



NORDION (CANADA) Inc.
CLASS 1B FACILITY

License Number: NSPFOL-11A.01/2025

**2022 ANNUAL COMPLIANCE AND
OPERATIONAL PERFORMANCE**

**REPORT to the Canadian Nuclear Safety
Commission for the period JANUARY to
DECEMBER 2022**

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2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

EXECUTIVE SUMMARY

This Annual Compliance and Operational Performance Report (ACOPR) provides performance and operational information for Nordion's Class 1B Facility. It reports annual performance against the Nuclear Safety and Control (NSC) Act, applicable regulations, relevant safety and operational programs and the license conditions of the Nuclear Processing Facility Operating License issued by the Canadian Nuclear Safety Commission (CNSC) (License NSFOL-11A.01/2025) and demonstrates that Nordion is operating in a safe and responsible manner.

As per Nordion's license condition on annual reporting, this report contains information on the following:

- The operation and maintenance of the facility
- A summary of facility and equipment performance and changes
- Changes to operating policies and organization
- Occurrences and personnel radiation exposures
- Releases of nuclear substances and hazardous substances from the facility
- Changes to the emergency procedures, changes that affect or may affect the facility's emergency response arrangements, training activities, drill and exercise activities and unplanned events in which the facility's emergency response organization was tested
- The results of the effluent monitoring and personnel radiation exposures of the facility
- The results of environmental monitoring
- A summary of non-radiological health and safety activities, information on minor incidents and lost-time incidents
- A summary of the Public Information Program activities
- The 2023 Environmental, Health and Safety (EHS) Objectives

The key points of this report are as follows:

- All key measures were implemented to ensure continued compliance with Nordion's Licence Conditions Handbook (LCH).
- All measurable radiation doses received by personnel and the public were within the regulatory limits of 50 mSv/yr for Nuclear Energy Worker (NEW) personnel and 1 mSv/yr for non-NEW personnel and public and no internal dose levels or limits were exceeded.
- Nordion did not have any instances in which there was potential to exceed a regulatory limit or reach or exceed a regulatory action level.
- Nordion had one lost time injury and three medical treatment injuries. Nordion had no non-radiological exceedances of an environmental regulatory limit or action level in 2022.

In 2022, Nordion's Class 1B Facility operated within the requirements of the Nuclear Safety and Control (NSC) Act, the applicable regulations and the conditions of the operating license issued by the CNSC with the exception of four non-compliances with the NSC Act, the regulations and within Nordion's site license NSFOL-11A.01/2025. Nordion had seven incidents that were reportable to the CNSC in 2022 (see Appendix A).

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....2

1. INTRODUCTION.....5

1.2 Compliance with Other Regulations 5

1.3 New Licensed Activities 5

1.4 Significant Modifications or Changes to Site or Facility 5

1.5 Operational Challenges 6

2. SAFETY AND CONTROL AREA6

2.1 Management System 6

2.2 Human Performance Management 8

2.3 Operating Performance 12

2.4 Safety Analysis 15

2.5 Physical Design 15

2.6 Fitness for Service 16

2.7 Radiation Protection 16

2.8 Conventional Health and Safety 22

2.9 Environmental Protection 26

2.10 Emergency Management and Fire Protection 31

2.11 Waste Management 33

2.12 Nuclear Security 34

2.13 Safeguards and Non-proliferation 35

2.14 Packaging and Transport of Nuclear Substances 35

2.15 Public Information Program 35

2.16 Financial Guarantee 36

2.17 Site Specific Information 37

3 FUTURE PLANS AND CONCLUDING REMARKS.....37

3.1 Improvement Plans and Future Outlook 37

3.2 Safety Performance Objectives for 2023 37

3.3 Concluding Remarks 38

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

GLOSSARY

ACOPR	Annual Compliance and Operational Performance Report
ALARA	As Low As Reasonably Achievable
AOPFN	Algonquins of Pikwakanagan First Nation
AMMS	Advanced Maintenance Monitoring System
BH	Borehole
BWXT	BWXT Medical Ltd
CAM	Continuous Air Monitor
CAPA	Corrective Action/Preventative Action
COF	Cobalt Operations Facility
█	█
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
DRL	Derived Release Limit
DU	Depleted Uranium
EHS	Environment, Health and Safety
EMS	Environmental Management System
FSAR	Final Safety Analysis Reports
HEPA	High Efficiency Particulate Air
IAEA	International Atomic Energy Association
ICP	Incident Command Post
KOB	Kanata Operations Building
LCH	Licence Conditions Handbook
MDA	Minimum Detectable Activity
MSFS	Management System for Safety
NEW	Nuclear Energy Worker
NSC	Nuclear Safety and Control
NVS	Nuclear Ventilation System
NWMO	Nuclear Waste Management Organization
PDP	Preliminary Decommissioning Plan
PIT	Physical Inventory Taking
PIV	Physical Inventory Verification
QA	Quality Assurance
RE	Roy Errington
SCBA	Self Contained Breathing Apparatus
SSTS	Sealed Source Tracking System
TDG	Transportation of Dangerous Goods
TLD	Thermo-luminescent Dosimeter
US DOT	United States Department of Transportation
US NRC	US Nuclear Regulatory Commission
WSIB	Workplace Safety Insurance Board

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

1. INTRODUCTION

Nordion is an indirect, wholly owned subsidiary of Sotera Health Company (Sotera Health), a recognized global leader in contract sterilization. Nordion's Class 1B Facility is dedicated to the manufacturing of sealed sources used in cancer therapy and irradiation technologies (Gamma Technologies).

Production operations for Gamma Technologies are housed in the Cobalt Operations Facility (COF) portion of the Kanata Operations Building (KOB).

A summary of the organizational structure and key environmental, health and safety (EHS) personnel is provided in Section 2.1.5.

Throughout this report, the following EHS risk significance definitions are applied to incidents:

Low Risk – A finding or failure that will not result in negative impact to security, employee health and safety, the environment, registrations, or licenses.

Medium Risk – A finding or failure that resulted or could potentially result in a negative impact to security, employee health and safety, the environment, registrations, or licenses.

High Risk – An event or occurrence which has a major negative impact, or potential major negative impact on security, employee health and safety, the environment, registrations, or licenses.

1.2 Compliance with Other Regulations

Nordion reports to the Workplace Safety Insurance Board (WSIB) whenever a reportable occupational injury or illness occurs. In 2022, Nordion reported three medical treatment incidents and one lost time incident to WSIB. WSIB may inspect Nordion's Occupational Health and Safety programs at any time.

As part of the transportation program, Nordion must remain compliant with not only CNSC regulations and requirements but also those of other regulators, most prominently Transport Canada (Transportation of Dangerous Goods (TDG) regulations), US Department of Transport (US DOT) and US Nuclear Regulatory Commission (US NRC).

There were no non-compliances related to the sealed and unsealed source reporting performed by Nordion to the Competent Authorities in France, Belgium, or Switzerland.

1.3 New Licensed Activities

There were no new licensed activities in 2022.

1.4 Significant Modifications or Changes to Site or Facility

Significant modifications and repairs that were carried out in 2022 include:

- Construction work continued for a new hot cell (Cell 1) in the COF that was started in 2020 and expected to be completed in 2023.

1.4.1 Changes to Procedures Related to Operations Safety and Control

In 2022, the following changes were made to procedures related to operational safety and control:

- QAP AP-045 "Change Control Procedure"
Updated to remove references to BWXT and BWXT leased areas.
- QAP AP-030 "Management and Control of Corporate Documents in SmartDoc"
Updated to streamline and simplify Nordion documentation processes.
- SE-HS-007 "Fire Protection Program"
Updated to reflect roles and titles to current and to remove references to Vancouver and Laval facilities.
- SE-ERP-002 "Emergency Response Plan"
General update to reflect current roles and responsibilities.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

- SE-ERP-011 “Radiation Emergency Response Plan”
Updated to reflect current roles and practices.

1.5 Operational Challenges

In 2022, the following operational challenges were experienced by Nordion.

- Managing the transition associated with BWXT Medical obtaining their own facility operating license from the CNSC.
- Ensuring uninterrupted manufacturing of sources for customers from diverse global Co-60 supply.

2. SAFETY AND CONTROL AREA**2.1 Management System****2.1.1 Applicable Activities**

The Management System for Safety (MSFS) is applicable to all CNSC licensed activities conducted under the Class 1B nuclear substance and processing facility operating license. Licensed activities include those activities undertaken to operate a nuclear substance processing facility and to service prescribed equipment.

Nordion operates the facility for the manufacture of sealed sources for medical and industrial applications. Nordion manufactures sealed sources that are installed in prescribed equipment that are either transported to another licensee or packaged and transported to be installed in prescribed equipment at another location or licensee. In addition, Nordion services its own self-shielded irradiator that is used to support the operations of the facility.

Nordion may also service, at the Class 1B nuclear substance and processing facility, prescribed equipment from other licensees and clients for which they have provided procedures to the CNSC.

2.1.2 Management System for Safety Program Effectiveness

The annual management review of the Environmental Management System (EMS) and the MSFS was conducted on June 17th, 2022, by the EHS Committee to review the 2021 EHS Performance Report. This report assessed the performance related to the 14 Safety and Control Areas over the past three years where this information was available. Any trends identified were addressed and tracked via a Nordion non-conformance system (ex. CAPA, Velocity EHS Action Items). The 2021 Environmental Objectives and Targets were reviewed and were on track. Resource requirements for the EMS and MSFS were discussed. The EHS Committee agreed that the programs are resourced adequately to ensure that critical issues were being addressed. Financial and specialized skills resources were felt to be adequate. The Committee made eleven recommendations for future reports and requested ten revisions and clarifications to the EHS Performance Report.

The Committee concluded that they were satisfied with the effectiveness of the EMS and the MSFS.

2.1.3 Internal and External Audits

Nordion uses both internal and external audits as a key part of the MSFS and the EMS.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.1.3.1 Internal Audits

In 2022, there was one audit of supplier by Nordion, and twenty internal audits completed by Nordion EHS. On site audits by suppliers were still curtailed due to Covid related restrictions in 2022 still enacted by several suppliers.

