EVR-LIC-G0-004-NP, Revision 0
“Factory Manufacturing and Assembly of the **eVinci™** Microreactor”
(Non-Proprietary)

Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

REVISION SUMMARY

Revision	Revision Description
0	Initial Issue

OPEN ITEMS

Open Item #[1]	Section	Open Item Description	Status
None			

[1] Identification, approval and tracking of open items is defined in project approved procedure, W3-6.1-003.

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Acronyms and Trademarks

Acronyms used in the document are defined in EVR-PGD-GX-001 (Reference 1) or included below to ensure unambiguous understanding of their use within this document.

Acronym	**Definition**
AEA	Atomic Energy Act
ARCOP	Advanced Reactor Construction Oversight Program
CDA	Control Drum Assembly
CFR	Code of Federal Regulations
CNA	Canadian Nuclear Association
CNSC	Canadian Nuclear Safety Commission
COL	Combined License
CP	Construction Permit
CSA	Canadian Standards Association
DC	Standard Design Certification
ESP	Early Site Permit
FA	Focus Area
FOAK	First-of-a-Kind
HALEU	High-Assay, Low-Enriched Uranium
IAEA	International Atomic Energy Agency
ICE	Instrumentation, Control, and Electrical
IMC	Inspection Manual Chapter
ISA	Integrated Safety Analysis
ISO	International Standards Organization
ITA	Inspections, Tests, and Analysis
ITAAC	Inspections, Tests, and Analysis, and Acceptance Criteria
LRQA	Lloyd's Register Quality Assurance
LTC	Licence to Construct
LTO	Licence to Operate
LTPS	Licence to Prepare Site
LWR	Light Water Reactor
MC&A	Material Control and Accounting
ML	Manufacturing License
NEI	Nuclear Energy Institute
NHSI	Nuclear Harmonization and Standardization Initiative
NOAK	N^{th}-of-a-Kind
NRC	Nuclear Regulatory Commission
NSCA	Nuclear Safety and Control Act
NSRST	Non-Safety-Related with Special Treatment
OL	Operating License
PCS	Power Conversion System
PHX	Primary Heat Exchanger
QA	Quality Assurance
QMS	Quality Management System
RXS	Reactor System
SDA	Standard Design Approval
SMR	Small Modular Reactor

SNM	Special Nuclear Materials
SR	Safety-Related
SRA	Shutdown Rod Assembly
SSC	Structure, System, or Component
TRISO	Tristructural Isotropic
VDR	Vendor Design Review

Glossary of Terms

Standard terms used in the document are defined in EVR-PGD-GX-001 (Reference 1) or included below to ensure unambiguous understanding of their use within this document.

Term	Definition
eVinci Microreactor Facility	The collection of installed structures, systems, and components (SSCs) within the operating site boundary. This is equivalent to the term "power plant" for a traditional site.
Important to Safety	SSCs important to safety shall include safety systems, complementary design features, safety support systems, and other SSCs whose failure may lead to safety concerns (e.g., process and control systems). Appropriately designed interfaces shall be provided between SSCs of different classes in order to minimize the risk of having SSCs less important to safety adversely affecting the function or reliability of SSCs of greater importance. Important to safety is equivalent to safety-related (SR) and non-safety-related with special treatment (NSRST) SSCs.
Manufacturing Facility(ies)	The location where eVinci microreactors are manufactured and where several Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) will be closed. The Manufacturing Facility(ies) includes the following buildings: [ ][a,c]
Safety-Related	SSCs that are credited in the fulfillment of RSFs and are capable to perform their RSFs in response to any Design Basis Hazard Level.
Non-Safety-Related with Special Treatment	Non-safety-related SSCs that perform risk-significant functions or perform functions that are necessary for defense-in-depth adequacy.

References

Following is a list of references used throughout this document.

