Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

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Date : 2021-08-18
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Supplementary Information

Renseignements supplémentaires

Written submission from Ontario Power Generation Inc.

Mémoire de Ontario Power Generation Inc.

In the Matter of

À l'égard de

Application for a licence amendment to authorize activities related to the production and possession of Molybdenum-99 (Mo-99) at the Darlington Nuclear Generating Station (NGS)

Demande de modification de permis en vue d'obtenir l'autorisation de produire du molybdène 99 (Mo-99) à la centrale nucléaire de Darlington

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Public Hearing - Hearing in writing based on written submissions

Audience Publique - Audience fondée sur des mémoires

September 2021

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Septembre 2021

Canada

ONTARIO POWER GENERATION

Steve Gregoris
Senior Vice President
Darlington Nuclear

P.O. Box 4000
Bowmanville ON L1C 3Z8

Tel: 905-623-6670 ext 7030099
Fax: 905-697-7596

steve.gregoris@opg.com

July 23, 2021

NK38-00531 P
NK38-CORR-00531-22562 P

Mr. M. Leblanc
Commission Secretary,
Canadian Nuclear Safety Commission
P.O. Box 1046
280 Slater Street
OTTAWA, Ontario
K1P 5S9

Dear Mr. Leblanc:

Darlington NGS – Molybdenum-99: Complementary Information to the Request for Amendment to the Darlington Nuclear Generation Station Reactor Operating Licence 13.02/2025

The purpose of this letter is to provide the Canadian Nuclear Safety Commission, referred to as the "Commission", with a technical summary of the design, operation and safety of the proposed Molybdenum-99 Isotope Irradiation System (Mo-99 IIS), also referred to as the Target Delivery System (TDS). This submission is intended as supplemental information to support the Commission's review of OPG's request to amend the Darlington NGS Power Reactor Operating Licence (PROL) 13.02/2025 to add, as a new activity, Molybdenum-99 (Mo-99) medical isotope production (References 1 and 2).

Over the years, the traditional Mo-99 supply, which uses enriched uranium targets, has encountered numerous challenges with unreliable production. The Mo-99 IIS medical isotope project, which uses natural molybdenum, is an important initiative for the nuclear industry and the medical community. Once operational it will provide a means to carry out the majority of medical diagnostic procedures to significantly support the health of Canadians, while reducing concerns related to nuclear proliferation and nuclear waste by-products associated with traditional Mo-99 production.

Attachment 1 provides a technical summary of the Mo-99 IIS, which includes an overview of the system's design, operation and safety case.

The technical summary is based on the completion of over 600 documents and assessments, which were submitted to CNSC staff, over more than two years to ensure a robust safety case and an open and transparent regulatory process. The assessments conclude that the proposed activities to support production of Mo-99 do not pose any additional risk to continued safe reactor operation, environmental protection and worker and public safety, and comply with all applicable regulatory requirements. The assessments demonstrate that the Mo-99 IIS will have a negligible impact on Darlington's licensing basis governance, programs and processes.

OPG has managed the design and construction of the Mo-99 IIS in compliance with industry codes and standards, and rigorous processes, including OPG's well established Engineering Change Control process, to ensure the modification is implemented based on a robust design and safety case. The Darlington PROL amendment to add this new activity is sought to allow OPG to continue to final stages of installation, followed by operation of the Mo-99 IIS.

Should you have any questions, please contact Ms. Paulina Herrera, Manager, Darlington Regulatory Affairs, at (289) 387-0520.

Sincerely,

Steve Gregoris
Senior Vice President
Darlington Nuclear
Ontario Power Generation Inc.

Attach.

cc: Mr. J. Burta – CNSC (Ottawa)
Site CNSC Supervisor
cnsc.forms-formulaires.ccsn@canada.ca

References:

1. OPG letter, S. Gregoris to M. Leblanc, “Darlington NGS - Application for Darlington Nuclear Generating Station Power Reactor Operating Licence 13.01/2025 Amendment”, December 5, 2018, CD# NK38-CORR-00531-20359.

2. OPG letter, S. Gregoris to M. Leblanc, “Darlington NGS - Molybdenum-99: Addendum to the Request for Amendment to the Darlington Nuclear Generating Station Power Reactor Operating Licence 13.02/2025”, February 11, 2021, CD# NK38-CORR-00531-22275.

ATTACHMENT 1

OPG letter S. Gregoris to M. Leblanc, “Darlington NGS – Molybdenum-99: Complementary Information to the Request for Amendment to the Darlington Nuclear Generation Station Reactor Operating Licence 13.02/2025”

CD# NK38-CORR-00531-22562

CONFIDENTIAL / RESTRICTED DOCUMENTATION

Molybdenum-99 Isotope Irradiation System Technical Summary

Prepared By: C. Horne
Checked By: J. Chapin

ATTACHMENT 1

Molybdenum-99 Isotope Irradiation System Technical Summary

1.0 MODIFICATION OVERVIEW

Molybdenum-99 (Mo-99) is an essential medical isotope, which is used in over 40 million heart, cancer, and bone diagnostic scans annually worldwide. Over the past 10 years, the Mo-99 industry has been challenged with unreliable production, uncertain long-term supply, and proliferation concerns, resulting in Mo-99 price increase and worldwide shortage.

In a response to the increasing market demand for medical radioisotopes in an industry that is currently undersupplied and under resourced, the Mo-99 Isotope Irradiation System (Mo-99 IIS) Project was launched in collaboration between BWXT-Medical and Laurentis Energy Partners (LEP), a wholly-owned subsidiary of Ontario Power Generation (OPG).

The project is to support a new business venture for the production of the Mo-99 radioisotope at the Darlington Nuclear Generating Station (NGS). Darlington NGS was selected as the location of production, as the Darlington reactors have an ideal flux to irradiate natural molybdenum targets in unused Adjuster Absorbers (AA) rods location(s), which are currently locked out of the reactor core.

The modifications associated with this project have followed OPG best practices, including OPG's well established and rigorous Engineering Change Control (ECC) process. Additional rigour was implemented within the process due to the nature of First of a Kind innovation required for this modification.

2.0 OPERATIONAL OVERVIEW

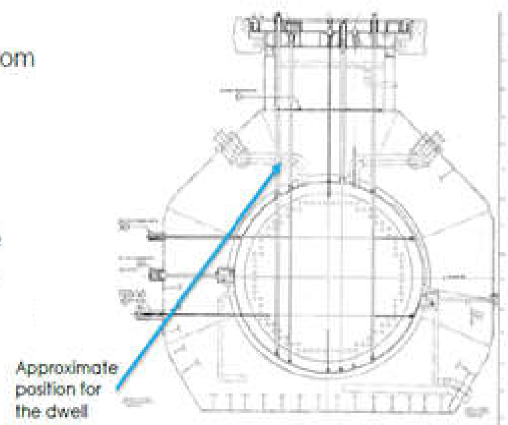
The purpose of the Mo-99 IIS, also referred to as the Target Delivery System (TDS), is to transfer natural molybdenum (Mo-98) target capsules through a qualified containment boundary and position them inside the reactor for irradiation by neutron capture to form Mo-99.

