.12
(2)	The arrangements shall include provisions for (a) annual familiarization visits to the nuclear facility by members of the off-site response force; and (b) the joint development of a contingency plan by the licensee and the off-site response force to facilitate the force making an effective intervention.	Security	Attachment 5 - Section 2.12
(3)	If a licensee does not have alarm monitoring capability, the alarm monitoring service under contract to the licensee shall notify the licensee and the off-site response force, immediately on receipt of an alarm signal from the nuclear facility or the area referred to in subsection 46(1).	Security	Attachment 5 - Section 2.12

<i>Nuclear Security Regulations</i>			
PART 2 SECURITY OF NUCLEAR FACILITIES LISTED IN SCHEDULE 2 – LICENCE APPLICATIONS			
Regulatory Requirement	Description of Regulatory Requirement	Related Safety Control Area	Location in Submission
48. Supervisory Awareness Program			
	Every licensee shall develop a supervisory awareness program and implement it on an ongoing basis to ensure that its supervisors are trained to recognize behavioural changes in all personnel, including contractors, that could pose a risk to security at a facility at which it carries on licensed activities.	Human Performance	Attachment 5 - Section 2.2

Attachment 3 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOI-W4-355.01/2023" CD# 00044-CORR-00531-01153

ATTACHMENT 3

Application Matrix for Additional Regulatory Compliance Information

(4 pages including this coversheet)

Attachment 3 – Application Matrix for Additional Regulatory Compliance Information

Table 1: NSS-D– Additional Regulatory Compliance Information

#	Necessary information	Related Safety Control Area	Location in Submission
1)	Summary of programs and supporting documentation needed to support the licence application organized under each SCA, including additional regulatory requirements. The programs and supporting documentation should be sufficiently detailed to describe the safety and control measures that will be implemented at NSS-D for each SCA.	All Safety and Control Areas	Attachment 5 - Sections 2.0 - 9.0
2)	Description of NSS-D's approach to safety, including reference to corporate and facility specific documents which enunciate the safety policies and standards to which NSS-D must adhere.	Management System Safety Analysis Radiation Protection Conventional Health & Safety Environmental Protection	Attachment 5 - Section 2.1 Attachment 5 - Section 2.4 Attachment 5 - Section 2.7 Attachment 5 - Section 2.8 Attachment 5 - Section 2.9
3)	Documents describing the organizational structure, roles and responsibilities of organizational units and management; including documents governing the day to day operation and conduct of the organization.	General Management Systems Operating Performance	Attachment 9 Attachment 5 - Section 2.1 Attachment 5 - Section 2.3
4)	Information on NSS-D's performance for each SCA during the current licence period, relative to OPG's expectations, including any trends	All Safety and Control Areas	Attachment 5 - Sections 2.1 to 2.14
5)	Assessment of existing and future safety challenges, along with a safety improvement plan to address these challenges during the next licence period	All Safety and Control Areas	Attachment 5 - Sections 2.1 to 2.14
6)	Describe opportunities for improvements and any safety improvement plans to address identified safety challenges	All Safety and Control Areas	Attachment 5 - Sections 2.1 to 2.14

Attachment 3 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

#	Necessary information	Related Safety Control Area	Location in Submission
7)	A description of the proposed operating plan for the next licensing period	Operating Performance	Attachment 5 – Section 1.7 Attachment 5 - Section 2.3
8)	Information on significant activities envisaged beyond the end of the next licensing period, if any	All Safety and Control Areas	Attachment 5 - Sections 2.1 to 2.14 Attachment 5 - Section 9.0
9)	Provide a list of federal, provincial, municipal, or other regulations, other than the regulations pursuant to the NSCA, which NSS-D must abide by	General	Attachment 6 – Part A
10)	Provide a description of any obligations for municipal, provincial, or other federal authorities and any obligations for public and/or private organizations.	General	Attachment 6 – Part A
11)	Provide a list of any permits, certificates and licences issued by authorities other than the CNSC	General	Attachment 6 – Part B
12)	Provide updated Derived Release Limits and Operating Release Limit reports for the facility	Radiation Protection Environmental Protection	Attachment 5 - Section 2.7 Attachment 5 - Section 2.9
13)	Provide OPG's plans and schedule, including dates, with respect to complying with each of the standards, codes and CNSC regulatory documents found in Attachment 2 (unless recommended to be included under recommendations and guidance), including transition measures as appropriate.	All Safety and Control Areas	Attachment 1 Attachment 5 – Sections 2.10, 2.11 and 6.0
14)	Summary of the current status of all open action items, as well as issues and requests that were discussed during the last NSS-D Commission hearings or meetings, including a plan and date for resolution.	Other Regulatory Requirements	There are no open action items, issues or requests that were discussed during the last NSS-D Commission hearings or meetings.

Attachment 3 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

#	Necessary information	Related Safety Control Area	Location in Submission
15)	Provide justification to ensure that any proposed action level for the purpose of section 6 of the <i>Radiation Protection Regulations</i> will provide timely warning of any potential or actual loss of control of part of the radiation protection program.	Radiation Protection Environmental Protection	Attachment 5 - Section 2.7 Attachment 5 - Section 2.9
16)	Provide a self-assessment to determine if the licence applications could have any new adverse impacts on Indigenous or treaty rights and therefore raise the duty to consult and trigger the requirements of REGDOC-3.2.2, <i>Indigenous Engagement</i> . REGDOC-3.2.2 also outlines what to consider when conducting this activity.	Indigenous Community Engagement	Attachment 5 - Section 4.0
17)	Provide a description of outreach activities to engage Indigenous groups and members of the public with respect to licence renewal.	Indigenous Community Engagement Community Relations and Public Information	Attachment 5 - Section 4.0 Attachment 5 - Section 5.0

Attachment 4 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

ATTACHMENT 4

Changes Between Previous Application and Current Application

(4 pages including this coversheet)

Attachment 4 - Changes Between Previous Application and Current Application

Parts of Previous Application	Contents of Previous Application (WFOL-W4-355.02/2012)	Parts of Current Application	Contents of Current Application (WFOL-W4-355.01/2023)
	N/A (unavailable)	Attachment 1	<p>Table of CSA Standards and Regulatory Documents compliance for Licence Renewal</p> <p>Implementation dates for the compliance of new codes and standards, and regulatory documents for inclusion into the Licence Conditions Handbook.</p>
Attachment 2 – General Nuclear Safety and Control Regulations	The proposed measures to ensure compliance with the <i>Radiation Protection Regulations</i> and the <i>Nuclear Security Regulations</i> ;	Attachment 2 – General Nuclear Safety and Control Regulations	<p>The proposed measures to ensure compliance with the Radiation Protection Regulations, the Nuclear Security Regulations and the Packaging and Transport of Nuclear Substances Regulations, 2015;</p> <p>Response in Attachment 5 (Report) – Section 2.7, Section 2.12, and Section 2.14</p>
Attachment 2 - Class I Nuclear Facilities Regulations	N/A (unavailable)	Attachment 2 - Class I Nuclear Facilities Regulations – Section 3(d.1)	<p>The proposed human performance program for the activity to be licensed, including measures to ensure workers' fitness for duty.</p> <p>Response in Attachment 5 (Report) - Section 2.2</p>

Attachment 4 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

Parts of Previous Application	Contents of Previous Application (WFOL-W4-355.02/2012)	Parts of Current Application	Contents of Current Application (WFOL-W4-355.01/2023)
N/A (unavailable)	N/A (unavailable)	Attachment 3 – Section 16)	Provide a self-assessment to determine if the licence applications could have any new adverse impacts on Indigenous or treaty rights and therefore raise the duty to consult and trigger the requirements of REGDOC-3.2.2, Indigenous Engagement. REGDOC-3.2.2 also outlines what to consider when conducting this activity. Response in Attachment 5 (Report) – Section 5.0.
N/A (unavailable)	N/A (unavailable)	Attachment 3 – Section 17)	Provide a description of outreach activities to engage Indigenous groups and members of the public with respect to licence renewal. Response in Attachment 5 (Report) - Section 5.0 and Section 6.0.
Letter	Requested a 6-month extension to the current licence to align with the DNGS licence renewal, then a 10-year licence renewal.	Letter	Requests a 10-year licence renewal.
Letter	Facility Name – Darlington Waste Management Facility (DWMF)	Letter	Facility Name – Nuclear Sustainability Services – Darlington (NSS-D)

Attachment 4 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

Parts of Previous Application	Contents of Previous Application (WFOL-W4-355.02/2012)	Parts of Current Application	Contents of Current Application (WFOL-W4-355.01/2023)
Application Structure	<p>Cover Letter</p> <p>Attachment 1: Compliance Matrix: Information Required in the Licence Application for the DWMF Waste Facility Operating Licence Renewal</p> <p>Attachment 2: Safety and Control Areas - Documents</p> <p>Attachment 3: List of Permits, Certificates or Licences</p> <p>Attachment 4: OPG and Nuclear Waste Management Division Organizational Charts</p>	<p>Cover Letter</p> <p>Attachment 1</p> <p>Attachment 2</p> <p>Attachment 3</p> <p>Attachment 4</p> <p>Attachment 5</p> <p>Attachment 6</p> <p>Attachment 7</p> <p>Attachment 8</p> <p>Attachment 9</p>	<p>Codes and Standards, and Regulatory Document Compliance</p> <p>Application Matrix for Compliance</p> <p>Other Information Required</p> <p>Changes</p> <p>Report – Detailed description of the information required under each Safety and Control Area</p> <p>Permits, Certificates, other Licences Federal, Provincial, Municipal Regulations</p> <p>Insurance Certificate</p> <p>Land Ownership</p> <p>OPG Organization Chart</p>

Attachment 5 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

ATTACHMENT 5

NSS-D Licence Renewal Application – Report

(104 pages including this coversheet)



Nuclear Sustainability Services - Darlington Licence Renewal Application



ONTARIO **POWER**
GENERATION

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EXECUTIVE SUMMARY

The current operating licence for the Darlington Waste Management Facility (DWMF) expires on April 30, 2023. OPG is required to provide the information required under the Nuclear Safety and Control Act and regulations, along with the request to renew the Waste Facility Operating Licence (WFOL) WFOL-W4-355.01/2023 for another ten-year term from May 1, 2023 to April 30, 2033.

OPG has renamed the DWMF to Nuclear Sustainability Services – Darlington (NSS-D) in Q4 2021.

NSS-D originally acquired its operating licence in 2007 (formerly as DWMF) and received its first dry storage container shipment with spent fuel from Darlington Nuclear Generating Station (DNGS) in 2008.

NSS-D is licensed by the CNSC as a Class 1B nuclear facility, as defined in the *Class 1 Nuclear Facilities Regulations*, which was designed and constructed to provide for the safe handling, management, and interim storage of radioactive waste produced by DNGS, until an alternative long-term waste management facility becomes available.

NSS-D accommodates High Level Waste (HLW, irradiated or used fuel) produced by DNGS reactor operation and Intermediate Level Waste (ILW) from the Darlington Refurbishment Project at DNGS Units 1 to 4.

The ongoing operation of NSS-D will enable the DNGS to continue to generate safe, environmentally sustainable, reliable, and economical energy for the province of Ontario. Over the requested licence term, Ontario Power Generation Inc. (OPG) remains committed to the safe operation of the NSS-D in a manner that poses minimal risk to the public, employees and the environment, and will continue to comply with Canada's international nuclear obligations.

OPG has built a healthy nuclear safety culture that permeates the NSS-D. A high level of safety can be demonstrated in safety analysis, radiation safety and conventional safety; there has been no lost time accident or medically treated injury in the 14-year period of operation. Environmental monitoring provides assurance that the public and environment is protected, as the results of monitoring and public dose assessment continue to demonstrate that dose to the public from the operation of NSS-D is a very small fraction of the public dose limit. Non-radiological emissions remain negligible.

This licence renewal application contains the information necessary to demonstrate that NSS-D has met the legal requirements of the *Nuclear Safety and Control Act* and applicable regulations for Class 1 Nuclear Facilities. Furthermore, this report presents the required information on the performance of NSS-D in the fourteen Safety and Control Areas defined by the CNSC. During the current licensing period, NSS-D has operated safely and reliably to protect the public, the workers, and the environment. OPG is proud of its excellent record in conventional and radiological safety and is well positioned for the continued operation of NSS-D.

OPG is committed to innovative and responsible solutions for managing radioactive materials safely, efficiently and cost effectively, and making investments for the continued safe operation of NSS-D.

1.0 OVERVIEW

OPG is an Ontario-based electricity generation company whose principal business is the generation and sale of electricity in Ontario. Electricity generated by nuclear power comes with the by-product of radioactive waste. OPG is committed to the responsible and comprehensive management of all its radioactive waste and has been safely storing the waste at the Darlington Waste Management Facility (DWMF), generated from the Darlington Nuclear Generating Station (DNFS).

The Nuclear Waste Management Division (NWMD) at OPG operates Nuclear Class 1B waste facilities and is responsible for the safe and responsible management of radioactive waste from all OPG nuclear owned and leased reactors. NWMD is responsible for the long term safe and economic management of all low, intermediate and high-level waste generated at OPG owned and operated nuclear reactors.

OPG has renamed its Nuclear Waste Management (NWM) division to Nuclear Sustainability Services (NSS) in Q4 2021. NSS safely accepts, transports, processes and stores nuclear by-products, while embracing the three Rs – reduce, reuse, and recycle. A new five-year strategic plan for NSS emphasizes minimizing waste volumes at source and reducing volumes for interim storage and permanent disposal –to reduce costs and to reduce OPG’s environmental footprint.

“Nuclear waste” is a phrase with negative associations in the public mind; and the term is inaccurate when describing all the nuclear materials OPG handles, including materials that are clean, recyclable and valuable – from copper and steel to heavy water – and important medical isotopes. Nuclear Sustainability Services is a name that is both true and inspirational, aligned with OPG’s Climate Change Plan. In both name and deed, NSS demonstrates that nuclear is clean energy, vital to net-zero climate action. With a focus on safety and protection of people and the environment, NSS demonstrates good stewardship of nuclear by-products, while developing lasting solutions for disposal, and ensuring public peace of mind.

In this application, Nuclear Waste Management (NWM) division will be replaced with Nuclear Sustainability Services (NSS) and the Darlington Waste Management Facility (NSS-D) will be replaced with Nuclear Sustainability Services – Darlington (NSS-D).

1.1 Land Acknowledgement

Ontario Power Generation respectfully acknowledges that the Nuclear Sustainability Services – Darlington facility is located in the treaty and traditional territory of the Michi Saagiig and Chippewa Nations, collectively known as the Williams Treaties First Nations.

Ontario Power Generation respectfully acknowledges that the peoples of the Williams Treaties First Nations are the original stewards and caretakers of these lands and that they continue to maintain this responsibility to ensure their health and integrity for future generations.

As a company, OPG remains committed to developing positive and mutually beneficial relationships with the Williams Treaties First Nations and Indigenous communities across Ontario.

1.2 Nuclear Sustainability Services – Darlington Structures

Used fuel generated by the operation of DNGS's four reactors is initially stored under water in the two Irradiated Fuel Bays for a period of approximately 10 years. Afterward, this used fuel is transferred to NSS-D.

NSS-D was designed and constructed to provide for the safe handling, management, and the interim storage of radioactive waste produced by DNGS, until an alternative long term waste management facility becomes available. NSS-D accommodates irradiated fuel produced by DNGS reactor operation and the Intermediate Level Waste (ILW) from the Darlington Refurbishment Project at Darlington Nuclear GS Units 1 to 4.

NSS-D received its operating licence in 2007 (as DWMF) and received its first Dry Storage Container (DSC) loaded with fuel from DNGS in 2008.

NSS-D is located within the larger Darlington Nuclear site boundary and to the east of the DNGS (Figures 1 and 2). The facility consists of the DSC Processing Building and Used Fuel Dry Storage Buildings (UFDSB) #1 and #2, and the Retube Waste Storage Building (RWSB). The DSC Processing Building is used to prepare DSCs for safe storage. UFDSB #1 & #2 are used to store DSCs. The RWSB is used to store the intermediate level waste from the Darlington Refurbishment Project. Photos of the current buildings are shown in Figure 3.

Two other storage structures are planned to be built in the next licensing period, Used Fuel Dry Storage Structures (UFDSS) #3 and UFDSS #4. The potential locations are outlined in Figure 2.

DSC Storage Building #1 has a nominal storage capacity of 500 DSCs and became operational in December 2007 and is located adjacent to the DSC Processing Building.

DSC Storage Building #2 was placed into service in March 2016. The building has a nominal storage capacity of 500 DSCs.

The Retube Waste Storage Building (RWSB) was approved for service on September 30, 2017, is an above ground concrete warehouse type building containing Retube Waste Containers (RWCs). They are stored inside another package referred to as the Darlington Storage Overpack (DSO) for shielding purposes. The RWSB has reinforced concrete floors and overlapping concrete wall panels with room to store 490 RWCs, which is sufficient storage capacity for the retubing of the four Darlington units.

With the exception of the RWSB, the NSS-D is contained within its own protected area, which is separate from the protected area of the DNGS but within the boundary of the Darlington site. The RWSB is also located within the boundary of the Darlington site but not within a protected area.

NSS-D has been operating safely and continued to operate safely during the current pandemic.

Figure 1: Darlington Site



Note: The blue dotted line in this figure is the DNGS exclusion zone.

Figure 2: Nuclear Sustainability Services - Darlington



Figure 3: NSS-D Buildings

DSC Processing Building



UFDSB #1



UFDSB #2



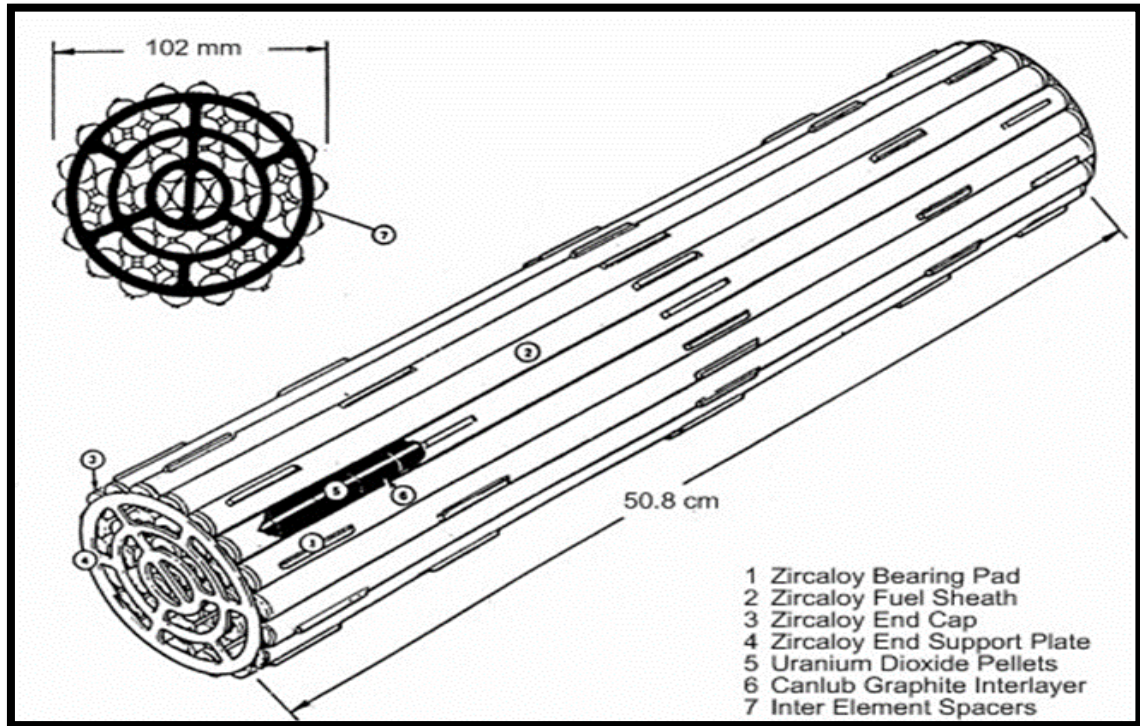
RWSB



1.3 Management of High Level (Used Fuel) Waste

The NSS-D provides safe interim storage for the used fuel discharged from the DNGS units and cooled for a period of approximately 10 years in the IFBs. The storage capacity of the operational storage buildings is limited to 1,000 DSCs. The fuel bundles are assemblies of 37 cylindrical fuel elements, arranged in concentric rings of 18, 12, and 6 elements around a central element (Figure 4).

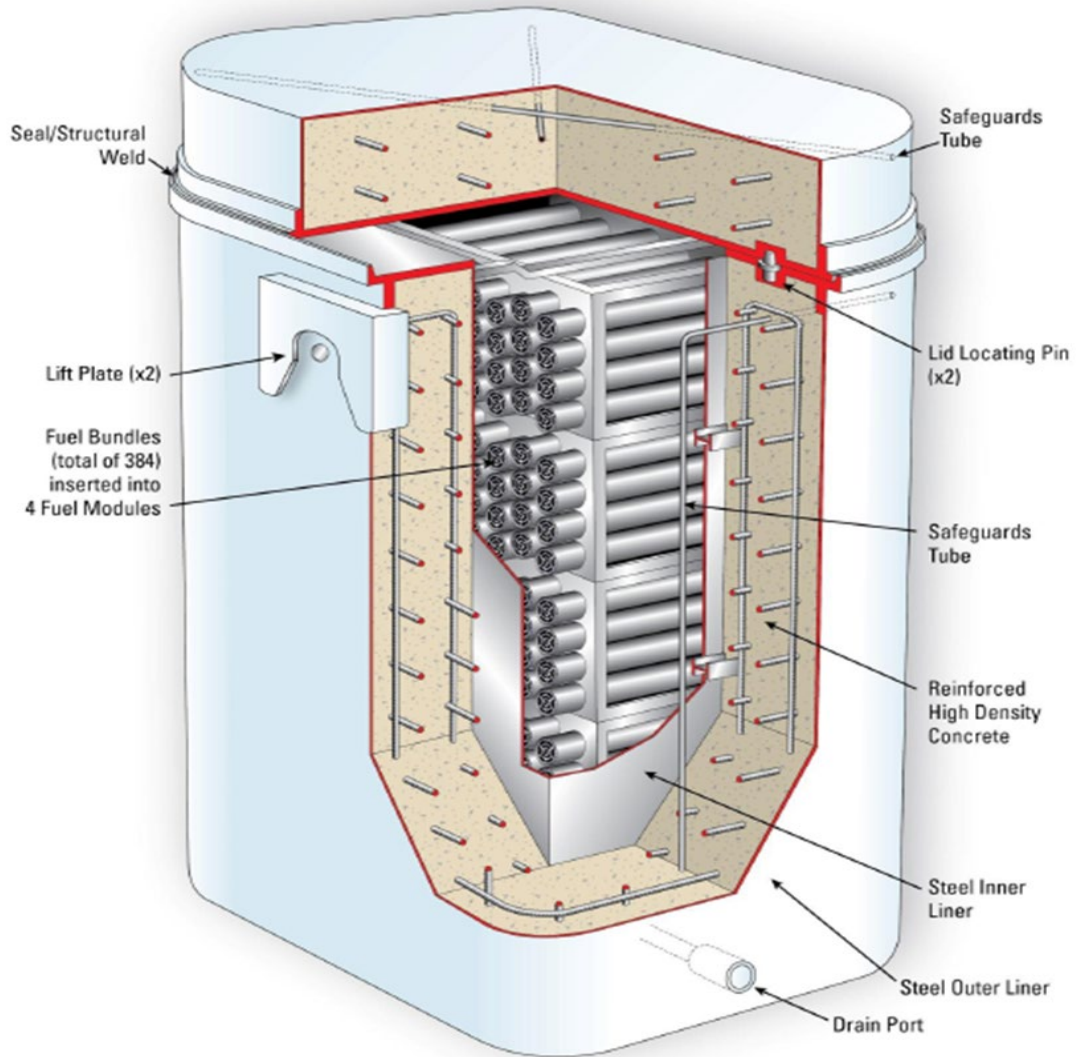
Figure 4: Fuel Bundle



1.3.1 Dry Storage Containers

The DSC is a freestanding reinforced concrete container, with an inner carbon-steel liner and an outer carbon-steel shell, for the storage, on-site transfer and off-site transportation (with an outer packaging) of used CANDU fuel. It is made of two sub-assemblies, a lid and a base. (Figure 5) The DSC is a double-shell rectangular container, with outside dimensions of 2.121 m x 2.419 m by 3.557 m in height (including the lid), and an inside cavity of 1.046 m x 1.322 m by 2.520 m in height. The thickness of each carbon-steel shell is 13 mm.

The reinforced high-density concrete provides radiation shielding while maintaining adequate used fuel decay heat dissipation. The concrete has a nominal density of 3.5 Mg/m³. The maximum total mass (including the lid) is approximately 60 Mg when empty and approximately 70 Mg when loaded with four modules (384 used fuel bundles). Lifting plates are designed to safely lift the DSC with the dedicated lifting beam or the transporter vehicle. The DSC is designed with provision for installing safeguard seals.