In addition, as part of the inspection program, Nordion conducted a total of eleven health and safety inspections, and ten environmental and fire inspections.

These audits included an audit of production areas and supporting functions as well as policy and program audits.

All findings were actioned using Nordion's corrective action system.

2.1.3.2 External Audits of Nordion

There were two CNSC inspections. One related to Management Systems and one related to Emergency Response. There were no findings identified by the CNSC in these inspections.

There were an additional three audits of Nordion by external parties. Three opportunities for improvement were identified in the ISO 14001 maintenance audit. Eight recommendations and two minor non-conformances were identified in the Third-Party Fire Protection audit. Results from the Third-Party EHS Regulatory Compliance audit conducted in late 2022 are pending.

These five audits of Nordion were conducted in May, September, October and November 2022.

2.1.3.3 External Audits Conducted by Nordion

Nordion conducted one EHS audit of a supplier in 2022. There were no findings resulting from the supplier audit.

2.1.4 Management System for Safety Program Improvements

Revisions were completed in early 2022 to the MSFS Program to update the Program as a result of BWXT Medical obtaining an operating license and to update the associated procedures, roles and responsibilities within the stand-alone Nordion MSFS Program.

Improvements made to the Radiation Protection (RP) Program, Conventional Health and Safety Program, the Environmental Protection Program, the Emergency Preparedness Program, and the Fire Protection are discussed in Section 2.7.8, 2.8.3 and 2.9.7, 2.10.4 and, 2.10.8, respectively.

In 2022, Nordion continued to implement a behavioural based safety awareness program to encourage safety discussions within the organization and to encourage employees to report near misses and hazard identifications.

2.1.5 Summary of Organizational Structure and Key EHS Personnel

Nordion is an indirect, wholly owned subsidiary of Sotera Health Company and operates as a stand-alone company.

The list of EHS personnel for Nordion as of December 2022 is provided below.

Nordion - Gamma Technologies – EHS Compliance

- Senior Vice President of Sotera Environmental, Health and Safety (Sotera Health)
- Director, Regulatory & EHS
- Administrative Assistant
- Director, Global Security
- Manager, Security
- Contract Security Analyst

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

- Contract Security Supervisor
- Contract Security Officers (15)
- Manager, Radiation Safety & Nuclear Transportation
- Junior Radiation Surveyor (2)
- Senior EHS Compliance Specialist (2)
- Senior Licensing Coordinator
- Radiation Safety Officer
- Manager, EHS
- EHS Compliance Specialist
- EHS Specialist

2.1.6 Changes to the Organizational Structure and Roles and Responsibilities of Key Personnel in 2022:

EHS Compliance Organization Changes:

- In 2022, Nordion hired a new Radiation Safety Officer. The previous Radiation Safety Officer remains within EHS and is currently transitioning tasks.

2.2 Human Performance Management

2.2.1 Overall Performance of Human Performance Management

Employee training was provided in accordance with QAP AP-47 “Training Program and Management System” and SE-TRN-006 “Systematic Approach to Training System”. Nordion provides EHS training for all employees as per SE-TRN-003 “Compliance Environmental, Health and Safety Training”. In 2022, Nordion’s training program continued to meet the requirements of CNSC REGDOC-2.2.2, “Personnel Training” and License Condition 3.1 of the Nordion LCH for the implementation and maintenance of a training program.

Nordion’s Change Control procedure, QAP AP-45, required that training requirements be assessed and documented for procedural changes. These requirements include assessment of the roles assigned to the document, the level of training to be completed and the training completion time. Most controlled documents require “read and understand” training regardless of the impact of changes. Change Leaders were required to consult with relevant managers and record whether this read and understand training needs to be supplemented by instructor-led classroom training and/or On-The-Job-Training. For changes assessed to have a high or medium risk safety impact, a “Training Needs Analysis” must be completed and EHS must review and approve of the final training decision.

2.2.1.1 Training Attendance Rate

Nordion designed and maintains a variety of radiation safety training courses. New employees who are not classified as Nuclear Energy Workers (NEWs) receive a basic course on EHS, Level I, which provides information on the facilities, emergency response procedures and alarms, and basic procedures for safety in the workplace. NEWs received a NEW Indoctrination Course. To be authorized to enter the Active Area unescorted, the employee must complete and pass a written test, as evidence of understanding the principles of radiation protection and Nordion safe work practices. NEW retraining and retesting are conducted on a three-year frequency. In addition, NEWs are provided with a half day Radiation Instrumentation Workshop, dealing specifically with the selection and use of radiation survey and contamination meters for the Active Area. In 2022, there were no radiation safety incidents attributed to employee radiation safety practices. This indicates that the radiation safety training was effective.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Supplementary training programs are provided to all personnel working on behalf of Nordion depending on the nature of the job and the requirements specified by their manager. These programs include but are not limited to topics such as “working with beta”, emergency response awareness, care and use of respirators, material handling training, and working safely with fume-hoods.

Employees who transport, handle, or offer dangerous goods for transport are trained in the TDG requirements. The training program includes a one-day classroom training course that is required once on employment or upon job change. Retraining is conducted on a two-year frequency and is accomplished through self-study. The self-study program is separated into three levels.

Employees are required to complete the self-study refresher training level that is appropriate for their job function. For each training course, participants must complete and pass a written test, as evidence of understanding the course contents.

A summary of the key safety training programs is provided in Table 1.

In 2022, the number of scheduled participants that required safety training was 319, and by the end of the year, 261 of the scheduled participants completed the training, which included refresher training. Therefore, the actual attendance completion rate for 2022 was 82% (261/319).

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Table 1
2022 Safety Training Programs

Program	Number of Participants Requiring Training in 2022	Number of Participants Completed Training in 2022
Nuclear Energy Worker (NEW) Indoctrination ³ and NEW Refresher	55	53
Radiation Instrumentation Workshop ³	31	31
Radiation Safety Review for Operators ³	20	15
Transport of Dangerous Goods Level I ³	9	5
Transport of Dangerous Goods Level II ³	22	17
Transport of Dangerous Goods Level III ³	10	10
Crane	25	23
Pallet	13	11
Forklift	10	7
Contractor Radiation Safety Protection Training ³	1	1
Contractor Radiation Safety Protection Refresher ³	22	22
Contractor EHS Training Level I ³	17	17
In-Depth Security Awareness ³	10	8
Emergency Response Part 1 ³	14	11
Emergency Response Part 2 ³	8	8
Emergency Response Part 3 ³	5	5
Emergency Response: Security ³	17	4
Emergency Response: Site Security Volunteer ³	3	3
Emergency Response: Monitors ³	3	2
Self Contained Breathing Apparatus (SCBA) Part 1 ³ and 2 ³	27	11
TOTAL	319	261
³ Key EHS course		

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.2.2 Evaluation of Training Effectiveness**2.2.2.1 Trainee Reaction**

Trainee reaction is the degree to which participants find the training favourable, engaging, and relevant to their jobs. These three components are evaluated by analyzing data collected through the completion of training evaluation forms for all internally developed key EHS training courses and delivered by EHS classroom instructors. The data is analyzed so that corrective actions can be taken, if necessary, to improve content and delivery. The degree to which trainees find the training favourable is evaluated by analyzing the overall training assessment rating for each course. Overall training is assessed as one of five ratings: Excellent, Very Good, Good, Poor or Very Poor. The training evaluation form allows the trainee to select which aspects related to training engagement and relevance they perceived as strengths or weaknesses. In addition, a review of the optional comments section is completed to identify any issues that would contribute to trainees' discomfort and distraction that could have impacted employee engagement such as room temperature, catering, lighting etc.

In 2022:

- 100% of course evaluation forms had an overall rating of good, very good or excellent. Overall trainee satisfaction remains high.
- Training courses were perceived by trainees as engaging and relevant, and trainees felt participation was encouraged.

2.2.2.2 Trainee Learning

Trainee learning is the degree to which trainees acquire the intended knowledge and skills based on their participation in the training. Learning is evaluated by the pass rate of tests written for key EHS training courses.

In 2022, 100% of trainees passed the assessment test for all key EHS training courses and there were no rescheduled tests due to failed attempts.

2.2.2.3 Training Results

Training results is the degree to which targeted outcomes occur as a result of the training. The effectiveness of training results is measured by the EHS significance (high, medium, and low) and the frequency of unplanned events documented through processes such as the deviation process, the non-conformance process, investigations, and customer complaints where the root cause was determined to be related to human error or training. The targeted outcome is zero high risk unplanned events related to human error or training as well as no trend for recurrence (three or more) of the same unplanned event with the same human error or training root cause.

In 2022, there were no unplanned events where the root cause was attributed to Nordion training or human error.

2.2.3 Confirmation of Sufficient Number of Qualified Workers

In 2022, Nordion ensured that at least the minimum number of responsible personnel were available to provide safety during overnight operations and during emergency situations. There were no changes to risk levels or available personnel.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Nordion Security is always on-site. Radiation Surveyors are always on site when production involving radioactive materials is occurring. Nordion's key emergency response personnel, Facilities and Production Managers are on-call at all times. The Incident Manager, or the person in charge of the response, can initiate a call-in of both on-call and regular emergency response personnel. Currently, there are approximately 60 Fire Wardens and Marshalls and over 100 other emergency response personnel. Due to the fact that both Nordion and BWXT Medical operate different portions of the same facility, the emergency response program and roles continue to include personnel from both Nordion and BWXT as needed.

Nordion routinely assesses the availability of qualified staff as part of the Emergency Response Program and through drills and exercises. Nordion tests its emergency call list annually and the results have demonstrated year over year that within one hour of the onset of an emergency, adequate emergency response personnel and at least one representative from each of the key emergency response groups would be available on-site (see Section 2.10).

There is at least one and normally two Health Physicists are on call who are qualified to establish and direct radiation safety activities to protect personnel, the public, and the environment from radiation hazards, and to develop safe work methods and procedures. Nordion maintains a formal on-call roster that includes the Manager, Corporate Security (or designate) and the Director, Regulatory/EHS (or designate), who is also a qualified Health Physicist.

2.3 Operating Performance

2.3.1 Effectiveness in Carrying Out Licensed Activities

Licensed activities were carried out in accordance to Nordion's programs, policies and procedures resulting in no significant unplanned events.