The term "target seeding" refers to the activity of inserting, through a qualified containment boundary, new (un-irradiated) molybdenum targets into the reactor core for irradiation. During seeding, the targets are propelled from the new target loader through the open outboard containment valves into a target airlock using instrument air, and from the target airlock into the target elevator using heavy water (D_2O). Refer to Figures 1 and 2. A basket and winch assembly is then used to safely lower the targets into the reactor core for neutron capture. The natural molybdenum target capsules are expected to irradiate [redacted] which there will be a sufficient quantity of Mo-99 generated for Technetium-99 (Tc-99m) processing.

The term "target harvesting" refers to the activity of withdrawing the irradiated targets from the reactor core. The target basket is raised to just above reactor level to allow the targets to dwell for a [redacted] period to allow high energy, short lived radioisotopes time to decay. The Reactivity Mechanism Deck (RMD) will provide the required shielding. Refer to Figure 1. The irradiated target capsules then enter the airlock from the target elevator through the inboard-side containment valves via low curie moderator grade D_2O circulation flow, while the outboard-side containment valves are closed. Refer to Figure 2.

Figure 1 – Harvest, Seed and Dwell of the Mo-99 IIS

- **Harvesting** is defined as transferring targets from the dwell position to the inside the transportation flask with the shield plug inserted.
- **Seeding** is defined as transporting the targets from the New Target Loader (NTL) to the reactor core.
- **Dwell**
  - Target Basket is raised to a position above the calandria to cease irradiation and allow high activity short-lived isotopes to decay -

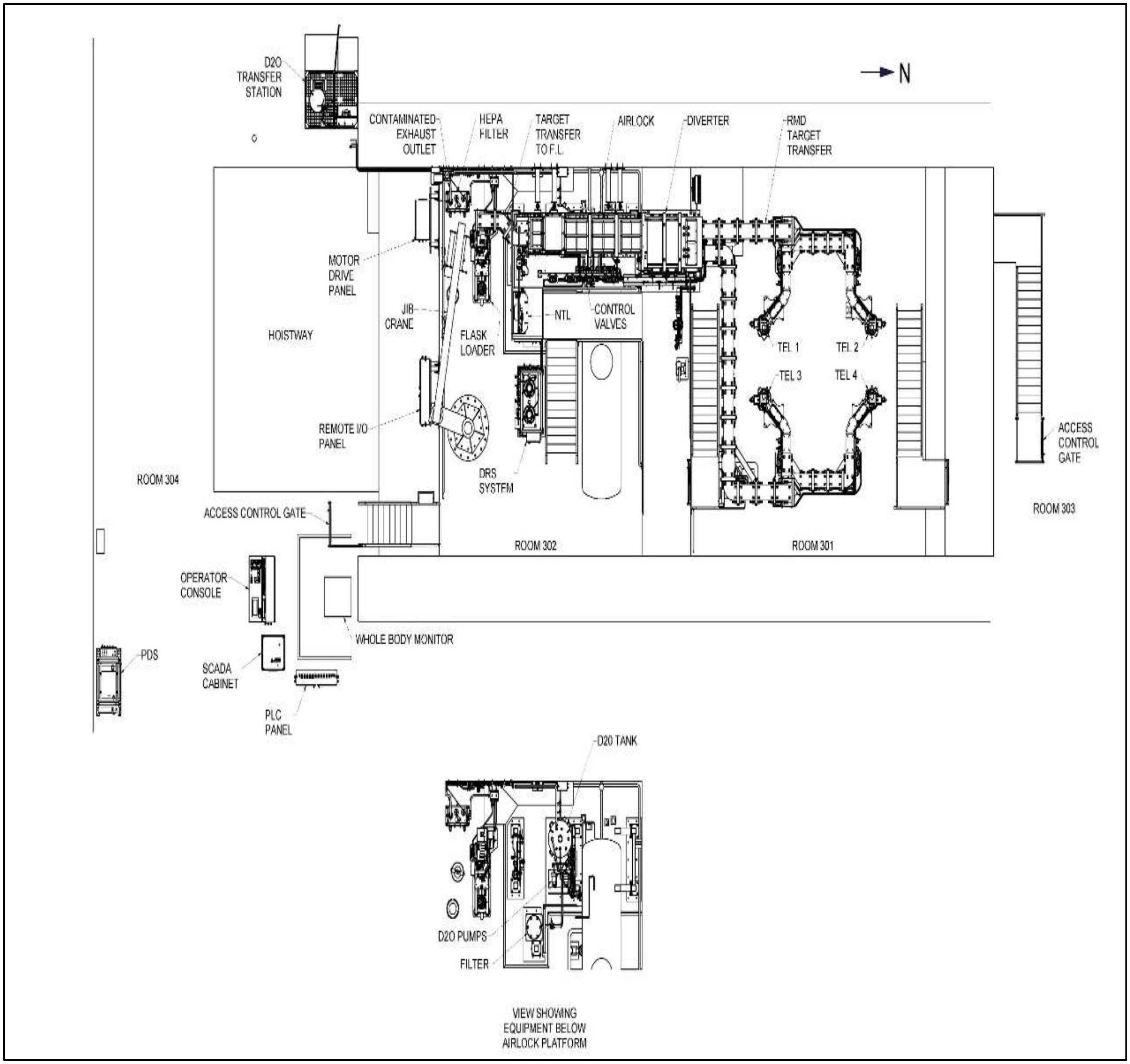


When transfer of irradiated target capsules to the airlock is complete, the inboard-side containment valves are closed, placing the target capsules in the target airlock cavity outside of containment. The target airlock cavity is then purged by station instrument air[redacted]. Refer to Figure 2. The TDS harvest operations are completed when the outboard-side valves are then opened, and the target capsules are pneumatically transferred out of the target airlock to a heavily shielded flask using station instrument air.

The Mo-99 IIS will essentially be an automated system requiring few operator actions with appropriate monitoring to ensure proper operation of the system. Fail-safe actions are incorporated into the system design to ensure the system operates in a safe manner even in the event of reactor perturbations. Alarm response, diagnostics and resolution are all built into the design of the Mo-99 IIS system control panel, and will be incorporated into OPG's procedures and training programs.