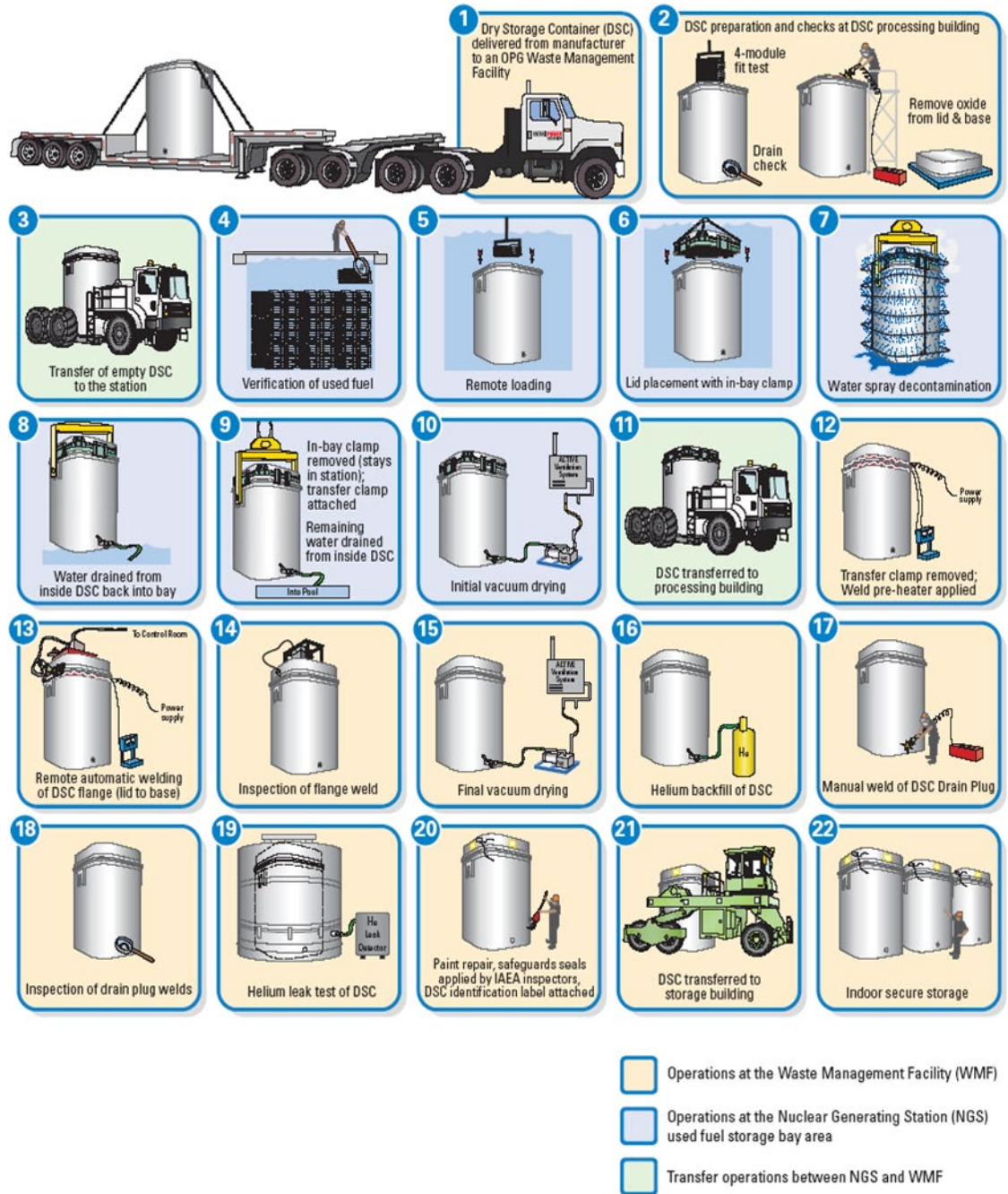
Figure 5: Dry Storage Container

1.3.2 Used Fuel Dry Storage Processing

The processing of a DSC begins with the preparation of new DSCs at the DSC Processing Building and ends with the storage of loaded, hermetically sealed DSCs in the UFDSBs/UFDSs. The steps are summarized in Figures 6 and 7.

Figure 6: Used Fuel Dry Storage Process

The Used Fuel Dry Storage Process



Steps 1-3: Preparing and Transferring Empty DSCs

New, empty DSCs are received at the NSS-D site from the manufacturers. The DSCs are prepared and then transferred to the DNGS for subsequent loading of used fuel.

The DSC Transporter is used to transfer both new (empty) and loaded DSCs between NSS-D and DNGS.

Steps 4 – 10: Loading a DSC at Darlington NGS

The processes of loading, decontaminating, draining and initial drying are completed at DNGS under the Power Reactor Operating Licence. At the DNGS, fuel bundles are loaded under water into storage modules. After a storage module has been loaded, it is transferred under water to a DSC. Each DSC is designed to hold four storage modules, for a total capacity of 384 bundles per loaded DSC.

While the loaded DSC is still submerged in water in the loading bay, the in-bay clamp is used to secure the DSC lid to the container. The DSC is lifted out of the water, drained and then the DSC exterior is decontaminated. The in-bay clamp is replaced with the transfer clamp, and the DSC interior cavity is vacuum-dried in preparation for on-site transfer to the NSS-D.

Prior to leaving the DNGS, the DSC is surveyed, and the entire exterior surface of the loaded DSC and its components are decontaminated including lid flange, drain housings, and the transfer clamp to ensure there is no detectable loose contamination.

Step 11: DSC transfer between Darlington NGS and the DSC Processing Building at the NSS-D

The DSC transporter picks up a loaded DSC from the DNGS after confirmation that it meets NSS-D's waste acceptance criteria. Both the vehicle and the DSC are monitored for contamination and decontaminated, as required, before leaving the station.

The transporter with a loaded DSC then leaves the station and travels along the DNGS site roads to the NSS-D site for further processing in accordance with security and safeguards requirements for on-site transportation. The maximum lift height required during loading or unloading of a DSC is about 0.60 m, which is well within the safety envelope of 2.4 m. When traveling with a DSC, the DSC transporter operates at low speed and has a short stopping distance where stopping is essentially instantaneous. The vehicle is always operated by a trained vehicle operator.

Steps 12 - 20: Processing a DSC at NSS-D

The loaded DSC is transferred on DNGS site roads to the NSS-D site, where it is off-loaded at the DSC Processing Building for further processing, as follows:

- **Receiving a Loaded Dry Storage Container (Step 12)** - After the loaded DSC is received at the DSC Processing Building, movement of the DSC within the DSC Processing Building is performed using the workshop overhead crane and lifting beam.

- **Dry Storage Container Lid Seal Welding (Step 13)** - The DSC is moved to a welding station where the DSC drain port transfer plug, transfer clamp and seal are removed, and the weld pre-heater is installed. The pre-heater is used to heat the DSC weld flange to a prescribed temperature. The weld between the lid and base of the DSC is performed with a prescribed number of passes of the welding machine. At the conclusion of lid welding, the weld machine is removed, and the DSC is allowed to cool.
- **Welding Inspections (Step 14)** - The Phased Array Ultrasonic Testing (PAUT) system is used for the inspection of the DSC lid-to-base seal weld. The scanner is mounted on the DSC base's top flange and is held in place by three magnetic wheels. A loading ramp is used to minimize the force required by the operator when engaging and disengaging the scanner. The inspection covers 100% of the weld as well as the Heat Affected Zone.
- **Final Vacuum Drying, Helium Backfill, and Drain Port Seal Welding (Steps 15 – 18)** - After successful completion of the weld inspection, the DSC is lifted into another workstation for final vacuum drying and helium backfilling. The lifting beam is removed, and the vacuum drying/helium backfilling system connected. Following helium backfill, the drain port is welded and inspected via visual and dye penetrant techniques.
- **Helium Leak Testing (Step 19)** - Helium leak testing is carried out using a vacuum chamber (bell jar). The lid of the bell jar is removed, and the seal-welded DSC is lifted into the lower half of the bell jar. The bell jar lid is craned over the DSC and sealed onto the base of the bell jar. Using the vacuum skid, air is first removed from the bell jar and then the helium leak detector is activated. If a leak is detected, the vacuum equipment is removed, and remedial work is carried out. A follow-up leak test is then performed. After completion of the lid weld inspection, partially processed DSCs may be transferred to a designated area inside either the DSC processing building or the IAEA surveillance and laydown area in UFDSB #1 and temporarily stored for up to one year from the time of loading.
- **Paint Touch Up and Safeguards Seals (Step 20)** - Areas affected by the welding are cleaned and painted. Touch-up paint is also applied to scrapes or scuffs on the DSC that may have resulted from handling. Painting is typically carried out in the paint bays. Documentation and identification labelling are completed and permanent safeguards seals are installed in a designated International Atomic Energy Agency (IAEA) surveillance area.

Steps 21 - 22: Storage of DSC at NSS-D

- **Dry Storage Container Placement and Storage (Steps 21 and 22)** - The DSC is moved, using the transporter, to a storage location (Figure 8). In the UFDSB/UFDS, the transporter unloads the DSC in a designated storage location.

Figure 7: DSC Processing Steps

New empty DSC (Step 1)



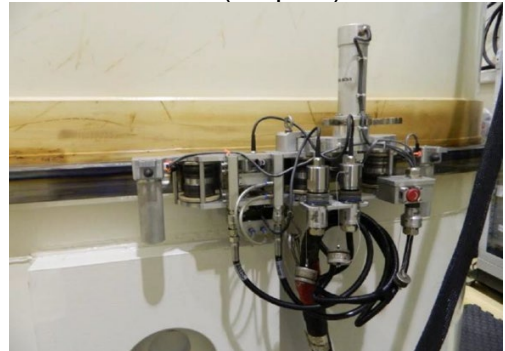
PAUT system (Step 14)



DSC Transfer Clamp (Step 4)



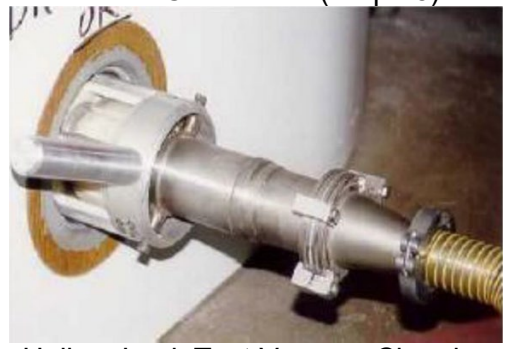
PAUT scanner (Step 14)



Overhead Crane (Step 12)



Drain Port Connection (Step 15)



Welding Machine (Step 13)



Helium Leak Test Vacuum Chamber (Step 19)



1.3.3 Dry Storage Container Processing Building

The DSC Processing Building is an industrial type conventional steel, concrete block, and concrete structure. The building floor is a concrete slab on grade. Occupancy, snow, wind, crane loads, and seismic limits meet the requirements of the National Building Code, which governs the design of the building framing, while the reinforced concrete floor slab is designed for heavy wheel load traffic, i.e., the transporter and the weight of loaded DSCs.

Amenities Area

The DSC Processing Building amenities area has two stories for the office and utility areas. The first-floor utility area accommodates rooms for electrical equipment, a mechanical room with active ventilation, and Heating Ventilation and Air Conditioning (HVAC) equipment, an operations room, janitor's room, a store room, men's and women's washrooms and locker rooms, a security area with a security observation post, a radiation monitoring area, and first aid room. The lobby has an elevator to provide barrier-free access to the second-floor office area. The second-floor office space includes general offices, an IAEA equipment room, washrooms, a janitor's room, a conference room, a lunchroom, a records room, and an electrical room.

Receiving Bay / Preparation Area

The DSC Processing Building consists of a truck bay area for receiving the empty DSC delivery truck from the manufacturer, and the DSC transporter. This area also provides space for storage of new DSCs and for preparation of DSCs for transfers to the Darlington fuel areas.

The length of the truck bay is designed to enclose the empty DSC delivery vehicle. The location and configuration of the truck bay is designed to enable the receipt or transfer of a DSC out of the facility without interrupting the processing of loaded DSCs. Vehicular access is via an electrical vertical roll-up type door sized with sufficient clearances for passage of the DSC delivery truck, and the DSC transporter.

Loaded DSCs are moved into the workshop promptly upon receipt from the Darlington Fueling Facility Auxiliary Areas to facilitate safeguards monitoring. The overhead crane has access to the receiving bay in order to move the DSCs.

Main Processing Area

The main processing area contains the following dedicated systems for DSC processing:

- Lid welding and welding-related systems.
- Welding inspection system.
- Vacuum drying system.
- Helium backfilling system.
- Helium leak detection system; and
- Paint bays.

In addition, there is an area for transporter maintenance, several utility rooms, areas for paint storage and weld gas storage, and an electrical room. The second floor has a storage area and the control centers for welding and weld inspection. A mezzanine area is also provided to give access for crane maintenance and is the primary location for mechanical units such as air handling equipment, HEPA filters, and exhaust stack.

1.3.4 Used Fuel Dry Storage Buildings

The UFDSBs contain the DSCs, which are stored in a pattern that allows retrieval, if needed, of any DSC. Layout of the storage areas permits placement of DSCs using the transporter to achieve the desired storage capacity. A designated IAEA surveillance area is provided inside UFDSB #1.

UFDSB #1 & #2 are unheated except for a janitor's closet in UFDSB #2. The only services in the two buildings are lighting, public address, telephone, and fire detection. Safeguards video surveillance systems are available in UFDSB #1. The buildings are equipped with a passive ventilation system, which consists of horizontal louvers in the east and west perimeter walls, and roof-mounted turbine ventilators designed to dissipate decay heat from the used fuel in storage. Covered louvers are also installed at each end of the north and south walls of UFDSB #2 to protect them from snow, ice and rain penetrating during winter. The east and west louvers have manual control capabilities to allow isolation of ventilation during winter (and / or severe weather conditions), and to minimize the ingress of wind driven snow and rain. Inactive floor drains are provided to collect any rain or melted snow that may penetrate the passive ventilation system.

1.3.5 On-Site Transfer of DSCs

OPG DSC transporters are specially designed multi-wheeled vehicles for the transfer of DSCs between the station's IFBs and the DSC Processing Building, and from the DSC Processing Building to storage (Figure 8).

The DSC transporters are self-loading and self-powered by a diesel engine and do not require the assistance of a crane when picking up or depositing a DSC. The DSC is lifted and transferred via lifting trunnions mounted on the upper frame of the machines. The DSC is carried at a low lift height (about 20 cm) during transfer. Locking arrangements prevent the DSC from being inadvertently lowered to the ground upon hydraulic failure. The tires on the transporters are designed not to deflate if punctured.

When travelling with a DSC, the transporters operate at low speed and have a short stopping distance. When travelling at minimal speeds (e.g. when moving DSCs within the DSC Processing Building and UFDSBs/UFDSBs), stopping is essentially instantaneous.

The transporters are capable of forward and reverse motion and have a tight turning radius. Vehicle lighting is provided for nighttime operation, if necessary. The DSC transporter (LiftKing) at NSS-D can travel up to a maximum of 4 km/hr.

Figure 8: DSC Transporter in the NSS-D Used Fuel Dry Storage Building

1.4 Management of Intermediate Level Waste (Retube Components)

The RWSB is designed to provide interim storage for irradiated reactor components from the Darlington Refurbishment Project. These components consist of mainly of pressure tubes, end fittings, annulus spacers, calandria tubes and calandria tube inserts.

The inner container is referred to as the Retube Waste Container (RWC). The outer container is referred to as the Darlington Storage Overpack (DSO). These containers can be seen in Figures 9 and 10.

The RWC/DSOs are designed for a minimum fifty-year life. The design of the RWC and the DSO preclude the need for periodic inspections to ensure their integrity over the design life. No maintenance on the RWCs and DSOs is required at this time and RWC/DSOs are in good condition.

1.4.1 Retube Waste Containers (RWC)

The RWC is cylindrical and constructed of heavy concrete lined internally and externally with steel. The RWC has an opening at the top, which is closed with a lid made of steel.

The RWC was designed to provide the primary containment and shielding from the retube waste. The RWC has a maximum mass of 24 tonnes including its maximum payload. To minimize the mass of the RWC and to facilitate off-site transport, the RWC shielding thickness has been established so that after storage at the NSS-D (approximately 20-30 years), the container meets the 100 $\mu\text{Sv/h}$ (10 mrem/h) dose rate acceptance criterion at one meter.

The maximum weight of a loaded RWC/DSO does not exceed 45 tonnes including the maximum payload. The external surfaces of the RWC and DSO clearly identify the internal configuration and waste type, for example, Pressure Tube/Calandria Tube (PT/CT), Calandria Tube Inserts (CTI), or End Fitting (EF), to ensure correct usage.

1.4.2 Darlington Storage Overpack (DSO)

The DSO is a cylindrical container made of thick steel with a single lid fastened on top, designed to hold a single RWC. The principal function of the DSO is to supplement the shielding provided by the RWC during the storage period at the NSS-D. See Figure 9.

The lid of the DSO is fastened securely to the body. The design of these fasteners is such that they cannot become loose and or be released unintentionally due to accelerations or vibrations during handling. The closure joint design precludes the ingress of moisture or debris and provides supplementary contamination control.

The fully loaded RWC/DSO was designed to be stacked two-high for storage at RWSB, see Figure 10.

Figure 9: DSO with RWC (inside)



Figure 10: RWC/DSOs in safe storage



1.4.3 Retube Waste Storage Building

The RWSB provides storage capacity for retube waste containers from the retubing of Darlington reactor units. The retube waste arrives at the RWSB in shielded containers (RWC/DSOs). The RWSB has a nominal capacity for 490 containers, which is sufficient for storage of the retube waste from all four Darlington units.

The RWSB floor plan design is approximately 106 m by 41 m. The concrete wall panels are joined in an overlapping configuration to prevent radiation streaming between the panels. The RWSB floor is constructed of reinforced concrete. The interior height accommodates the movement and placement of containers stacked two high.

The RWSB is an unheated building; however, the design includes the following services:

- Fire Protection
- Ventilation
- Lighting
- Internal Drainage
- Public Address and Telephone

1.4.4 On-Site Transfer of RWC/DSO

A truck with a flatbed trailer is used to transport RWC/DSOs to the RWSB, as seen in Figure 11.

Figure 11: RWC/DSO Transporter



1.5 Maximum Quantity of Radioactive Waste (Nuclear Substances) at NSS-D

The maximum quantity of High Level Waste (HLW) is interpreted as the maximum amount of used fuel bundles that can be stored on site, in DSCs.

The maximum quantity of Intermediate Level Waste (ILW) is interpreted as the maximum amount of non-fuel radioactive waste that can be stored at the RWSB on site, in RWC/DSOs. Table 1 contains the maximum quantity of nuclear substances at NSS-D.

Table 1: Maximum Quantity of Radioactive Waste (Nuclear Substances) at NSS-D

Nuclear Substance	Form / Location	Maximum Quantity
Irradiated Fuel	Total used fuel storage capacity: <ul style="list-style-type: none"> • UFDSB #1 • UFDSB #2 • UFDSS #3 and #4 (UFDSS #3 and #4 to be constructed in the future)	844,800 bundles: <ul style="list-style-type: none"> • 500 DSCs • 500 DSCs • 1,200 DSCs (maximum 384 bundles per DSC)
Intermediate Level Waste	Retube components in DSO / RWC	490 RWC/DSOs (Design Capacity)

1.6 Management of Non-Nuclear Hazardous Materials

The NSS-D contains a small amount of a variety of non-radiological hazardous materials, which are typically found in industrial buildings, including the following:

- **Paint:** Touch-up paint is applied to areas on the DSC that have been affected by the scrapes or scuffs that may have resulted from handling. The total amount of paint stored at NSS-D in “purpose-built” storage lockers is approximately 100 L.
- **Consumables for maintenance:** These include items such as adhesives, abrasives, various solvents, lubricants for operations and maintenance equipment as required, and janitorial and cleaning supplies. The total amount of these materials that may be stored onsite in “purpose-built” storage lockers is approximately 400 L, primarily janitorial cleaning supplies. Flammable materials are stored in appropriate cabinet.
- **Fuel:** A small amount of fuel for snow blowers and maintenance equipment is stored on-site. The quantity stored on-site in flammable material storage cabinets is less than 20 L.

1.7 Summary of Buildings for Next Licensing Period

DNGS Units 1 to 4 were commissioned between 1989 and 1992 and are currently in the process of being refurbished so that they can operate for another approximately 30 years. The current operational storage capacity of the NSS-D is nominally 1000 DSCs.

Based on the annual processing rates of approximately 60 DSCs per year and with consideration of the Darlington Refurbishment Project, there is a need for an additional storage capacity of approximately 1,200 DSCs.

In the current operating licence, there is a provision and authorization for the construction of two (2) additional Used Fuel Dry Storage Buildings (UFDSB) at the NSS-D site, for additional future DSCs. Based on the annual processing rates of approximately 60 DSCs per year, and with consideration of the Darlington Refurbishment Project, OPG expects that additional storage capacity will be needed in 2026. Current plans include the construction of Structure #3 with an anticipated in-service date of 2025; and Structure #4 with an anticipated in-service date of 2031 or later, to support continued operations at DNGS.

With the construction of UFDSS #3 and #4 at NSS-D, there will be adequate DSC storage capacity until 2043, when the Deep Geologic Repository is expected to be constructed and operational.

The RWSB was constructed to include contingency, therefore additional storage capacity for ILW will not be necessary.

1.7.1 Changes to Licensed Activity

The current Waste Facility Operating Licence (WFOL) WFOL-W4-355.01/2023 authorize the licensee to:

- (i) operate the Darlington Waste Management Facility ("the facility") located at the Darlington Nuclear Generating Station, Township of Darlington, Municipality of Clarington, Regional Municipality of Durham, Province of Ontario;
- (ii) possess, transfer, use, process, package, manage, and store nuclear substances that are required for, associated with or arise from the activities described in (i);
- (iii) transport Category II nuclear materials that are associated with the activities described in (i) on the site of the Darlington Nuclear Generating Station;
- (iv) carry out the site preparation, construction, or construction modifications at the facility associated with the authorized additional storage buildings, when on completion will result in a total of no more than 4 used fuel dry storage buildings and no more than 1 intermediate level radioactive waste storage building; and,
- (v) possess and use prescribed equipment and prescribed information that are required for, associated with or arise from the activities described in (i), (ii), (iii), and (iv).

OPG is changing the name of the storage facility from the Darlington Waste Management Facility to Nuclear Sustainability Services – Darlington. Therefore, OPG requests a change to the name of the licence, including the description of the facilities listed in Part IV – (i) of the WFOL to include this new name.

OPG is also changing the nomenclature of the structures for the storage of the DSCs. OPG requests a change to the description of the facilities listed in Part IV - (iv) of the WFOL to a used fuel dry storage structure (UFDSS).

Therefore, the licenced activity would be re-worded to the following:

- (iv) carry out the site preparation, construction, or construction modifications at the facility associated with the authorized additional storage buildings, when on completion will result in a total of no more than **2 used fuel dry storage buildings and 2 used fuel dry storage structures**, no more than 1 intermediate level radioactive waste storage building;

In addition, currently the storage structures are identified as having a nominal capacity of 500 DSCs each. Storage Structures #3 and #4 will have a larger total capacity (1,200 DSCs instead of 1,000 DSCs) to remove the need for a fifth storage structure. Storage Structures #3 and #4 will incorporate more innovative designs.

As required, OPG will submit an environmental management plan, a construction verification plan and the project design requirements to CNSC staff prior to the commencement of construction activities as authorized in licence condition 15.1 of the current operating licence.

2.0 SAFETY AND CONTROL AREAS

2.1 MANAGEMENT SYSTEM

HIGHLIGHTS

- During the current licencing period, a Nuclear Safety Culture Assessment was performed based on Station Condition Records, survey, interviews, and field observations, which confirmed a healthy Nuclear Safety Culture.
- During the current licensing period, all programs applicable to NSS transitioned to CSA N286-12, this initiative is now complete.
- OPG does not foresee any significant changes to the Nuclear Management System, during the next licensing period.

OPG has implemented and maintains a management system. The key documents are listed in the table below.

Doc #	Title
N-POL-0001	Nuclear Safety and Security Policy
N-CHAR-AS-0002	Nuclear Management System
OPG-PROG-0005	Environment Health and Safety Managed Systems ¹
OPG-PROG-0009	Items and Services Management
N-STD-AS-0020	Nuclear Management System Organizations
N-STD-AS-0023	Nuclear Safety Oversight
N-PROC-AS-0077	Nuclear Safety Culture Assessment

¹ OPG-PROG-0010, in the current LCH, has been superseded and replaced with OPG-PROG-0005.

2.1.1 Nuclear Management System

The OPG Nuclear Management System defines the organizational structure, roles and responsibilities, applicable programs and the interfaces amongst them. It applies to all OPG Nuclear facilities, including the Nuclear Waste Management Division (NWMD), which includes Darlington Waste Management Facility, Pickering Waste Management Facility, and Western Waste Management Facility. A change management plan will include all the changes to the Nuclear Management system required to rename the division to Nuclear Sustainability Services and the facilities to the Nuclear Sustainability Services – Darlington, Pickering and Western.

The Nuclear Management System establishes the required programs and processes to ensure that all OPG Nuclear facilities define the necessary safety objectives, continuously monitor performance against these objectives, and foster a healthy Nuclear Safety Culture.

2.1.2 Nuclear Safety & Security Policy

The NMS receives its direction from the policies set by the OPG Board of Directors.

OPG's Nuclear Safety & Security Policy was established in recognition that nuclear power poses unique hazards due to the enormous energy in the reactor core, radioactive material and decay heat produced by the fuel. Nuclear Safety is the protection of workers, public and the environment from these hazards. Nuclear Security is aimed at preventing intentional acts that might harm the facility or result in the theft of nuclear materials. The policy goal is to protect the public, workers, and the environment from these hazards.

The policy objective is to ensure that Nuclear Safety and Security is the overriding priority in all activities performed in support of OPG Nuclear facilities. Nuclear Safety shall have clear priority over schedule, cost and production. To meet these objectives, OPG Board of Directors established that everyone shall demonstrate respect for nuclear safety and security and exhibit the following traits of a healthy nuclear safety and security culture:

- Personal Accountability
- Questioning Attitude
- Effective Safety Communication
- Leadership Safety Values and Actions
- Conservative Decision-Making
- Respectful Work Environment
- Continuous Learning
- Problem Identification and Resolution
- Environment for Raising Concerns
- Work Processes
- Vigilance

These traits are continuously reinforced, promoted, and applied by staff in all work performed. Many of the daily meetings that occur at NSS-D involve a discussion of the nuclear safety and nuclear security traits and sharing of good practice respecting the application of these traits or an experience where application of these traits could have been better utilized.

Nuclear Safety and Nuclear Security will continue to be the top priority at OPG, NSS and NSS-D.

2.1.3 Nuclear Management System Charter

The OPG Nuclear Safety & Security Policy is implemented through a series of governing documents, which together form the NMS. The highest management system governing document is the Nuclear Management System Charter. The NMS Charter (the Charter) establishes the programs that support the day-to-day, safe, reliable operation of the OPG Nuclear facilities. The Charter defines the organization responsibilities, interfaces, and applicable programs to satisfy all legal and regulatory requirements to achieve planned results.

The effectiveness of the NMS implementation is monitored through a series of activities, including external and internal audits; performance metrics designed to capture the key outcomes of the programs; management assessments; corrective action and continuous improvement processes, including benchmarking of industry best practices. All of these activities allow OPG to identify continuous improvement opportunities to improve performance and make its operations safer and more reliable.