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3. EVR_LTR_230011, "Notice of Intent for CNSC-NRC Joint Report Reviews in 2023," Westinghouse Electric Company LLC.
4. EVR_LTR_230012, "Notice of Intent for CNSC-NRC Joint Report Reviews in 2023," Westinghouse Electric Company LLC.
5. 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," U.S. Nuclear Regulatory Commission.
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7. Canadian Nuclear Association (CNA) and Nuclear Energy Institute (NEI) Joint Report, "Canadian and United States Regulatory Cooperation for New Nuclear Deployment: Recommendations for Implementation of the International Regulatory Efficiency Framework," September 2023.
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13. REGDOC-1.1.2, Version 2, "Licence Application Guide: Licence to Construct a Reactor Facility," Canadian Nuclear Safety Commission, October 2022.
14. REGDOC-1.1.3, Version 1.2, "Licence Application Guide: Licence to Operate a Nuclear Power Plant," Canadian Nuclear Safety Commission, July 2022.
15. REGDOC-1.1.5, Version 1.0, "Supplemental Information for Small Modular Reactor Proponents," Canadian Nuclear Safety Commission, August 2019.
16. REGDOC-2.3.1, Version 1.0, "Conduct of Licensed Activities: Construction and Commissioning Programs," Canadian Nuclear Safety Commission, January 2016.
17. CSA N286:12 (R2022), "Management system requirements for nuclear facilities," CSA Group, June 2012.
18. REGDOC-2.13.2, Version 2, "Import and Export," Canadian Nuclear Safety Commission, April 2018.
19. REGDOC-3.5.1, Version 2.1, "Licensing Process for Class 1 Nuclear Facilities and Uranium Mines and Mills," Canadian Nuclear Safety Commission, February 2022.

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21. ISO 9001:2015, “Quality management systems,” International Standards Organization.
22. ISO 19443:2018, “Quality management systems — Specific requirements for the application of ISO 9001:2015 by organizations in the supply chain of the nuclear energy sector supplying products and services important to nuclear safety (ITNS),” International Standards Organization.
23. N299.1:19, “Quality Assurance Program Requirements for the Supply of Items and Services for Nuclear Power Plants, Category 1,” CSA Group.
24. EVR-LIC-G0-003, Revision 0, “Deployment Model,” Westinghouse Electric Company LLC.
25. EVR-LIC-GG-021, Revision 0, “Vendor Design Review Focus Area 21, Manufacturing,” Westinghouse Electric Company LLC.
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28. CNSC-NRC joint report, “Technology Inclusive and Risk-Informed Reviews for Advanced Reactors: Comparing the US Licensing Modernization Project with the Canadian Regulatory Approach,” Canadian Nuclear Safety Commission, August 2021 (Available via NRC ADAMS Accession Number ML21225A101).
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1.0 Introduction

Westinghouse Electric Company LLC (Westinghouse) has initiated pre-application review activities for the **eVinci™** microreactor with both the Canadian Nuclear Safety Commission (CNSC) and the U.S. Nuclear Regulatory Commission (NRC) (collectively, the regulators). In Canada, Westinghouse has initiated the Vendor Design Review (VDR) and has submitted the Phase 1 focus area (FA) reports for CNSC review. In the United States, Westinghouse has submitted white papers and some topical reports to the NRC for feedback and approval, respectively, on select topics related to the eVinci microreactor. Westinghouse plans to continue pre-application engagement in both countries to support licensing under the Canadian and U.S. regulatory frameworks.

To support pre-application activities, Westinghouse finds it beneficial to have several eVinci microreactor topics reviewed jointly. As identified in the "Memorandum of Cooperation on Advanced Reactor and Small Modular Reactor Technologies among the United States Nuclear Regulatory Commission, the Canadian Nuclear Safety Commission and the United Kingdom Office for Nuclear Regulation" (Reference 2), and consistent with the objective to collaborate on pre-application reviews for advanced reactors, Westinghouse is submitting this report to the CNSC and the NRC for a joint review.

This report is Westinghouse's second submission for CNSC and NRC joint review, as described in EVR_LTR_230011 to the NRC (Reference 3), and EVR_LTR_230012 to the CNSC (Reference 4). This pre-application activity takes place under the NRC, CNSC and ONR Memorandum of Cooperation (Reference 2).

1.1 Purpose

The purpose of this report is for Westinghouse to provide additional information regarding manufacturing, reactor module assembly, and factory fuel loading in a manufacturing facility as part of the eVinci microreactor deployment strategy and to request specific CNSC and NRC responses associated with those topics. This report also includes suggestions for potential opportunities for increased cooperation between the CNSC and NRC on inspection and oversight activities.