Nordion's programs that are in place for auditing and capturing non-conformances continue to identify issues in areas that require corrective actions. These processes functioned as expected.

The 2022 EHS program objectives and results are shown in Table 2. The EHS objectives that did not meet the target in 2022 were Medical Treatment incidents, Lost Time incidents, Timely closure of regulatory actions within 60 days, Overdue training, and Fullmark participation rate.

The number of Medical Treatment Incidents (3) did not meet the target of ≤ 1 and the number of Lost Time Incidents (1) did not meet the target of 0. Further details of these incidents can be found in Section 2.8.4.

The timely closure of regulatory actions within 60 days (74%) did not meet the target of 90% in 2022. Regulatory action tracking is a relatively new target, introduced in 2022. Performance results for this target are reviewed monthly with the Senior Leadership Team to continue to drive performance in this area. CAPA related metrics are also reviewed monthly in Sales & Operations review meetings, which includes the Senior management of Nordion.

Overdue training (3.1%) is above the $\leq 2\%$ training target. There is strong focus and attention being channeled to improving training metrics and getting them to target levels in 2023.

Safety culture program Fullmark participation rate (38%) was below the 90% participation target. It is anticipated that a new safety Culture enhancement program will be launched in 2023.

The remainder of the EHS Targets and Objectives were met for 2022. The maximum employee dose rates (4.29 mSv/yr) were well under the target of ≤ 7.5 mSv/yr. Nordion's radioactive materials emissions (0.038% of the Derived Release Limit (DRL)) continue to be well below the target of $\leq 2\%$ DRL. There were no non-radiological releases in 2022.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Nordion diverted 70.1% of waste from landfills and completed a supplier audit by the end of 2022.

A system is in place to ensure that the manager self-assessment performance reviews are completed twice a year. The self-assessment process is audited annually. Deviations, Change Forms, and complaints are reviewed yearly at the Annual Joint EMS and MSFS review.

**Table 2
2022 EHS Program Objectives and Results**

Objective	Measure/Target *	Result
Timely Regulatory Action Closure	<ul style="list-style-type: none"> • Ensure timely closure of regulatory actions (90% completed within 60 days) 	<ul style="list-style-type: none"> • Timely closure of regulatory actions = 74% completed within 60 days
EHS Management System Effectiveness	<ul style="list-style-type: none"> • Ensure documents under your ownership are maintained and reflect current practices * • Overall percentage of overdue training ≤ 2% 	<ul style="list-style-type: none"> • Overall percentage of overdue training = 3.1%
Minimize the number and extent of occupational injuries	<ul style="list-style-type: none"> • The number of Medical Treatment Incidents ≤ 1 • Lost time Incidents = 0 	<ul style="list-style-type: none"> • The number of Medical Treatment Incidents = 3 • Lost time Incidents = 1
Minimize the use and release of hazardous materials to the environment and ensure adherence to permissible levels	<ul style="list-style-type: none"> • Radioactive materials emissions to ≤ 2.0% DRL (Ottawa) • Reportable releases of radioactive and non-radioactive hazardous materials to the environment (sanitary or storm sewer, air, groundwater, land) = 0 	<ul style="list-style-type: none"> • Radioactive materials emissions = 0.038% DRL (Ottawa) • Reportable releases of radioactive and non-radioactive hazardous materials to the environment (sanitary or storm sewer, air, groundwater, land) = 0
Actively limit radiation doses to employees as per ALARA principle	<ul style="list-style-type: none"> • Maximum employee dose rate < 7.5 mSv/yr 	<ul style="list-style-type: none"> • Maximum employee dose rate = 4.29 mSv/yr
Maintain a healthy safety culture. *	<ul style="list-style-type: none"> • Actively participate in the behavioural based safety culture program (Fullmark and other safety discussions and training) <ul style="list-style-type: none"> ○ Target: 90% participation rate • Immediately report, and where possible, correct near-misses and hazard identifications <ul style="list-style-type: none"> ○ Target: Safety Improvement Rate – 110 (includes near miss reports, hazard identifications, etc). ○ Target: 30 safety 	<ul style="list-style-type: none"> • Actively participate in the behavioural based safety culture program (Fullmark and other safety discussions and training) <ul style="list-style-type: none"> ○ 38% participation rate • Immediately report, and where possible, correct near-misses and hazard identifications <ul style="list-style-type: none"> ○ Safety Improvement Rate = 135.1 (includes near miss reports, hazard identifications, etc). ○ Safety walkthroughs over

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

	walkthroughs over the year	the year = 35
	<ul style="list-style-type: none"> • Immediately report injuries and suspected ergonomic symptoms to your manager * 	<ul style="list-style-type: none"> • Immediately report injuries and suspected ergonomic symptoms to your manager*

* Note: Some Health and Safety Targets have been established to promote safety culture only and are therefore not measurable.

2.3.2 Effectiveness in Implementing Operational Controls and Improving Safety Culture

EHS operational controls are documented in a specific series of documents (SE-OP and SE-HS series) and safety critical steps are added into routine production procedures. These procedures are routinely updated using Nordion’s change control process when safety improvements are identified or during the document’s scheduled periodic review. In 2022, Nordion continued the practice of monthly behavioural based safety awareness campaigns to encourage safety discussions within the organization and to encourage employees to report near misses and hazard identifications.

2.3.3 Reportable Events

A list of reportable incidents, their causes and corrective actions is provided in Appendix A.

2.3.4 Sealed Source Tracking

Nordion has a process for reporting the transfer, receipt, export or import of sealed sources if the activity exceeds the threshold limits and within the specified timeframes as detailed in Nordion’s LCH.

2.3.4.1 Sealed Source Tracking Activities

Throughout 2022 Nordion provided manual reporting to the CNSC for all Co-60 raw material received from suppliers outside of Canada. Discussions between Nordion and CNSC regarding Co-60 raw material sealed source tracking system (SSTS) reporting were ongoing at the end of 2022.

2.3.4.2 Sealed Source Tracking Improvements

The internal processes for reallocated Co-60 sources to a different end user after SSTS reporting has been completed were improved in 2022. Procedural changes to document these improved processes were in-progress at the end of 2022.

2.3.5 Non-production Sealed and Unsealed Source Inventory

The inventory of non-production sealed and unsealed sources is provided in Appendix B.

2.3.6 Annual Production

Activities relating to the procurement, possession, processing and shipping of radioactive materials are conducted under Nuclear Substance Processing Facility Operating Licence, NSPFOL-11A.01/2025.

2.3.6.1 Sealed Source Manufacturing/Radioisotope Processing

The 2022 data on sealed source manufacturing is shown in Table 3.

**Table 3
Sealed Source Manufacturing
Activity in PBq (kCi)**

<u>Radioisotope</u>	<u>Total Processed in 2022</u>	<u>Total Shipped in 2022</u>
Co-60	[REDACTED]	[REDACTED]

2.3.6.2 Processing >1 Petabecquerel (PBq)

Nordion has processed and shipped quantities of activity greater than 1 PBq of Co-60. In 2022, the quantities of Co-60 processed and shipped was [REDACTED] and [REDACTED] respectively.

2.3.6.3 Acquisitions of Finished Sealed Radioactive Sources

Sealed radioactive sources acquired by Nordion in 2022 included Co-60 double encapsulated sources that have been returned from customers [REDACTED]

[REDACTED]

2.3.6.4 Sealed Sources/Devices >50 Megabecquerels (MBq)

[REDACTED]

2.4 Safety Analysis

2.4.1 Validation and Maintenance of Overall Safety Case

The overall Nordion safety case for the facility is effectively maintained in the overall primary Final Safety Analysis Reports (FSARs) for Cobalt Operations, and the Cobalt Pools. When modifications are made, an assessment is performed, and details are captured in the primary FSARs for the facility. The overall safety case for the facility is then validated by the EHS Committee.

2.4.2 Modifications and Changes to Facility that May Affect Safety Analysis

In 2022, there were no modifications that affected the facility's safety analysis.

2.5 Physical Design

The FSAR review process identifies areas of continuous improvement to ensure that the overall design basis for the facility is both validated and maintained. In 2022, there were no significant design issues identified through these reviews. Overall, Nordion's facility design has been maintained.

Construction work for a new hot cell in the COF continued in 2022 and expected to be completed in 2023. This construction work did not impact the overall design basis for the facility.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

The facility modifications and additions occurring in the leased areas (BWXT Medical) did not impact the ability of the facility structures, systems and components to meet and maintain their design basis.

2.6 Fitness for Service**2.6.1 Effectiveness of Maintenance and Testing Programs**

Nordion has a system in place for the maintenance and control of equipment that supports the facility. The program provides guidelines for the documentation and maintenance of the system to ensure responsibilities are identified, filing systems are maintained, and all necessary controls are in place for facility calibration and maintenance.

Nordion uses an Advanced Maintenance Management System (AMMS) to control Nordion's calibration and maintenance activities. The AMMS is used to catalogue all equipment requiring calibration or maintenance, record equipment information, schedule maintenance, and issue work orders.

Detailed processes and rules governing the preventative maintenance program are available in Facilities Master Plan documents.

The AMMS provides the necessary oversight to ensure equipment integrity. All equipment inspections and preventative maintenance schedules are dictated using the AMMS.

Unscheduled repairs are reviewed on an annual basis by Facilities to assess for trends in equipment failures. Recurring failures are reviewed by EHS Compliance for the determination of any additional corrective actions.

This continues to prove effective as during 2022, there were no major equipment failures.

2.6.2 Effectiveness of Aging Management Strategies

Every year a detailed review is carried out at the Senior Management level to discuss aging equipment at the site. This annual business plan review considers three criteria: safety of the facility, regulatory requirements, and site improvements. When approved, the work identified during the aging equipment review is executed as a project. Projects are prioritized into three categories and funds are allocated as required. This aging equipment review process, because of the link to the Senior Management team and Finance, has been effective in keeping the Nordion facility up to date with current technology.