2.1.4 Programs and Objectives

2.1.4.1 Nuclear Safety Culture

OPG routinely monitors the health of its Nuclear Safety Culture through Nuclear Safety and Security Culture Monitoring Panels. These panels were established based on nuclear industry best practices. The OPG Nuclear Safety Culture Monitoring Panels examines information from a variety of the programs and processes that have been implemented, such as the:

- Corrective Action Program
- Human Performance Program
- Audits and Self-Assessments
- External inspections (such as CNSC inspections)
- Industry evaluations
- Employee concerns
- Business performance monitoring

This information is evaluated against the Traits of a Healthy Nuclear Safety Culture, to identify strengths and areas for focused attention, within the organization. The panel is composed of the managers and senior leadership within Nuclear Sustainability Services. The panel evaluates the information, approves initiatives, and reinforces communications as needed, to maintain and improve Nuclear Safety Culture.

In 2018 a Nuclear Safety Culture Assessment was performed, based on information from a review of Station Condition Records (SCRs) and other documents, an extensive survey sent to all NWMD personnel, along with interviews and field observations. The assessment found that NWMD has a strong and healthy Nuclear Safety Culture, respect for nuclear safety and does not allow nuclear safety to be compromised by production priorities. Areas for further improvement include timeliness of problem resolution, the use of the change-management process, and maintaining up-to-date documentation.

Other nuclear safety culture assessment findings were addressed by:

- Increasing communications to front line staff around issue resolution.
- Creating a change management committee.
- Integrating change management practices into existing meetings and processes.
- Establishing metrics and actions to monitor and track the ongoing health of the documentation status.

NSS-D's Nuclear Safety Culture will be assessed again in 2022, in accordance with OPG's Nuclear Safety Culture Assessment procedure, which has been updated to reflect the requirements of REGDOC-2.1.2 "Safety Culture".

2.1.4.2 Business Continuity Program

The purpose of the business continuity program is to define the key program elements, objectives, roles and responsibilities, with the overall goal to ensure OPG has strategies in place to prepare for, respond to, and recover from emergencies that impact operations or impact the public. Approved strategies are intended to:

- Protect employee and public health and safety.
- Limit significant impacts to the environment, as well as to OPG's assets, reputation and operational continuity.
- Maintain financial viability.

To ensure OPG's business continuity, OPG performs business impact analyses and develops business continuity plans as required, in response to the analysis. This involves conducting a risk analysis of the impacts that a temporary disruption of a process would have on the company. Business continuity plans are established to mitigate the identified risks, if necessary.

Pursuant to this process, NSS has conducted a business impact analysis. This shows that if NSS processes were unavailable for several weeks, there would be no notable consequences to operations or the public. As the activities were assessed to be low risk, specific business continuity plans were not developed for the NSS-D.

2.1.4.3 Management of Contractors

OPG has extensive experience in the use of contractors to engineer, procure, and construct new facilities or to implement design improvements to OPG's existing facilities. The process for oversight of contractors has been proven effective, as demonstrated through the Darlington Refurbishment Project for Unit 2.

Contractors are qualified by OPG Supply Chain Quality Services, under a process that ensures each contractor has developed and implemented a management system that meets the applicable requirements outlined in CSA N286-12. The contractors are assessed by OPG for capability of working at OPG Nuclear facilities. This is completed by OPG through an audit of the contractor processes, to ensure they can perform the necessary work, with OPG oversight as the licensee at each stage. Once OPG is assured of their capabilities, contractors are placed on OPG's approved suppliers list, as approved contractors.

The contractors that OPG uses have experience with the nuclear industry and with OPG. They have proven capability to meet the quality standards necessary for a nuclear facility, such as NSS-D. OPG's Items and Services Management Program includes provisions for extending applicable quality requirements to sub-contractors. OPG requires that all sub-contractors work under the contractor's quality program, to ensure there is an assurance that the agreed upon quality standards and expectations will be met, regardless of who is performing the work in the field. Field surveillance and

verification activities are performed by OPG personnel to ensure that the quality program requirements are being achieved.

Where possible, OPG will temporarily turn the contractor work area over to the contractor, as a Construction Island where the contractor assumes the role of “*Constructor*” as defined in the *Ontario Occupation Health and Safety Act*. As Constructor, the contractor assumes responsibility and liability for conventional safety and environmental safety associated with the contractor work. The contractor produces a site-specific Health and Safety Plan and Environmental Safety Plan, which is accepted by OPG prior to the contractor work start. Radiation protection remains the responsibility of OPG.

Where a construction island is not feasible, OPG maintains the role of Constructor and provides oversight to the contractor. In this case, all contractor work will be carried out in accordance with OPG processes and procedures. OPG maintains responsibility and liability for conventional safety, environmental safety, and radiation protection of the contractor work.

OPG retains the responsibility that the facility remains compliant with the operating licence. As such, OPG is accountable to the CNSC to provide the required assurances that the health, safety, and security of the public, workers, and environment are protected. This accountability cannot be delegated through contractual arrangements.

2.1.5 Current Operations and Results

During the current licence period, NSS-D continued to improve the Nuclear Management System, to make it more effective and efficient. This trend will continue into the next licence period.

Fleetview Program Health and Performance Reporting

Fleetview Program Health and Performance Reporting (or simply Fleetview) is a senior management review process, created to monitor and routinely report on the effectiveness of each program defined within the NMS Charter, for all nuclear power generating stations and nuclear waste management facilities.

Each program executing the Nuclear Management System is reviewed in accordance with management system principles in three defined areas including oversight and leadership, execution performance, and program action plan. This review is conducted by the Nuclear Executive Committee on a pre-established review schedule, and enhancements or new initiatives are identified based on performance.

The annual Fleetview Program Health and Performance Reporting process includes OPG nuclear waste management facilities (including NSS-D) and nuclear power plants, as applicable.

2.1.6 Future Plans and Improvements

NSS-D will continue to make incremental improvements in work processes and program implementation through:

- Continued adoption of OPG Nuclear governance as appropriate.
- Ongoing use of Fleetview Program Health and Performance Reporting to assist with overall program effectiveness.
- Management of the business to ensure a focus on long-term sustainable performance excellence; and
- Development of leadership and management capability at all levels of the organization with a focus toward teaching and learning moments.

OPG does not foresee, during the next licensing period, any significant changes to the NMS.

2.1.7 Organizational Chart

The Vice-President, Nuclear Sustainability Services has the authority to act for OPG in dealings with the CNSC and is responsible for the management and control of licensed activities at the NSS-D. The day-to-day operations and management of the NSS-D is the responsibility of the Darlington Used Fuel Operations Manager, who reports to the Director of Eastern Operations & DGR. Only those persons authorized by the Darlington Used Fuel Operations Manager supervise operations at the NSS-D.

NSS-D receives direct support from the central functions, such as Conventional Safety, Radiation Safety, Environment, Security and Regulatory Affairs and others.

OPG submits updates to CNSC on persons authorized to act on behalf of OPG in dealings with the CNSC, as required per Subsection 15(c) of the *General Nuclear and Safety Control Regulations*. The organization chart for NSS-D and supporting center-led organizations is provided in Attachment 9.

2.2 HUMAN PERFORMANCE MANAGEMENT

HIGHLIGHTS

- During the current licensing period, there was only one Site Event Free Day Reset as a result of operations at the NSS-D.
- Enhanced training is often used to improve safety and reduce errors at NSS-D.
- Worker led pre-job briefings are being promoted and found to be very successful, due to increased employee interaction and adherence to the required procedures.

OPG has implemented and maintains a human performance program and training program, the key documents are listed in the table below.

Doc #	Title
N-PROG-AS-0002	Human Performance
N-PROG-TR-0005	Training
N-PROC-OP-0047	Hours of Work Limits and Managing Worker Fatigue
N-PROC-TR-0008	Systematic Approach to Training

2.2.1 Human Performance Program

2.2.1.1 Program and Objectives

The program objective of the Human Performance Program is to continually reduce the frequency and severity of events through the systematic reduction of human error and the management of defenses in pursuit of zero events of consequences.

The program includes the behavioural expectations that guide worker activities, the supervisory activities that are applied to observe, recognize, and improve behaviours, and the reporting and evaluation activities that are used to assess performance and identify needed improvement initiatives.

The key program elements are:

- Pre-Job Brief/Safe Work Plan and Post-Job Debriefing
- Procedural Use and Adherence
- Communications
- Self-Check
- Conservative Decision-Making
- Second Party Verification
- Event Free Challenge Process
- Human Performance Event Communication and Analysis
- Site and Department Level Event Free Day Resets
- Observation and Coaching
- Benchmarking Activities

2.2.2 Current Operations and Results

Procedure Use and Adherence

OPG staff are trained and expected to follow procedures as written and required to stop and consult their supervisor where procedures cannot be followed as written.

Observation and Coaching

Managers coach in the field to reinforce expectations and correct behaviors following the expectations of the observation and coaching program. Observations are recorded by supervisors with the purpose of the identification of strengths and weaknesses in human performance behaviors. Strengths are positively reinforced. Results are collected to evaluate areas of excellence and areas needing improvement. Gaps to excellence are addressed through additional targeted improvements.

Pre-Job and Post-Job Briefings

The pre-job and post-job briefing component of the Human Performance Program is an essential element to provide the necessary review and focus for the job at hand. Pre-job briefings are routinely delivered, with enhancements provided by the use of operating experience. Worker led pre-job briefings are being promoted and found to be very successful due to increased employee interaction and adherence to the required procedures. Post-job briefings are either lessons learned, captured in formal lessons learned exercises or informal lessons, including the relevant operating experience of the crew and delivered to the next crew.

Staff Communication Meetings

A variety of communication tools are used to establish and reinforce the expectations and correct behaviours. The most effective tool is face-to-face meetings between managers and their staff, to discuss the events that have occurred at the facility or in other facilities, with a focus on continuous learning and building capacity to fail-safe. Employees are engaged in the conversation and encouraged to actively share their own experiences.

Situational Awareness

Situational Awareness involves improving the ability of individuals to recognize hazards by anticipating changes and taking appropriate actions. It is being aware of the surroundings, recognizing changes, and ensuring new hazards are controlled. It is a frame of mind where individuals are actively looking for potential hazards, assessing the hazards, and ensuring controls are in place.

OPG expects that employees perform a two-minute job site drill when they reach their job site on first instance and after any breaks, to confirm that the hazards are as expected, the preventative measures identified in the pre-job brief are adequate, that they are on the right equipment, and have the tools and protective equipment necessary to safely perform the assigned work activities. Any employee that has concerns is to stop and speak to their supervisor. Managers reinforce this expectation

through field observations and perform coaching when necessary to ensure the expectation is being achieved.

OPG Fleetwide Strategic Plan

An OPG fleetwide strategic plan is developed each year in response to Human Performance trends and events noted in the previous year. The strategic plan is also influenced by industry developments and emerging best practices in sustaining high levels of Human Performance. The strategic plan can focus on improving human performance at the level of individual performance, supervisory performance, or on improving an aspect to enhance organizational effectiveness.

Performance Monitoring

Industry standard performance measures are used to monitor human performance. In addition, coding is applied to station condition records created as part of the corrective action program that supports monitoring trends of human performance.

The overall effectiveness of the Human Performance Program is measured through the analysis of events that occur to determine whether the event free operations “clock” should be re-set. Targets are set every year based on previous performance to strive for ongoing reduction in the number of clock resets. The resets are divided into Site and Department levels based on their consequence. The more significant events, that have high consequences in terms of safety or production, are identified as Site Event Free Day Resets. Less significant events, that are potential precursors to site level events, are considered to be Department Event Free Day Resets. Each reset triggers an analysis process to identify any systemic, organizational or behavioral deficiencies that contributed to the event as well as communication within the organization for awareness and lessons learned in effort to reduce occurrence.

Events that are not Event Free Day Resets are assigned human performance codes in the station condition record process and trended to identify patterns of systematic, organizational or behavioural error precursors or flawed defenses.

Each year, for the resets that have occurred, the results of the review of the trend codes are assessed, and the responding initiatives are developed.

NSS-D Event Free Day Resets

During the current licensing period, there was one Event Free Day Reset at the NSS-D in 2018. During the performance of maintenance on power supplies, the IAEA and the CNSC were incorrectly informed that the safeguards equipment would be powered through normal power supplies. Instead, the normal power supply was isolated and the safeguard equipment had to be use the equipment’s built-in back up battery power. Normal power was returned when the power supplies were restored the next day.

An incorrect assumption was made that work protection that would be used would be similar to one used for previous maintenance, instead, the work protection that was used isolated the safeguards equipment from the normal power supply.

2.2.3 Future Plans and Improvements

The Human Performance Program includes an ongoing aspect of reviewing performance and identifying the areas for improvement that would benefit from planned enhancements. Best practices from the nuclear industry will also continue to be evaluated and incorporated into the programs where there is an identified benefit.

Compliance

OPG is currently compliant with CNSC REGDOC-2.2.4 (2017) "*Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 2*", with the exception of random alcohol and drug testing, which will be implemented by January 22, 2022.

2.2.4 Training Program

2.2.4.1 Program and Objectives

The purpose of the Training Program is to define the key program elements, objectives, roles and responsibilities, with the overall goal to ensure OPG Nuclear staff have the appropriate knowledge, skill, and attitudes for safe and efficient facility operation.

2.2.4.2 Current Operations and Results

Operations, maintenance, and support staff are trained and qualified under OPG's Nuclear Training Program. The staff training and qualifications includes initial training, on-the-job training, and evaluation. This training is then maintained by periodic re-qualification and refresher training as appropriate.

Training Plan

A training plan is developed for each job family using a systematic approach to training, which identifies the training needed to meet the skill and knowledge requirements of the position. Specialized training is provided where appropriate. The employees' training status is maintained in a training information management system.

Enhanced Training

The training program is closely linked to the Human Performance program. Enhanced or focused training is often utilized in the effort to improve safety and reduce errors at NSS-D. The human performance expectations are built into the training courses; for example, the Nuclear General Employee Training that is taken annually by all employees contains human performance content.

Performance Monitoring

Training performance is tracked using a computer program to measure completion, scheduling and administration of qualification adherences and the capability of personnel to perform work duties through qualification status. A monthly computer report is generated that is reviewed during Monthly Curriculum Review Committee

Meetings for each program area, quarterly Nuclear Waste Division Training Performance Review Committee meetings and quarterly Nuclear Waste Division Training council meetings to ensure training adherence and performance.

2.2.4.3 Continuous Behaviour Observation Program

The Continuous Behaviour Observation is designed to develop a supervisor's ability to recognize and respond to behaviours that may indicate a risk to security, safety or health of employees, facilities, and the public. All OPG supervisors must complete this training during initial training and complete refresher training at least every 36 months. The Continuous Behaviour Observation Program training helps supervisors effectively observe, assess, and respond appropriately to behaviours that warrant attention and response.

2.2.4.4 Future Plans and Improvements

The program will continue to ensure OPG Nuclear staff have the appropriate knowledge, skill, and attitudes for safe and efficient plant operation.

2.3 OPERATING PERFORMANCE

HIGHLIGHTS

- The NSS-D demonstrates its commitment to safety by working without a lost time accident or medically treated injury for its entire operational period (14 years).
- During this licence period, there were no reportable events at NSS-D under Operating Performance (processing of DSCs and RWC/DSOs); this SCA has been performed well and without error.
- During the current licencing period (until June 30, 2021), there have been 512 DSCs and 96 RWC/DSOs processed and safely stored at NSS-D.
- Procurement of two new DSC Transporters has been initiated, which will ensure continued reliability for transportation of DSCs between DNGS and NSS-D.

The operation of NSS-D is to provide for the safe handling, management, and the interim storage of high and intermediate level radioactive waste, produced by DNGS.

Doc #	Title
N-PROG-RA-0002	Conduct of Regulatory Affairs
N-PROG-RA-0003	Performance Improvement
00044-OPP-01911.1-00001	Operating Policies and Principles, Darlington Waste Management Facility
N-PROC-RA-0020	Preliminary Event Notifications
W-PROG-WM-0001	Nuclear Waste Management

2.3.1 Programs and Objectives

This SCA is supported by three OPG programs: Operating Policies and Principles, Conduct of Regulatory Affairs Program and the Performance Improvement Program.

2.3.1.1 Performance Improvement Program

The purpose of the Performance Improvement Program is to define the key program elements, objectives, roles and responsibilities, with the overall goal to ensure that problems are corrected or dispositioned with a level of rigor and formality commensurate with their risk significance.

The program objectives are to establish the processes that support the conduct of performance improvement and, by extension, employ the principles of problem prevention, detection, and correction at OPG Nuclear. The implementing processes described by this program allow for the proactive identification and resolution of potential issues, or opportunities for improvement, as well as the prompt identification of adverse conditions. This includes non-conformances, deficiencies, or conditions that adversely impact – or may adversely impact – plant operations, personnel, nuclear safety, the environment or equipment and component reliability.

For those problems deemed to be of a high level of significance or systemic in nature, these processes ensure appropriate levels of management are notified, causes identified, actions taken to minimize or prevent recurrence and lessons learned

communicated. Actions taken to address the identified causes of significant or systemic problems are verified to be complete and effective.

2.3.1.2 Independent Assessment Program

The Nuclear Oversight organization audits the nuclear management system as required by CSA N286-12 and in accordance with OPG's independent assessment program. Nuclear Oversight has implemented a risk-based auditing process for the nuclear management system that ensures the highest risk programs and activities receive a higher frequency of oversight. The Nuclear Oversight organization's five-year audit plan identifies the audits to be conducted in any given year.

Findings from the independent audits are resolved through OPG's corrective action program. The results of all audits are reported directly to the Chief Nuclear Officer and OPG Board of Directors.

2.3.1.3 Self-Assessment and Benchmarking

The self-assessment and benchmarking process is part of Performance Improvement Program. The purpose of this process is to ensure continuous improvement and comparison with industry best practices. The self-assessments are carried out internally to a division or department, to assess its performance for efficiency, safety, or to investigate events for purposes of improvement.

The self-assessment and benchmarking process requires that OPG Nuclear management plan divisional and departmental level benchmark objectives and schedule self-assessments against these objectives, for each upcoming year.

OPG participates in a number of industry peer groups, facilitating good opportunities to benchmark OPG Nuclear programs and processes with other utilities. Similarly, peers from other utilities visit OPG facilities to gain insights. These relationships are important to ensure OPG continues to gain insight into industry best practices.

2.3.1.4 Event Reporting

For events at the NSS-D that are determined to be reportable to the CNSC, preliminary reports are submitted to the CNSC which include the location and circumstances of the situation and of any action that NSS-D has taken or proposes to take in accordance with the regulatory requirements of REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*.

During the current licensing period, since 2013, there were 32 CNSC reportable events at NSS-D. OPG reportable events are also posted on OPG's public website at www.opg.com.

2.3.2 Current Operations and Results

NSS-D Operating History

During the current licence period, between 2013 and June 30, 2021, the number of DSCs received, processed, and safely stored each year at NSS-D in UFDSB#1 and UFDSB#2 is shown in Table 2.

During the current licence period, as of June 30, 2021 there are 96 RWC/DSOs from DNGS Unit 2 refurbishment, which is now complete.

Table 2: DSCs Received at NSS-D between Quarter 1, 2013 and Quarter 2, 2021

Year	Number of DSCs
2013	60
2014	60
2015	63
2016	65
2017	63
2018	57
2019	59
2020	59
2021 (end of Quarter 2 or June 30 th)	26
TOTAL	512

DSC and RWC/DSO Transfer

Empty DSCs and those loaded with used fuel are transferred between DNGS and NSS-D. As of June 30, 2021, during the current licensing period, 512 DSCs has been transferred between DNGS and NSS-D without incident. During the entire operational period of NSS-D (since 2007), 765 DSCs has been transferred between DNGS and NSS-D.

RWSB has been in service since 2017, which falls within the current licence period. As of June 30, 2021, 96 RWC/DSOs have been safely transferred to NSS-DRWSB from DNGS.

DSC Reverse Loading

In the current licence period, OPG has demonstrated that all the required DSC reverse loading steps, to safely return fuel to the irradiated fuel bay, can be performed should it be required. This is a precautionary step, to ensure flexibility and safety in reverse-operations and removing fuel, if necessary. This demonstration included full weld removal using a combination of arc gouging, chipping, and grinding. Full weld removal was confirmed by performing a freedom of movement check using a feeler gauge to confirm that the DSC lid was separated from the base. Removal of used fuel from a DSC was performed where a partially loaded DSC was submerged in the irradiated fuel bay and one of the used fuel modules (containing 96 fuel bundles) was removed. The remaining steps in the reverse loading process include craning and transfer of the DSC, which are routine operations performed regularly at the NSS-D.

DSC Spare Weld Head

A spare weld head for the DSC welding system was procured and commissioned in October 2016. The spare weld head increases the reliability of the DSC lid to base welding program and is available to support the operational requirements across the NSS fleet.

Operations Reports

NSS-D submits Quarterly Operations Reports and Annual Compliance Reports to the CNSC. All reports have been submitted to the CNSC on time and comply with the NSS-D licence conditions handbook and REGDOC-3.1.2 requirements.

2.3.3 Future Plans and Improvements

The following future improvements are planned for NSS-D:

- Construction of UFDSS #3, with an anticipated in-service date of 2025, to support continued operations at DNGS.
- Construction of UFDSS #4, with an anticipated in-service date of 2031 or later, to support continued operations at DNGS.
- DSC lid to base welding process is anticipated to gain efficiencies and expected to be approved and implemented at NSS-D in 2021.
- Development and procurement of a next generation DSC welding machine, to assist with efficiencies and overcome obsolescence challenges of the current machines. This welding machine is anticipated to be available in 2024.
- Procurement of two new DSC Transporters has been initiated, which will ensure continued reliability for transportation of DSCs between DNGS and NSS-D.
- Actions are underway to look for efficiencies to reduce the number of RWC/DSOs needed per unit for the Darlington Refurbishment Project. It is estimated that a reduction of approximately five (5) RWC/DSOs per unit may be possible.

2.4 SAFETY ANALYSIS

HIGHLIGHTS

- The results from Safety Reports demonstrate a high level of safety for NSS-D.
- Used fuel stored in DSCs cannot achieve criticality under normal conditions or under any postulated accident scenario at NSS-D.
- DSC shielding analysis methodology has been updated to incorporate the use of the Monte Carlo N-Particle transport code for dose rate calculations.
- DSC and RWC/DWOs models have been updated to better represent actual geometries and analysis assumptions ensure reasonable conservatisms.
- During this licence period, there were no reportable events at NSS-D under Safety Analysis.

OPG has implemented and maintains a safety analysis program. The key documents are listed in the table below.

Doc #	Title
N-PROG-MP-0014	Reactor Safety Program
00044-SR-01320-10002	Darlington Waste Management Facility Safety Report
00044-SR-01320-10003	Darlington Waste Management Facility Safety Report Annex

2.4.1 Reactor Safety Program and Objectives

Safety analysis is a systematic evaluation of the potential hazards associated with the conduct of a proposed activity or facility and considers the effectiveness of preventative measures and strategies in reducing the effects of such hazards. It evaluates the risk and consequences of normal, abnormal and accident conditions to ensure that the facility does not pose an unacceptable risk to workers or the public. The results of the safety analysis are used in the development of the operating limits and conditions for a facility. Safety analyses and assessments of structures, systems, components, or facilities are carried out to determine the impact on workers and the public. Safety assessments are presented in each nuclear waste facility safety report, which also provides an overview of the facility design and operations.

To assess the overall safety of the operation of NSS-D storage buildings and structures, deterministic safety analyses are used. Computational tools are used for the dose consequence calculations when required. Bounding (worst-case) accident scenarios are conservatively identified, and the results of off-site dose consequence calculations are then compared against the regulatory dose limits.

The Nuclear Waste specific safety analysis process was adopted by the OPG Reactor Safety Program effective March 31, 2015. The objective of the Reactor Safety Program is to define the organizational responsibilities and key program elements for the management of issues related to nuclear safety analysis. Specifically, as it relates to nuclear waste management, the program provides a basis for the performance of

nuclear safety analysis and outlines the governing documents that define the processes associated with maintaining the safety analysis and safety reports supporting the operation of Nuclear Waste Facilities.

2.4.2 Current Operations and Results

The NSS-D safety report is reviewed every five years and updated as required to reflect changes in site layout, operational experience and information supporting the assumptions made in the assessments. The safety report update process encompasses the systematic identification of safety issues, their prioritization, their resolution, and the physical updates of the safety report. The safety report is updated in accordance with the NSS-D operating licence, Licence Condition 4.1.

The current version of the NSS-D safety report was submitted to the CNSC in 2016 and accepted by the CNSC in 2017. There is also a safety report annex describing the refurbishment waste storage activities in the RWSB, which was updated and accepted by the CNSC in 2017.

These safety reports demonstrate that dose rates and emissions from the NSS-D under normal and abnormal operating conditions as well as postulated accident conditions are within allowable limits, and operation of the facility continues to pose an acceptably low risk to the public, the workers, and the environment. The NSS-D safety report is being updated in 2021 and it will combine the safety report and safety report annex into one document.

Used Fuel Dry Storage Safety Analysis - Normal Operating Conditions

Shielding analysis is performed to determine dose rates from individual DSCs, both inside and outside the storage buildings. Dose rates external to the buildings are determined for workers on-site and for members of the public off-site. In all cases, predicted dose rates inside the NSS-D facility, at the site boundary and for the nearest public populations are estimated to result in doses well below the CNSC regulatory dose limit for Nuclear Energy Worker (NEW) and well below the regulatory public dose limit of 1 mSv/year.

Used Fuel Dry Storage - Safety Assessment of Malfunctions and Accidents

The assessment of malfunctions and accidents considered the following main stages of the out-of-station used fuel dry storage operations:

- On-site transfer operations.
- Operations inside the DSC Processing Building; and
- Storage.

Each potential event was screened to determine if it could result in any radiological impact to the public and/or workers. Common mode incidents such as seismic events, tornados, etc. have been considered. Design provisions and procedural measures that could prevent the event or mitigate its consequences were also evaluated.

Although considered unlikely, for on-site transfer and processing of DSCs (e.g. welding, inspecting, testing, sealing and moving to storage), the bounding accident was identified to be a drop of the DSC, with subsequent 100% fuel sheath failures and associated release of volatile nuclides to the environment. The total doses to the public at the Darlington Nuclear site boundary and the occupational doses due to this event were assessed to be below the regulatory dose limits.

Criticality

Criticality assessments have been completed for the used fuel stored in DSCs for the NSS-D. Consistent with expectations for irradiated natural uranium fuel, the analyses and assessments have yielded adequate sub-criticality margin and have demonstrated that there can be no criticality of used CANDU fuel.