Westinghouse recognizes that there is regulatory risk associated with specific elements of its deployment strategy. These elements include manufacturing, assembly, and fuel load of the eVinci microreactor module in a manufacturing facility. Historically, manufacturing complete reactor modules, final module assembly, including fuel load, in a manufacturing facility have not historically been performed in the U.S. and Canada. Traditionally, final assembly, including fuel load, activities have only occurred at the intended reactor operating site. Since Westinghouse's deployment strategy includes some first-of-a-kind (FOAK) elements, this report seeks to reduce regulatory risk by engaging with CNSC and NRC early and obtaining feedback on specific aspects of its deployment strategy.

Responses from the regulators will support future work to develop licence applications in Canada that reference the eVinci microreactor design, including licence to construct (LTC) and licence to operate (LTO), as applicable. Responses from the regulators will also inform Westinghouse's eVinci microreactor licensing strategy to enact deployment in the U.S. and will inform development of applications for licenses, certifications, approvals, and/or permits. For example, [

][a,c]

An ancillary purpose of this report is to support efforts by the CNSC and the NRC that advance regulatory cooperation, as discussed in the Canadian Nuclear Association (CNA) and Nuclear Energy Institute (NEI) joint report, "Canadian and United States Regulatory Cooperation for New Nuclear Deployment: Recommendations for Implementation of the International Regulatory Efficiency Framework" (Reference 7).

The CNA and NEI joint report from September 2023 (Reference 7) provides recommendations for improving collaborative efforts between the CNSC and NRC within the overall context of international regulatory efficiency. Westinghouse supports these efforts and believes that submittal of this report specifically advances the goals and recommendations discussed under Goal 2, “Regulatory Cooperation Agreements”. Westinghouse aligns with the following aspirational recommendations from the CNA/NEI report regarding regulatory cooperation:

1) The CNSC and NRC should establish a plan for increasing their regulatory cooperation over time in ways that increase the benefits of international regulatory efficiency enabled by “4 Star” (i.e., partial reciprocity) and “5-Star” (i.e., harmonization) regulatory cooperation agreements. CNSC and NRC should use their experience in regulatory cooperation to inform, and be informed by, the International Atomic Energy Agency (IAEA) Nuclear Harmonization and Standardization Initiative (NHSI).

2) The CNSC and NRC should expand regulatory cooperation by pursuing a) cooperation on additional designs that are common to Canada and the United States and b) additional bilateral cooperation agreements, or inclusion of other countries in the CNSC/NRC agreement, to bring international regulatory efficiency to more countries.

3) The CNSC and NRC should establish a mechanism for greater discussion with industry on the long-term regulatory cooperation goals and opportunities for near term cooperation.

To help ensure the safe development of small modular reactor and advanced reactor technologies and the efficient deployment of these technologies, Westinghouse encourages the CNSC and NRC to also consider avenues for efficient and effective cooperation on inspection and oversight of factory manufacturing and assembly, including fuel load, of the eVinci microreactor at the manufacturing facility.

1.2 Scope

This report provides Westinghouse’s strategy for manufacturing, reactor module assembly and factory fuel loading as part of the eVinci microreactor deployment in Canada and the United States. Westinghouse plans to manufacture, assemble, and load fuel in the eVinci microreactor at a manufacturing facility located in the United States. Performing these activities at a manufacturing facility, as opposed to an operating site, is a key element of the eVinci microreactor deployment model. This report discusses the Westinghouse strategy to receive the necessary licensing approvals for this step in the deployment model.

In addition, this report discusses the application of Westinghouse management systems and quality controls processes. Westinghouse also offers suggestions for potential cooperation consistent with the MOC between the CNSC and NRC on inspection and oversight of eVinci microreactor manufacturing, reactor module assembly, and fuel load at the U.S. factory.

Transportation of the eVinci microreactor, whether fueled or unfueled within the United States or into Canada from the U.S. manufacturing facility, is not within the scope of this report. Westinghouse plans to submit a separate report for joint CNSC and NRC review on this topic.

1.3 Request for Regulators

To further collaborative efforts on pre-application reviews for advanced reactors, Westinghouse is providing both the CNSC and NRC with additional information on the eVinci microreactor deployment strategy, with a focus on factory manufacturing, reactor module assembly, and fuel load. Based on the information provided in this report, Westinghouse is requesting responses on the following topics:

1) Considering long-lead procurement and manufacturing of equipment and components and assembly of the eVinci microreactor module, Westinghouse intends to pursue these activities as [ ][a,c] and under its NRC-approved Quality Management System (QMS). In addition:

1a) For deployment in Canada, Westinghouse requests feedback from the CNSC on its proposed strategy to perform initial assembly of the eVinci microreactor module, except for fuel load, [ ][a,c] and prior to issuance of an LTC, as discussed in Section 3.3.