2.7 Radiation Protection**2.7.1 Dose Control Data****2.7.1.1 Occupational External Dosimetry**

Table 4 provides dosimetry data for employees grouped in various ranges of exposure. In 2022, a total of 131 employees were monitored. Only the Whole-Body and extremity doses are provided. The skin and lens of the eye doses are equivalent to the whole-body dose since Nordion processes Co-60, a high-energy gamma emitter. Of the 131 employees monitored, 58 were active area employees and 73 were non-active area employees. Of the 73 non-Active Area personnel, 8 support industrial irradiators (containing Co-60) work at customer sites. These individuals are included in the Class 1B licence dosimetry as they may also receive dose from work at the Nordion facility during the dosimetry year. In 2020 and previous years, the numbers of employees in the table included those employees now working under the BWXT in what is now the BWXT licence.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

**Table 4
Personnel Dosimetry**

Number of Employees					
Dose Range (mSv)	Whole Body				
	2018	2019	2020	2021	2022
0	60	47	70	18	44
0.01 - 1.00	151	190	219	61	52
1.01 - 5.00	37	41	35	28	35
5.01 - 10.00	0	0	0	0	0

Number of Employees										
Dose Range (mSv)	Right Hand					Left Hand				
	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
0	44	50	61	14	10	44	52	93	13	10
0.01 - 1.00	35	35	50	7	12	34	40	23	7	10
1.01 - 5.00	35	39	38	15	19	35	33	33	16	21
5.01 - 10.00	2	5	3	2	0	3	4	3	2	0
10.01 - 20.00	0	0	1	0	0	0	1	1	0	0
>20	0	1	0	0	0	0	0	0	0	0

**Table 5
Average, Maximum and Minimum Worker Effective Doses (mSv)**

		2018	2019	2020	2021	2022	CNSC Regulatory Limit
NEWs	Average	0.45	0.48	0.36	0.8	0.71	n/a
	Average*	0.6	0.57	0.46	0.96	1.07	n/a
	Maximum	4.23	4.79	4.92	4.3	4.29	50/yr 100/5yr
	Minimum	0	0	0	0	0	n/a
	Number of NEW monitored	248	278	324	107	131	
Contractors	Average	0.05	0.03	0.01	0.04	0.03	n/a
	Average*	0.06	0.06	0.03	0.06	0.04	n/a
	Maximum	0.25	0.26	0.29	0.30	0.29	1/yr
	Minimum	0	0	0	0	0	n/a

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

	Number of NEW monitored	45	123	381	53	40	
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* This average is calculated excluding zero dose values.

**Table 6
Minimum, Maximum and Average Worker Extremity Doses (mSv)**

		2018	2019	2020	2021	2022	CNSC Regulatory Limit
NEWs	Average	0.96	1.14	0.93	1.56	1.52	n/a
	Maximum	9.08	20.93	16.48	7.73	4.29	500/yr
	Minimum	0	0	0	0	0	n/a
	Number of NEW monitored	116	130	153	38	58	

Table 5 and 6 provides maximum and average doses to NEWs. In 2022, there was a slight increase in the average dose over 2021. The maximum dose had significantly decreased from 2021.

Contractor dosimeters and doses continue to be well managed and controlled. There was no significant change in average or maximum doses to contractors between 2021 and 2022.

Table 5 and 6 shows continued good performance in maximum whole-body and extremity dose relative to the CNSC Regulatory Limit.

The above analysis of trends demonstrates doses are well managed at Nordion and adherence to the principle in the execution of duties by Nordion personnel.

2.7.1.2 Internal Occupational Radiation Doses

Nordion's bioassay program includes whole-body counting if air contamination monitoring indicates a need. In 2022, Nordion had a non-reportable contamination event that had the potential for employee inhalation of Co-60. Twelve employees were sent for off-site whole-body monitoring. Of these twelve monitored employees, two were confirmed to have no uptake of Co-60. The remaining ten employees had Co-60 inhalation average doses of 4.36 µSv, varying between a maximum of 19.6 µSv and a minimum of 0.7 µSv. These doses are a fraction of the 100-300 µSv external dose these employees typically receive in a month.

2.7.2 Significance of Results for the Dose Control Data

The group with the highest average dose (2.3 mSv/employee) is the Cobalt Monitoring Decontamination and Shipping group. This is the group with the historic highest average. The 2022 average (2.3 ± 1.02 mSv) is slightly decreased from the 2021 average (2.71±1.11 mSv).

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

The other group that drives Nordion's doses are the production technicians. The average dose in 2022 to production technicians was 2.13 ± 1.08 mSv. This is consistent with the 2021 value of 2.36 ± 1.072 mSv.

Non-active area personnel include [REDACTED] personnel that are part of Nordion's installation and services team that performs work at customer sites. This group has the highest average dose for non-active area personnel. In 2022, the installation group had an average dose of 1.4 mSv, with a max dose of [REDACTED]. Results overall demonstrate continued and consistent high performance of Nordion employees in accordance with ALARA.

2.7.3 Dose to the Public

Table 7 shows the doses to the public from 2018 - 2022. This dose represents the combined dose to the public from Nordion and BWXT activities that occur on the site. It is important to note that a new set of DRL values came into effect in Nordion's LCH in January 2019. The increased dose after 2018 is primarily due to the new DRL values. There is a slight decrease in 2022 public dose versus 2021.

Table 7
Dose to Public

Year	(mSv)
2018	0.000067
2019	0.00087
2020	0.00122
2021	0.00185
2022	0.00156

2.7.4 Contamination Control Data

The contamination control program for the Active Area includes routine sampling and monitoring on a daily basis of the floors, benches, fume-hoods, gloveboxes, support/service areas, and on a weekly basis, change-rooms and inactive floors. Regular sampling, by wipe testing, of the corridors and office areas is conducted several times daily to ensure areas are maintained contamination free and, should contamination be found, to decontaminate immediately to the levels specified in the decontamination procedure. In addition, equipment and personnel leaving the Active Area are monitored for contamination.

During 2022 operations, there were sixteen instances where contamination was found and subsequently contained within the Active Area. Of the sixteen contamination incidents, seven were related to contamination found on clothing and nine were related to contamination found on equipment or floors. There was no significant increased dose to personnel as a result of these incidents.

The distribution of contamination incidents from 2018 to 2022 is shown in Table 8 and illustrated in Figure 1.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

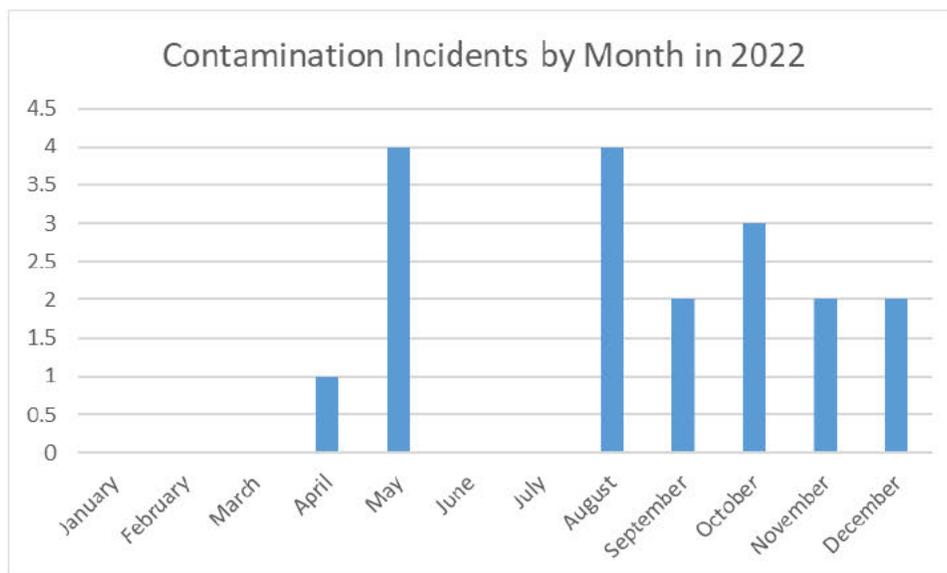
The main isotope identified during the contamination events is Co-60. Currently, Co-60 is the only isotope processed within the Cobalt Operations facility. The number of Co-60 contamination events in 2022 is higher than the Co-60 contamination events in previous years. Of the sixteen contamination events in 2022, eleven occurred between August and December 2022. This corresponds to a time when Nordion was receiving raw Co-60 material from a supplier and identified higher than normal levels of contamination associated with the receipts. However, these findings did not result in any additional risk to personnel or the environment.

Nordion's contamination control program continues to be well managed and meet the conditions of the licence.

Table 8
Contamination Incidents by Contamination Level

Year	Not recorded	<500 cpm	>500 cpm, <2,000 cpm	>2,000 cpm, <10,000 cpm	> 10,000 cpm, < 50,000 cpm	>50,000 cpm	Annual Total	Total Co60 Contamination Incidents
2018	0	5	4	6	3	0	18	4
2019	1	1	6	6	4	0	18	4
2020	0	6	8	4	3	1	22	5
2021	0	0	3	4	1	1	9	9
2022	0	5	1	7	3	0	16	16

Figure 1
Contamination Incidents by Month in 2022



2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.7.5 Facility Radiological Conditions

The radiation survey program involves radiation measurements within the Active Area, and on the perimeter and exterior of the building. Within the Active Area, radiation surveys are generally conducted daily, throughout all the labs and rooms. Areas where radiation fields are above 2.5 mrem/hr (0.025 mSv/hr) are posted with radiation warning signs, indicating the radiation fields. In addition, surveys are conducted at employee work areas, at cells, gloveboxes, and fume-hoods, during production and test operations, to ensure radiation fields during processing are within acceptable levels. Special surveys are conducted on new processes/equipment to provide information on the safety performance of new operations. Detailed surveys are conducted on each of the Cobalt Operations cells every three years, to check for integrity of the cells and ensure radiation levels are within acceptable levels. In 2022, detailed cell surveys were conducted on the hot cells. No non-conformance was observed from the survey.

On a monthly basis, radiation surveys have been conducted on the perimeter of the Active Areas, and within the Inactive Office Areas. The monthly survey also includes measurement of radiation fields outside the KOB to ensure conditions have not changed in the operations that may impact the environment/exterior exposure. All the monthly surveys were conducted in 2022.