Used fuel stored in DSCs cannot achieve criticality under normal conditions or under any postulated accident scenario at the NSS-D.

RWSB – Normal Operating Conditions

The RWSB has been designed and constructed such that OPG's dose rate targets at the facility fence and at site boundaries are achieved. Dose rates in the RWSB area are routinely monitored and shown to be within facility targets and resulting worker and public doses are well below regulatory limits.

OPG plans to commence storing RWCs containing combined PT and CT waste at the RWSB in Q4 2021. It has been a long-standing practice to remove pressure and calandria tubes individually during refurbishment. While planning for Darlington Unit 3 refurbishment, the process was adapted to withdraw the pressure and calandria tubes at the same time. By removing both tubes simultaneously and containing the annulus spacers, the estimated amount of dose for personnel performing the work was greatly reduced. Also significantly reduced was the number of lifts required to transport the flasks for on-site volume reduction and waste processing.

A safety assessment for the storage of RWCs containing combined both pressure and calandria tube waste in the Retube Waste Storage Building at the NSS-D was completed, and there is no impact on the acceptance criteria. There will be no adverse impact on the health and safety of workers and the public as a result of storing this new waste configuration.

RWSB – Abnormal Operating Conditions

Potential exposures from the RWSB under abnormal operating conditions have been assessed and no credible events have been identified that would lead to a failure of containers and release of irradiated components. Conservative estimates of worst-case doses from extreme conditions, such as seismic events or tornados are well below regulatory limits.

2.4.3 Future Plans and Improvements

Safety Analysis Methodology

The methodology for performing safety assessments is routinely assessed and updated for the methodology to be as up-to-date and accurate as possible. DSC shielding analysis methodology has been updated to incorporate the use of the Monte Carlo N-Particle (MCNP™) transport code for dose rate calculations. DSC models (including fuel) and RWC/DSOs have been updated to better represent actual geometries, and analysis assumptions continue to be reviewed to ensure reasonable conservatism exist. This demonstrates OPG's goal of continuous improvement. These improvements will be reflected in the safety report updates when they are completed.

Support for Additional Structures

In the current NSS-D operating licence, there is provision and authorization for two (2) additional structures to be built at the NSS-D site.

Prior to construction, safety assessments will be performed for these new structures, once additional design and specific location information is available. This is to ensure that the designs are adequate and that all radiological safety requirements provided in the *Nuclear Safety and Control Act* and its regulations, and the safety report are met. While designs of these structures are not currently finalized, preliminary calculations show that the addition of these structures will not result in any doses to workers or the public that exceed acceptance criteria for the NSS-D.

Safety Analysis Update

Safety analyses are reviewed and updated as necessary prior to construction and prior to safety report updates, to confirm that facility operations will not result in any significant radiological consequences to the health and safety of the workers and the public, under normal and abnormal operating conditions as well as postulated accident conditions.

Safety Report

The NSS-D safety report was submitted to the CNSC in November 2021. It combines the safety report and safety report annex into one document.

2.5 PHYSICAL DESIGN

HIGHLIGHTS

- During the current licencing period, several small and large modifications have been completed, to improve the safety and performance of NSS-D.
- NWMD Physical Design programs were superseded by OPG Nuclear programs.
- NWMD has adopted the standard OPG Nuclear fleet metrics for Physical Design.
- Immediately prior to current licence, NWMD completed a code classification for all pressure retaining systems at NSS-D. During the current licencing period, all work on classified pressure-retaining systems was completed under the OPG Nuclear Pressure Boundary Program.

Physical Design relates to activities that impact on the ability of systems, structures, and components to meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.

NSS has robust processes to ensure that the physical design of the NSS-D complies with the current safety basis and that all changes are authorized and performed in a controlled manner, and in accordance with the NSS-D waste facility operating licence.

OPG's key documents for Physical Design are listed in the table below.

Doc #	Title
N-PROG-MP-0009	Design Management
N-PROG-MP-0001	Engineering Change Control
N-PROG-MP-0004	Pressure Boundary
N-STD-MP-0028	Conduct of Engineering
N-STD-MP-0027	Configuration Management
N-PROC-MP-0082	Design Registration
N-PROC-MP-0040	System and Item Classification
N-MAN-01913.11-10000	Pressure Boundary Program Manual
N-LIST-00531-10003	Index to OPG Pressure Boundary Program Elements
N-CORR-00531-22359	Authorized Inspection Agency Service Agreement
N-CORR-00531-22931	Amendment to Authorized Inspection Agency Service Agreement

2.5.1 Programs and Objectives

This SCA is supported by three OPG programs: the Design Management Program, Engineering Change Control Program, and Pressure Boundary Program. Management of the design basis at the NSS-D is governed by the Design Management Program and Engineering Change Control Program. These programs provide the framework for performing engineering work in a consistent manner across all OPG Nuclear facilities.

2.5.1.1 Design Management Program

The Design Management Program specifies requirements for:

- Management of prescribed activities appropriate for execution and control of required design, design support, and documentation for nuclear facilities and organizations owned by OPG Nuclear.
- Processes for creating or modifying documentation that requires controlling design bases and design outputs.
- Minimum set of documentation that identifies and describes design bases, design output, and design process.
- Procurement Engineering processes ensuring implementation and maintenance of the physical nuclear facilities meet the design basis requirements.

2.5.1.2 Engineering Change Control Program

The objectives of this program are to provide guidance to ensure that all modifications to OPG Nuclear systems, structures, or components, including software and engineered tooling, are planned, designed, installed, commissioned, placed into service, or removed from service within the Safe Operating Envelope or Safety & Design Envelope, design basis, and licensing conditions.

2.5.1.3 Pressure Boundary Program

The Pressure Boundary Program defines the managed process to control the quality of all pressure boundary activities at OPGN. It provides the requirements and defines the responsibilities for compliance with and maintenance of the Pressure Boundary Quality Assurance Program and, provides the governance framework for the execution of field work activities. This is to ensure:

- OPG Nuclear retains the Pressure Boundary Certificates of Authorization necessary to perform Pressure Boundary activities.
- OPG Nuclear remains compliant with the nuclear station Power Reactor Operating Licence, Waste Facility Operating Licence, and applicable Canadian Standards Association (CSA) standards.

This program covers activities related to Pressure Boundary quality at nuclear facilities and support facilities. It is applicable to the following:

- Pressure-retaining systems, components, storage tanks and supports that are registered or eligible for registration with an Authorized Inspection Agency (AIA).
- Component supports (American Society of Mechanical Engineers [ASME] Class NF) mandated by Codes and Standards applicable to this program.
- Propane systems.

2.5.2 Current Operations and Results

Governance Alignment

In the previous licence application, NWMD committed to aligning its governance with OPG Nuclear governance by February 28, 2013. That commitment has been met and the Nuclear Waste specific programs for physical design have been superseded by the nuclear programs. The transition from legacy NWMD governance was accomplished through a managed process of governance management records that ensured a controlled and thorough adoption process. The current Licence Conditions Handbook for Physical Design has removed all references to Waste-specific OPG governance and only lists Nuclear-wide OPG governance.

Pressure Boundary Code Classification

Immediately prior to issuance of the current licence, NSS improved its pressure boundary related activities by completing code classification for all pressure retaining systems at the NSS-D. All work on classified pressure-retaining systems since then, including modifications, have been completed under the Nuclear Pressure Boundary program.

Projects

Various modifications have been executed with no impact on the NSS-D's ability to operate within its safety envelope. These modifications have been undertaken to improve the overall performance of the NSS-D and to improve safety in design and operations. Some of the significant modifications in the current licensing period are:

- To facilitate interim storage of primarily ILW resulting from the Darlington Refurbishment Project, the RWSB was designed, constructed and placed in-service.
- The storage of ILW in the RWSB is achieved using RWC/DSOs to store the removed Pressure Tubes, Calandria Tubes, and associated hardware. These containers were designed, and several have been constructed and placed in-service. Additional RWC/ DSOs will be constructed in preparation for waste from future units in the Darlington Refurbishment Project.
- To facilitate additional interim storage of used fuel on site, UFDSB #2 was designed, constructed and placed in-service. This building was similar in design to the existing UFDSB #1 and included tie-ins to existing services.

Metrics

NSS has adopted the standard OPG Nuclear fleet metrics for physical design. The current suite of metrics includes measures of the health of the Engineering Change Control process within NSS. The quality of design products is monitored using recorded verification results and cold-body design review boards within NSS. A monthly report card is used to record and track performance and to ensure that corrective actions are being taken to address any weaknesses or deficiencies that are observed.

2.5.3 Future Plans and Improvements

Compliance

NSS-D follows the OPG Nuclear governance for pressure boundary. OPG Nuclear has an agreement with the CNSC that freezes the code effective dates of applicable pressure boundary codes and standards throughout the duration of the DNGS Refurbishment project. These frozen code effective dates are in place for NSS-D as well. Once the DNGS Refurbishment project is completed, the new code effective dates for applicable pressure boundary codes are to be accepted by CNSC staff and will be incorporated into OPG Nuclear governance. The NSS-D Licence Conditions Handbook would reflect the new code effective dates as necessary after that time.

New Structures

Used Fuel Dry Storage Structure (UFDSS) #3 is currently in Conceptual Design stage, with an anticipated in-service date of 2025. It will be constructed in compliance with the licence and will follow OPG procedures and processes, including those in the Design Engineering Program, Engineering Change Control Program, and Pressure Boundary Program.

UFDSS #4 design will be initiated in the future, taking into consideration more innovative designs. The current planned in-service date is 2031.

2.6 FITNESS FOR SERVICE

HIGHLIGHTS

- Condition of the coating on the containment welds and the DSCs remain in good-to-excellent condition.
- No changes have been observed in the condition of the DSC base plates, between the time of their initial inspection and re-inspection.
- Measured chloride levels to date have a negligible effect on the potential corrosion of the DSC external surfaces.
- With the continued implementation of the Aging Management Program, OPG is confident of DSC and RWC/DSO integrity during the next licence period.
- NSS-D concrete floor slabs have been found currently in good condition and expected to remain so in the foreseeable future.

Fitness for service ensures the safety of the public and site personnel, by maintaining NSS-D Systems, Structures and Components (SSC) and equipment that are critical to the safe, reliable and economic transportation, processing and storage of nuclear waste. The implementation of OPG's Equipment Reliability Program and Integrated Aging Management Program ensures the on-going fitness-for-service of these systems.

OPG's key documents for Fitness for Service are listed in the table presented below.

Doc #	Title
W-PROG-WM-0001	Nuclear Waste Management
N-PROG-MA-0026	Equipment Reliability
N-PROG-MP-0008	Integrated Aging Management
N-PROG-MP-0009	Design Management
N-STD-MP-0028	Conduct of Engineering
00104-PLAN-79171-00002	Ontario Power Generation Dry Storage Container – Base (Underside) Inspection Plan
00104-PLAN-79171-00001	Used Fuel Dry Storage Container Aging Management Plan
00044-PLAN-20670-00001	Welding Bay Walls Inspection Plan

2.6.1 Programs and Objectives

This SCA is supported by two OPG programs: the Equipment Reliability Program and Integrated Aging Management Program. The Equipment Reliability Program looks after systems and components at NSS-D. The Aging Management Program looks after structures (DSC Processing Building, UFDSB #1 and UFDSB #2) and specific equipment (DSCs and RWC/DSOs) at NSS-D.

2.6.1.1 Equipment Reliability Program

The purpose of the Equipment Reliability Program is to define the key program elements, objectives, and roles and responsibilities, with the overall goal to ensure ongoing high levels of reliable performance of components, important to nuclear safety, production, and environment protection.

The program objectives are to ensure very low numbers of component failures, degraded equipment condition is minimized, and redundancy is maintained on key systems.

2.6.1.2 Integrated Aging Management Program

The objective of the Integrated Aging Management Program is to ensure that the condition of critical nuclear facility equipment is understood and that required activities are in place to ensure the health of these components and systems while the plant ages. This is accomplished by establishing an integrated set of programs and activities to ensure that the performance requirements of all critical station equipment are met on an ongoing basis.

2.6.2 Current Operations and Results

System Performance Monitoring

Under OPG's Equipment Reliability Program, system performance monitoring is performed on critical NSS-D systems to ensure ongoing reliable operation.

System performance monitoring involves the trending of system performance and initiation of investigations or maintenance activities before failures occur. Process parameters, field observations, maintenance work order backlogs, Station Condition Records, inspection results and spare parts status are some of the typical sources of data for performance monitoring. Where appropriate, equipment critical to system reliability are identified and maintenance strategies for this equipment are prepared. Actions to maintain or improve system health are also prepared.

Meetings with facility management, including representation from key stakeholders, are routinely held to review system health status, maintenance strategies and improvement plans, and ensure alignment between these work groups for the implementation of improvement plans. There are currently 10 systems at NSS-D that are included in the system performance monitoring plan. Ongoing management oversight of these improvement plans provides assurance that the plans are being implemented and the improvements are being achieved.

Preventive Maintenance

Under OPG's Equipment Reliability Program at NSS-D, recurring preventive maintenance activities are planned, scheduled, and executed according to the Preventive Maintenance program. The management and scheduling of preventive maintenance activities are completed using OPG's enterprise software system, which also retains records of all maintenance tasks completed. Feedback inputs from

maintenance staff and changes to preventive maintenance activities are managed through this software.

Non-routine maintenance (corrective maintenance) activities are requested, planned and executed using the same software system. Significant corrective maintenance issues are identified and tracked to completion.

As part of system performance monitoring, the status of the maintenance program is routinely assessed and reported to facility management for their review. Metrics for the completion of preventive and corrective maintenance activities are presented, and SCRs are initiated to address adverse conditions related to equipment health or the execution of maintenance activities. Corrective actions to address maintenance issues are provided for management approval and are monitored to completion.

DSC Aging Management

The DSC aging management plan addresses aging mechanisms, such as corrosion, which could potentially affect DSCs. Current aging management activities include:

- General visual check of the condition of the protective coating on the exterior of the DSC, with emphasis on the condition of the coating on containment welds.
- Periodic inspection and re-inspection of the base plates of a baseline population of DSCs.
- Monitoring of chloride levels, which have the potential to accelerate corrosion.

With the ongoing implementation of this Aging Management Program, OPG is confident of DSC integrity throughout and beyond the next licence period. Specific results of the aging management activities are as follows:

- Condition of the coating on the containment welds and the DSCs themselves remain in good-to-excellent condition.
- No changes have been observed in the condition of the base plates between the time of their initial inspection and re-inspection (CNSC is provided with annual summary reports of the inspections).
- Measured chloride levels to date have a negligible effect on the potential corrosion of the DSC external surfaces.

RWC/DSO Aging Management

RWCs and DSOs have been included in the aging management screening process because of their susceptibility to aging degradation and the risk from an economic and environmental perspective. One DSO contains one RWC, and together they are referred to as RWC/DSO. These RWC/DSOs are safely stored in the RWSB, which has been in operation since 2017, at NSS-D.

During the interim storage, only DSOs will be inspected, since all RWCs are contained within DSOs. After an interim period, when dose rates have reduced and the DSOs have been removed, only the RWC will be inspected.

A visual inspection will be carried out every 5 years by field engineering to check rust marks, mechanical damage to paint, paint deterioration, and rust marks or evidence of water on the building floor. Chloride samples will be taken from top and sidewalls of RWC/DSOs and adjacent floor locations to determine chloride concentration every 5 years.

Structural Integrity Aging Management

OPG conducts various activities to ensure the structural integrity of the NSS-D storage structures, to protect the health and safety of persons and the environment. Activities include weld bay walls inspections and floor slab inspections.

Additionally, OPG conducts Phased Array Ultrasonic Testing (PAUT) to verify the integrity of the lid closure-weld on each loaded DSC received from DNGS.

Concrete Floor Slab Aging Management

NSS-D concrete floor slabs are inspected annually to monitor the structural integrity. Existing cracks that are greater than the acceptable criteria are monitored for growth and new cracks, if any, are identified and documented for corrective actions. The concrete slabs have been found to be in good condition currently and expected to remain so in the foreseeable future.

2.6.3 Future Plans and Improvements

OPG has planned a number of initiatives to address aging, obsolescence and to ensure ongoing Fitness for Service of critical Systems, Structures and Components through the next licence period:

- LiftKing transporter LT1024 is planned for refurbishment, to have expected end of life of December 2051. There are no safety issues with the LiftKing transporter.
- Procurement of two new DSC transporters has been initiated, which will ensure continued reliability for transportation of DSCs between DNGS and NSS-D.
- Periodic roof replacement will be undertaken at NSS-D starting with DSC Processing Building and UFDSB #1.
- All six air conditioning units are scheduled to be replaced in 2022.
- New generation welding machines are expected to be commissioned starting 2024.
- A new project has been initiated to replace of the current Phased Array Ultrasonic Testing system by 2025.

2.7 RADIATION PROTECTION

HIGHLIGHTS

- During the current licencing period, there have been no Action Level exceedances related to worker dose at NSS-D or any loss of contamination control events in excess of NSS-D's contamination control action levels.
- During the current licencing period, worker doses were maintained consistently below OPG individual exposure control levels and well below regulatory limits.
- Since 2013, all measured dose rates have been below target.
- During the current licensing period, new instrumentation has been deployed to assist with the execution of Likely Clean Waste minimization efforts.
- Installation of new gamma portal monitors is currently underway.

OPG has implemented and maintains a radiation protection program, which includes a set of action levels. The key documents are listed in the table below.

Doc #	Title
N-PROG-RA-0013	Radiation Protection
N-REP-03420-10011	Occupational Radiation Protection Action Levels for Nuclear Waste Management Facilities

2.7.1 Radiation Protection Program

Program and Objectives

The Radiation Protection Program is implemented through a series of standards and procedures for the conduct of activities within nuclear sites and with radioactive materials intended to achieve and maintain high standards of radiation protection including the achievement of the following objectives:

- (1) Controlling occupational and public exposure by:
 - Keeping individual doses below regulatory limits.
 - Avoiding unplanned exposures.
 - Keeping individual risk from lifetime radiation exposure to an acceptable level, and
 - Keeping collective doses As Low as Reasonably Achievable (ALARA).
- (2) Preventing the uncontrolled release of contamination or radioactive materials from the nuclear sites through the movement of people and materials, and
- (3) Demonstrating the achievement of (1) and (2) through monitoring.
The key program elements are:
 - Program Management
 - Management Control over Work Practices
 - Personnel Qualification and Training
 - Exposure Control
 - Contamination Control

- Ascertainment and Recording of Doses

Management Control over Worker Practices for Dose and Contamination Control

Performing radioactive work within NSS-D requires a systematic approach and is managed via the OPG Radiation Protection program, which includes the following processes:

- Limiting individual worker dose.
- Managing dose as a resource, in terms of constraints on work activities.
- Establishing facility design consistent with ALARA principles.
- Assessing hazards for planning and maintaining knowledge of conditions.
- Controlling the use of licensed radioactive devices and equipment, and
- Planning all radioactive work, taking into account personnel, hardware, procedures, supervision, and the physical environment of the job.

The planning process includes the anticipation and evaluation of radiation hazards and the selection of appropriate protective measures and dosimetry. The degree of formalization of the planning process and the approval levels for a job are proportional to the potential for exposure. Plans include backout conditions and contingencies. Radiation protection planning decisions are documented in a radiation exposure permit.

Radioactive contamination controls are in place to reduce occupational and public exposure, and to minimize the release of radioactive materials to the environment. The objectives are to prevent a loss of radioactive contamination control, to minimize the area affected if contamination occurs, and to restore the condition to acceptable levels as soon as possible.

Radiation Protection Program Monitoring and Oversight at NSS-D

Established performance indicators include Radiation Protection Program effectiveness measures commonly used in the nuclear industry and OPG defined indicators established for the purpose of monitoring particular program elements. These are captured in OPG's Electronic Performance Reporting systems as well as NSS scorecards and radiation protection indices. Specific measures include personnel contamination incidents, regulatory infractions, as well as dose performance versus dose targets. In addition to Fleetview reporting and assessments, the design and execution of the Radiation Protection Program is subject to ongoing monitoring through mechanisms including but not limited to:

- Management review and assessment which includes:
 - Joint Committee on Radiation Protection, and
 - Monthly Management Oversight Meetings.
- Exceptional dosimetry and dose control device measurement results.
- Dose trends.
- Annual review of ALARA targets.
- Radiation Protection program self-assessments and independent audits.
- Investigation of events in which an Action Level has been exceeded, trending, benchmarking, and review of industry operating experience.

2.7.2 Current Operations and Results

Dose and Contamination Control

During the reporting period there have been no action level exceedances related to worker dose at NSS-D or any loss of contamination control events in excess of NSS-D's contamination control action levels.

The current action levels for dose to workers and for contamination control are shown in Table 3 and are documented in N-REP-03420-10011 *Occupational Radiation Protection Action Levels for Nuclear Waste Management Facilities*.

Table 3: Radiological Action Levels for NSS-D

Application	Action Level	Observations
A person receives an external whole body dose that equals or exceeds 0.5 mSv (50 mrem) above the Electronic Personal Dosimeter (EPD) dose alarm set point in a shift	0.5 mSv (50 mrem)	The Action Level is exceeded if a person receives an external whole body radiation dose of greater than 0.5 mSv above the planned dose per shift.
Total (fixed and loose) surface contamination levels greater than 37 kBq/m ² (1 µCi/m ²) (beta-gamma) or 3.7 kBq/m ² (0.1 µCi/m ²) (alpha) are found in Zone 1.	3.7 x 10 ⁴ Bq/m ² (1 µCi/m ²) [beta/gamma] 3.7x10 ³ Bq/m ² (0.1 µCi/m ²) [alpha]	The Action Level is exceeded if total contamination (fixed and loose) is found in excess of the corresponding values for beta/gamma or alpha radiological contamination.
A person receives a single intake of tritium oxide (tritiated water) in which the unplanned component of the initial concentration immediately after intake is estimated to equal or exceed 600 kBq/L (16 µCi/L) (representing a nominal unplanned exposure of 0.5 mSv [50 mrem]).	Single intake of tritium oxide of unplanned component of 600 kBq/L (16 µCi/L)	The Action Level is exceeded if a person receives a single intake of tritium oxide (tritiated water) in which the unplanned concentration immediately after intake is estimated to equal or exceed 600 kBq/L (16 µCi/L) which would represent a nominal unplanned exposure of 0.5 mSv or 50 mrem
A person receives an intake of a radionuclide other than tritium (in the form of tritium oxide) attributable to a single event that equals or exceeds 0.025 of an Annual Limit of Intake (ALI) as defined in	Intake of a radionuclide (other than tritium oxide) do due to a single event that equals or	The Action Level is exceeded if a person receives an intake of a radionuclide other than tritium oxide due to a single event that results in a nominal exposure of 0.5 mSv or 50 mrem.

Application	Action Level	Observations
International Commission on Radiation Protection (ICRP) 68 Dose Coefficients for Intakes of Radionuclides by Workers (representing a nominal unplanned exposure of 0.5 mSv [50 mrem])	exceeds 0.025 of an ALI (Annual Limit of Intake)	The recommendations of CNSC staff with regards to ICRP-68 references will be updated in the next regular update of licensee document N-REP-03420-10011. This technical alignment will not impact the 0.5 mSv or 50 mrem Action Level.

Collective Dose and Maximum Individual Dose per Year for Nuclear Energy Workers (NEW)

OPG's administrative limits include two control levels for exposure: (1) the Exposure Control Level is 10 mSv/year, and (2) the Administrative Dose Limit is 20 mSv/year. Exposure control levels are set below administrative control levels, which are in turn below the regulatory limits. Graph 1 shows the OPG individual exposure control level of 10 mSv (1 rem) per calendar year is significantly below the single year regulatory limit of 50 mSv (5 rem) in a year, and the five-year regulatory limit of 100 mSv (10 rem) over five years for a NEW.

Doses are maintained ALARA (As Low as Reasonable Achievable, Socio and Economic Factors considered) through the use of engineered barriers, work planning and use of exposure control levels for NEWs.

OPG's contamination control sub-program continues to be in full compliance with regulatory requirements. Facility targets are set annually, based on DSC throughput and other operations, and communicated in Quarterly Operations Reports.

Graph 1: Average and Maximum Dose at NSS-D

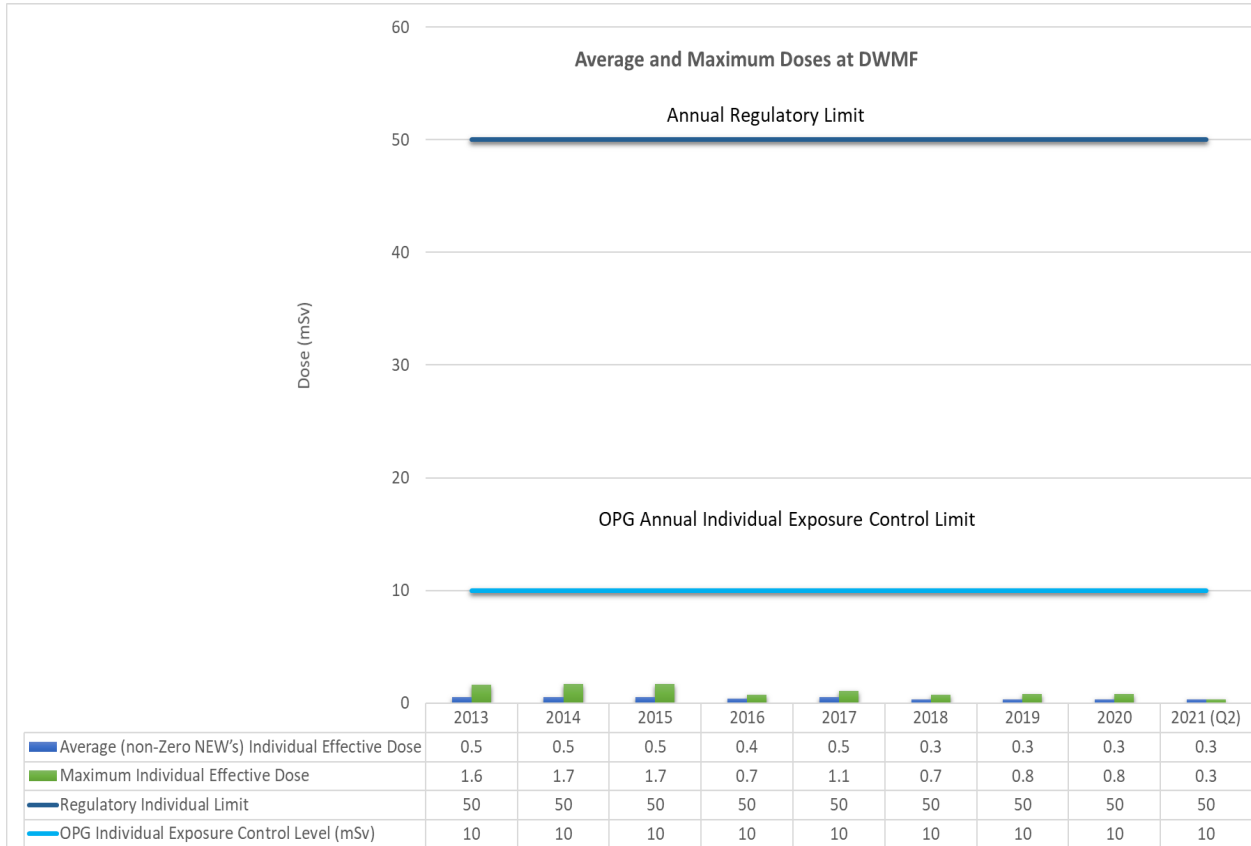


Table 4 outlines the key dose statistics for NSS-D. Worker doses were maintained consistently below OPG Individual Exposure Control Levels and well below regulatory limits in the *Radiation Protection Regulations* over the current licensing period.