1b) For deployment in Canada, Westinghouse requests feedback from the CNSC for regulatory oversight of manufacturing and assembly, except for fuel load, as well as commissioning of the eVinci microreactor module under an LTC at the manufacturing facility in the U.S, as discussed in Section 4.3.

2) For the proposed deployment strategy of performing fuel load of the eVinci microreactor at the manufacturing facility [

]a,c

3) The requirement in 10 CFR 52.167(c)(1) (Reference 5) specifies that a holder of an ML may not transport, or allow to be removed from the place of manufacture, the manufactured reactor except to the site of a licensee with either a construction permit (CP) under 10 CFR Part 50 (Reference 8) or a COL under Subpart C of 10 CFR Part 52.

[

]a,c

1.4 Applicable Regulatory Documents

1.4.1 Key U.S. Licensing Regulations and Guidance Documents

- **10 CFR Part 50**, “Domestic Licensing of Production and Utilization Facilities” (Reference 8)

  10 CFR 50.34 provides regulations for information to be included with a construction permit application and an operating license application.

- **10 CFR Part 52**, “Licenses, Certifications, and Approvals for Nuclear Power Plants” (Reference 5)

  10 CFR Part 52 governs the issuance of early site permits (ESPs), DCs, COLs, standard design approval (SDAs), and MLs for nuclear power facilities.

  10 CFR 52.47 provides requirements for technical information to be included with an application for a DC.

  10 CFR 52.73(a) notes that an application for a COL may (but is not required) reference a DC, SDA, or ML issued under 10 CFR Part 52 Subparts B, E, or F, respectively.

10 CFR 52.79 and 10 CFR 52.80 provide requirements for technical information to be included with an application for a COL.

10 CFR 52.137 provides requirements for technical information to be included in an application for SDA.

10 CFR 52.157 provides requirements for technical information to be included with an application for an ML.

10 CFR 52.153(b) notes that an ML applicant may reference a DC or SDA in its application.

10 CFR 52.167(c)(1) specifies that: "A holder of a manufacturing license may not transport or allow to be removed from the place of manufacture the manufactured reactor except to the site of a licensee with either a construction permit under part 50 of this chapter or a combined license under subpart C of this part. The construction permit or combined license must authorize the construction of a nuclear power facility using the manufactured reactor(s)."

Note: Section IV.B of each DC rule in the appendices to 10 CFR Part 52 specifies that the NRC reserves the right to determine in what manner the appendix may be referenced by an applicant for a CP or operating license (OL) under 10 CFR Part 50.

- **10 CFR Part 70**, "Domestic Licensing of Special Nuclear Material" (Reference 6)

  10 CFR Part 70 provides regulations for licenses to receive title to own, acquire, deliver, receive, possess, use, and transfer SNM. As part of the eVinci microreactor deployment model, a 10 CFR Part 70 Category II SNM license would be necessary to allow Westinghouse to receive, store, and load fuel at the manufacturing facility.

- **SECY-24-0008,** "Micro-Reactor Licensing and Deployment Considerations Fuel Loading and Operational Testing at a Factory" (Reference 9)

  In SECY-24-0008, the NRC staff documents near-term strategies for resolving several microreactor licensing and deployment issues. These proposed strategies do not rely on rulemaking. The NRC staff's considerations focus primarily on fuel loading and operational testing at a factory.

  One strategy proposed in SECY-24-0008 would change the historical definition of when a reactor is considered "in operation." This change would allow the holder of an ML to load fuel into a factory-fabricated microreactor at the fabrication facility without also having to obtain a CP and OL under 10 CFR Part 50 (Reference 8) or a COL under 10 CFR Part 52 (Reference 5). The proposed change would also require the ML holder to obtain a license under 10 CFR Part 70 (Reference 6) to receive title to own, acquire, deliver, receive, possess, use, and transfer SNM to facilitate fuel loading at the factory. However, as discussed in SECY-24-0008, operational testing of a factory-fabricated microreactor at the factory would require the ML and 10 CFR Part 70 Category II SNM license holder to also obtain a CP and OL or COL.