Breathing air was monitored at various locations in the facility. In addition to having the capability of alarming locally, Continuous Air Monitors (CAM) are monitored and logged at the Surveyor's control panel and on the building monitoring system.

For work known to have the possibility of creating radioactive contamination of the breathing air, a zone is demarcated, and signage is posted requiring respirators to be worn. Respirator requirements are removed only once air monitoring measurements are below the required levels. In 2022, all breathing air sampling was performed in accordance with procedures and results indicated that processes were in control. Facility radiological conditions were very stable and routine in 2022. There were no fluctuations in 2022 radiological conditions beyond the routine movement of containers through the facility when required. Contamination incidents are discussed in Section 2.7.4.

2.7.6 Exceeding Regulatory Limits or Action Levels

In 2022, there were no exceedances of either regulatory limits or actions limits.

2.7.7 Radiation Protection Program Effectiveness

The Radiation Protection (RP) Program is reviewed by conducting process audits and process safety audits. Data and performance of the RP Program is also reviewed regularly at EHS Committee meetings. The RP Protection program continued to operate effectively in 2022.

2.7.8 Radiation Protection Program Improvements

There were no significant changes to the RP program in 2022. The RP program continued to operate effectively in 2022.

2.7.9 Radiation Protection Program Performance

The objectives, goals and targets of the RP Program are shown in Table 2 of Section 2.3.1. The targets for maximum NEW dose and environmental releases were met in 2022. These targets are tracked as key performance indicators at EHS Committee meetings and in Monthly Operational reports. The targets are reviewed yearly at the Annual Joint EMS and MSFS Review. See Section 3.2 Table 16 for a summary of the initiatives and targets for the upcoming year.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.7.10 Continuous Improvements under ALARA Performance

ALARA objectives and performance is reviewed at EHS Committee meetings and all activities in the ALARA program are outlined in Nordion's internal procedure "Keeping Radiation Exposures and Doses as Low as Reasonably Achievable" (SE-RP-002). Safety is integrated into the design aspects of new builds, from design objectives, design review and to performing Hazard Risk Analysis and Third-Party Reviews of process flows.

2.7.11 Radiation Devices and Instruments Performance

Performance of the following equipment, alarms and monitoring devices is checked at various frequencies throughout the year. Maintenance is performed for any tests that are out of specification.

In 2022, the following testing was performed:

Nuclear Ventilation System (NVS) High Efficiency Particulate Air (HEPA) filters are required to be tested yearly. Testing at Nordion occurred twice annually, with the exception of one filter which was tested at the required annual frequency. HEPA specifications were met.

The emergency generators were tested monthly and confirmed to be operational.

The radiation evacuation alarm was tested weekly and confirmed to be fully functional.

The radiation alarms throughout the facility were tested on a weekly basis in 2022. The tests verified that the alarms sound at the pre-set alarm levels and that the alarms register on the Building Management System (BMS).

The sprinkler system fire system was tested monthly in 2022 and found to be operational. All dry systems were tested and verified in good operating condition in 2022 as required by the National Fire Protection Association.

The fire alarm panels were tested monthly and found to be fully functional.

Handheld contamination monitoring equipment was maintained twice a year. Hand & Foot and Whole-body area monitors are checked weekly. Area monitors are checked daily. Equipment continued to function properly in 2022.

Air sampling pumps were tested on a weekly basis.

Radiation survey instruments were tested on a monthly, bi-annual, or annual basis as required. Radiation instruments that do not meet the calibration check specifications are sent for repair and service. Nordion maintains an inventory of radiation survey instruments to ensure sufficient radiation instruments are available at all times.

There were no trends identified in 2022 relating to radiation instruments.

2.7.12 Radiation Protection Training Program and Effectiveness

See Section 2.2.1 and 2.2.2.

2.8 Conventional Health and Safety**2.8.1 Conventional Health and Safety Program Effectiveness**

The Conventional Health & Safety Program is reviewed by conducting program audits, process audits, regular inspections by both employees and management, and a review of revised safety programs is performed by the Workplace Health & Safety Committee. The Workplace Health & Safety Committee is also responsible for reviewing the Hazard Prevention Program. In addition, the EHS Committee sets targets each year that are used to monitor the effectiveness of the safety program.

Targets were established for less than or equal to one Medical Treatment Incidents and zero Lost Time incidents. In addition, Near Miss Reports and Hazard Identification Reports were tracked and reported monthly to senior management and are provided to the EHS Committee for review.

Process safety audits are conducted annually.

See Section 2.1.3 for a description of audits and inspections for 2022.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.8.2 Conventional Health and Safety Committee

The Nordion Workplace Health and Safety Committee is represented by union and management and typically meets monthly.

The Nordion Workplace Health and Safety (H&S) Committee met twelve times in 2022. The 2022 accomplishments for these Committees were their continued review of new or changes to existing EHS policies and programs. In addition, the Workplace H&S Committee continued to review ergonomics as a standing agenda item for each meeting.

2.8.3 Conventional Health and Safety Program Improvements

Improvements to the Conventional Health and Safety Program in 2022 included the following:

- Continued to implement behavioural based safety awareness campaign
- Continued focus on the COVID-19 related programs/processes (education, response, decontamination)
- Hosted a Safety Week in June 2022 to continue to raise safety awareness

2.8.4 Conventional Health and Safety Occurrences

During 2022, there were three medical treatment incidents, including one lost time injury. The details are summarized below. Figures 2 and 3 illustrate the number of Incidents by year and the Number of Days Lost by year respectively.

Lost Time Incidents: One

Lost Time Injury	Actions Taken/Being Taken
Employee stated they were seated on a chair and when they were getting up from the chair, they stated that they tripped on an ergonomic mat injuring their knee.	<ol style="list-style-type: none"> 1) Investigate and implement better storage for ergo mats 2) Investigate a better solution than stacking of ergo mats 3) Develop training on the proper use of ergo mats

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Medical Treatment Incidents: Three

Medical Treatment Injury	Action Taken
<p>Employee states they were trying to retrieve material from the pool. The item they were trying to retrieve was stuck. It was determined during the investigation that it was being hindered by 1 or 2 other buckets in the pool. After repositioning, the employee was able to lift material as required. Employee indicated that they did not feel pain at the time. They then went to break shortly after and started to feel pain in right lower back. Modified duties and medical treatment was provided for this injury.</p>	<p>Reviewed prevention actions with at the morning huddle with the Operations Team. Conducted a full review of the pool inventory to assess for other potential areas where there could be similar issues.</p>
<p>Back Injury during flight to a Customer Site. Modified duties and medical treatment was provided for this injury.</p>	<p>Employees are provided highest class of travel, reviewed and reminded employees to take breaks while on jobs. A “Before Work Warm Up”, Stretch and Flexibility Program was provided to the team. The team was encouraged to ask Customer for resources where needed to help with physical aspects and lessen the physical workload where feasible.</p>
<p>An employee cut their finger on a scraping tool that contained a razor blade used to remove labels from packaging. The employee was setting up their workstation for the day. The employee was installing a new razor blade on the scraping tool. As they were pressing the metal pressure clip back, they slipped on the new blade, lacerating their index finger. They were given first aid and went to the hospital for further evaluation. The employee had the cut treated at the hospital and received three stitches.</p>	<p>Replaced tool with plastic scraping blades.</p>

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Figure 2
Number of Medical Treatments and Lost Time Incidents by Year

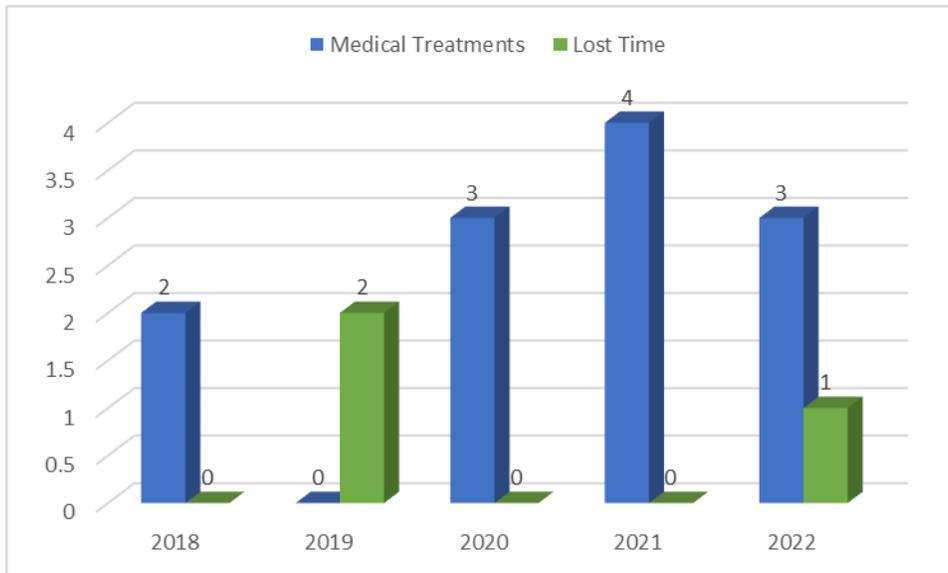


Figure 3
Number of Lost Time Days by Year



2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Nordion Lost Time Injury Statistics for 2022

# Lost-Time Injuries ¹	1
Severity Rate ²	33.88
Frequency Rate ³	0.65

1 An injury that takes place at work and results in the worker being unable to return to work for a period of time.
 2 The accident severity rate measures the total number of days lost to injury for every 200,000 person-hours worked at the site. Severity = [(# of days lost in last 12 months) / (# of hours worked in last 12 months)] x 200,000.