Table 4: Key Dose Statistics for NSS-D

Year	Total Number of Staff Monitored	Total Number of NEW's Monitored	Collective Dose	Average (total) Individual Effective Dose	Average (non-Zero NEW's) Individual Effective Dose	Maximum Individual Effective Dose	Regulatory Individual Limit	OPG Individual Exposure Control Level	DSCs Loaded per Year
	#	#	Person-mSv	mSv	mSv	mSv	mSv	mSv	#
2013	47	44	12.9	0.3	0.5	1.6	50	10	60
2014	45	44	15.0	0.3	0.5	1.7	50	10	60
2015	40	40	8.8	0.2	0.5	1.7	50	10	63
2016	35	35	5.1	0.2	0.4	0.7	50	10	65
2017	37	37	6.1	0.2	0.5	1.1	50	10	63
2018	42	42	2.9	0.1	0.3	0.7	50	10	57
2019	42	42	6.5	0.2	0.3	0.8	50	10	59
2020	43	42	5.2	0.1	0.3	0.8	50	10	59
2021	35	35	2.54 (Q2)	0.01 (Q2)	0.3 (Q2)	0.3 (Q2)	50	10	26 (Q2)

NSS-D Perimeter Dose Monitoring (non-NEW and Public)

Environmental Thermoluminescent Dosimeters are mounted on the perimeter fence of the NSS-Don Figure 12 and Figure 13 and are changed and analyzed quarterly. The Thermoluminescent Dosimeters are located on the perimeter fence – demarking the limit of approach for a non-NEW. Data is reported to the CNSC in the NSS-D Quarterly Operations report. Target Dose Rates for these locations is to be less than $0.5 \mu\text{Gy/h}$ (air kerma rate).

A dose rate of $0.5 \mu\text{Sv/h}$ for 2,000 hours of exposure would result in a dose to the public of 1 mSv, the regulatory annual limit. The average actual perimeter dose rate at the NSS-D has consistently been less than the $0.5 \mu\text{Sv/h}$, with an overall average less than $0.1 \mu\text{Sv/h}$. The maximum potential dose at the site boundary over the course of a year to a member of the public is well below the regulatory annual dose limit of 1 mSv for a member of the public.

All measured dose rates have been below target. Annual performance is reported as the average of all dose rates.

Figure 12: Thermoluminescent Dosimeter Locations around the DSC Processing Building and Storage Buildings #1 and #2

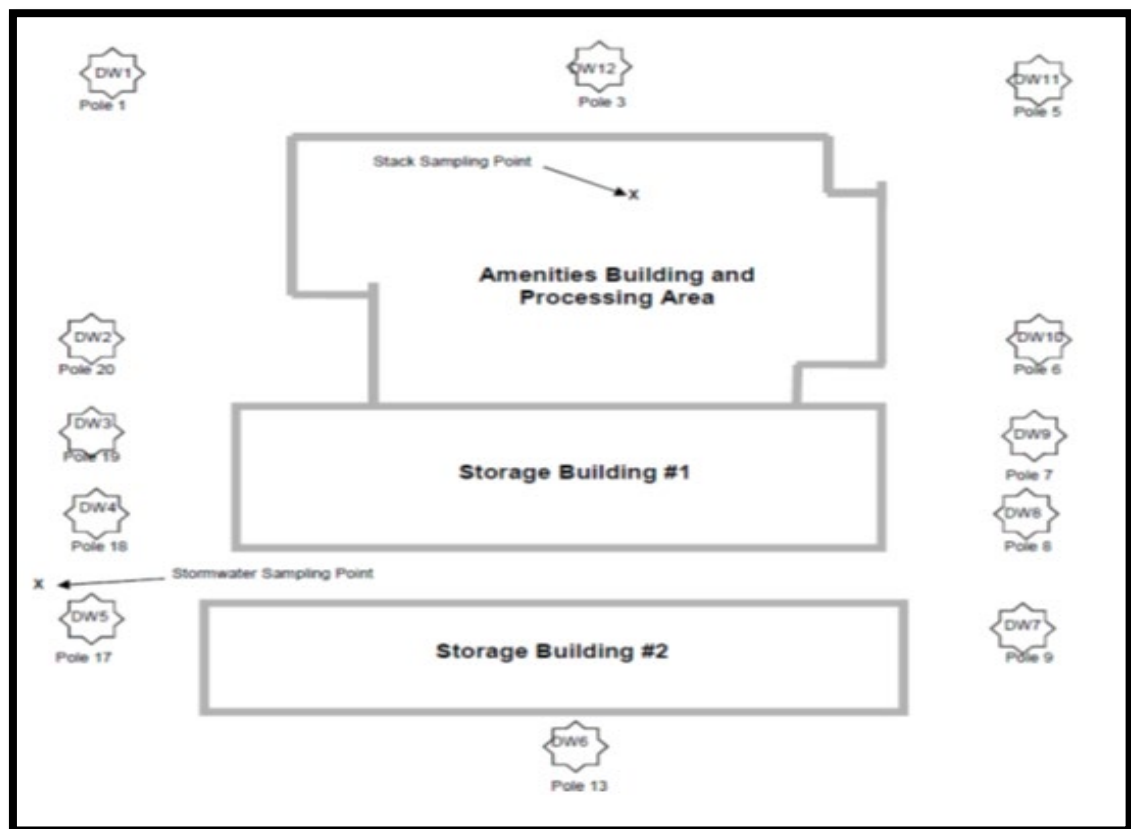
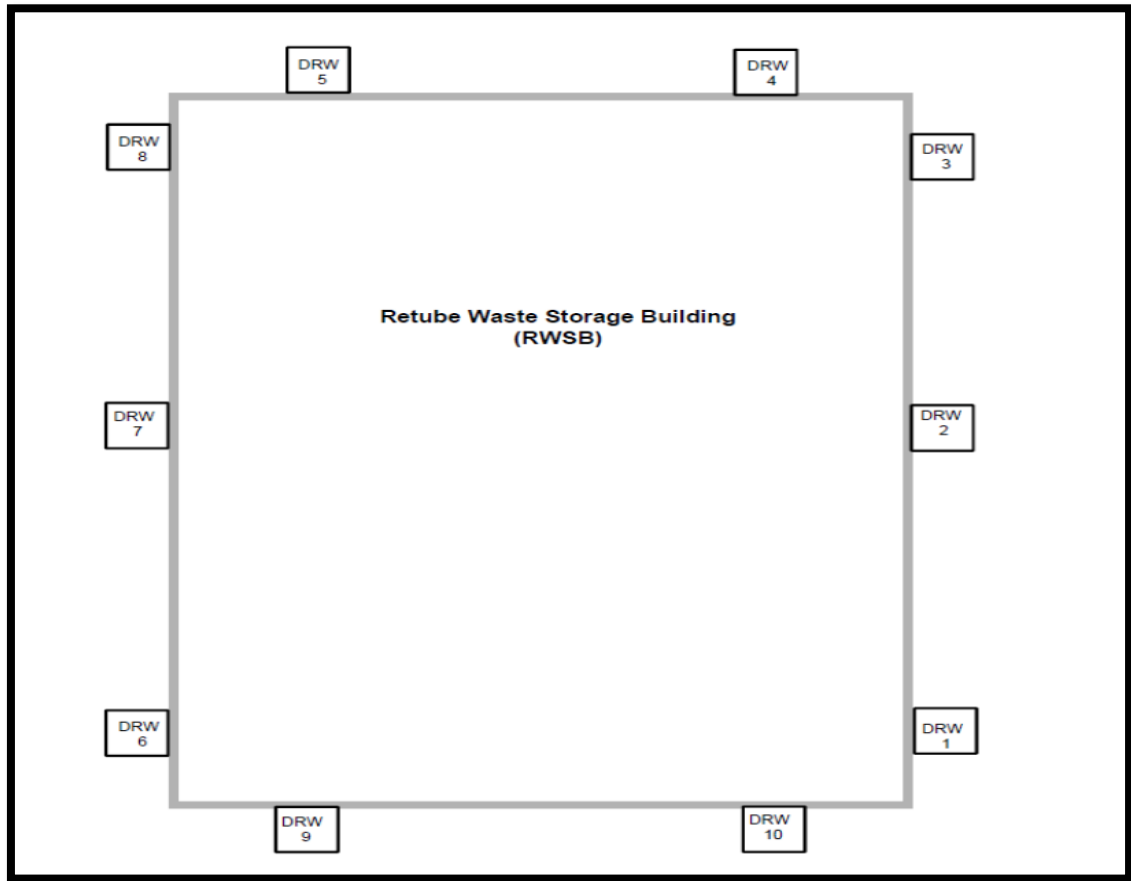


Figure 13: Thermoluminescent Dosimeter Locations around the RWSB

2.7.3 Future Plans and Improvements

The action level report will be reviewed, and revised if necessary, in 2022.

The radiation protection section has simplified the routine constancy check process for fixed Radiation Protection instrumentation at the NSS-D. This improvement will simplify the execution of the work activities by staff.

In addition, new fixed Instrumentation has been deployed to assist with execution of likely clean waste minimization efforts and installation of new gamma portal monitors are underway.

2.8 CONVENTIONAL HEALTH AND SAFETY

HIGHLIGHTS

- NSS-D demonstrates its commitment to safety by working without a lost time accident or medically treated injury for its entire operational period (14 years).
- During the current licencing period, there have been zero (0) safety events at NSS-D.
- During the current licensing period, Serious Incidence Injury Rate has remained zero (0) since the introduction of the new safety performance metric.
- Completion of safety corrective action performance is 100% completion rate.
- During the current licensing period, there were zero (0) High Maximum Reasonable Potential for Harm events that occurred at NSS-D

OPG has implemented and maintains a conventional health and safety program. The key documents are listed in the table below.

Doc #	Title
OPG-POL-0001	Employee Health and Safety Policy
OPG-PROG-0005	Environment Health and Safety Managed Systems ¹

¹ OPG-PROG-0010, in the current LCH, has been superseded and replaced with OPG-PROG-0005.

2.8.1 Employee Health and Safety Policy

The Employee Health and Safety Policy commits to the prevention of workplace injuries and ill health, and to continuous improvement of its employee health and safety performance.

The objectives of the OPG Health and Safety Policy are:

- Meet or exceed all applicable health and safety legislative requirements, as well as other associated health and safety standards to which OPG subscribes. OPG shall require that its contractors maintain a level of safety equivalent to that of OPG employees while at OPG workplaces.
- Ensure that employees are involved in decisions that have an impact on their health and safety, either individually, as a group, or through their employee representative groups.
- Ensure that work is planned and performed to protect workers. It shall provide its employees with the information, training, tools, procedures, and support required to do their jobs safely; and
- Set health and safety targets as part of its annual business planning process. Health and safety performance against these targets shall be regularly measured and evaluated to ensure the effectiveness of OPG's health and safety systems.

2.8.2 Program and Objectives

The objective of the Conventional Health & Safety section of the Environment Health and Safety Managed Systems Program is to ensure the safety and well-being of its workers. This is achieved by ensuring that safety is a core value and by managing conventional risks in the workplace associated with NSS-D's operations. This program is designed to be an integrated system with OPG Nuclear business managed processes, where appropriate, and considers the current organizational structure.

Additionally, the Internal Responsibility System is a system applied consistently throughout OPG Nuclear, where everyone has personal and shared responsibility for working together co-operatively, to prevent occupational injuries and illnesses. The duties for a healthy and safe workplace fall on every individual, to the degree they have:

- Authority to do so (based upon their position), and
- Ability to do so (based upon their expertise and qualifications).

Each person is expected to take the initiative on health and safety issues, work to solve problems, and make improvements on an on-going basis. The Internal Responsibility System is based on the principle that employees themselves are in the best position to identify health and safety problems and identify solutions. The Internal Responsibility System outlines the appropriate resolution level for timely corrections.

2.8.3 Current Operations and Results

The NSS-D demonstrates its commitment to safety by working without a lost time accident or medically treated injury for its entire operational period. This period has lasted 14 years.

To ensure that the overall objective of managing occupational hazards is met, OPG monitors the following performance indicators / elements:

- Total Recordable Injury Frequency (TRIF)
- Accident Severity Rate (ASR)
- Serious Injury Incidence Rate (SIIR)
- Timely Completion of Safety Corrective Actions (TCSCA)
- High Maximum Reasonable Potential for Harm Events (HMRPHE)

The TRIF and ASR are inclusive for the entirety of NSS (which the NSS-D is part of). There were zero (0) safety events that occurred at the NSS-D that impacted the TRIF and ASR for the reporting period.

Total Recordable Injury Frequency (TRIF)

The Total Recordable Injury Frequency (TRIF) is defined as the number of fatalities, lost-time injuries, restricted work, and medically treated injuries divided by exposure hours and multiplied by 200,000. In 2018, the decision was made to change the safety performance indicator from ASR to TRIF.

During the licence period, there were zero safety events that occurred at the NSS-D that impacted the TRIF for the reporting period.

Accident Severity Rate (ASR)

The Accident Severity Rate is defined as the total number of calendar days lost due to a work-related injury multiplied by 200,000 person-hours, divided by the total exposure hours worked. OPG made the decision in 2014 to no longer set a target for ASR.

NSS Accident Severity Rate remained at zero (0) from 2013 through 2021, as there were zero lost time injuries experienced in the reporting period. Specifically, at NSS-D, to date, there have not been any lost time safety events. This shows a strong commitment to safety with an exceptional performance of 14 years without a lost time event at NSS-D.

Serious Injury Incidence Rate (SIIR)

Serious Injury Incidence Rate is defined as the number of work-related accidents for all OPG employees that result in serious injuries or fatalities, per 200,000 person-hours worked. This metric focuses on more serious injuries, assists in maintaining attention on high-consequence hazards, and accounts for the actual injury instead of the type of medical treatment.

NSS-D Serious Injury Incidence Rate has remained at zero (0) since the introduction of the new safety performance metric in 2020.

Timely Completion of Safety Corrective Actions (TCSCA)

Timely Completion of Safety Corrective Actions (TCSCA) aims to prioritize completion of safety related actions in a timely manner. TCSCA is the percentage of corrective actions, arising from safety events, that are completed on or before the initial due date (zero extensions).

Strong TCSCA performance has been observed for NSS-D since the introduction of the metric in 2019 with 100% completion rate, which is better than the target of 96%.

High Maximum Reasonable Potential for Harm Events (HMRPHE)

The High Maximum Reasonable Potential for Harm is an OPG rating system used to classify incidents, and to determine the potential severity of safety incidents. These are incidents with potential for injury to personnel; however, no actual injury may have occurred. High Maximum Reasonable Potential for Harm incident investigations offer learning opportunities for continued improvement in safety performance.

During the current licensing period, there were zero (0) High Maximum Reasonable Potential for Harm events that occurred at NSS-D.

Safety Enhancements

During the current licensing period, a number of safety enhancements have been made to equipment and systems at the NSS-D, some examples are:

- Fan 10 located in the Standby Generator room was moved from Class IV to Class III power to allow the fan to exhaust the hot room when the Standby Generator is running. This keeps the room cooler and prevents the engine from overheating.
- A barrier was installed in front of 600V electrical equipment to prevent contact with objects and equipment incidents in high traffic area.
- Outriggers installed on the IAEA rolling inspection ladder to increase stability.

2.8.4 Future Plans and Improvements

A number of health and safety improvement initiatives have been identified for the NSS-D as part of the continuous improvement cycle of the health and safety management system, which include:

- Implementation of Fail-Safe Culture Change initiatives to build defenses into the planning of work, creating a learning organization, recognizing our workers are the solutions, avoiding blaming the worker, and other key Fail-safe concepts.
- Continue to maintain the iCare Safety Culture initiatives in areas of Communications, Recognition, Risk Management, Human Performance & Coaching, and Total Health Strategies. The initiatives focus on how safety messages are presented and transition the tone from “do this because we are required” to “do this because you care and don’t want an injury”.
- Implementation of a “Total Health Initiative” supporting 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. There is a continued focus on mental health and Musculoskeletal Disorder prevention with campaigns to raise awareness in these areas.
- The leading indicator safety performance metric, Timely Completion of Safety Corrective Actions (TCSCA) will continue to be reinforced to focus on completing safety related actions in a timely manner. Focusing on safety related actions to ensure completion builds on the iCare safety culture.
- Industry leading Serious Injury Incidence Rate (SIIR) metric will continue to be reinforced to focus on prevention of serious injuries that have life-altering consequences.

2.9 ENVIRONMENTAL PROTECTION

HIGHLIGHTS

- During this licence period, there have been no reportable events at NSS-D under the Environmental Protection SCA.
- Since 2012, there have been no reportable spills and no environmental infractions at the NSS-D.
- The emissions / effluents from NSS-D have been consistently orders of magnitude below DRL values for Darlington site.
- The most recent ERA (2020) concluded that the Darlington Nuclear Site (including the NSS-D) is operating in accordance with its approved limits, and measures are taken to ensure regulatory compliance is maintained.

The OPG Environmental Management System (EMS) program implements the requirements of the Environmental Policy. The program defines procedures and supporting documents, which execute the policy. This program is implemented at the NSS-D.

The key documents are listed in the table below.

Doc #	Title
OPG-POL-0021	Environmental Policy
OPG-PROG-0005	Environment Health and Safety Managed Systems
N-STD-OP-0031	Monitoring of Nuclear and Hazardous Substances in Effluent
N-PROC-OP-0025	Management of Environmental Monitoring Programs
NK38-REP-03482-10001	Derived Release Limits and Environmental Action Levels for Darlington Nuclear Generating Station
D-REP-07701-00001	2020 Environmental Risk Assessment for the Darlington Nuclear Site

2.9.1 Environmental Policy

The objectives of the OPG Environmental Policy are to:

- Establish an environmental management system and maintain registration for this system to the ISO 14001 Environmental Management System standard.
- Work to prevent or mitigate adverse impacts on the environment, with a long-term objective of continual improvement in its environmental management system and its environmental performance. OPG shall strive to be a leader in climate change mitigation.
- Manage its sites in a manner that strives to maintain, or enhance where it makes business sense, significant natural areas and associated species of concern. OPG will work with its community partners to support regional ecosystems and biodiversity through science-based habitat stewardship. Where disruption is required, OPG shall take reasonable steps to manage the residual impact to these areas and species.

- Set environmental objectives as part of its annual business planning process. Performance against these environmental objectives will be monitored and associated documented information will be maintained.
- Communicate its environmental performance to employees, governments, local communities, and other stakeholders.

2.9.2 Environmental Management System

The OPG Environmental Management System (EMS) program implements the requirements of the Environmental Policy. The program defines procedures and supporting documents, which execute the policy. This program is implemented at the NSS-D.

The EMS uses a risk-based approach to identify and assess areas of concern with respect to environmental management. Elements of OPG's activities, products, and services, including those at NSS-D, that interact or can interact with the environment are considered environmental aspects. Significant Environmental Aspects, as determined by assessing risks and opportunities, are environmental aspects that have or can have a significant environmental impact. Identified aspects, including Significant Environmental Aspects, are managed as appropriate through operational controls at the relevant sites.

Identification of the significant environmental aspects which apply to NSS-D allows for more focus on areas where there is the potential to have a negative (or positive) impact on the environment. The significant environmental aspects that have been identified for the NSS-D include the following:

- Wildlife Habitat (Enhancement or Disruption)
- Spills

Performance measures are established to ensure the controls perform as designed and are corrected and/or improved under the EMS framework. For example, spill and compliance targets have been established and tracked during the licence period. Since that time, OPG has consistently met or surpassed these targets. Since 2012, there have been no reportable spills and no environmental infractions at the NSS-D.

OPG is committed to maintaining registration of the ISO 14001 Standard. Verification that the EMS is effectively maintained is completed through annual internal and compliance audits.

2.9.3 Current Operations and Results

OPG has established monitoring programs in support of its nuclear facility operations to ensure compliance with the NSS-D licence, the *Nuclear Safety and Control Act* and its regulations, applicable federal and provincial legislation and OPG requirements. The programs are administered on a site-wide basis and encompass all nuclear facilities at the Darlington site, including the NSS-D. These programs include effluent monitoring, groundwater monitoring, environmental monitoring, and environmental risk assessments.

Derived Release Limits (Radiological)

Derived Release Limits (DRLs) are derived using CSA N288.1, *Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities* and approved by the CNSC. DRLs are used to establish controls on the releases of radioactive materials. DRLs are calculated for radionuclides of potential dose significance in effluent streams, to facilitate the control, reporting, and regulation of radionuclide emissions.

The emissions from NSS-D have been consistently orders of magnitude below DRL values. The DRL values shown in Table 5 are for the Darlington Nuclear site, which includes both Darlington Nuclear Generating Station (DNFS) and the NSS-D.

Table 5: Darlington Nuclear Site Derived Release Limits

Release Category	Radionuclide	Derived Release Limit (Becquerel/year)
Air	Tritium (HTO)	4.94×10^{16}
	Elemental Tritium (HT)	8.23×10^{17}
	Iodine (mixed fission products)	1.77×10^{12}
	Carbon-14	1.21×10^{15}
	Noble Gases ¹	3.80×10^{16}
	Particulate – Gross Beta-Gamma	6.06×10^{11}
	Particulate – Gross Alpha	1.08×10^{11}
Water	Tritium	6.43×10^{18}
	Carbon-14	6.97×10^{14}
	Gross Alpha	4.39×10^{11}
	Gross Beta-Gamma	3.47×10^{13}

¹ Noble gases DRLs are in units of Bq-MeV.

General Note: The NSS-D uses the DRLs established for the Darlington Site.

Environmental Action Levels (Radiological)

The *Radiation Protection Regulations* state that an “action level” means “a specific dose of radiation or other parameter that if reached, may indicate a loss of control of part of a licensee’s Radiation Protection Program and triggers a requirement for specific action to be taken”. Environmental Action Levels (EALs) are set at a fraction of the DRL values to provide early detection of a potential loss of control and ensure appropriate action is taken to prevent emission from approaching a DRL. Exceeding an action level requires notification and reporting to the CNSC, investigation of the cause, and corrective action as required.

NSS-D does not have any specific environmental action levels as the emissions from the facility have historically been an extremely small fraction of the DNFS emissions. The EALs in Table 6 are for the Darlington Nuclear site, which includes the DNFS and the NSS-D.

Table 6: Darlington Nuclear Site Environmental Action Levels

Release Category	Radionuclide	EAL: Gaseous Releases (Becquerel/week)
Air	Tritium (HTO)	9.88×10^{13}
	Elemental Tritium (HT)	1.65×10^{15}
	Iodine	3.53×10^9
	Carbon-14	2.42×10^{12}
	Noble Gases ¹	7.60×10^{13}
	Particulate – Gross Beta-Gamma	1.21×10^9
Release Category	Radionuclide	EAL: Liquid Releases (Becquerel/ month)
Water	Tritium (HTO)	5.14×10^{16}
	Carbon-14	5.58×10^{12}
	Gross Beta-Gamma	2.77×10^{11}

¹ Noble gases EALs are in units of Bq-MeV.

General Note: These EALs are for the Darlington site, which includes the DNGS and the NSS-D.

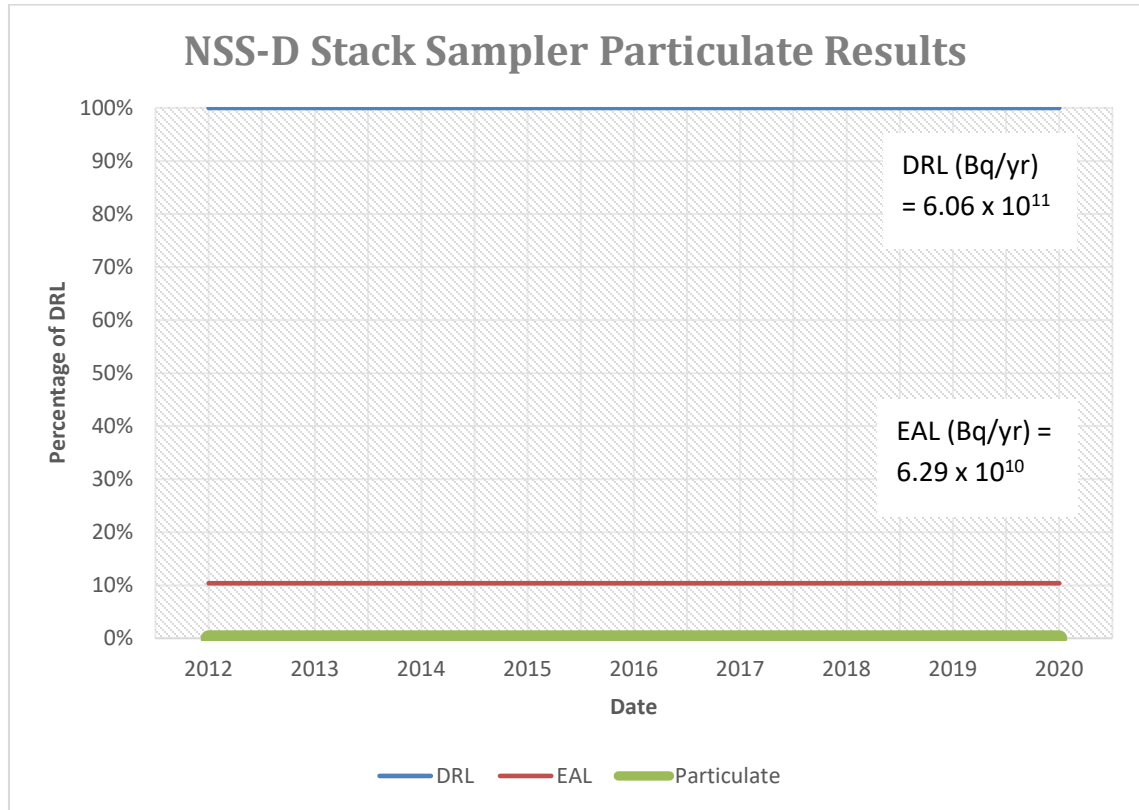
General Note: EAL for gross alpha is not specified since it is not a routinely monitored radionuclide group at the DNGS or NSS-D because its activity is below the threshold value specified in the standard for radioactivity monitoring in effluents.