Mo-99 IIS operations will be governed by a strong operations program utilizing a robust training program, Operating Experience (OPEX) and procedures. OPG's Conduct of Operations program will ensure that the Mo-99 IIS system is operated safely. Human Factors engineering has been incorporated into the design and construction of Operator interface panels, as well as Operator OPEX. Radiation protection and As Low As Reasonably Achievable (ALARA) principles have also been integral in the design of the system. [redacted] Titanium was selected for the basket cable to reduce long-lived activation. The inboard target propulsion will use low curie D_2O.

Figure 2 – Mo-99 IIS Overview



3.0 SYSTEM OVERVIEW

A three dimensional (3D) rendering of the Mo-99 IIS is shown in Figure 3. The Mo-99 IIS system can be broken down into three different categories as follows:

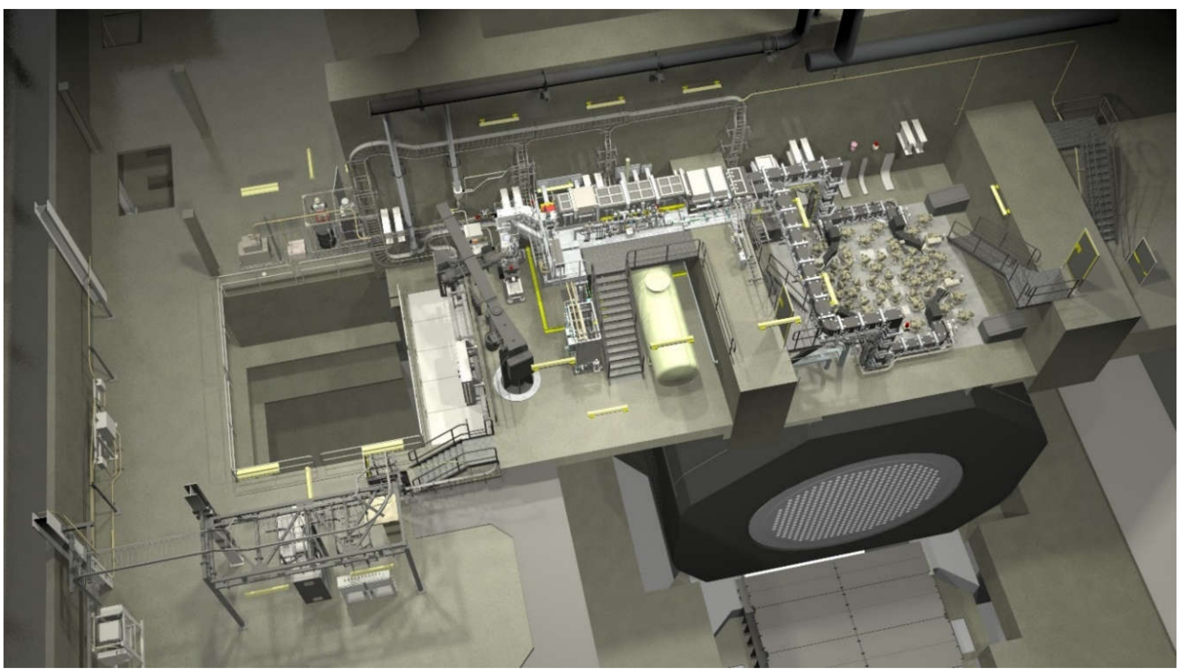
- Reactor Interfacing Components
- Non-Reactor System Components
- Station Tie-In Components

Each of the components will be installed in phases to align with the overall implementation strategy at Darlington NGS. The interfaces between the systems are highly integrated to ensure that there are minimal impacts to the Mo-99 IIS system, as well as the reactor itself.

The reactor components of the system will be installed in Room (Rm) 301 (RMD) and the non-reactor components and station tie-in components will be installed in Rm 302, Rm 303 and Rm 304. The control equipment for the Mo-99 IIS will also be connected into both the Main Control Room (MCR) and Control Equipment Room (CER) to give Authorized Nuclear Operators (ANO) the ability to monitor the system through status indicators and control the system through a permissive switch. [redacted] considerations relating to system decommissioning have been built into the overall design.

Access gates at the entry points to Rm 301 and Rm 302 will be installed as a barrier to assist in preventing personnel from entering these rooms during target harvesting, until the target capsules are stored in the flask. The access gates provide a logic to stop target movement if either gate is opened during target harvesting. This will also cause an alarm on the local control console and an MCR generic Mo-99 IIS trouble alarm.