3 The accident frequency rate measuring the number of LTIs for every 200,000 person-hours worked at the site. Frequency = [(# of injuries in last 12 months) / (# of hours worked in last 12 months)] x 200,000

2.9 Environmental Protection

2.9.1 Air and Water Release Monitoring

The environmental monitoring program is designed to monitor and measure effluent releases to the environment and to determine radiation levels in areas exterior to the KOB. The program includes the following elements:

- a) Continuous monitoring of process ventilation, exhausts ductwork, and stack emissions by use of in-situ detectors and samplers and computerized recording
- b) Weekly air sampling and analyses for KOB exhaust stack emissions
- c) Holding tanks for Active Area liquid effluent to allow sampling, analysis, and authorized release of liquid effluent
- d) Environmental TLD program
- e) Soil sampling
- f) Groundwater sampling

Ventilation and stack sampling is conducted by using particulate and/or activated charcoal filters, depending on the physical and chemical nature of the radionuclide. Particulates are sampled by use of cellulose filter papers and analyzed by gamma measurement.

All production operations are contained within cells, gloveboxes and/or fume-hoods. Ventilated air from these containment systems is filtered through roughing and HEPA filters and, where appropriate, activated charcoal adsorbers. These systems are designed with redundant fan/motor and filtration units that include pre-filters, primary and secondary filtration units. The NVS has been designed and is maintained to prevent the unnecessary release of radioisotopes to the atmosphere.

2.9.1.1 Airborne Effluent

A revised LCH was issued to Nordion in January 2019 containing the DRL values submitted by Nordion in 2016 and approved by CNSC.

In 2022, there was air release of Co-60 material equal to 0.000117% of the DRL (see Table 9). No Action Levels were exceeded. There was no significant contribution to dose to public from air releases in 2022.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Table 9
Airborne Releases

Year	Co-60 (GBq/yr)
2018	0.002
2019	0.00002
2020	0
2021	0.00004
2022	0.0003
Action Levels (GBq/week)	0.001

	Co-60
DRL (GBq/yr)	250
% DRL	0.000117

2.9.1.2 Liquid Effluent

A revised LCH was issued to Nordion in January 2019 containing the DRL values submitted by Nordion in 2016 and approved by CNSC.

Allowable liquid effluent releases to the environment are also limited to values in SE-OP-013 "Water Effluent Monitoring". The 5-year variation in activities released is listed in Table 10. Each release of liquid effluent in 2022 was well below the values in SE-OP-013 (exceedance of which would be Action Level reporting). All liquid effluent releases have been below the Nordion action levels and well within CNSC licensed limits. A summary of liquid releases, expressed as a % DRL, is provided in Table 10.

The City of Ottawa is informed whenever a release to the sanitary sewer takes place. In addition, a monthly summary report of the activity levels released is provided to the City of Ottawa.

Note that liquid release activity measurements have an uncertainty of $\pm 10\%$.

Liquid releases are listed in Table 10 against both the DRL limits as well as the constraints Nordion places on every delay tank before it can be released from the building. In 2022, delay tanks were held on \blacksquare occasions (versus \blacksquare in 2021) for sampling, analysis and verification against the constraints in Nordion procedure SE-OP-013 "Water Effluent Monitoring" before release was permitted. The subsequent 15 discharges of the delays were measured for the 4 radionuclides show in Table 10. Of these radionuclides, only Co-60 was measured above the Minimum Detection Activity (MDA) meaning that less than 10% of the reported liquid releases are measured values and the remainder are reported as the MDA value instead of zero. This is typical for every year in Table 10, and therefore releases and resulting dose to public are significantly conservative overestimates.

If the critical receptor was the same group for all radionuclides potentially released by Nordion, the dose to public would be 0.00109 mSv. This value is a conservative over-estimate because the critical receptor has been used as the same receptor and because the DRLs are conservatively calculated.

Table 10
Liquid Releases (GBq/yr)

Year	Litres	Co-60	Nb-95	Zr-95	Cs-137
2018	713224	0.027	0.001	0.0017	0.0007
2019	576800	0.020	0.002	0.0019	0.0007
2020	747902	0.031	0.0015	0.0013	0.00076
2021	152762	0.0046	0.002	0.002	0.001
2022	101337	0.038	0.002	0.001	0.001
Nordion SE-OP-013 (20) Constraints on each delay tank release (pH or GBq/Release)					
pH	Co-60	Nb-95	Zr-95	Cs-137	
6-9.5	<0.015	<0.047	<0.047	<0.0024	
	Co-60	Nb-95	Zr-95	Cs-137	
DRL (GBq/yr)	35.4	3,250	2,060	24.8	
% DRL	1.23E-01	5.69E-05	5.37E-05	2.50E-03	

2.9.1.3 Environmental TLDs

The locations of environmental TLDs are shown in Appendix C and listed in Table 11. The existing environmental TLD placement corresponds roughly to the historical locations of these dosimeters. The dosimeters are deployed to generally cover the points of a compass and preferentially to the east of the facility, which is the direction of the prevailing winds. The TLDs are also placed in residences of Nordion employees.

All environmental TLD readings for 2022 were well below the public limit of 1 mSv. The similarity in the recorded dose in these locations year over year, taken with the absence of any contamination found in soil illustrates that the variation between locations and between years is due to variations in natural background radiation at these different times and locations.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

**Table 11
Environmental TLDs**

	Location	2017 (mSv)	2018 (mSv)	2019 (mSv)	2020 (mSv)	2021 (mSv)	2022 (mSv)
16	[REDACTED]	0.032	0.086	0.096	*	0.2	0.135
17	[REDACTED]	0.169	0.132	0.164	0.103	0.096	0.137
18	[REDACTED]	-0.052	-0.071	-0.086	-0.092	0.04	0.358
19	[REDACTED]	0.037	0.08	0.039	-0.044	0.074	0.08
20	[REDACTED]	0.061	0.079	0.093	0.081	0.065	0.088
32	[REDACTED]	-0.041	0.031	-0.011	-0.04	-0.03	0.105
33	[REDACTED]	-0.057	0.036	-0.004	-0.083	-0.04	0.044
38	[REDACTED]	0.036	0.082	0.078	0.067	0.109	-0.053
57	[REDACTED]	-0.047	0.003	-0.018	-0.061	-0.037	0.07
58	[REDACTED]	0.046	0.144	0.140	0.068	-0.048	0.084

* Missing TLD.

2.9.2 Significance of Air and Water Release Monitoring Results

As in previous years, air releases remain several orders of magnitude lower than liquid effluent releases.

Nordion's releases remain well below the allowed DRL and do not present a negative impact to people or the environment.

2.9.3 Exceeding Regulatory Limits or Action Levels

There were no instances of exceeding CNSC environmental regulatory limits or action levels in 2022.

2.9.4 Spills to the Environment

There were no spills to the environment in 2022.

2.9.5 Environmental Protection Program Effectiveness

A review of the performance related to the Environmental Protection Program and the EMS is conducted on an annual basis. In 2022, this review was held during the Annual EHS Program Review on June 17th, 2022.

See Section 2.1.3 for a description of audits and inspections for 2022.

2.9.6 Environmental Protection Program Activities

Activities which took place in 2022 included the following:

- Conducting a total of ten fire and environmental inspections to identify areas for improvement and/or concerns,
- Conducting a supplier audit of a supplier whose goods/services could have a significant impact on the environment,
- Nordion was subject to an ISO 14001:2015 maintenance audit. No non-conformances and three opportunities for improvement were identified during this audit.

2.9.7 Environmental Protection Program Improvements

In 2022, Nordion made the following improvements to the Environmental Protection Program.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

- Third party quality control assessment of soil and groundwater was conducted in 2022.

2.9.8 Environmental Protection Program Performance

A description of the Environmental Protection Program Initiatives is provided in Table 12, along with the results/outcomes.

A summary of initiatives and targets for 2023 is provided in Table 13.

Table 12
2022 Environmental Objectives and Targets

Objective	Target	Status
New - Conduct an audit of a supplier whose goods and/or services could have a significant impact on the environment	Complete one supplier audit in accordance with SE-ENV-019 "External Supplier Environmental Audits by the end of December 2021	Audit of a supplier whose goods and/or services can have a significant impact on the environment was completed.
New - Investigate energy reduction opportunities	Estimated savings of 7,500 kWh per year	Complete, an estimated 10,750 kWh energy savings annually as a result of lighting retrofits.
Investigate sources of non-radiological contaminants in the wastewater with a goal of zero exceedances of the City of Ottawa Sewer Use By-Law in 2022	Zero exceedances of the City of Ottawa Sewer Use By-Law in 2022	Complete, there were no exceedances to the City of Ottawa By-Law in 2022.

Table 13
2023 Environmental Objectives and Targets

Objective	Target
New – Conduct an audit of a supplier whose goods and/or services could have a significant impact on the environment	Complete one supplier audit in accordance with SE-ENV-019 "External Supplier Environmental Audits by the end of the year
New – Investigate energy reduction opportunities	Estimated savings of 7,500 kWh per year

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.9.9 Groundwater and Soil Sampling and Monitoring**2.9.9.1 Soil Sampling**

Soil samples were taken at 19 locations around the Nordion site in 2022. Samples were placed in plastic bags, labeled with the site location, and then analyzed on the multi-channel analyzer for eight hours as per Nordion's procedure. Background measurements (no sample, empty chamber) were also taken for reference but not subtracted from the measurements directly. The radioisotope primarily analyzed was Co-60. The MDA is determined for each sample individually and ranged between 0.9 – 1.6 Bq. When accounting for background Co-60 fields present in the facility, all 19 samples were determined to be less than the MDA. No radionuclides attributable to licensed activities were detected in the soil samples.

2.9.9.2 Groundwater Sampling**2.9.9.2.1 Non-Radiological Sampling**

Non-radiological groundwater samples were taken on June 8th, 2022.

The results of this analysis demonstrated that there were no significant changes to groundwater when compared to previous years. This indicates that Nordion's operations have not had a significant impact on the groundwater.

2.9.9.2.2 Radiological Sampling

Nordion monitors groundwater at least once a year.

Samples are taken in July 2022 from the following boreholes (BH) to assess potential radiological contaminants:

- 1991-BH1
- 1991-BH2
- 1991-BH3
- 1991-BH4
- 2012-BH1

Samples were placed in 1L Nalgene bottles and analyzed on the MDA for eight hours as per Nordion procedure. The radioisotope primarily analyzed was Co-60. The MDA was determined for each sample individually and ranged between 1.1 - 1.2 Bq. When accounting for background Co-60 fields present in the facility, all five samples were determined to be less than the MDS. No radionuclides attributable to licensed activities were detected in the water samples.