Airborne Emissions (Radiological)

Under normal operating conditions, no airborne emissions are expected from loaded Dry Storage Containers (DSC) during transfer from the Fueling Facility Auxiliary Areas to the NSS-D. Airborne releases are also unlikely to arise under normal operating conditions during storage of seal welded DSCs. There is a small potential for airborne emissions resulting from DSC processing operations such as welding and vacuum drying. The DSC processing building has a dedicated active ventilation system. The active ventilation exhaust from the DSC Processing Building is monitored for radioactive particulates. A continuous emission sample is passed through a particulate filter that is replaced and analyzed on a weekly basis.

Although there are no significant particulate emissions expected from the exhaust at the NSS-D, it has been monitored for confirmation purposes. All data is reported to the CNSC in the quarterly environmental emissions data for Darlington, including the NSS-D and the reports are available to the public on the OPG website at www.opg.com.

Graph 2 shows a summary of the radiological airborne emissions from the DSC Processing Building stack. During the current licensing period, there have been no derived release limit or action level exceedances for airborne particulates from the DSC Processing Building stack sampler. The emissions from the NSS-D have been 0.00001% of the derived release limit for the site. The overall trend has been stable.

Graph 2: Airborne Particulates from the DSC Processing Building Stack Sampler

General Note: Airborne particulate data (Bq/yr) was calculated by multiplying the reported airborne contamination (weekly average) by the number of fiscal weeks per month, then summing the months into an annual total.

Waterborne Emissions (Radiological)

There are no liquid emissions from the DSC during onsite transfer to the NSS-D. The DSCs are fully drained and vacuum dried after loading at the station Fueling Facility Auxiliary Areas and the elastomeric seals and drain plugs are present during transfer. The DSCs are also decontaminated prior to transfer; and spot decontamination operations, which may be carried out in the DSC Processing Building, are not expected to generate liquids.

Stormwater and foundation drainage associated with the DSC processing building and the two DSC storage buildings, is currently sampled weekly for tritium and gross gamma. This historical sampling was implemented voluntarily for confirmation purposes. This sampling has not identified any impacts associated with this facility. The facility EA concluded no significant interaction of stormwater with radiation or radioactivity during construction and operations phases. NSS-D stormwater and foundation drainage are primarily influenced by air emissions from external facilities, such as tritium in precipitation from the adjacent generating station.

A recent assessment of stormwater and foundation drainage monitoring at the NSS-D identified that routine monitoring is not required per the CSA N288 series of standards. Based on this assessment, OPG intends to discontinue routine stormwater and foundation monitoring at the NSS-D. The results of the assessment and notification of the planned program change has been provided to the CNSC. Potential impacts to surface water and groundwater at the site will continue to be assessed through the environmental risk assessment and groundwater protection programs.

Groundwater Monitoring (Radiological)

As part of the DNGS operations, the NSS-D groundwater monitoring has been integrated into the overall DNGS groundwater monitoring program. This program is in place to address the following primary objectives:

- Confirm predominant on-site groundwater flow characteristics at the DNGS.
- Monitor changes to on-site groundwater quality to ensure timely detection of inadvertent releases to groundwater; and
- Ensure that there are no adverse off-site impacts from the DNGS groundwater

Groundwater flow interpretations for DNGS were first established in 2010. On an annual basis, a set of water levels is collected from specific groundwater monitoring wells to verify that interpretations have not changed, and that OPG continues to have a sound understanding of the groundwater flow patterns at the site.

Also on an annual basis, groundwater samples are collected for analysis as per the Sampling and Analysis Plan (SAP) developed for the site to allow for data evaluation to support monitoring of groundwater quality. Refer to Figure 14 for groundwater monitoring locations.

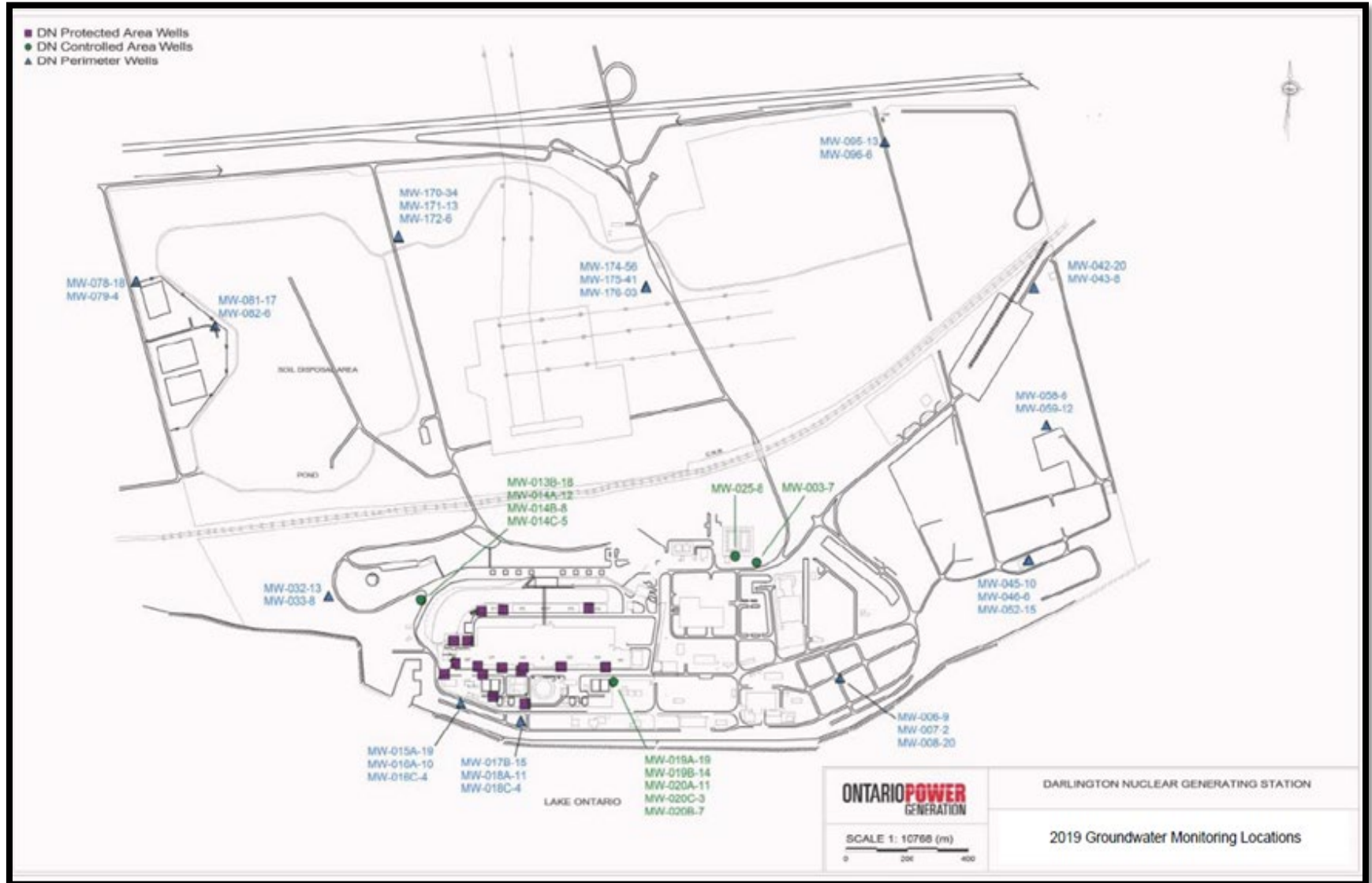
Environmental Monitoring - Protection of the Public (Radiological)

Radiological emissions from the NSS-D are an extremely small fraction of the overall emissions from the Darlington Nuclear site. OPG has a comprehensive Environmental Monitoring Program that provides data to confirm that it is operating in a manner that is protective of human and ecological receptors residing in the surrounding area. The off-site radiological impacts from the operation of the NSS-D, in addition to the other facilities on the Darlington Nuclear site, are monitored under Darlington Nuclear Environmental Monitoring Program. The Darlington Nuclear Environmental Monitoring Program monitors off-site air, water (municipal, well, lake/stream), aquatic samples (fish, sediment, sand), and terrestrial samples (animal feed, and vegetation). Data gathered from this program, along with emissions data, are used to assess the annual radiological dose to members of the public living or working in the vicinity of the Darlington Nuclear site.

Results of monitoring and public dose assessment are published in the annual Environmental Monitoring Program report, which is submitted to the CNSC and made available to the public on www.opg.com. Dose to the public from the operation of facilities on the Darlington Nuclear site (including the NSS-D) is a very small fraction of the public dose limit. The NSS-D is covered by the Darlington Nuclear Environmental

Monitoring Program, which is in compliance with CSA N288.4, *Environmental Monitoring Program at Class I Nuclear Facilities and Uranium Mines and Mills*.

Figure 14: 2019 Darlington NGS Groundwater Monitoring Locations



Biodiversity Management

OPG has had a very extensive and diverse biodiversity program at the Darlington Nuclear site for over 20 years. Protecting biodiversity is a fundamental part of OPG's operations, and the DNGS conservation vision follows OPG's four R's:

- Retain what is significant.
- Restore habitats that have been degraded.
- Replace habitats that have been lost; and
- Recover species that are at risk.

As part of the DNGS operations, the NSS-D biodiversity plan has been integrated into the overall site biodiversity plan. Multiple site biodiversity and Priority Natural Area management plans have been made throughout the years to maintain a diverse site and achieve the Wildlife Habitat Council certification. The Wildlife Habitat Council certification adds value to programs by providing third party credibility and an objective evaluation of projects.

The major initiatives accomplished during the previous two (2) Wildlife Habitat Council certification periods at the Darlington Nuclear site under the Biodiversity Program are as follows:

Accomplishments between 2013 and 2016:

- Ecological Land Classification Surveys & Vegetation Monitoring - initiated in 1998, subsequent surveys have been carried out in 2002, 2007 & 2013. Ecological land classification monitoring allows OPG to document changes in vegetation communities between survey years and allows for consideration when planning future works. The monitoring program is ongoing.
- Monitoring - amphibian, bat, breeding birds, bird nest boxes (tree swallow nest boxes), habitat structures (hibernaculum, bat boxes), butterfly and dragonfly inventory, vegetative and invasive plant communities.
- On-Site Habitat Enhancements – habitat restoration/replanting along Coot's Pond south berm.
- Partnerships - maintained with many local communities, conservation groups and government agencies, and school boards.

Accomplishments between 2017 and 2019:

- Monitoring - amphibians, bees, bats, waterfowl, breeding birds, bird nest boxes (tree swallow nest boxes), habitat structures (hibernaculum, bat boxes), butterfly and dragonfly inventory, vegetative and invasive plant communities
- On-Site Habitat Enhancements – nesting surveys and nest guards deployed around Coot's Pond to protect Snapping Turtle species, turtle basking structures were added, Darlington Pollinator program supports the increasing of the pollinator-friendly gardens and landscapes; the Darlington Energy Complex pollinator garden was established as a Monarch Waystation

- Social and Community Outreach programs supported by Darlington Nuclear site – Darlington Pollinator Partners, March Break Madness, Peregrine Falcon & Birds of Prey Elementary School Visits
- Darlington site received the Oshawa Chamber of Commerce Sustainability Award

OPG's ongoing Beyond Compliance Biodiversity Management Plan continues to incorporate the restoration, retention, replacement, and recovery of multiple Priority Natural Areas. Darlington Nuclear, including the NSS-D, will be submitting their Wildlife Habitat Council Recertification application as the OPG Nuclear Beyond Compliance Biodiversity Application to achieve recertification by December 31, 2022.

Non-Radiological Emissions

Non-radiological air emissions at the NSS-D are negligible. DSC paint touch-up operations involve minimal paint quantities. Residual paint aerosols from the paint bays are removed through filters before exhausting to the active ventilation system. Due to small quantities, painting methods, and the use of appropriate filtration, no significant emissions of paint materials are expected. Welding fumes from DSC seal-welding operations are additionally exhausted through the High Efficiency Particulate Air filtered active ventilation system. The emissions from the welding operations are also considered negligible. Consequently, there is no monitoring program required for non-radiological emissions at the NSS-D.

Stormwater management at industrial facilities is regulated by the Ministry of Environment, Conservation and Parks (MECP) under the *Environmental Protection Act* and the *Ontario Water Resources Act*. DNGS stormwater works are approved under the site Environmental Compliance Approval (ECA) No. 4810-A78QUZ for industrial sewage works. The stormwater works are designed, approved, and maintained per the ECA process to ensure stormwater is properly managed to prevent erosion, flooding and degradation of receiving water bodies. The NSS-D employs stormwater management ponds for the treatment of stormwater.

Environmental Risk Assessment

Environmental Risk Assessments (ERAs) are prepared for the Darlington Nuclear site in accordance with the requirements of CSA N288.6-12, *Environmental Risk Assessment at Class I Nuclear Facilities and Uranium Mines and Mills*. The ERA characterizes the baseline environment and assesses the human health and ecological risks from operations of the facilities located on the Darlington Nuclear site, including the NSS-D. ERAs are to be completed at a minimum of once every five years.

The ERA has the specific objectives:

- To evaluate the risk to relevant human and ecological receptors resulting from exposure to contaminants of potential concern and stressors related to the Darlington Nuclear site and its activities; and
- To recommend potential further monitoring or assessment as needed based on the results of the ERA

Specific to the operations of the NSS-D, emissions from the facility are accounted for in the overall emissions reported for the site and the environmental measurements.

The most recent ERA, completed in 2020, focused on monitoring activities that occurred on the DN site during the 2016 to 2019 period that encompass normal operations at Darlington Nuclear site during the operations and refurbishment phases of the facility. It was concluded that the Darlington Nuclear Site (including the NSS-D) is operating in accordance with its approved limits and measure are taken to ensure regulatory compliance is maintained. No follow-up monitoring was identified for the NSS-D operations.

Prior to the 2020 ERA, the ERA completed in 2016, focused on activities that occurred during the 2011-2015 period that encompassed normal operations at Darlington Nuclear site and preparation for refurbishment phases of the facility. It was concluded overall, the Darlington Nuclear site (including the NSS-D) is operating in a manner that is protective of human and ecological receptors residing in the surrounding area. No follow-up monitoring was identified for the NSS-D operations.

2.9.4 Future Plans and Improvements

The ISO 14001 standard embodies the expectation of continual improvement of the EMS and, as a consequence, environmental performance. To this end, reviews of environmental performance and re-evaluation of objectives and achievement plans in key areas which may impact on the environment are performed regularly.

OPG will continue to implement best practices at the NSS-D, which have been aimed at reducing the environmental and radiological risk associated with the handling, processing, and/or storage of used fuel. This is done by the continuation of following procedures and protocols, training and by following safe operating practices. NSS-D will continue to be included in the DNGS Biodiversity initiatives, which are continuously developing.

Consistent with OPG fleet plans and as part of continuous improvement, the NSS-D will be transitioning to the following CSA Standard:

- By December 31, 2022, the DNGS site (including the NSS-D) will be compliant with the requirements of CSA Standard N288.7, *Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills*.

2.10 EMERGENCY MANAGEMENT AND FIRE PROTECTION

HIGHLIGHTS

- During the current licensing period, fire drills were performed in accordance with the CSA N393 and National Fire Code of Canada, findings from drills have been satisfactory.
- Since 2013, OPG has issued its NWMD Fire Impairment Manual, which describes how OPG manages impairments for NWMD facilities, including NSS-D.
- During the current licensing period, OPG has issued its NWMD Combustible Material Safety Instruction, to ensure that all transient combustible materials are minimized.
- New structures will comply with CSA N393-13, NBCC (2015), NFCC (2015).

OPG has implemented and maintains an emergency preparedness program for emergencies and for non-routine conditions. Furthermore, OPG has implemented and maintains a fire protection program. The key documents are listed in the table below.

Doc #	Title
N-PROG-RA-0001	Consolidated Nuclear Emergency Plan
N-STD-RA-0036	Radioactive Materials Transportation Emergency Response Plan
N-PROG-RA-0012	Fire Protection

2.10.1 Emergency Management Program

2.10.1.1 Program and Objectives

The purpose of the Consolidated Nuclear Emergency Plan is to define the key program elements, objectives, and roles and responsibilities to ensure OPG can effectively respond to nuclear emergencies, with the overall goal to protect the public, employees, and the environment.

The key program elements are:

- Basis for Emergency Planning
- Concept of Operations
- Emergency Response Organization structure
- Facilities
- Equipment
- Mutual Aid and Community Agreements
- Program Administration, Assessment and Maintenance

The Consolidated Nuclear Emergency Plan documents the emergency response capabilities to a nuclear emergency at OPG's nuclear stations. The plan deals with nuclear emergency situations that have the potential to endanger the safety of the public, on-site staff, or the environment.

Although potential event scenarios at NSS-D would not result in a radiological danger to the public, and therefore would not require protective actions as defined in the Provincial Nuclear Emergency Response Plan, there may still be potential radiological danger to on-site staff or the environment. As a result, the procedures implemented under the Consolidated Nuclear Emergency Plan would be utilized to support a NSS-D event, if it resulted in a station emergency being declared or if support from the Emergency Response Organization was required.

NSS-D on-site staff participate in recurring site wide emergency drills that involve assembly and accounting, and site evacuation of non-essential staff.

2.10.1.2 Current Operations and Results

NSS-D Emergency Response

The OPG DNGS Emergency Response Team will support Clarington Emergency and Fire Services as the first responders to events at the NSS-D. The Emergency Response Team and Clarington Emergency and Fire Service will establish a unified incident command.

Hazardous Material Spill Drills

Hazardous Material spill drills are conducted annually at the Darlington site that include consideration for NSS-D. Upon completion of each drill, a report is issued which captures lessons learned, corrective actions and valuable operating experience.

2.10.1.3 Future Plans and Improvements

Remote / Online Drills and Exercises

As an excellence initiative in 2021, OPG has maintained in-person drills and exercise program using innovative remote evaluation initiatives, at a time when many in industry have moved to a tabletop drill structure because of COVID-19. This has allowed OPG to demonstrate that the Darlington Site Management Centre remains fully able to respond to any events requiring the support of the augmented Emergency Response Organization, including those at the NSS-D, if required. This response capability is additionally supported through the development of a new dashboard tool, to more effectively monitor the qualification status of the entire nuclear Emergency Response Organization.

2.10.2 Fire Protection Program

2.10.2.1 Program and Objectives

The purpose of the Fire Protection Program is to define the key program elements, objectives, and roles and responsibilities, with the overall goal to minimize the risks and consequences of fire to OPG Nuclear facilities.

The key program elements for NSS-D are:

- Fire Safety Plan
- Inspections, Testing, Maintenance
- Analysis, Assessments, Reviews, Audits
- Drills

2.10.2.2 Current Operations and Results

Governance

The NSS facility specific Fire Protection Program has been incorporated into the OPG Nuclear corporate Fire Protection Program to ensure a consistent approach to fire protection across all the nuclear sites and facilities. NSS fire protection procedures and other elements derive their authority from the OPG Nuclear Fire Protection Program. A comprehensive program ensures adequate fire protection by minimizing both the probability of occurrence and the consequences of fire at the facilities.

Fire Safety Plan

The NSS-D Fire Safety Plan provides direction with respect to fire prevention, fire protection, emergency procedures, training and drills. The Fire Safety Plan is reviewed and revised accordingly on an annual basis to ensure it reflects current field conditions and practices. The Fire Safety Plan at NSS-D meets the requirements of the National Research Council of Canada (NRC) National Fire Code of Canada (NFCC).

Fire Drills

During the current licensing period, fire drills were performed in accordance with the CSA N393-13 and NRC NFCC (2010). Findings from drills have been satisfactory with no major findings. Minor procedure improvements have been recommended and are currently being implemented as appropriate.

Inspection, Testing, Maintenance

During the current licensing period, in accordance with the NSS-D operating licence, the inspection, testing and maintenance of the fire detection and suppression system was performed at the required frequency, as stipulated in the NRC NFCC (2010). The inspection and testing were performed by OPG and reviewed by a third party. During the current licensing period, independent third-party reviews were completed tri-annually, to confirm the NSS-D fire system has been operated, inspected, tested, and maintained in accordance with the NRC NFCC (2010) and the standards listed therein.

The independent third-party reports received indicate that NSS-D is in general compliance with the CSA N393-13, and NFCC (2010) requirements. Corrective actions resulting from these reviews have been completed; examples included creating preventive maintenance identifications to:

- Perform the annual inspection of 10% of fire barriers.
- Ensure hose valves on Class II standpipe systems are tested every three years.

- Perform annual test for self-contained emergency lighting recharging capability.

Analysis, Assessments, Reviews, Audits

Since the completion of the NSS-D implementation plan for meeting the requirements of CSA N393, to maintain compliance with CSA N393, the following required third-party reviews, analysis and audits have been completed within the intervals stipulated in CSA N393:

- Code Compliance Review
- Fire Response Needs Analysis
- Fire Protection Program Audit
- Annual Facility Condition Inspection
- Fire Hazard Assessment

The results of the compliance reviews have been submitted to the CNSC as required by the NSS-D operating licence and CSA N393-13.

Fire Protection Response

A Memorandum of Understanding between the Municipal of Clarington and OPG applies to the provision of fire protection services, including coordinated emergency response. In the event of an on-site incident, City of Clarington's Emergency and Fire Services will be called for assistance.

The initial response for extinguishing fires in the NSS-D rests with the Clarington Emergency and Fire Services, with support from the DNGS Emergency Response Team. Clarington Emergency and Fire Services has annual familiarization tours with NSS-D.

NWMD Fire Impairment Manual

During the current NSS-D licensing period, OPG has issued its NWMD Fire Impairment Manual, which describes how OPG manages impairments for OPG's NWMD facilities, including NSS-D. This manual provides resource information to guide trained staff who are directly involved with planned and unplanned impairment to the fire protection system in evaluating, establishing, planning, controlling and executing outages on fire systems. The manual also provides detailed compensatory measure information for impaired fire protection systems.

NWMD Combustible Material Safety Instruction

OPG has issued its NWMD Combustible Material Safety Instruction to ensure that all transient combustible materials are minimized, properly assessed, analyzed, and authorized before being placed in the waste management facilities, including NSS-D. Combustible materials, combustible equipment, and ignition sources, other than that forming part of the approved facilities design that is located outside of designed storage areas, shall be eliminated. When elimination is not practical, combustibles shall be minimized, controlled, analyzed, and located in accordance with this instruction.

Engineering Change Control

All new structures and existing design modifications are reviewed for fire protection impact through the Engineering Change Control process.

2.10.2.3 Future Plans and Improvements

Governance

Fire Protection governance will be frequently reviewed to maintain the alignment of NSS, including NSS-D, with OPG Nuclear.

Current / Existing Structures

Fire Protection - Detection System:

- Continue to perform inspections, testing, and maintenance of the fire detection system and supervised circuits as per the current preventive maintenance schedule. This includes replacement of fire system batteries after 3 years of service.
- Retrofit or replace current NSS-D system with a modern equivalent following obsolescence. Based on obsolescence, perform second replacement after 20 years of service with modern equivalent, which will allow reliable service until the end of facility operation.

Fire Protection - Suppression System:

- NSS-D will continue to perform inspection, testing, and maintenance as required by the applicable codes and standards.
- The current plan is to replace defective or deficient components, as required per regular maintenance.
- Major replacement of fire pump diesel engine will be done after 20 years of service and continue to be replaced every 20 years to ensure reliability.
- Replace system piping at 30-year intervals, the scope of which will be aligned with system condition.

Compliance

OPG is currently compliant with CSA N393-13, NCR NBCC (2010), NFCC (2010) and will be in compliant with NFCC (2015 at NSS-D by December 1, 2022.

When the NSS-D licensed area is expanded, as proposed for UFDSS #3 and #4, the new structures within that area will comply with CSA N393-13, NBCC (2015), NFCC (2015), and applicable fire Codes & Standards.

Fire Protection of New Structures

When the design of the new structures is initiated by the design engineering team, the fire protection impact evaluation form will be prepared. This form will be sent to the fire protection team to perform a review and provide comments.

As required, fire protection will also provide support to the design engineering team, by providing interpretation of code and standard requirements, as well as reviewing the project Fire Hazard Assessment, Code Compliance Review and Third Party Review reports.

2.11 WASTE MANAGEMENT

HIGHLIGHTS

- During this licence period, there were no reportable events at NSS-D under the Waste Management SCA. This SCA has been performed well and without error.
- LLW produced as a result of NSS-D operations will remain minimal during the next licensing period.

The NSS-D Waste Management Program is aligned with and based on OPG Nuclear's environmental management program. The Nuclear Waste Management Facilities work in collaboration with the OPG nuclear generating stations in order to implement strategies for waste minimization and waste management.

The NSS-D Decommissioning Program provides the requirements and processes required to safely and cost effectively decommission OPG owned nuclear facilities and provides assurance that decommissioning work will be performed in accordance with regulatory requirements.

OPG has implemented and maintains a waste management program and a decommissioning program. The key documents are listed in the table below.

Doc #	Title
W-PROG-WM-0001	Nuclear Waste Management
W-PROG-WM-0003	Decommissioning Program
N-PROG-RA-0013	Radiation Protection
OPG-STD-0156	Management of Waste and Other Environmentally Regulated Materials
N-PROC-RA-0017	Segregation and Handling of Radioactive Waste
00044-PLAN-00960-00001	Preliminary Decommissioning Plan - Darlington Waste Management Facility

2.11.1 Nuclear Waste Management Program

2.11.1.1 Program and Objectives

The purpose of the Nuclear Waste Management Program is to define the key program elements, objectives, and roles and responsibilities, with the overall goal to ensure safe and responsible management of radioactive waste.