  The enclosure to SECY-24-0008 also discusses considerations for potentially resolving the following microreactor licensing and deployment issues, including:

  - Timeframe for authorization to operate at the operating site
  - Replacement of factory-fabricated modules at the operating site
  - Autonomous operation and remote operation
  - Transportation of fueled factory-fabricated modules
  - Storage of fuel after irradiation in a power reactor
  - Decommissioning process, decommissioning funding assurance, refurbishment, and refueling
  - Siting in densely populated areas

- Commercial maritime and space applications
- Commercial mobile microreactors

Several topics discussed in SECY-24-0008 apply to the content of this report, including fuel loading and timeframe for authorization to operate a microreactor at the operating site.

- **SECY-23-0048**, "Vision for the Nuclear Regulatory Commission's Advanced Reactor Construction Oversight Program (ARCOP)" (Reference 10)

SECY-23-0048 outlines the NRC staff's path to develop an effective and efficient construction oversight program for advanced reactors. The ARCOP framework reflects an approach to optimize the NRC's established oversight to respond to the evolving landscape of advanced reactor technologies. The ARCOP will provide reasonable assurance that advanced reactor facilities are built and will operate in accordance with their approved designs and licensing bases. The ARCOP will address each aspect of an effective oversight program (i.e., performance monitoring, enforcement, and assessment).

In SECY-23-0048, the NRC staff recognizes that many advanced reactor construction projects likely will rely more on factory assembly of safety-significant structures, systems, and components (SSCs) than previous projects, and onsite construction inspection, in some cases, may only be a small part of the integrated oversight of project quality.

The NRC staff envisions that the ARCOP could leverage available information, such as domestic and international vendor and manufacturer oversight information) to inform the inspection scope and provide additional performance monitoring data.

For example, the NRC staff could consider pooling inspection resources with other countries and crediting other countries' oversight activities when a manufacturer is producing SSCs for more than one country's licensees.

1.4.2 Key Canadian Regulatory Documents

- **Canadian Class I Nuclear Facilities Regulations** SOR/2000-204, May 31, 2000 (Reference 11)

Class 1 Nuclear Facilities Regulations outlines the licence stages followed by the CNSC's licensing process.

- **REGDOC-1.1.1**, "Site Evaluation and Site Preparation for New Reactor Facilities" (Reference 12)

REGDOC-1.1.1 outlines the level of facility design information required to support the site selection case.

- **REGDOC-1.1.2**, "Licence Application Guide: Licence to Construct a Reactor Facility," (Reference 13)

REGDOC-1.1.2 provides guidance for applicants to demonstrate that a reactor facility's design will conform to regulatory requirements for safe operation over the proposed facility's life. This includes ensuring the proposed construction and prior to fuel loading commissioning activities meet all applicable regulatory requirements.

REGDOC-1.1.2 identifies the submittal information necessary for an LTC application, including the management system used to validate that the SCCs have been fabricated and constructed in accordance with the design, encompassing procurement of equipment and services.

Once granted, an LTC permits a licensee to construct, commission and operate identified components of the facility (e.g., fire protection system). Some commissioning activities may demonstrate the facility was built according with the approved design and that the important to safety SSCs function as intended.

- **REGDOC-1.1.3**, "Licence Application Guide: Licence to Operate a Nuclear Power Plant," (Reference 14)

  REGDOC-1.1.3 provides guidance on the information necessary to support a licence to operate. An LTO will enable a licensee to complete final commissioning activities, including nuclear commissioning, and operate the facility.

- **REGDOC-1.1.5**, "Supplemental Information for Small Modular Reactor Proponents," (Reference 15)

  Applicants should use REGDOC-1.1.5, in conjunction with REGDOC-1.1.1 (Reference 12), REGDOC-1.1.2 (Reference 13), and REGDOC-1.1.3 (Reference 14), for requirements and guidance to submit a licence application for a small modular reactor (SMR).

  Section 3.2 of REGDOC-1.1.5 allows consideration of alternative approaches and/or graded approaches to meet the requirements in CNSC regulatory framework set out in REGDOC-1.1.1, REGDOC-1.1.2, and REGDOC-1.1.3.