2.10 Emergency Management and Fire Protection**2.10.1 Emergency Preparedness Program Effectiveness**

Management has assessed the existing program and deemed it effective through historical success in meeting the response objectives during exercises.

Nordion completed all its scheduled activities for 2022, including a CNSC-observed major exercise, in which Nordion tested its emergency response plan against a live (controlled) exercise environment with the Ottawa Fire Department. CNSC concluded that there were no areas of non-conformance within the Emergency Management Program, nor during the exercise.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.10.2 Emergency Preparedness Program Activities

Nordion has an extensive emergency preparedness program to respond to various types of emergency situations, including on-site and off-site emergencies. During 2022, a number of Emergency Response exercises were conducted to test these emergency response plans and response personnel. In addition to these exercises, two false alarms acted as “real-world” exercises.

Activities which took place in 2022 included:

- Hosting a number of Ottawa Police Inspectors and Superintendents for a tactical meeting/site familiarisation tour
- Onboarding several new employees to IMS positions, support groups and ERP roles
- Hosting a CNSC Emergency Management Program inspection
- Nordion held a CNSC observed major exercise on October 13th, 2022. This exercise included coordination and response from multiple Ottawa Fire Department stations to test the effectiveness of both the internal and external response forces in the event of an emergency on site. This exercise included testing of the following subplans and drill schedules:
 - Emergency Response Plan
 - Fire Safety Plan (KOB/KRMF)
 - Radiation Emergency Response Plan
 - First Aid Program
- A building evacuation of the KOB and KRMF occurred on September 5th, 2022 as a result of a faulty flow switch on the sprinkler system.
- A test of the Chemical Spill Response Plan occurred on October 19th, 2022, which involved activation of the Chemical Spill Response Team responding to a mock spill.
- A building evacuation of the KOB and KRMF Building occurred on May 16th, 2022, as a result of a faulty flow switch on the sprinkler system
- Testing of the Fire Safety Plan in each of the RE Building and Heating Plant including alarm activation and full evacuation.
- Testing of the ER Contact List to ensure accuracy of telephone numbers listed, to determine availability of personnel, and to estimate response times.
- Providing third party Chemical Spill Training for the Chemical Spill Response Team

2.10.3 Emergency Preparedness Program Performance

The emergency preparedness program performance was tested during the exercises and drills noted in the previous section. During these exercises and drills, Nordion executed an effective response and demonstrated good interoperability with local first responders.

Overall compliance with the Emergency Management Program was proven satisfactory. There were no events (planned or actual) demonstrating non-compliance with the Emergency Management Program.

2.10.4 Emergency Preparedness Program Improvements

In 2022, Nordion completed program enhancements to address minor areas for improvement identified in exercises and drills and other continuous improvements. As noted above, these included:

- Onboarding new staff
- Continued training with all IMs, IMS positions and subplan support groups
- Equipment upgrades, including additional Incident Command Post (ICP) vests
- Actioning program enhancements to address CNSC recommendations

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.10.5 Fire Protection Program Effectiveness

Fire exercises/evacuations were conducted in the Heating Plant, the RE Building and the KOB in 2022. There were no significant findings identified as a result of these exercises.

The objective of the fire protection program is to promote life safety, the conservation of property and essential equipment, the protection of the environment and the continuity of operations through provisions of fire prevention and fire protection measures. Nordion met all scheduled activities related to the fire protection program in 2022. An annual facility condition inspection was conducted by a third party in 2022.

2.10.6 Fire Protection Program Activities

The Fire Protection Program Activities that took place in 2022 include:

- Testing of the fire safety plans. This test involved evacuation of the Heating Plant and RE buildings by activation of the building fire alarm system, and a test of the KOB fire safety plan and emergency response plan which included participation with Ottawa Fire Services.
- Conducting ten fire and environmental inspections
- Conducting an annual facility condition inspection

A fire protection program audit was conducted in 2022 and is conducted every three years as required by Canadian Standards Association (CSA) standard N393, "Fire protection for facilities that process, handle, or store nuclear substances".

2.10.7 Fire Protection Program Performance

Overall, compliance with the Fire Protection Program was satisfactory.

2.10.8 Fire Protection Program Improvements

Improvements to the Fire Protection Program in 2022 included:

- Conducting a Fire Protection Program Audit
- Updating the Fire Safety Plan

There were no changes to training, methods, instrumentation, or equipment in 2022.

2.11 Waste Management**2.11.1 Effectiveness of Waste Segregation and Minimization**

Nordion production facilities have been designed and operated in a manner to prevent radioactive waste being released to municipal garbage or sewer systems and to ensure that releases to the environment via air or water emissions are within limits approved by the CNSC. All radioactive waste that is generated through the production operations is collected and sent to a CNSC approved radioactive waste management facility.

Nordion has designated space and processes to store and separate radioactive waste that is generated in Operations. Long term decay storage areas are located in the KOB active shipping/receiving facility. Space is also designated for storage of containers and management of waste being prepared for shipment to the external waste management facilities.

Nordion's non-radiological waste diversion rate in 2022 was 70.1% which is slightly higher than 2021 diversion rate of 66.3%.

2.11.2 Identification and Characterization of Waste Streams

Due to the nature of radioisotope production that involves decay and contamination products, identification of individual isotopes and their respective quantities in waste material is difficult. Nordion has worked with a radioactive waste management facility to identify waste streams that are determined by the major isotope product in a given facility. Data for the actual waste activity levels are estimated from activity in the production volume and waste streams.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.11.3 Waste Shipments

Table 14 provides a summary of solid waste material shipped to [REDACTED]. In 2022, there were no shipments to [REDACTED] of radioactive liquid waste from Nordion's Class 1B Facility.

Table 15 provides a summary of solid waste, shipped to [REDACTED] in 2022. Solid waste sent to [REDACTED] is no longer compacted, as compacted wastes are unfavourable for this disposal route, and the waste volumes shown in Table 15 represent uncompacted waste volumes.

Spent Co-60 sealed sources may be returned to Nordion from customers where [REDACTED] or included with other product material for disposal. In 2022, 186 low activity sources totalling [REDACTED] were disposed at [REDACTED] in routine waste shipments (included in the values shown in Table 14).

Table 14
Radioactive Solid Waste Shipments to [REDACTED] for 2022

Isotope	Volume (m ³)	Bq	Ci
Co-60	[REDACTED]	[REDACTED]	[REDACTED]

Table 15
Radioactive Solid and Low-level Liquid Waste Shipments to [REDACTED] for 2022

Isotope	Weight (kg)	Volume (m ³)	Bq	Ci
Co-60	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

2.11.4 Waste Management Program Performance

- Nordion diverted an estimated 70.1% of waste from landfill in 2022.

The waste management program was audited in late 2021 (finalized in 2022) and is on a three-year frequency for internal auditing. Nordion has an annual waste audit conducted by a third party (non-hazardous waste only).

2.11.5 Waste Management Program Improvements

Improvements to the Waste Management Program in 2022 included the following:

[REDACTED] No sources shipped to [REDACTED] for disposal [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

2.12 Nuclear Security

Details of Nordion security and any security improvements of 2021 were provided in the Nordion Physical Security Report and Security Plan for 2022, submitted in February 2022. These safeguards and improvements are prescribed information and were reviewed and accepted by CNSC Security.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.13 Safeguards and Non-proliferation**2.13.1 Safeguards Program Effectiveness**

Nordion has a safeguards program that meets the safeguards requirements of the CNSC regulatory document REGDOC 2.13.1-Safeguards and Nuclear Material Accountancy, CNSC *Nuclear Non-Proliferation Import and Export Control Regulations*, the *Nuclear Safety and Control Act* and *General Nuclear Safety and Control Regulations*.

2.13.2 Safeguards Program Performance

In 2022, Nordion performed accounting and reporting of nuclear material as required by REGDOC 2.13.1-Safeguards and Nuclear Material Accountancy. Nordion completed a Physical Inventory Taking (PIT) of safeguarded material from which there were no findings.

Nordion was not selected for an International Atomic Energy Association (IAEA) Physical Inventory Verification (PIV) in 2022.

There was an IAEA Complementary Access conducted at Nordion on October 20th, 2022, for a baseline measurement on Cell 1.

2.13.3 Safeguards Program Improvements

As of December 31st, 2022, an additional ten DU packages were granted exemption by the IAEA: four of model number 3300 and six of model 3750.

2.14 Packaging and Transport of Nuclear Substances

Nordion routinely ships nuclear substances in Type B, Type A and Excepted packages. Nordion also routinely ships waste materials in these same package types. Shipments of Nordion's products are made via road, air, and sea. Shipments of waste are routinely made via road transport.

In 2022, Nordion shipped approximately [REDACTED] packages containing radioactive materials.

The Packaging and Transportation Program at Nordion provides a high-level overview of Nordion's transportation of radioactive materials program. The program applies to employees involved in design, production, use, inspection, maintenance and repair of packages, and the preparation, consigning, handling, loading, carriage, storage during transport, receipt at final destination, and unloading of packages. It applies to various types of packages including Type A, Type B, and Excepted packages. The content of the program was modeled on regulatory requirements listed in the CNSC *Packaging and Transportation of Nuclear Substances Regulations 2015*, Transport Canada *Transportation of Dangerous Goods Regulations*, IAEA *SSR-6 Regulations for the Safe Transport of Radioactive Material (2018 Edition)*, US DOT 49 CFR, and US NRC 10 CFR part 71.

In 2022, Nordion reported two non-conformances related to packaging and transport of nuclear substances. One of these reportable non-conformances was reported as "dangerous occurrences" pursuant to subsection 37(1) of the Packaging and Transportation of Nuclear Substances Regulations, the other reported non-conformance was reported pursuant to subsection 26 of the Packaging and Transportation of Nuclear Substances Regulations. Refer to Appendix A for further information regarding these incidents.