The program objectives are to ensure activities are carried out in a safe and effective manner by qualified personnel.

Activities at NSS-D are performed in accordance with the same processes as other OPG nuclear facilities. However, there are also additional NSS-D specific procedural documents, to address the unique aspects associated with nuclear waste operations. Some examples of procedural documents specific for NSS-D are the work management and emergency response procedures. The Nuclear Waste Management

Program identifies the specific procedural documents, together with any necessary exceptions to the generally applicable NMS procedures. Most of the specific procedural requirements apply to the handling of waste at the NSS-D, such as the handling and storage of the used fuel DSCs and RWC/DSOs.

As with all other programs that make up the OPG NMS, implementation of the Nuclear Waste Management Program for NSS-D is assessed on an on-going basis.

2.11.1.2 Current Operations and Results

Employees at the NSS-D use waste management procedures to ensure that waste generated at the facility is separated properly. Waste receptacles are located throughout the NSS-D for likely clean and active waste. Minimal radioactive waste is generated from activities conducted at the NSS-D. Low-Level Waste generated by NSS-D is typically restricted to floor sweepings that have a potential to contain contamination from preparing and welding DSCs. Annual volumes amount to less than one drum and is sent to DNGS for segregation as necessary and eventual transportation to the NSS - Western. NSS-D does not generate intermediate or high level waste.

NSS-D is currently compliant with the requirements of CSA N292.0-19, *General Principles for the Management of Radioactive Waste and Irradiated Fuel*, as required in the current LCH.

2.11.1.3 Future Plans and Improvements

The volume of Low-Level radioactive Waste (LLW) produced at NSS-D will remain minimal during the next licensing period with an expected slight variation proportional to the number of DSCs processed.

A gap analysis and implementation plan for the implementation of REGDOC-2.11.1, *Waste Management, Volume 1: Management of Radioactive Waste* at the Waste Management Facilities, including NSS-D, will be submitted to the CNSC by April 15, 2022.

2.11.2 Decommissioning Program

2.11.2.1 Program and Objectives

The purpose of the Decommissioning Program is to define the key program elements, objectives, and roles and responsibilities; with the overall goal to ensure that, when retiring a licensed nuclear facility permanently from service and rendering it to a predetermined end-state condition, actions are taken in the interest of health, safety, environment, security, quality and economics.

The program objective is to describe the requirements and processes for decommissioning planning and conduct of decommissioning.

2.11.2.2 Current Operations and Results

Planning for the eventual decommissioning of the NSS-D is an ongoing process, taking place throughout each stage of the licensed facility lifecycle. A Preliminary Decommissioning Plan (PDP) is prepared in accordance with relevant codes and standards, per the licence and LCH. The PDP is updated and submitted as part of the financial guarantee submission every five years or when required by the Commission.

OPG's strategy for decommissioning its nuclear waste facilities, including NSS-D, is to dismantle the facilities once all the waste is removed and the facility is no longer required. Since all the wastes will be removed from the facility prior to decommissioning, little residual radioactivity is expected to be present at NSS-D and as such, there will be no radiation hazard driver for deferment of decommissioning. In some cases, however, decommissioning activities may be deferred to align with other decommissioning related activities on site.

Under the NWMO Adaptive Phased Management program, established by the federal government, the long-term facility for used fuel is expected to be in service no earlier than 2043, at which time used fuel will start to be transferred from the interim storage location at NSS-D to the Adaptive Phased Management facility.

The NSS-D PDP describes the activities that will be required to decommission and restore the site for other OPG uses. It demonstrates that decommissioning is feasible with existing technologies, and it provides a basis for estimating the cost of decommissioning. The PDP includes schedules and cost estimates based on the assumptions that form the basis for the plan. OPG will update this plan as required to incorporate lessons learned, updates to regulatory requirements, and industry best practices.

2.11.2.3 Future Plans and Improvements

OPG is planning to update the NSS-D PDP in support of the 2023 to 2027 financial guarantee submission. This revision of the PDP will include the expansion of NSS-D Used Fuel Dry Storage Structure #3. The requirements of CSA N294-19 as well as any relevant domestic and international experience obtained in the previous five years will be incorporated into this revision.

CSA N294-19, *Decommissioning of Facilities Containing Nuclear Substances* will be implemented by December 31, 2021, and included into the next NSS-D Financial Guarantee submission, as per the current Licence Conditions Handbook.

A gap analysis and implementation plan for the implementation of REGDOC-2.11.2, *Decommissioning at the Waste Management Facilities*, including NSS-D, will be submitted to the CNSC by March 17, 2023.

OPG continuously monitors and incorporates best practices from the industry and has a high degree of confidence that the current plans are appropriate and sufficient.

2.12 SECURITY

HIGHLIGHTS

- During the current licencing period, all inspections have been Satisfactory / Fully Satisfactory.
- Interface meetings between NSS-D Facility Management, Security Management, and other key staff are held on a quarterly basis.
- Currently executing a project to modernize the existing security systems at NSS-D.

OPG has implemented and maintains a security program and cyber-security program. The key documents are listed in the table below.

Doc #	Title
N-PROG-RA-0011	Nuclear Security
N-PROC-RA-0135	Cyber Security
W-LIST-08161-00001	Nuclear Waste Management Cyber Essential Assets

2.12.1 Programs and Objectives

2.12.1.1 Nuclear Security Program

The purpose of the Nuclear Security Program is to define the key program elements, objectives, and roles and responsibilities; supporting OPG's need to manage residual risk to the public created by the operation of its facilities, protect assets, and respond to security events that impact operations and the public. Key elements of this program include response to threats and maintaining compliance with legislative requirements, while minimizing the adverse impact on legitimate staff and plant operations.

The overall goal of the program is to establish a state of security readiness to ensure safe and secure operation of OPG stations and facilities. OPG's security program includes measures to protect against unauthorized disclosure of prescribed information.

2.12.1.2 Cyber Security Program

The purpose of the Cyber Security Program is to define the key program elements, objectives, and roles and responsibilities, with the overall goal to protect the cyber-critical assets for nuclear safety, safeguards, physical protection, and emergency preparedness functions from cyber-attacks.

The program objectives are to establish and maintain processes, procedures, and controls to ensure OPG meets or exceeds legal and regulatory requirements for Cyber Security, ensuring effective implementation of a cyber security management system for information technology and industrial control systems across OPG's operating units

2.12.2 Current Operations and Results

The DSC Processing Building, UFDSB #1 and UFDSB #2 of NSS-D are contained within a separate protected area located on the DNGS controlled area site.

OPG's security program ensures the security of the NSS-D's assets through physical and administrative security measures utilizing equipment, personnel, and procedures. The security program at the sites has continued to evolve to meet industry best practices and all regulatory requirements. The OPG security program includes the following:

- Security measures for NSS-D are evaluated against annual OPG threat and risk assessments to ensure credible threats are mitigated.
- Training programs are in place to enhance and sustain improved performance of OPG's Security Divisions.
- A comprehensive drill program is in place as a means of validating security practices, ensuring regulatory compliance, and identifying areas for improvement in security operations. CNSC evaluated force on force exercises, conducted at the nuclear generation sites, which provide performance testing of the nuclear security program. Lessons learned through OPG security drills and exercises are applied to enhance the program at NSS-D.
- OPG continues to participate in an Inter-Utility Security Working Group, which includes representation from all nuclear power operators in Canada. This group provides benchmarking opportunities to ensure that the program meets industry standards.
- OPG conducts regular meetings with CNSC staff to ensure open communication and that evolving security requirements are understood, and
- Security requirements in accordance with the Nuclear Security Regulations are in effect at OPG's High Security Sites, including NSS-D.

Security and Facility Interface

Interface meetings between Facility and Security Management and key staff are held on a quarterly basis.

CNSC Type II Security Compliance Inspections

CNSC regularly conducts Type II security compliance inspections at NSS-D. Since 2013, all Inspections have had either satisfactory or fully satisfactory outcomes. The last inspection was conducted in October of 2020.

2.12.3 Future Plans and Improvements

Security Report

Prior to construction, OPG will submit the proposed security arrangements and measures for UFDSS #3 and UFDSS #4 and obtain acceptance from the CNSC.

Current NSS-D Structures

OPG is currently executing a project to modernize the existing security systems at UFDSB #1 and UFDSB #2 protected area.

Security at Future NSS-D Structures

UFDSS #3 is currently in design, with an anticipated in-service date of 2025. It will be located on the Darlington Site and is planned to be in an additional separate protected area south of the existing facility. Construction plans include consideration for:

- Construction of a new protected area boundary, including vehicle portal and security kiosk.
- Using leading technology for perimeter intrusion detection and assessment.
- Utilizing leading technology for weapons detection and explosive detection used for search of persons, vehicles and packages entering UFDSS #3.
- The protected area barrier and associated systems and devices for UFDSS #3 will be constructed to meet the requirements of the CNSC *Nuclear Security Regulations* and other CNSC requirements per the licence and LCH.
- Further expansion of the protected area boundary, to enclose the footprint of UFDSS #4, at a later date. The anticipated in-service date for UFDSS #4 is 2031.

Existing NSS-D Security Systems

Planned upgrades include:

- NSS-D integration into a Darlington site entry control system upgrade.
- Updates to the Darlington site security monitoring room infrastructure.
- Replacing existing intrusion detection and assessment systems with devices utilizing leading technology; and
- Upgrades to facility lighting.

2.13 SAFEGUARDS AND NON-PROLIFERATION

HIGHLIGHTS

- During the current licencing period, all Integrated Safeguards Protocol commitments were met at the NSS-D.
- Completed full DSC inventory scanning at NSS-D with IAEA (October 2020).
- All safeguard conditions and terms of agreement between Canada and IAEA, pursuant to the Treaty on Non-Proliferation of Nuclear Weapons, have been met.
- Trilateral Working Group meetings between the IAEA, CNSC, and industry have been initiated and continue to be held to discuss improvements and issues.

OPG has implemented and maintains a safeguards program. They key documents are listed in the table below.

Doc #	Title
N-PROG-RA-0015	Nuclear Safeguards
N-STD-RA-0024	Nuclear Safeguards Implementation
N-PROC-RA-0136	OPG Safeguards and Nuclear Material Accountancy Requirements

2.13.1 Nuclear Safeguards Program

The purpose of the Nuclear Safeguards Program is to define the key program elements, objectives, roles and responsibilities, with the overall goal to ensure OPG's compliance with the governing agreement made between the Government of Canada and the International Atomic Energy Agency (IAEA).

The program objectives are to meet the compliance requirements for the:

- *Treaty on the Non-Proliferation of Nuclear Weapons*
- Arrangement between Government of Canada and the IAEA for the application of safeguards, in connection with the treaty.
- Additional protocol to the agreement between Government of Canada and IAEA for the application of safeguards, in connection with the treaty.

OPG nuclear safeguards program includes the following elements:

- A communication protocol between the IAEA, CNSC and OPG.
- Obligations to meet applicable regulatory requirements and the requirements of safeguards agreements.
- Reporting to meet applicable regulatory requirements and the requirements of safeguards agreements.

2.13.2 Current Operations and Results

OPG Nuclear management stays current with the IAEA's safeguards requirements and is committed to meeting OPG's safeguards obligations in an efficient and timely manner.

IAEA Integrated Safeguard Protocol

As of February 2007, in accordance with the IAEA requirements, OPG has adopted the integrated safeguards protocol. Under the integrated safeguards protocol, all safeguards' commitments were met at the NSS-D, for the current licensing period.

Self-Assessments

NSS-D also performs annual self-assessments to ensure adherence to the OPG Nuclear Safeguards program.

IAEA Fuel Verification Program

The IAEA Fuel Verification Program includes material accounting, the IAEA monthly remote monitoring report, and the use of surveillance equipment such as cameras, portable verification equipment, and containment equipment.

NSS-D's compliance with the Fuel Verification Program is met through the following ongoing activities:

- Complying with the Safeguards Agreement and the Additional Protocol.
- Providing services and assistance for IAEA staff tasks and equipment operation.
- Disclosing any records to the IAEA upon request.
- Not interfering in any way with Safeguards equipment, samples or seals
- Making no changes to operations, equipment or procedures that would affect Safeguards implementation without prior written CNSC approval.
- Preparing and submitting nuclear inventory reports per CNSC Regulatory Document REGDOC 2.13.1, *Safeguards and Nuclear Material Accountancy*.

Physical Inventory Taking

NSS-D staff completes an annual physical inventory taking as part of licence conditions pursuant to the implementation of safeguards by the IAEA. This is a snapshot of the fuel physical inventory at any given time.

Physical Inventory Verification

Canadian facilities are selected at random by the IAEA for a physical inventory verification that follows the physical inventory taking. If a facility is not chosen for a physical inventory verification, then CNSC safeguards staff may perform limited confirmation activities following the annual physical inventory taking process. The IAEA completed a physical inventory verification at NSS-D in October 2020.

These IAEA inspections are often attended by CNSC staff to review the facility's support for IAEA inspectors, including escorts and equipment; the provision of accountancy information and supporting documents; the facility compliance with safeguards licence conditions relevant to the inspection activity; and the IAEA's adherence to its rights and obligations relevant to the inspection. No significant compliance issues were identified.

Laser Mapping Container Verification System

In October of 2020, the NSS-D and IAEA completed full inventory scanning for DSCs in storage at the NSS-D. All new containers with full height welds will now only have the Cobra Seal (Figure 15) applied, and LMCV completed negating the requirement for the metallic seals. For containers that have the 5/8" weld, both Cobra and metallic seals will be applied until the LMCV tool can be modified by the IAEA to scan a 5/8" weld.

The LMCV system (Figure 16), designed by the IAEA, is a digital weld identification scanner created to verify and uniquely identify DSC in-situ, a powerful tool for acquiring and verifying the "weld fingerprint" of the DSC.

Figure 15: DSC in Storage showing IAEA Cobra Seals



Figure 16: LMCV System



NSS-D has met all safeguards conditions in its operating licence, and the terms of the agreement between Canada and the IAEA pursuant to the Treaty on Non-proliferation of Nuclear Weapons. The NSS-D staff have fully co-operated with the IAEA and facilitated achievement of IAEA safeguards goals. All reports and information necessary for safeguards implementation and compliance continue to be provided on a timely basis. No compliance issues have been identified by IAEA or CNSC staff.

Compliance

OPG has implemented the plan for tracking of non-fuel nuclear material and is fully compliant with CNSC REGDOC-2.13.1 (2018) “*Safeguards and Nuclear Material Accountancy*” by October 29, 2021, as required as per the current Licence Conditions Handbook.

2.13.3 Future Plans and Improvements

New Structures

The IAEA have been informed of NSS-D expansion plans for UFDSS #3 and #4 in the Additional Protocol annual report, which is electronically submitted to the CNSC and then forwarded to the IAEA. During the design phase of NSS-D expansion, OPG will request the IAEA to identify any measures required for the expansion. UFDSS #3 and #4 will be discussed in the Design Information Questionnaire for NSS-D, which will be submitted to the IAEA.

Training

Safeguards personnel will continue to be trained to OPG qualification requirements for safeguards. Safeguards governance will be updated, as required, to reflect any new regulatory standards or guides related to implementation of safeguards measures.

Self Assessments

OPG plans to continue to perform annual self-assessments at NSS-D to ensure adherence to the Safeguards program. Findings will be addressed in a timely manner.

CANDU Owners Group Nuclear Safeguards Task Team

OPG participates in CANDU Owners Group (COG) meetings to discuss and ensure a consistent Safeguards approach is applied at all CANDU plants in Canada.

Trilateral Working Group

Trilateral Working Group meetings between the IAEA, CNSC Safeguards Division, and Industry have been initiated and continue to be held to discuss improvements and to address stakeholder issues.

2.14 PACKAGING AND TRANSPORTATION

HIGHLIGHTS

- During this licence period, 512 DSCs and 96 RWC/DSO were transferred from the DNGS to NSS-D for processing and storage, without any incidents.
- During this licence period, there were no reportable events at NSS-D under Packaging and Transportation; this SCA has been performed well and without error.

OPG has implemented and maintains two programs, which cover this Packaging and Transportation SCA. Transportation using public roads is covered under the Radioactive Material Transportation Program, and transportation within the Darlington Nuclear Site is covered under the Radiation Protection Program. The key documents are listed in the table below. NSS-D is only affected by the Radiation Protection Program, since transportation of used fuel from DNGS and ILW from the Darlington Refurbishment Project to NSS-D occurs on Darlington Nuclear Site, without use of public roads.

Doc #	Title
W-PROG-WM-0002	Radioactive Material Transportation Program
N-PROG-RA-0013	Radiation Protection Program
N-STD-RA-0036	Radioactive Materials Transportation Emergency Response Plan

2.14.1 Radioactive Material Transportation Program

The objective of this program is to ensure safe, compliant, and efficient transportation of radioactive material. This program establishes the procedures for radioactive material shipments and the radioactive material transportation records. However, this program does not apply to the on-site transfers of radioactive material, which is the case for NSS-D, which are controlled through the Radiation Protection Program.

2.14.2 Radiation Protection Program

The CNSC *Packaging and Transport of Nuclear Substances Regulations* applies to off-site transfers using public roads and does not apply to the on-site transfer of used fuel in DSCs and refurbishment waste in RWC/DSOs between DNGS and NSS-D. Nonetheless, in the absence of any specific regulations for on-site packaging and transport, OPG provides an equivalent degree of safety to workers, the general public and the environment as would have been achieved for off-site transportation.

2.14.2.1 Current Operations and Results

The on-site transfer of used fuel in DSCs and refurbishment waste in RWC/DSOs, from the DNGS to the NSS-D, is conducted on designated transfer routes, in accordance with OPG's procedures. As of June 30, 2021, OPG has safely transferred 765 loaded DSCs and 96 RWC/DSOs from the DNGS to the NSS-D for processing and safe storage, without any events or incidents.

2.14.2.2 Future Plans and Improvements

The procurement of two new DSC transporters has been initiated, which will ensure continued reliability for transportation of DSCs between DNGS and NSS-D.

3.0 ENVIRONMENTAL ASSESSMENTS

3.1 Previous Environmental Assessment Study Report

In 2003, OPG completed and submitted to the CNSC an Environmental Assessment (EA) Study Report for the then proposed Darlington Used Fuel Dry Storage Facility, which was renamed the Darlington Waste Management Facility (NSS-D) when it was built. This EA Study Report met the CNSC *EA Guidelines for Construction and Operation of the Darlington Used Fuel Dry Storage Facility* (the “EA Guidelines”) issued in 2002.

The EA examined site preparation, construction and operation activities for storage buildings and a processing building. The results of the assessment identified no significant residual adverse environmental effects of the Used Fuel Dry Storage Facility project with the proposed mitigation measures in place. In 2013, the Commission concluded that the project, taking into account the appropriate mitigation measures identified in the Screening Report, was not likely to cause significant adverse environmental effects, and approved the Environmental Assessment. The Follow-Up Monitoring Program for the EA included four recommendations, which are summarized with the respective actions:

- (1) Mitigative actions, should active bird nests be identified during construction:
 - Breeding bird surveys were undertaken in 2004 and 2005.
 - As recommended by biologists, site clearing took place between August and March to minimize nest disturbances.
- (2) Soil sampling and analysis program, where potentially contaminated soils were disturbed / redistributed by construction:
 - Program was carried out in 2005; all results were less than the Ministry of Environment Conservation and Parks (MECP) - Site Condition Standards for non-potable groundwater conditions.
- (3) Public attitude research survey, to monitor public attitudes and effectiveness of mitigation:
 - Completed in 2009 and compared to the 2002 survey, OPG and CNSC agreed no further survey work was needed.
- (4) Indigenous Interests:
 - Inclusion of First Nation communities and Métis Nation of Ontario on the Darlington Nuclear Community Stakeholder list (Mississaugas of Scugog Island First Nation, Ojibways of Hiawatha First Nation, Alderville First Nation, Curve Lake First Nation, Chippewas of Georgina Island First Nation, Mississaugas of the New Credit First Nation, and the Métis of Ontario)

The NSS-DEA follow-up monitoring was considered complete by the CNSC in 2012 after submission and acceptance of the *Closure of Environmental Assessment Follow-Up and Monitoring Program for the NSS-D* report.

3.2 **DNGS Refurbishment and Continued Operation Project**

In 2011, an EA was conducted for the Darlington Nuclear Generating Station (DNGS) Refurbishment and Continued Operation project. The NSS-D was considered a key support facility within the Darlington Nuclear site. The following activities applicable to the NSS-D were assessed:

- Construction of the Retube Waste Storage Building(s) (RWSB) at the NSS-D, in support of refurbishment activities.
- Management of nuclear and non-nuclear waste (including storage of retube waste at the NSS-D and transportation of miscellaneous refurbishment Low and Intermediate-Level radioactive Waste (L&ILW)), in support of refurbishment activities.
- Management of routine operational radioactive wastes (including construction and operation of additional facilities at the NSS-D for interim storage of used fuel and any Steam Generators that may have to be replaced as part of normal maintenance) and non-radioactive wastes, in support of continued operation activities.

The DNGS Refurbishment and Continued Operation Project EA documents were prepared in compliance with the requirements of the *EA Scoping Information Document*, as issued by the CNSC. In December 2011, the *DNGS Refurbishment and Continued Operation Environmental Impact Statement* and fifteen technical support documents (considered the definitive Environmental Assessment document) were submitted to the CNSC.

In 2013, the EA was approved and the Record of Proceedings and Decision concluded that the proposed project was not likely to cause significant adverse effects. No specific follow-up activities related to the construction and operation of additional storage building(s) or management of wastes, pertinent to the NSS-D, were identified.

4.0 INDIGENOUS COMMUNITY ENGAGEMENT

4.1 Indigenous Relations Policy

OPG is committed to engaging with Indigenous communities about its nuclear operations, projects and initiatives, including waste operations. OPG is directed by a corporate-wide Indigenous Relations Policy that provides a framework for meaningful engagement with Indigenous communities and for the support of community programs and initiatives through its Corporate Citizenship Program.

The Indigenous Relations Policy describes OPG's commitment to work with Indigenous communities and peoples proximate to OPG's present and future operations, and to develop positive and mutually beneficial relationships that will create social and economic benefits through partnership and collaboration. This policy governs OPG's engagement with Indigenous peoples with respect to the re-licensing of the NSS-D.

Indigenous Relations Work Plan

An Indigenous relations work plan is developed and executed on a yearly basis between OPG's Indigenous Relations Division and OPG Corporate Relations due to the shared touch points these functions have with Indigenous communities.

Licence Renewal and the Duty to Consult

The re-licensing of the Darlington Waste Management Facility does not create any new adverse impacts on Aboriginal and/or treaty rights held by local Indigenous communities. However, while the duty to consult is not triggered by this activity, OPG will engage local Indigenous communities regardless as part of its preferred practice and in light of their interest in OPG nuclear operations.

Engagement on NSS-D relicensing will be focused on the Williams Treaties First Nations (WTFN) in whose treaty and traditional territory Darlington station is located; the Mohawks of the Bay of Quite (MBQ); and Métis Nation of Ontario Region 8. OPG engages with these Indigenous communities on a regular basis in order to raise awareness about nuclear subjects and will table NSS-D relicensing. Meetings are held at least quarterly, and in the case of WTFN, they are held monthly.

Engagement with the identified Indigenous communities during the re-licensing process will include timely communication by e-mail, phone, meetings (virtual and/or in-person), community information sessions and presentations. Site tours to the NSS-D will be offered as is practicable given OPG's Covid-19 protocols and those of the Indigenous communities named above.

Outreach Activities for Licence Renewal

OPG is committed to engaging with Indigenous communities about its nuclear operations, environmental reporting, projects and initiatives, including waste operations. OPG is directed by a corporate-wide Indigenous Relations policy that provides a framework for meaningful engagement with Indigenous communities.

Engagement for activities concerns Pickering and Darlington nuclear generating stations are focused on the Williams Treaties First Nations (WTFN) in whose treaty and traditional territory Darlington station is located; the Mohawks of the Bay of Quinte (MBQ); and Métis Nation of Ontario Region 8. OPG engages with these Indigenous communities on a regular basis in order to raise awareness about nuclear subjects. Meetings are held at least quarterly, and in the case of WTFN, they are held monthly.

Outreach activities include nuclear waste management, the Canadian Centre for Nuclear Sustainability, Pickering decommissioning, fish impingement and entrainment, project updates (Darlington New Nuclear Project, medical isotopes), site tours (pre-Covid) as well as procurement and employment opportunities, e.g., Indigenous Opportunities Network regarding building trades and other jobs in the energy sector.

Indigenous Community Meetings

OPG holds regular meetings regarding OPG's nuclear operations, including waste operations and the transportation of low to intermediate waste to the Western Waste Management Facility with the identified Indigenous communities below. The purpose of these meetings is to share information, to identify issues and concerns for resolution, and work collaboratively on areas of common interest.

OPG meets with the identified Indigenous communities who have an interest in OPG's nuclear operations, including the current NSS-D operations, to ensure that they are informed in a timely manner. The meetings also cover subjects such as current and future facility operations and the Darlington New Nuclear Project. As well, areas of interest such as opportunities for procurement from Indigenous suppliers, skills training and employment via the Indigenous Opportunities Network are included.

Based on work undertaken through Indigenous engagement, OPG believes the following specific Indigenous communities continue to have a primary Aboriginal and/or treaty rights and interests with respect to OPG's waste operations at the NSS-D:

- Williams Treaties First Nations
- Mohawks of the Bay of Quinte
- Métis Nation of Ontario Region 8

Further information on current operations, events of significance and the NSS-D operating licensing process will continue to be shared with the above communities and any others that identify an interest.

OPG has continued its engagement with Indigenous communities to raise awareness about its nuclear operations, environmental reporting and projects and their nature and scope. Discussion of potential timing of the NSS-D operating licence renewal process, how to access the Participant Funding Program from the CNSC, and determination of a community's level of desired engagement will also be included.

Engagement with the identified Indigenous communities during the re-licensing process will include timely communication by e-mail, phone, meetings (virtual and/or

in-person), community information sessions as requested and presentations. Site tours to the NSS-D will be offered as is practicable given Covid-19 Protocols.

Meetings with CNSC

OPG also meets on a monthly basis with CNSC to discuss the status of Indigenous engagement across all of its nuclear operations.