- **REGDOC-2.3.1**, "Conduct of Licensed Activities: Construction and Commissioning Programs," (Reference 16)

  REGDOC-2.3.1 sets out requirements and guidance for the construction and commissioning of facilities in Canada that use nuclear reactors. This standard also requires that all construction, commissioning, and related activities be developed and implemented under the control of the licensee using a management system meeting the requirements of Canadian Standards Association (CSA) N286, Management system requirements for nuclear facilities (Reference 17).

- **REGDOC-2.13.2**, "Import and Export" (Reference 18)

  Part I of REGDOC-2.13.2 sets out the guidance for current and prospective licensees who intend to import or export nuclear and nuclear-related dual-use items, also known as controlled nuclear substances, equipment, and information.

- **REGDOC-3.5.1**, "Licensing Process for Class 1 Nuclear Facilities and Uranium Mines and Mills," (Reference 19)

  REGDOC-3.5.1 provides an overview of the licensing process for all stages of licensing, from initial application to abandonment, for Class I nuclear facilities and uranium mines and mills in Canada. The licensing process considers the requirements of the Nuclear Safety and Control Act (NSCA) and Class I Nuclear Facilities Regulations.

- **CSA N286-12**, "Management System Requirements for Nuclear Facilities," (Reference 17)

  CSA N286-12 is a key reference for the management system. Westinghouse's Quality Management System (QMS-A) (Reference 20) serves as a directive for all organizational functions in establishing the necessary policies and procedures that comply with the requirements of International Standards Organization (ISO) 9001 (Reference 21). Westinghouse will comply with the most recent ISO 9001 standard before the required compliance date.

  The Westinghouse QMS has been approved by Lloyd's Register Quality Assurance (LRQA) to ISO 19443:2018 (Reference 22).

- **CSA N299.1**, “Quality Assurance Program Requirements for the Supply of Items and Services for Nuclear Power Plants, Category 1,” (Reference 23)

  CSA N299.1 is the first in a series of four standards that encompasses the requirements and guidelines outlined in the entire N299 series of documents for a quality assurance (QA) program for the procurement of items and services to prevent the occurrence of nonconforming items or services. N299.1 is suitable for custom-designed, first-of-a-kind, high-technology items and services that tend to require many complex processes and extensive design effort by either customers or suppliers, or both.

2.0 Summary of the eVinci Microreactor Design and Facility Description

The eVinci microreactor is a 15 MW_t thermal neutron spectrum reactor that delivers high temperature heat from the reactor core through heat pipes and a primary heat exchanger (PHX) to an open-air Brayton power conversion system (PCS). The reactor system (RXS) design is shown in Figure 2-1.

The reactor core is enclosed within a canister filled with an inert gas just above atmospheric pressure to protect reactor components from oxidation while enhancing heat transfer. The core design consists of graphite blocks with repeated, segmented, hexagonal unit cells oriented horizontally along the length of the core. The unit cells contain channels for fuel, burnable absorbers, alkali metal heat pipes, and shutdown rods.

The reactor uses high-assay, low-enriched uranium (HALEU) tristructural isotropic (TRISO) fuel. The core is surrounded by a thick radial reflector that houses the control drums. The core alone, without the radial reflector, is subcritical, requiring the radial reflector to achieve criticality. Shielding attenuates gamma and neutron radiation to protect site personnel and the public during operation and transportation. The PCS receives reactor heat from the PHX and converts it from 15 MW_t to 5 MW_e (nominal) with an open-air Brayton cycle.