Figure 1 - 3D Rendering of Mo-99 IIS System



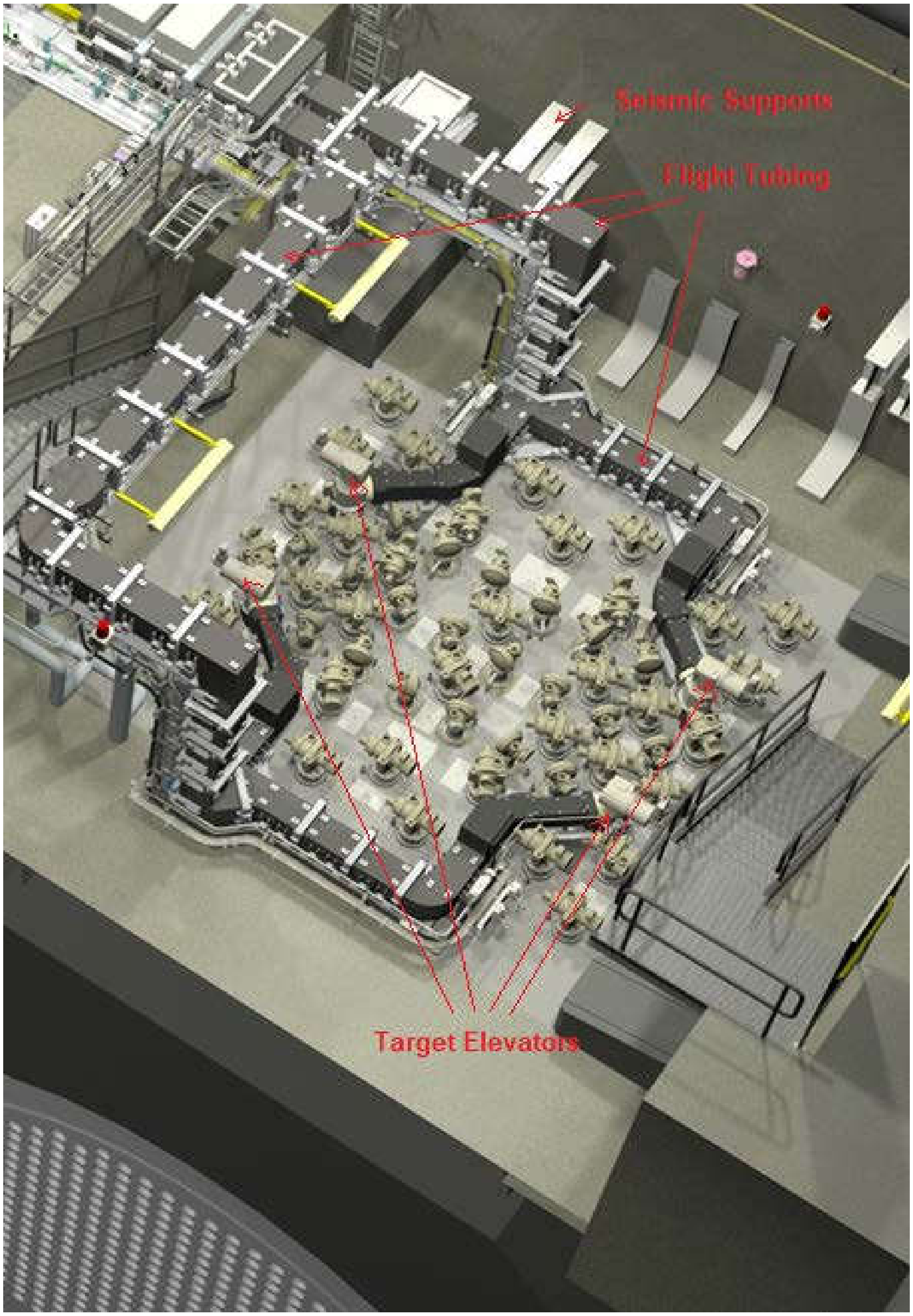
3.1 Reactor Interfacing Components

The reactor interfacing components will make use of four existing Adjuster Guide Tubes of Adjuster Absorber (AA) rods that were permanently locked out of core in the late 1990s. Removal of the locked out AA rods will be safely completed during a Unit outage using existing procedures and best practices from Darlington Refurbishment. Once safely removed, the Mo-99 IIS reactor interfacing components can be installed. All components will be installed on the existing RMD (Figure 4) in Rm 301.

Figure 2 - Darlington RMD (Rm 301)

The design of the Mo-99 IIS has incorporated clearances from existing mechanisms to allow maintenance and operational checks to occur with minimum interferences. The design of the equipment is also seismically qualified to ensure no safety systems are compromised during operations. Figure 5 shows the 3D rendering of the Mo-99 IIS with the mechanisms in place.

Figure 3 - 3D Rendering of Mo-99 IIS on RMD



The main reactor interfacing components on the RMD are as follows:

- Target Elevators
- Flight Tubing
- Seismic Supports

The primary function of the reactor interfacing components is to allow for insertion/removal of natural molybdenum targets into/out of the reactor core and then to transfer the targets to the target airlock (Non-reactor interfacing component). [redacted]

[redacted]

[redacted]

3.1.1 Target Elevators

Target elevators are installed into the newly vacated AA guide tube wells (AA1, AA8, AA17 and AA24) of the RMD. The primary function of each target elevator is to safely lower and raise the Mo-99 target basket containing the target capsules into the high flux region of the reactor. The main components of the target elevator are the basket and the winch assembly, which uses cabling similar to the existing AA rod design. [redacted] The materials used in both the basket and winch cable designs incorporates OPEX to ensure maximum tensile strength under irradiated conditions. The target elevator housing is made of stainless steel to reduce radiation levels. A mechanical seal is utilized at the bottom of the target elevator when low curie D_2O is introduced to start movement of the targets from the elevator through the flight tubing.

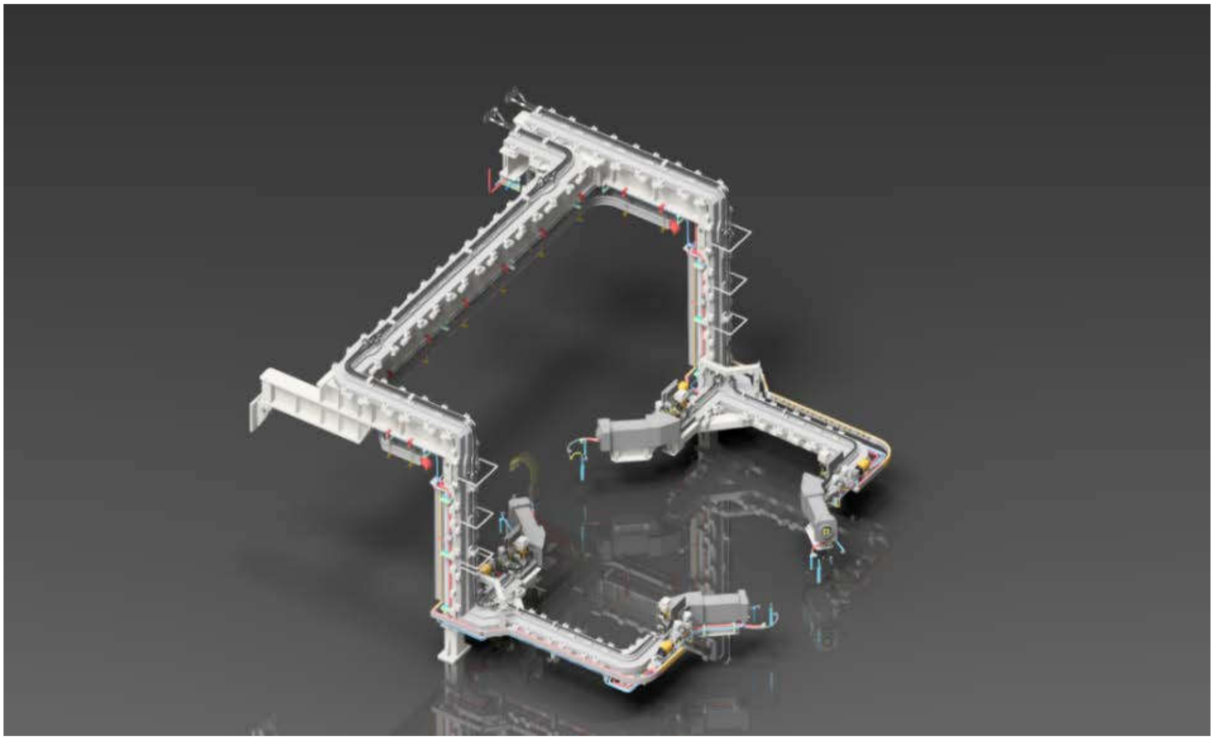
[redacted]

[redacted]

3.1.2 Flight Tubing

The flight tubing refers to shielded pipework to facilitate the transport of targets through the system. Refer to Figure 8. Due to the radioactivity of the irradiated Mo-99 targets, [redacted] shielding blocks are utilized to allow transfer of targets through the system while keeping dose rates ALARA.