4.2 Program and Objectives

OPG has operated the Indigenous Opportunities Network program since 2018. This program promotes Indigenous employment within the nuclear industry with the Darlington Refurbishment project as the original catalyst. Since the program's start, over fifty (50) Indigenous candidates have been placed in various roles with OPG, vendors and unions. Most of these roles have been in the building trades, e.g., millwrights, electricians, boiler-makers, though placement have also been made in other roles such as civil maintainers, radiation technicians, engineers and project management staff. ION will continue to serve OPG's various, ongoing nuclear projects and initiatives.

4.2.1 Current Operations and Results

OPG maintains a Public Information and Disclosure program to comply with the *Nuclear Safety and Control Act* and associated Regulations. This program is in accordance with the NSS-D Licence and Licence Conditions Handbook.

Engagement has been focused on the Williams Treaties First Nations (WTFN) in whose treaty and traditional territory Darlington station is located and who collectively hold Aboriginal title, the Mohawks of the Bay of Quinte (MBQ) and the Métis Nation of Ontario Region 8, who have interests.

OPG engages with these identified Indigenous communities on a regular basis and topics covered have included nuclear waste management, the Canadian Centre for Nuclear Sustainability, Pickering decommissioning, fish impingement and entrainment, project updates (Darlington New Nuclear Project, medical isotopes), as well as procurement and employment opportunities.

Awards

OPG was awarded the Gold Designation through the Canadian Council for Aboriginal Business Progressive Aboriginal Relations program in August 2021. The program is a certification program that confirms corporate performance in Indigenous relations at the bronze, silver, or gold level. Progressive Aboriginal Relations gold companies demonstrate sustained leadership in Indigenous relations and commitment to working with Indigenous businesses and communities through innovative programs and engagement.

The designation is determined by a jury of Indigenous business people and supported by an independent and third party verification company that reports on measurable outcomes and initiatives in four key areas:

- Leadership actions
- Employment
- Business development, and
- Community relations

Collaboration internally and with communities is the keystone of OPG's Indigenous relations and has led to effective strategy development and mutually beneficial outcomes in the areas of employment, business development and community investment. Previously, OPG held the silver Progressive Aboriginal Relations designation.

4.2.2 Future Plans and Improvements

OPG continues to build upon its relationships with the identified Indigenous communities regarding its nuclear facilities, operations and projects, including NSS-D.

5.0 COMMUNITY RELATIONS & PUBLIC INFORMATION

OPG implements and maintains a public information and disclosure program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects of the licensed activity on the environment and the health and safety of persons. The primary goal of the public information and disclosure program, as it relates to the licensed activities, is to ensure that information related to the health, safety and security of persons and the environment, and other issues associated with the life cycle of nuclear facilities are effectively communicated to the public.

OPG's key document for Public Information and Disclosure is listed in the table presented below.

Doc #	Document Title
N-STD-AS-0013	Nuclear Public Information Disclosure

5.1 Community Consultation Program

OPG ensures timely, open, and transparent communication to maintain positive and supportive relationships and confidence of key stakeholders. OPG develops, maintains and implements an annual Public Information and Disclosure program.

Annual engagement activities are directed towards community stakeholders, including government, media, business leaders, educational institutions, interest groups, and community organizations. OPG ensures transparent disclosure of operations and potential impacts, both positive and negative that may occur.

5.1.1 Current Operations and Results

During the reporting period, OPG regularly and proactively provided information to the public on its facility activities. For operational status changes or unscheduled operations that may cause public concern or media interest, OPG follows the OPG Disclosure Protocol to notify key community stakeholders in a timely manner. OPG maintains a duty on-call position 24 hours a day, seven days a week, to manage this requirement.

Increased efforts over the past nine years have resulted in expanded outreach with key stakeholders, government officials and the broader public. This is in response to growing interest by the public and community in OPG's waste operations, and the future of Canada's long-term permanent and safe solutions for nuclear by-products.

On a quarterly basis, OPG publicly posts performance reports on nuclear waste operations at www.opg.com and shares this document electronically with key stakeholders. Additionally, starting in 2014 OPG developed and began issuing a quarterly Environment report in an easy to read and understandable format. Annually, OPG posts the Environmental Monitoring Program report on www.opg.com for both Pickering and Darlington sites, which includes NSS-D. In 2015, OPG initiated the quarterly posting of Waste Facilities Reportable Events, which aligns with OPG's nuclear station disclosure activities.

Disclosure Protocol

In 2013, OPG implemented a managed system to carry out the requirements of CNSC RD/GD-99.3 *Public Information and Disclosure* and transitioned to REGDOC-3.2.1 (2018) *Public Information and Disclosure* in 2020. This included the development and issuance of OPG's *Nuclear Public Information and Disclosure Standard* and the development and public posting of an *OPG Nuclear Information Disclosure and Transparency Protocol*. All OPG's nuclear waste operations at the NSS-D adhere to *OPG Nuclear Public Information and Disclosure Standard* and the *Nuclear Information Disclosure and Transparency Protocol*.

Community Outreach and Programming

Through community outreach, OPG has established strong working relations within the community. Regular briefings are provided to elected officials and council, key community organizations, interested groups and the public on waste operations and OPG's long-term permanent and safe solutions for nuclear by-products. OPG continues to respond to and supports requests for information or briefings.

Two-way dialogue with the public is facilitated through personal contact, community newsletters, speaking engagements, educational outreach, robust websites with email response options, and many other products and processes.

To increase the understanding of nuclear waste operations, tours are provided to key stakeholder groups, media and interested groups. At the NSS-D, sixty-one (61) tours were conducted from November 2012 to mid 2021.

OPG received, documented, and responded to concerns, complaints and inquiries raised by the public. A managed process is in place to track actions through to closure.

During the current licence period (November 2012 to July 2021), communications in support of waste operations generated the following:

- Eighteen (18) Darlington newsletters distributed to a combined audience of 250,000 households.
- Sixty-one (61) tours and presentations of the NSS-D to interested groups and stakeholders.
- Over 52,680 users visited OPG's waste and Deep Geologic Repository websites.
- From 2012, OPG attended twenty-four (24) Durham Nuclear Health Committee meetings and forty-seven (47) Community Advisory Council meetings to provide updates or to respond to questions about nuclear waste operations.
- 20 public open houses were held on the Darlington Refurbishment Project, which provided the community information, exhibits and an opportunity for the public to ask questions, obtain clarification, and identify or raise any concerns or issues they may have pertaining to current waste operations or the continued operations.

OPG relies heavily on websites to provide up-to-date information that is easily accessible by the public and offers opportunities for further contact. During this

licensing period, several newsletters, reports, media releases, updated stories and links to other agencies and regulatory proceedings were kept current on a number of nuclear-related websites.

Social media continues to increase in popularity and use. OPG actively monitors and responds to activity through Twitter, Facebook, and other social media platforms. OPG maintains a Twitter account with 17,267 followers and an Instagram account with 6,125 followers, on relevant nuclear activities and information.

During the licence renewal process, OPG will develop and undertake a public community engagement program. The program will:

- Communicate and inform the public of the future site operations and expansion to determine the level of interest and concern.
- Document findings and address concerns.
- Take appropriate steps for public engagement and consultation to help inform the public about the environmental review work, as part of OPG's licence submission.
- Address and manage concerns as appropriate.

5.1.2 Future Plans and Improvements

OPG plans to:

- Continue to develop and implement a yearly Public Information and Disclosure program.
- Continue to maintain strong community relationships.
- Continue with website improvements and migration of all relevant NSS-D information to OPG websites.
- Continue to expand public environmental reporting and engagement including environmental follow up processes.

6.0 FINANCIAL GUARANTEE

6.1 Cost Estimates

NSS-D is included in OPG's Consolidated Financial Guarantee for all of the costs of implementing proposed decommissioning plans for all its Class I licensed facilities.

Cost estimates are prepared based on the NSS-D Preliminary Decommissioning Plan to determine the liability to be incurred during decommissioning. In 2016, OPG completed a comprehensive review and update of the Ontario Nuclear Funds Agreement Reference Plan and associated lifecycle cost estimate for nuclear waste management, stations and waste facilities decommissioning as part of the five-year update cycle as required by *Ontario Nuclear Funds Agreement*. The updated Ontario Nuclear Funds Agreement Reference Plan was approved by Ontario Minister of Finance effective January 1, 2017. The updated and approved cost estimates formed the basis of OPG's proposed 2018-2022 CNSC Consolidated Financial Guarantee requirement submission.

OPG is currently working on an update to the Ontario Nuclear Funds Agreement Reference Plan, which is expected to be approved by the Ontario Minister of Finance effective January 1, 2022. The update to the NSS-D Preliminary Decommissioning Plan will be prepared in accordance with CSA N294-19. The updated and approved cost estimates based on the revised Preliminary Decommissioning Plan will form the basis of OPG's 2023-2027 CNSC Consolidated Financial Guarantee submission in 2022.

6.2 Financial Guarantee

In November 2017, CNSC accepted OPG's proposed 2018-2022 Consolidated Financial Guarantee. The sources to satisfy the Consolidated Financial Guarantee requirement are the *Ontario Nuclear Funds Agreement* segregated funds augmented by a Provincial Guarantee. CNSC's access to these funds is provided by the CNSC *Financial Security and Ontario Nuclear Funds Agreement Access Agreement* between the CNSC, OPG and the Province of Ontario, and the *Provincial Guarantee Agreement* between the CNSC and the Province of Ontario. The NSS-D is included within this Consolidated Financial Guarantee scope. The Consolidated Financial Guarantee is normally updated on a five-year cycle using the guidance set out in CNSC Regulatory Guidance documents. Specific to NSS-D, this requirement is embedded in the NSS-D operating licence requirement under Licence Condition G.3, which requires OPG to maintain a Financial Guarantee acceptable to the CNSC Commission and references the accepted documentation supporting the Financial Guarantee.

A gap analysis and implementation plan for the implementation of REGDOC-3.3.1, *Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities* at the Waste Management facilities, including NSS-D, will be submitted to the CNSC by March 17, 2023.

6.2.1 Financial Guarantee Reporting

In addition to the five-year update cycle, OPG provides an annual Financial Guarantee report to CNSC detailing the status of the guarantee including the amounts accumulated in segregated funds and the value of the Provincial Guarantee required. The report compares the amount of the liabilities and the financial resources available to discharge the obligations. The guarantee remains valid and in effect and is sufficient. The 2021 Annual Report for the 2018-2022 CNSC Financial Guarantee was submitted to the CNSC in February 2021.

6.2.2 Financial Guarantee Hearing

The next Financial Guarantee public hearing before the CNSC Commission is expected to occur towards the end of 2022 where OPG will request that the Commission accept a revision to OPG's Consolidated Financial Guarantee for the 2023-2027 review period.

7.0 NUCLEAR LIABILITY INSURANCE

OPG continues to maintain Nuclear Liability Insurance for NSS-D consistent with the requirements of the *Nuclear Liability and Compensation Act*. A copy of the most current certificate, provided in Attachment 7, confirms that the appropriate insurance is in place. Insurance inspections are conducted at NSS-D at the request of the nuclear property or conventional insurers.

8.0 COST RECOVERY

OPG has provided timely payments during the current licensing period to the CNSC on a quarterly basis upon receipt of invoices. OPG will continue to make timely payments as required. There is no special request or inquiry about cost recovery at this time.

9.0 LONG-TERM STORAGE OF USED FUEL AND ILW

OPG will continue to store used fuel and intermediate level waste at the NSS-D until a long-term storage facility becomes operational.

In November 2002, the Canadian Parliament passed the Nuclear Fuel Waste Act, which provides the legal framework for the Government of Canada to make a decision on the long-term management of Canada's used nuclear fuel. The Nuclear Fuel Waste Act required the majority owners of nuclear fuel waste to form a Nuclear Waste Management Organization (NWMO) to study approaches for managing Canada's used nuclear fuel. NWMO is responsible for the long-term management of Canada's used nuclear fuel waste that currently exists and that which will be produced in the future.

Under the NWMO Adaptive Phased Management program, established by the federal government, the long-term facility for used fuel is expected to be in service no earlier than 2043, at which time used fuel will start to be transferred from the interim storage location at NSS-D to the Adaptive Phased Management facility.

OPG had planned to dispose of L&ILW from the NSS-D in a Deep Geologic Repository, however, early in 2020, the L&ILW Deep Geological Repository project was cancelled. OPG is exploring options and remains committed to permanent and safe disposal of its operational waste as well as future decommissioning waste.

OPG is participating in the public review launched in November 2020 by Natural Resources Canada, with the goal of modernizing the federal policy framework for low- and intermediate-level radioactive waste, as well as developing an integrated waste strategy. Pending regulatory approval, any decommissioning L&ILW generated prior to the in-service dates of the disposal facilities is expected to be stored on an interim basis.

10.0 ACRONYMS

Table 7. List of Acronyms

Acronym	Description
ALARA	As Low As Reasonably Achievable
ASR	Accident Severity Rate
CNSC	Canadian Nuclear Safety Commission
DRL	Derived Release Limits
DSC	Dry Storage Container
DWMF	Darlington Waste Management Facility
DNGS	Darlington Nuclear Generating Station
DSO	Darlington Storage Overpack
EAL	Environmental Action Levels
ECA	Environmental Compliance Approval
EMS	Environmental Management System
ERA	Environmental Risk Assessment
HMRPHE	High Maximum Reasonable Potential for Harm Events
IFB	Irradiated Fuel Bay
L&ILW	Low and Intermediate Level Waste
LMCV	Laser Mapping Container Verification
MECP	Ministry of Environment, Conservation and Parks
NEW	Nuclear Energy Worker
NGS	Nuclear Generating Stations
NMS	Nuclear Management System
NWMD	Nuclear Waste Management Division
NSS	Nuclear Sustainability Services
NSS-D	Nuclear Sustainability Services - Darlington
NWMO	Nuclear Waste Management Organization
NWMP	Nuclear Waste Management Program
OPG	Ontario Power Generation
PAUT	Phased Array Ultrasonic Testing
RWC	Retube Waste Container
RWSB	Retube Waste Storage Building
SCR	Station Condition Record
SIIR	Serious Injury Incidence Rate
TRIF	Total Recordable Injury Frequency
UFDSB	Used Fuel Dry Storage Building
UFDSS	Used Fuel Dry Storage Structure
WFOL	Waste Facility Operating Licence

11.0 REFERENCES

- [R1] OPG letter, J. Van Wart to P. Burton, "Notice of Intent to Renew Darlington Waste Management Facility Waste Facility Operating Licence WFOL-W4-355.01/2023", March 22, 2021, CD# 00044-CORR-00531-01133.
- [R2] CNSC letter, P. Burton to J. Van Wart, "CNSC staff expectations for the licence application for the renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023", June 25, 2021, e-Doc: 659258, CD# 00044-CORR-00531-01149.

Attachment 6 to OPG letter, Jason Van Wart to Mr. M.A. Leblanc, "Licence Application for the
Renewal of the Darlington Waste Management Facility Operating Licence
WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

ATTACHMENT 6

List of other Relevant Regulations

(3 pages including this coversheet)

**Attachment 6: Part A
List of other Relevant Regulations**

This attachment provides a listing of federal, provincial, municipal, or other regulations, other than the regulations pursuant to the NSCA, which NSS-D must abide by:

Regulatory Agencies	Legislation	Description
FEDERAL		
Environment and Climate Change Canada (ECCC)	Canadian Environmental Protection Act	Section 48
ECCC	CEPA	Federal Halocarbon Regulations (SOR / 2003 / 289)
ECCC	CEPA	Federal PCB Regulations
ECCC	CEPA	Migratory Birds Convention Act
ECCC	CEPA	Species at Risk Act (SARA) – Wildlife Species at Risk Regulations
ECCC	CEPA	Environmental Emergency Regulation
PROVINCIAL		
Ministry of the Environment, Conservation and Parks (MECP)	Environmental Protection Act (EPA)	Section 20.2 (Stormwater)
MECP	EPA	Section 20.2 (Air)
MECP	EPA	O. Reg. 419/05: Air Pollution Local Air Quality
MECP	EPA	O. Reg. 1/17: Registration under Part II.2 of the Act Activities Requiring Assessment of Air Emissions
MECP	EPA	O. Reg. 347: General Waste Management – Section 17 Management of Asbestos Waste
MECP	EPA	O. Reg. 347: General Waste Management – Section 74 Land Disposal of Hazardous Waste
MECP	Ontario Water Resources Act (OWRA)	Section 53
MECP	Endangered Species Act	Section 17(2)(B)
Ministry of Labour (MoL)	Occupational Health and Safety Act (OHSA)	O. Reg. 278/05: Designated Substance Asbestos on Construction Projects and in Buildings and Repair Operations

Attachment 6 to OPG letter, Jason Van Wart to Mr. M.A. Leblanc, "Licence Application for the
Renewal of the Darlington Waste Management Facility Operating Licence
WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153

Regulatory Agencies	Legislation	Description
Ministry of Labour (MoL)	Workplace Safety and Insurance Act (WSIA)	
Minister of Community Safety and Correctional Services of Ontario	Emergency Management and Civil Protection Act	Provincial Nuclear Emergency Response Plan (PNERP)
MUNICIPAL		
Municipality of Clarington	Fire Protection	Memorandum of Understanding (MOU)

Attachment 6: Part B

List of Permits, Certificates, and other Licences

This attachment provides a listing of permits, certificates, and other licences that have been issued to OPG for NSS-D.

Certification # or Registration #	Description
PWC-ISO14000-510	ISO 14001:2015 Environmental Management Systems
ECA# 0187-BGYNDD	Environmental Compliance Approval (ECA) for Air
ECA# 4810-A78QUZ	Environmental Compliance Approval (ECA) for Sewage works
DA-OR-2021-1196	Migratory Bird Damage and Danger permit obtained annually from ECCC (valid Jan/21 through Dec/21)
HWIN # ON0490015	Hazardous Waste Information Network (HWIN) annual registration
www.wildlifehc.org	Wildlife Habitat Council (WHC) Certification
WD-76200-ELV1 #085196	Wheelchair Lift NSS-D– DSC Processing Building (Amenities Area)
10934844	Professional Engineers Ontario (PEO) - Certificate of Authorization (C of A)
O243.11	X-ray machine located in the NSS-D Entrance Lobby

Attachment 7 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFUL-W4-355.01/2023" CD# 00044-CORR-00531-01153

ATTACHMENT 7

**NSS-D Licence Renewal Application –
Nuclear Liability Insurance Certificate**

(2 pages including this coversheet)

Attachment 7 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence WFOL-W4-355.01/2023" CD# 00044-CORR-00531-01153



Certificate of Insurance

No.: 2021-93-REV-1

Dated: July 22, 2021

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:
 Darlington Waste Management Facility

Type(s) of Insurance	Insurer(s)	Policy Number(s)	Effective/ Expiry Dates	Sums Insured Or Limits of Liability
NUCLEAR LIABILITY	Nuclear Insurance Association of Canada	OF105	Jan 01, 2021 to Jan 01, 2022	Limit of Liability CDN 600,000,000
NUCLEAR LIABILITY	Lloyd's Underwriters Zurich Insurance Company Ltd	NCNTPL56	Jan 01, 2021 to Jan 01, 2022	Limit of Liability CDN 103,000,000

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 120 Bremner Boulevard Suite 800 Toronto, ON M5J 0A8 Telephone: 1-844-990-2378 Fax: - certificaterequestscanada@marsh.com	Marsh Canada Limited  By: _____ Matthew Pullen
--	---

Attachment 8 to OPG letter, J. Van Wart to M. Leblanc, "Licence Application for the Renewal of the Darlington Waste Management Facility Operating Licence

ATTACHMENT 8

**NSS-D Licence Renewal Application –
Land Ownership and Control Deed**

(5 pages including this coversheet)

FOREWORD

Attachment 8 is comprised from two documents, first the Transfer / Deed of Land (Figure 1), and second the Corporate Profile Report (Figure 2).

The purpose of this Transfer / Deed of Land attachment is to provide evidence that Ontario Power Generation (OPG) is the owner of the site to carry on the activity to be licensed, pursuant to subsection 3 (c) of the Class I Nuclear Facilities Regulations. OPG-DARLINGTON INC. is listed as the owner of the site.

The purpose of the Corporation Profile Report document is to provide evidence that ONTARIO POWER GENERATION INC. received legal ownership of OPG-DARLINGTON INC. through the process of amalgamation on January 1, 2007.

Figure 1: Transfer / Deed of Land

Transfer/Deed of Land
 Form 1 — Land Registration Reform Act

SOP2008 41 (Version 08/09) 1/10/08

A

(1) Registry Land Titles **(2) Page** 1 of 5 pages

(3) Property Identifier(s) Block: 26606 Property: 0134(LT) Additional: 0133(LT) See Schedule

(4) Consideration NIL 00/100 Dollars \$NIL

(5) Description This is a Property Division Property Consolidation
 Firstly: Part of Lots 23 and 24, Concession Broken Front, Darlington and part of road allowance between Lots 24 and 25, Concession Broken Front, Darlington, designated as PART 6, Plan 10R-94; Municipality of Clarington, Regional Municipality of Durham – more particularly described on Schedule B annexed

(6) This Document Contains (a) Redescription New Easement Plan/Sketch (b) Schedule for Description Additional Parties Other **(7) Interest/Estate Transferred** Fee Simple

(8) Transferor(s) The transferor hereby transfers the land to the transferee and, as the case may be, to the transferees as follows: see attached Schedule A entitled "Electricity Act, 1998 Registration Statement"

Name(s) OPG-DARLINGTON INC. **Signature(s)** *[Signature]* **Date of Signature** 2001 2 5
 By: David G. [Signature] Executive Vice-President
 Title: Law and Corporate Development
 We have authority to bind the corporation. **By:** *[Signature] 2001 2 5
 Name: Executive Vice-President
 Title: And Corporate Secretary*

(9) Spouse(s) of Transferor(s) I hereby consent to this transaction. **Signature(s)** **Date of Signature** Y M D

(10) Transferor(s) Address for Service c/o 700 University Avenue, Toronto, Ontario, M5G 1X6

(11) Transferee(s) OPG-DARLINGTON INC. **Date of Birth** Y M D

(12) Transferee(s) Address for Service c/o 700 University Avenue, Toronto, Ontario, M5G 1X6

(13) Transferor(s) The transferor verifies that to the best of the transferor's knowledge and belief, this transfer does not contravene section 50 of the Planning Act. **Signature** **Date of Signature** Y M D
 Signature: *[Signature]* **Signature** **Date of Signature** Y M D
 Solicitor for Transferor(s) I have explained the effect of section 50 of the Planning Act to the transferor and I have made inquiries of the transferor to determine that this transfer does not contravene that section and based on the information supplied by the transferor, to the best of my knowledge and belief, this transfer does not contravene that section. I am an Ontario solicitor in good standing. **Date of Signature** Y M D
 Name and Address of Solicitor: **Signature**

(14) Solicitor for Transferee(s) I have investigated the title to this land and to abutting land where relevant and I am satisfied that the title records reveal no contravention as set out in subclause 50(22)(c)(i) of the Planning Act and that to the best of my knowledge and belief this transfer does not contravene section 50 of the Planning Act. I act independently of the solicitor for the transferor(s) and I am an Ontario solicitor in good standing. **Signature** **Date of Signature** Y M D
 Name and Address of Solicitor: **Signature**

(15) Assessment Roll Number of Property City: Darlington, Municipality: Clarington, Map: 10R-94, Sub: 6, Plan: 10R-94

(16) Municipal Address of Property Darlington Generating Station, Clarington #11095616

(17) Document Prepared by: BLAKE, CASSELS & GRAYDON LLP Barristers and Solicitors Box 25, Commerce Court West Toronto, Ontario M5L 1A9 (416) 863-2400 ATTENTION: Edward P. Perlmutter/BRK

Fees and Tax	
Registration Fee	60
Land Transfer Tax	NILA
Total	

SOP2008 is a registered trade mark of Stevens Corporation, Toronto, Canada (1484 Form) 10/10/02

Figure 2: Corporate Profile Report

Request ID: 025776758
Transaction ID: 78383911
Category ID: UNE

Province of Ontario
Ministry of Government Services

Date Report Produced: 2021/03/02
Time Report Produced: 17:18:10
Page: 1

CORPORATION PROFILE REPORT

Ontario Corp Number 1720591	Corporation Name ONTARIO POWER GENERATION INC.	Amalgamation Date 2007/01/01
		Jurisdiction ONTARIO
Corporation Type ONTARIO BUSINESS CORP.	Corporation Status ACTIVE	Former Jurisdiction NOT APPLICABLE
Registered Office Address 700 UNIVERSITY AVENUE 19TH FLOOR TORONTO ONTARIO CANADA M5G 1X8		Date Amalgamated NOT APPLICABLE Amalgamation Ind. A New Amal. Number NOT APPLICABLE Notice Date NOT APPLICABLE Letter Date NOT APPLICABLE
Mailing Address 700 UNIVERSITY AVENUE 19TH FLOOR TORONTO ONTARIO CANADA M5G 1X8		Revival Date NOT APPLICABLE Continuation Date NOT APPLICABLE Transferred Out Date NOT APPLICABLE Cancel/Inactive Date NOT APPLICABLE EP Licence Eff.Date NOT APPLICABLE EP Licence Term.Date NOT APPLICABLE
Activity Classification NOT AVAILABLE	Number of Directors Minimum Maximum 00003 00015	Date Commenced in Ontario NOT APPLICABLE Date Ceased in Ontario NOT APPLICABLE

Request ID: 025776758
Transaction ID: 78383911
Category ID: UNE

Province of Ontario
Ministry of Government Services

Date Report Produced: 2021/03/02
Time Report Produced: 17:18:10
Page: 2

CORPORATION PROFILE REPORT

Ontario Corp Number

Corporation Name

1720591

ONTARIO POWER GENERATION INC.

Corporate Name History

Effective Date

ONTARIO POWER GENERATION INC.

2007/01/01

Current Business Name(s) Exist:

YES

Expired Business Name(s) Exist:

NO

Amalgamating Corporations

Corporation Name

Corporate Number

ONTARIO POWER GENERATION INC.

1682951

OPG-PICKERING INC.

1345454

OPG-PICKERING WASTE INC.

1345453

OPG-DARLINGTON INC.

1345455

OPG-DARLINGTON WASTE INC.

1345099

ATTACHMENT 9

Organization Chart

(2 pages including this coversheet)

ATTACHMENT 9: Organization Chart