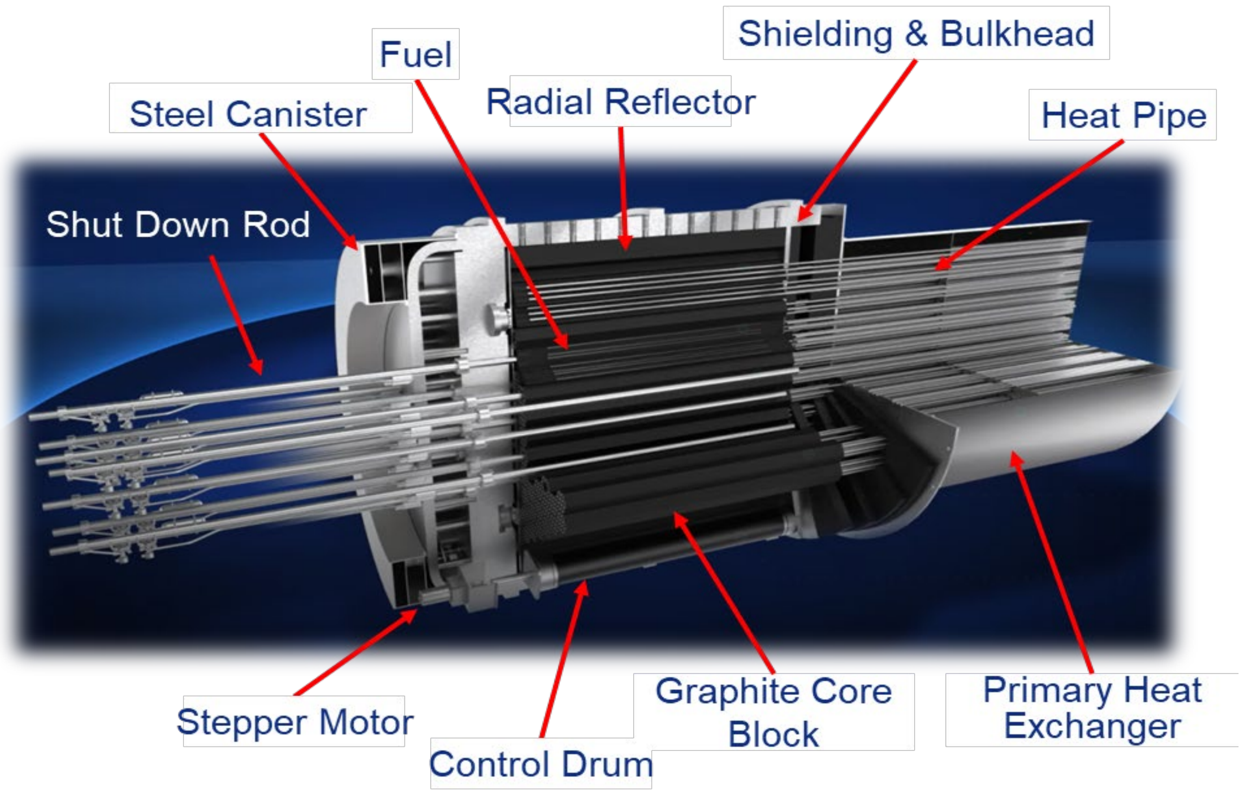

Figure 2-1 eVinci Microreactor Cutaway

The canister system does not function as a pressure vessel but instead as an element of the functional containment. During normal operation, the canister is pressurized just above atmospheric pressure with helium to eliminate oxidation of core components and increase thermal gap conductance. The design of the microreactor allows for decay heat removal through the core block, radial reflector, canister system, and shielding. Several layers of the TRISO fuel and the canister together represent the barriers that exist to preclude the release of fission products to the environment and collectively represent the functional containment.

Reactivity control is accomplished using control drums located on the periphery of the core and burnable absorbers in the core. Reactivity is monitored using the power range and source range neutron detectors. Shutdown can be achieved by two diverse and independent means: the shutdown rods and the control drums. Additional shutdown rods are used to address hypothetical accident conditions associated with the transportation of a fueled reactor and maintain a subcritical reactor during transportation.

The reactor is installed in a transportation cask for transportation. The secondary system (i.e., the power conversion system) and support systems, including instrumentation, control, and electrical (ICE) systems, are transported in separate shipping containers. The shipping containers can be transported to remote locations via truck, rail, or waterway.

The site will be prepared prior to shipment of the reactor and support systems. Prior to the reactor arriving to the site, construction and installation activities will commence and continue after the reactor's arrival to the site. Any necessary criticality testing will be performed after site construction and installation of the reactor. The site layout and connection between containers are designed to enable quick deployment. An illustration of the site layout is shown in Figure 2-2.

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Figure 2-2 eVinci Microreactor Site Layout Rendering

Limited onsite staff is needed to perform the necessary site activities such as operations, maintenance, and security. A remote monitoring station will be used to allow remote personnel to monitor reactor power operations.

A replacement reactor will be shipped to, and installed at, the site as the operating reactor reaches its end of fuel life. Once the primary reactor reaches its end of fuel life, it is shut down and the replacement reactor will begin operation and become the new primary reactor. The shutdown reactor is allowed to cool before being transported off site for refurbishment and refueling or for decommissioning. Spent fuel is not required to be stored on site.