Figure 6 – 3D Rendering of Flight Tubes Leaving Target Elevators



3.1.3 Seismic Supports

The supports incorporated into the design of the Mo-99 system are to ensure the system remains functional and in tact during a seismic event, and meet the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (BPVC), Section III: "*Rules for Construction of Nuclear Facility Components, Division 1 - Subsection NF-Supports*". The supports and pipework have been analyzed and modelled to ensure the support structures have the strength to not cause damage to Mo-99 IIS equipment or adjacent Darlington safety system equipment.

3.2 Non-Reactor Interfacing Components

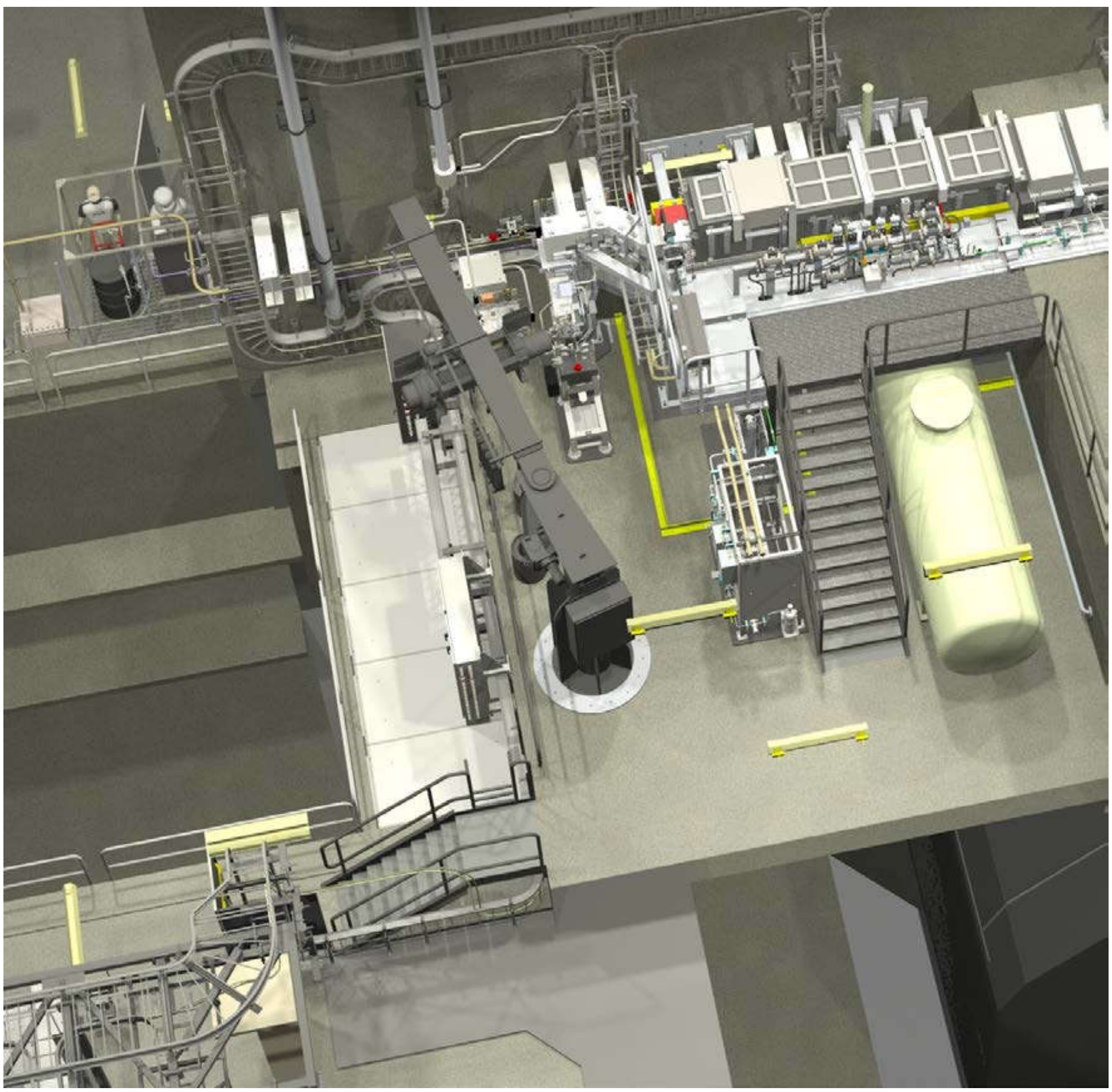
The non-reactor interfacing components of the Mo-99 IIS enable the safe movement of targets into the core for seeding operations and into the flask for harvesting operations. The control system and electrical panels also make up an important part of the TDS. Other support hardware such as the jib crane, D_2O transfer station and Deuterium Recombination System (DRS) are additional pieces of equipment to support safe harvesting activities at Darlington NGS. Figure 9 shows an overview of the non-reactor interfacing components on the 115m elevation at Darlington NGS in Rms 302 and 304.

The main non-reactor interfacing components are defined as follows:

- Diverters
- Target Airlock
- Flask Loader
- New Target Loader
- DRS
- Control Panel
- Other Support Components

Each of these components play an important role in ensuring human, plant and reactor safety are maintained as the highest priority.

Figure 7 – 3D Rendering of Non-Reactor Interfacing Components in Rm 302 and Rm 304



3.2.1 Diverter

The diverter system [redacted] configures the correct path between the target airlock and the four target elevators during harvest and seeding operations. [redacted] The diverter operation is automatically controlled from the local control panel and will only allow targets from the appropriate flight tubes to reach the target airlock.

The diverter is a pneumatically actuated component. Target capsules are routed through different flight paths [redacted]. [redacted]

[redacted]

[redacted]

3.2.2 Target Airlock

The target airlock serves as the primary containment boundary for the Mo-99 IIS and additionally dries the irradiated targets of low curie D_2O prior to transfer to the flask. Refer to Figures 11 and 12. As with most containment systems, the target airlock has dual redundant containment valves to minimize loss of containment risk. The target airlock is also connected to the station air [redacted] to the station's contaminated exhaust supply. The target airlock is made of stainless steel to reduce radiation levels during target harvesting.