2.15 Public Information Program**2.15.1 Indigenous Engagement Activities**

In June 2022, Nordion participated in a Nuclear Waste Management Organisation (NWMO) event with the Algonquins of Pikwakanagan First Nation (AOPFN) on the AOPFN priorities for radioactive waste management in Canada.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Based on recent interventions from indigenous communities to the CNSC's 2021 regulatory oversight reports, Nordion developed a more formal Indigenous Engagement plan in December 2022. As a first step in this plan, Nordion reached out to the AOPFN and has scheduled Cultural Awareness Training for Nordion's senior leadership team for early April 2023.

2.15.2 Public Information Program Activities

Nordion is committed to fully disclosing its activities to the public to maintain transparency to the surrounding community and to the City of Ottawa. Nordion's website is the primary communications vehicle. In 2022, 2176 unique users visited the social responsibilities page of the Nordion.com website.

In absence of offering on-site facility tours to the general public, Nordion offers the general public a glimpse into our campus through an online Nordion Virtual Tour.

In 2022, Nordion published the following information in the "Public Disclosure" web page:

- May: Short circuit in a piece of safety system equipment that triggered a call to the Ottawa Fire Services during a routine on-site cleaning.
- June: on-site familiarization visits for Ottawa Fire Services Personnel.
- May and September: two false fire alarms triggered by the sprinkler flow switches caused an evacuation of the facility.
- October: emergency response plan training exercise with the City of Ottawa Emergency Response teams.
- Q1, Q2, Q3, and Q4: 2022 Event reports.

Nordion's website includes a feedback survey form in the Social Responsibility section as a mechanism to invite the public to provide feedback on Nordion's Public Information Program and to learn how the public would like the program to evolve. In 2022, there were no questions pertaining to Nordion's public information program received through the general contact form.

Nordion issues news releases to inform the public of company initiatives, achievements, and issues that the business may be facing. In 2022, there were no media articles related to Nordion environment, health and safety issues or topics. As the context of media coverage referring to Nordion was business-oriented, there was no media analysis of public opinion.

On December 22nd, 2022, Nordion published an ad in the *Community Voice*, a bi-weekly newspaper distributed to 85,000 homes and businesses across Ottawa and the surrounding areas. The ad underlined Nordion's ongoing commitment to protect the safety of employees, the community and the environment, referred to the Kanata facility as a Class 1B nuclear facility, noted that Nordion is certified to ISO 14001, an international standard for environmental management systems; and encouraged the public to contact Nordion with any questions, comments, or concerns.

2.15.3 Public Information Program Summary of Questions/Concerns Raised by the Public

There were no specific questions or concerns raised by members of the public in 2022.

2.15.4 Public Information Program Improvements

There were no significant changes to the Public Information Program in 2022.

2.16 Financial Guarantee

The Financial Guarantee, as approved by the Commission and based on the Facility's Decommissioning Plan, remains valid and in effect.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

2.17 Site Specific Information

Nordion's site-specific reporting requirements are as follows:

- Nordion shall submit a written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs, and methods, referred to in the licensing basis,
- Nordion shall, when aware that an action level has been reached, notify the Commission within seven days,
- Nordion shall prepare and submit to the Commission an Annual Compliance Report by March 31st of each year,
- Nordion shall report the transfer, receipt, export or import of sealed sources if the activity exceeds the threshold limits and within the specified timeframes as detailed in the LCH,
- Nordion shall report annually to the CNSC on the status of the financial guarantee, to inform that it remains valid, in effect and adequate to fund decommissioning of the facility.

In 2022, Nordion submitted written notification of changes to programs and documents to the CNSC as required.

In 2022, there were no exceedances of action levels.

Nordion submitted its Annual Compliance Report to the CNSC on March 31st, 2022.

In 2022, there were no events with regards to sealed source reporting.

Nordion continues to work on continuous improvements to sealed source reporting processes as required.

Nordion complied with all other site-specific reporting requirements. Throughout 2022, the Nordion decommissioning financial guarantee remained effective and compliant with CNSC requirements. Nordion submitted a 5-year update to its preliminary decommissioning plan (PDP) as required in 2020. In December 2021, Nordion received the CNSC comments on the 2020 PDP submission. In early 2022, Nordion submitted a response to these comments as well as an updated revision to the 2020 submission to remove the decommissioning activities and costs for which BWXT Medical is responsible under their CNSC operating license (issued in November 2021). As of December 2022, Nordion continued to work with the CNSC to have the updated PDP accepted. The updated PDP was accepted by the CNSC in February 2023.

3 FUTURE PLANS AND CONCLUDING REMARKS**3.1 Improvement Plans and Future Outlook**

In 2020, work was initiated for the installation of an additional cell (Cell 1) in Nordion's COF. This work is expected to be completed in 2023.

Nordion is planning to implement increased storage rack capacity within the Cobalt Operations Facility in 2023.

The forecasted plans for next year that would require CNSC regulatory oversight are as follows:

- License amendment due to the sale of Nordion's Medical Isotopes business to BWXT Medical, when BWXT Medical obtained an operating license from the CNSC.
- The installation of an additional cell (Cell 1) in Nordion's COF.

3.2 Safety Performance Objectives for 2023

Nordion's 2023 EHS Program Objectives and Targets and Health and Safety Objectives are shown in Table 16.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

3.3 Concluding Remarks

Based on the information provided in this report, Nordion continues to demonstrate its capacity to operate in a manner that protects the safety of employees and causes no adverse effects to the public or the environment.

Table 16
2023 EHS Program Objectives and Targets

Objective	Measure/Target *
Timely Regulatory Action Closure	<ul style="list-style-type: none"> • Ensure timely closure of regulatory actions (90% completed within 60 days)
EHS Management System Effectiveness	<ul style="list-style-type: none"> • Ensure documents under your ownership are maintained and reflect current practices • Overall percentage of overdue training ≤ 2%
Minimize the number and extent of occupational injuries	<ul style="list-style-type: none"> • The number of Medical Treatment Incidents ≤ 1 • Lost time Incidents = 0
Minimize the use and release of hazardous materials to the environment and ensure adherence to permissible levels	<ul style="list-style-type: none"> • Radioactive materials emissions to ≤ 2.0% DRL (Ottawa) • Reportable releases of radioactive and non-radioactive hazardous materials to the environment (sanitary or storm sewer, air, groundwater, land) = 0
Actively limit radiation doses to employees as per ALARA principle	<ul style="list-style-type: none"> • Maximum employee dose rate < 7.5 mSv/yr
Maintain a healthy safety culture. *	<ul style="list-style-type: none"> • Actively participate in the behavioural based safety culture program (Fullmark and other safety discussions and training) <ul style="list-style-type: none"> ○ Target: 90% participation rate • Immediately report, and where possible, correct near-misses and hazard identifications <ul style="list-style-type: none"> ○ Target: Safety Improvement Rate – 110 (includes near miss reports, hazard identifications, etc). ○ Target: 30 safety walkthroughs over the year • Immediately report injuries and suspected ergonomic symptoms to your manager

* Note: Some Health and Safety Targets have been established to promote safety culture only and are therefore not measurable.

 2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

APPENDIX A 2022 Reportable Events

Date of Occurrence	Incident No.	Description	Causes	Corrective Actions
February 26, 2022	22-01	The sample chamber for the Nordion GammaCell 220 was not allowed to engage in the fully shielded position due to a piece of coolant tubing being in the path of the chamber.	Equipment – the coolant tubing had been allowed to hang next to the irradiator sample chamber which resulting in a piece of the tubing being in the path of the sample chamber.	Radiation fields were measured and deemed acceptable, and the tubing was removed and repaired. A Nordion Service Technician assessed the GammaCell unit, and it was determined to be functioning properly
March 29, 2022	22-03	It was identified that Nordion had exported model RSL 2089 Co-60 sources using a CNSC export license that only allowed for the export of model C-188 sources.	This was an uncommon situation where two different source models were to be exported. Nordion's systems and processes require improvement to ensure compliance with the source models allowed by CNSC export licenses.	Modifications were made to Nordion's CBS-based system for sealed source licensing to include multiple source models and to track compliance with related license conditions. Updates were made to process to clarify when multiple source models may be shipped in a single shipment
April 8, 2022	22-05	Nordion shipped an empty trailer to a domestic Co-60 supplier that had an area with fixed contamination. Nordion had assessed the contamination to be below exemption levels but it was ultimately determined that the contamination was above exemption levels and the shipment should have been designated as Class 7.	Nordion and the supplier used different methods to assess the level of fixed contamination. Ultimately Nordion concurred that the supplier's methodology was likely more robust and the conveyance should have likely been designated as Class 7.	The trailer was taken out of service for additional decontamination. The supplier and Nordion confirmed expectations for measuring fixed contamination levels. Nordion also updated its contamination monitoring program as a result of this occurrence.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Date of Occurrence	Incident No.	Description	Causes	Corrective Actions
May 20, 2022	22-06	A fire alarm went off in the KOB/KRMF facility, tripped by the sprinkler system flow switch. Ottawa Fire Services arrived on site. There was no fire, and this was a false alarm.	Malfunction of the sprinkler system flow switch.	The flow switch and related alarm panel modules were replaced.
June 6, 2022	22-07	The fire alarm panel triggered indicating an issue at a pull station within the Facility. Ottawa Fire Services were dispatched and arrived on site.	This was a result of a faulty pull station that shorted due to cleaning of the surrounding walls. This pull station is in the BWXT leased area.	Measures were implemented to prevent water from the required cleaning in the area from causing issues with pull stations.
June 22, 2022	22-08	A Nordion contract carrier carrying a shipment of Co-60 sources was involved in a minor traffic accident while in transit. The transport packages were not affected by the accident.	The contract carrier was involved in a minor traffic accident in Ontario, caused by another vehicle.	There were no corrective actions by Nordion or the contract carrier.
September 5, 2022	22-11	A fire alarm sounded, staff was evacuated, and Ottawa Fire Services arrived on site. There was no fire, and this was a false alarm.	The root cause was found to be a faulty check valve.	The faulty check valve was replaced. All other check valves in the system were inspected to ensure proper functionality. The flow trip timer was increased from 29s to 39s.

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

Nordion Depleted Uranium Transport Containers

SN	Activity (GBq)	SN	Activity (GBq)
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

[REDACTED]

[REDACTED]

2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility



2022 Annual Compliance and Operational Performance Report - Nordion Class 1B Facility