Figure 9 - 3D Rendering of Target Airlock

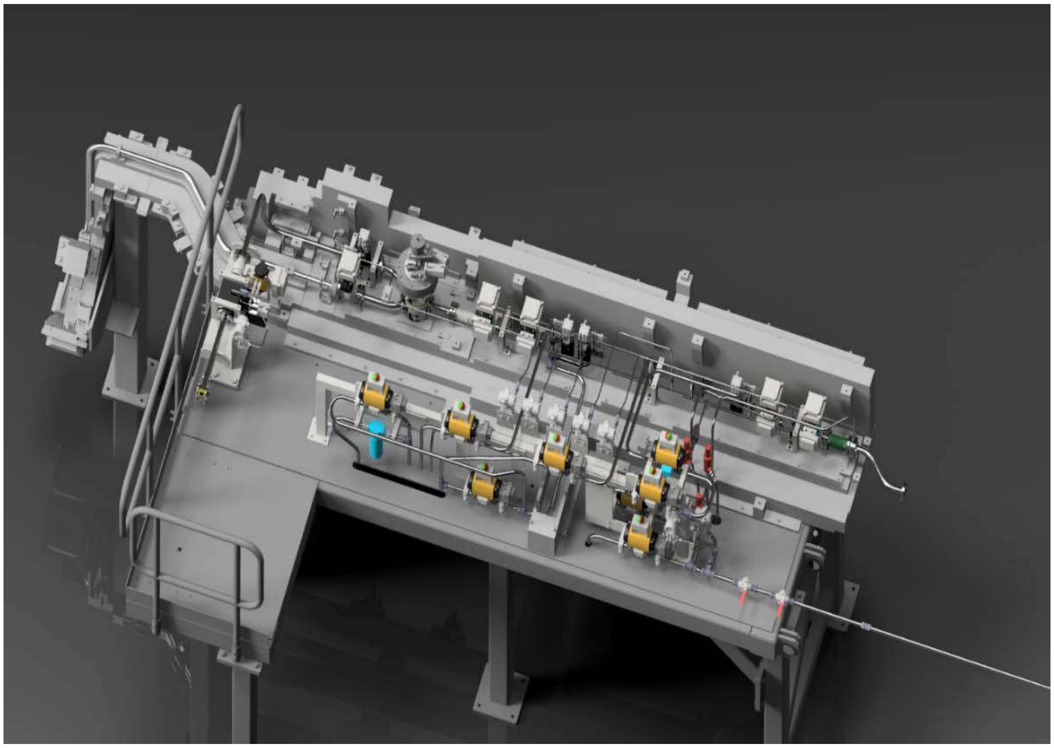
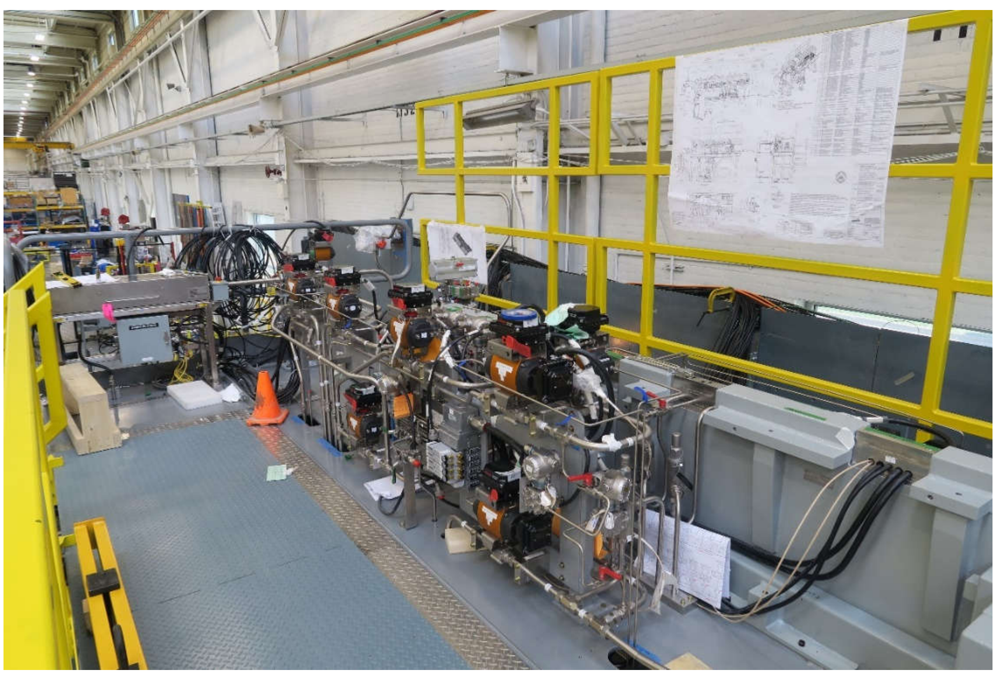


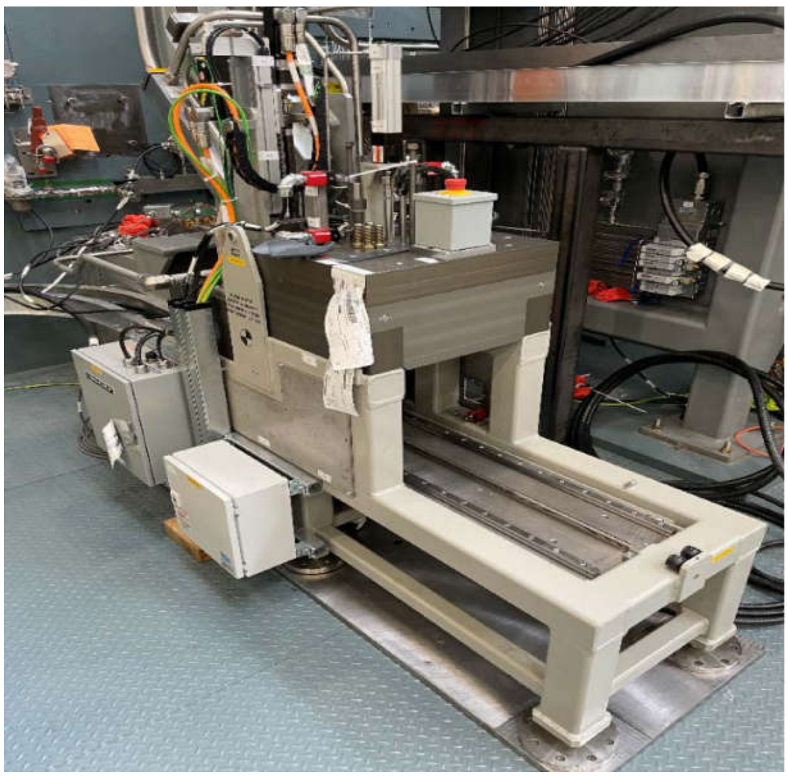
Figure 10 - Target Airlock Assembled at BWXT-Medical Mock-up Facility in Peterborough



3.2.3 Flask Loader

The flask loader is designed to accept irradiated target capsules from the pneumatic supply system and insert them into a Type B certified transportation package. Refer to Figure 13. The flask loader will be capable of shielding the flask during target capsule loading and insertion of the flask cover. [redacted] the flask loader receives the target capsules and deposits them [redacted] into the flask magazine. The flask loader contains a tie-in to the contaminated exhaust system to minimize spread of any contamination. The sequence of lid removal/re-installation is automated to minimize radiation exposure to workers. The loaded Type B transportation package is lowered for transportation onto the 100m elevation by the newly constructed jib crane. The transportation package will be certified by CNSC staff as a Type B transportation packaging and will meet all Type B regulatory requirements.

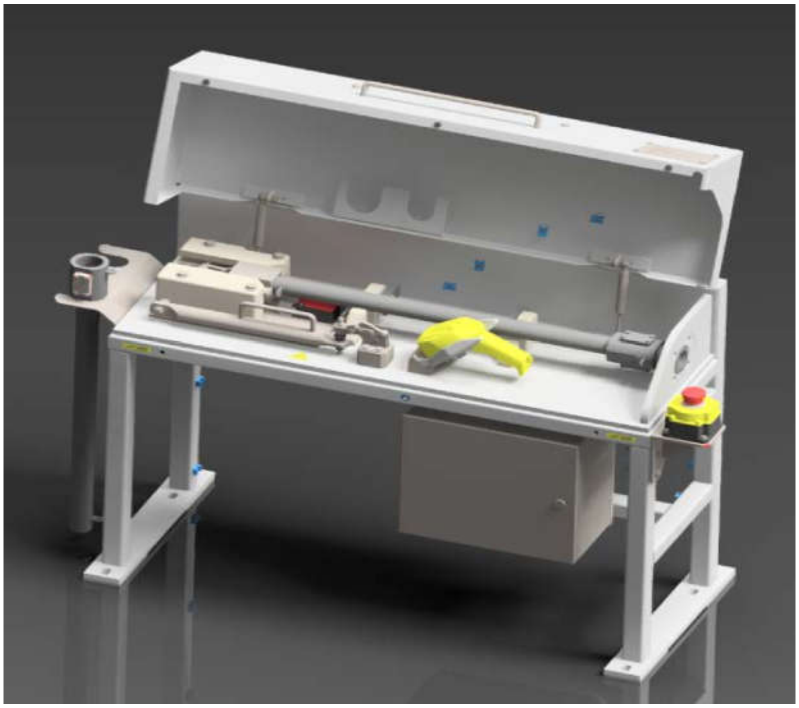
Figure 11 - Assembled Flask Loader



3.2.4 New Target Loader

The new target loader is used to load new (un-irradiated) target capsules into the pneumatic transfer system. Refer to Figure 14. The target loader transfers target capsules [redacted] into the pneumatic flight tube and then transfers the target capsules to the airlock [redacted]

Figure 12 – 3D Rendering of New Target Loader



[redacted]

[redacted]

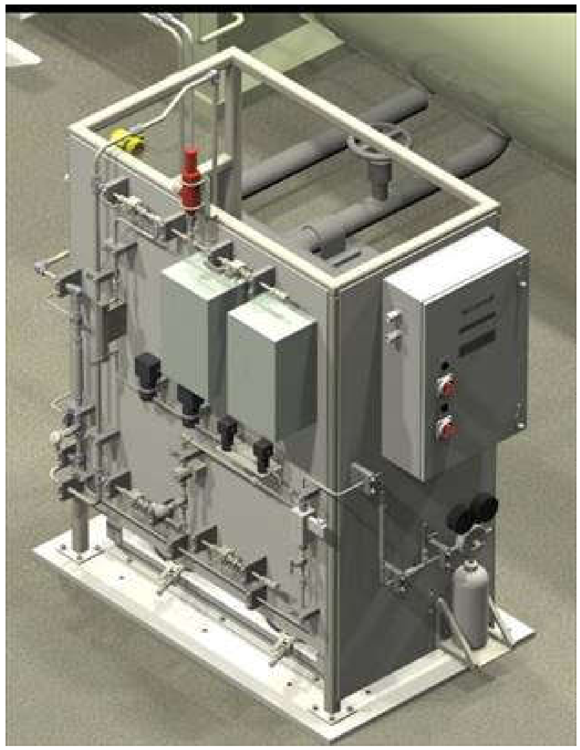
3.2.5 Deuterium Recombiner System

The DRS is used to limit the amount of deuterium gas that accumulates in the target elevators and the existing AA guide tube thimbles during reactor operation. [redacted]

[redacted] Refer to Figure 16.

This system also provides for periodic sampling of the Moderator Cover Gas that is recirculated from the four target elevators, [redacted]

Figure 14 - 3D Rendering of the Deuterium Recombination System



3.2.6 Mo-99 IIS Control Panel

The Mo-99 IIS local control panel will contain the indications, controls and alarms necessary to operate the system safely. Refer to Figure 17. Human Factors Engineering was integral in ensuring the design of the control panel met the requirements for operators to harvest/seed Mo-99 targets with minimal confusion or disruption. Safe shut down sequences and alarm indications ensure that the system is only run under normal operating conditions. Panel control cannot proceed until the interconnect switches in the MCR are closed (i.e. given permissives from Unit ANO). The Human Machine Interface (HMI) of both the panel and MCR allow for monitoring during system operation.

An additional control panel was built for the Darlington Learning Center to allow operators to train during simulated field conditions, thus improving overall proficiency to run the system safely.

Figure 15 - Mo-99 IIS Local Control Panel

3.2.7 Additional Support Systems

The following components also support the operation of the system:

- **D_2O Reservoir and Pumps –** Ensures the D_2O loop of the system is at a level which will allow safe propulsion of Mo-99 targets through the system. This system also collects D_2O from the airlock drying process.
- **D_2O Transfer Station –** Allows filling of the D_2O reservoir from low curie D_2O drums, or to drain the D_2O reservoir for maintenance of the system.

[redacted] **Flask Jib Crane –** Used to raise/lower the Mo-99 transportation package between Rm 302 and the 100m elevation. [redacted]

- **Exclusion Zone Gates -** Two sets of gates, one in Rm 303 and the other in Rm 304, will be installed to control access to Rooms 301 and 302 during target harvesting.
- **Electrical Panels –**New electrical support panels will be installed in Rooms 302 and 304. Refer to Figure 18.

Figure 16 - Electrical Panel to Support Mo-99 IIS Operation

3.3 Station Tie-In Components

The integration with existing station systems was the final crucial part of the design. It was imperative that the impact of the Mo-99 IIS on existing station systems was minimized. The main interfaces between the Mo-99 IIS and the station are as follows:

- **Instrument Air**: Used to operate the Mo-99 IIS pneumatically operated valves, and used for propulsion of the targets on the outboard side of the airlock to the flask and from the new target loader to the airlock.
- **Moderator Cover Gas**: The DRS will circulate and sample Moderator Cover Gas from the four guide tubes to ensure that an accumulation of deuterium gas does not pose a deflagration risk during harvesting.
- **Class II and Class III Electrical Power**: The Mo-99 IIS will be supplied from the electrical power distribution system. To prevent targets from being stalled in the flight tubing in the event of an interruption of electrical power, the highly reliable sources of power (Class II and III) will be used.
- **Contaminated Exhaust System**: The Mo-99 IIS exhaust system will connect to the Darlington NGS contaminated exhaust system.
- **MCR Panel and Annunciation System**: Status indications and an operation permissive pushbutton will be added to an MCR panel (Panel 006) to permit the ANO to monitor and authorize permissives for the system operation.

Other additional station tie-ins to LAN, phone and auxiliary systems have also been included as part of OPG's ECC Process.

3.4 Design Testing

[redacted] the design of the system has gone through additional testing and rigour to validate design assumptions. For each phase of the design, most major components have gone through both concept testing and prototype testing to validate assumptions. The overall system will also go through individual component testing followed by system integration testing and factory acceptance testing. All of these activities involve OPG oversight and witness points to ensure rigorous testing protocols.

Once the system is on-site, each phase of the project will have specific check-out testing to be completed prior to progressing to the next phase. All of these tests are completed prior to final system commissioning, which also includes rigorous testing and checks prior to declaring the system operational. The tools required for installation and maintenance of the Mo-99 IIS system will also be tested in accordance with OPG's ECC process on a mock-up prior to first use.

4.0 REACTOR SAFETY

The Safety and Control Area "*Physical Design*" in the Darlington NGS Licence Conditions Handbook requires that design modifications be "c*ontrolled such that the plant is maintained and modified within the limits prescribed by the design and licensing basis*." Accordingly, OPG ensures that any modifications made to the facility are in accordance with OPG's ECC process, and Canadian Standards Association (CSA) N291, "*Requirements for safety-related structures for CANDU nuclear power plants*" and N290.0, "*General requirements for safety systems of nuclear power plants*". This process ensures that the modification is accurately reflected in the safety analysis in compliance with the requirements and conditions set out in the Darlington NGS Power Reactor Operating Licence (PROL), including CNSC regulatory documents REGDOC-2.4.1, "*Deterministic Safety Analysis*", REGDOC-2.4.2, "*Probabilistic Safety Assessment (PSA) for Nuclear Power Plants*" and CSA standard N286.7, "*Quality assurance of analytical, scientific and design computer programs for nuclear power plants*".

OPG completed an Integrated Nuclear Safety Analysis, which documents the nuclear safety and operational assessments completed in support of the permanent modifications associated with installation and operation of the Mo-99 IIS. A final integrated safety analysis was performed to providing an integrated and complete collection of rationale and evidence demonstrating the safety of the installation and operation of the Mo-99 IIS and compliance with all applicable regulatory requirements.

The safety assessment performed included detailed assessments of potential new initiating events, the potential for impact on the existing safety analyses, impacts on the Probabilistic Safety Assessment (PSA) elements, and operational impacts. The following is a summary of the conclusions from these assessments:

- The event identification and classification identified 11 new events and potential impact on three existing analyses reported in the Darlington Safety Report.

- Parametric reactor physics and thermal hydraulic assessments show that installation and operation of the TDS and production of isotopes have no detrimental impact on reactor safety and reliable operation of the station.
- Detailed operational assessments indicate that there are no significant impacts on operation, other than potential constraints in channel selection for fuelling due to local power increases following harvesting. These impacts include:
    - Unit conditions which may delay TDS harvesting and reseeding, or require additional measures for compliance with action limits on bundle power.
    - A new Reactor Safety Guarantee for the Over Poisoned Guaranteed Shutdown State (OPGSS) and a restriction on operation in Drained Guaranteed Shutdown State (DGSS) when targets are not secured in the target elevator.
- Analyses performed show that:
    - Dose consequences for out-of-core events are either bounded by existing analyses or are significantly less than the allowable single failure dose limits.
    - There is no potential for deflagration following a postulated loss of moderator inventory (LOMI) due to the presence of the TDS system.
    - There is no significant impact on the neutron overpower trip set point due to the installation or operation of the TDS.
- A detailed review of the existing Darlington NGS Safety Report demonstrated that the introduction of the TDS has no impact on existing accident progression or consequences and that the potentially impacted appendices are not adversely affected.
- Three events were identified which could impact the Level 1 At-Power Internal Events PSA. All other initiating events and potential hazards were screened out.
- The impacts on the existing PSA elements were identified and qualitative analysis shows that the overall impacts from the TDS on the quantification of Severe Core Damage Frequency (SCDF) and Large Release Frequency (LRF) in the various PSA elements is expected to be low.

Based on the safety and operational assessments, installation and operation of the Mo-99 IIS will have no significant impact on the safe operation of Darlington NGS. Thus, the systems and components important to safety will continue to meet their design basis, and the protective and emergency mitigating systems will continue to meet their design objectives.

TDS commissioning will confirm consistency with TDS design and the reactor response to seeding and harvesting of the target strings, also ensuring OPG’s procedures are consistent with long term operation of the TDS and OPG’s reactivity management practices.

5.0 ENVIRONMENTAL PROTECTION

OPG's first priority is the safety of the public and employees, protection of the environment and continued safe unit operation. OPG completed an assessment of the impact of the Mo-99 IIS on the environment, and determined that the proposed system will not create an unacceptable environmental impact from a human health and ecological risk perspective.

[redacted]

6.0 SUMMARY

This modification follows OPG's ECC process for permanent modifications and applies the rigour and vendor oversight required to ensure quality deliverables are provided. The design of the system has undergone over three years of innovation, testing and analysis to support the current robust design. The fail-safe operation and integration with existing station systems has been examined thoroughly to ensure minimal impacts on day-to-day operations at the station, and will be confirmed during final commissioning.

The extensive reactor safety analysis and assessments of the design and operation demonstrate a minimal impact on current Darlington NGS operations, safety systems, and safety analysis results. The safety assessments conclude that the proposed activities to support production of Mo-99 will not compromise continued safe reactor operation, environmental protection and public safety.

Overall, the Mo-99 IIS is a safe, well-controlled system which will allow OPG to deliver life saving isotopes back to the medical communities that need them the most.

Summary of Regulatory Commitments, Regulatory Obligations and Regulatory Management Actions Made/Concurrence Requested

NK38-CORR-00531-22562

Submission Title: **Darlington NGS – Molybdenum-99: Complementary Information to the Request for Amendment to the Darlington Nuclear Generation Station Reactor Operating Licence 13.02/2025**

Regulatory Commitments (REGC):

No.	Description	Date to be Completed
	None	

Regulatory Management Action (REGM):

No.	Description	Date to be Completed
	None	

Regulatory Obligation Action (REGO):

No.	Description	Date to be Completed
	None	

Concurrence Requested: None