3.0 eVinci Microreactor Licensing and Deployment Model

3.1 Introduction

Deployment of an eVinci microreactor in both Canada and the United States assumes that the eVinci microreactor module is manufactured, assembled, and fueled in a facility located in the United States. Section 3.2 provides an overview of the licensing strategy to enact deployment in the United States based on the NRC regulatory framework. Section 3.3 provides an overview of the CNSC regulatory framework for licensing the eVinci microreactor and considerations for deployment in Canada.

Westinghouse previously communicated details of the eVinci microreactor deployment model to the NRC in EVR-LIC-G0-003, “Deployment Model” (Reference 24) and provided an overview of this deployment model to the CNSC in VDR Focus Area 21 Report (Reference 25). The eVinci microreactor deployment consists of the steps shown graphically in Figure 3-1. For the purposes of this report, only the “assemble in factory” step is discussed in further detail below.

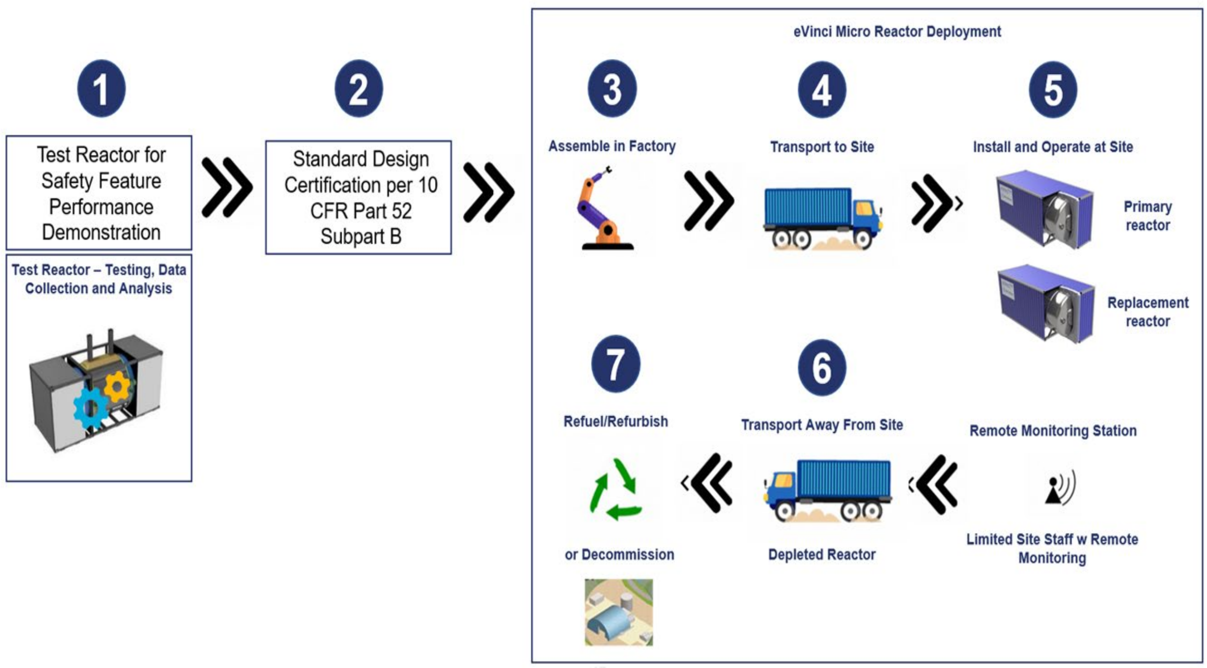

Figure 3-1 eVinci Microreactor Deployment Model

Assemble in Factory

Multiple eVinci microreactors will be manufactured and assembled within the manufacturing facility. [

]a,c

The manufacturing facility will likely include the following discretely purposed buildings:

- [

]a,c

Westinghouse intends to perform manufacturing and associated activities identified above in accordance with its NRC-approved QMS. For a deployment in Canada, as the supplier of the eVinci microreactor to a Canadian licensee, Westinghouse intends to comply with the requirements of CSA N299.1 (Reference 24).

3.2 U.S. Licensing Strategy for Deployment

The proposed licensing strategy to deploy the eVinci microreactor in the United States uses multiple NRC regulations and licenses. The deployment model depicts the Westinghouse plan to deploy multiple eVinci microreactors successfully and safely in the future. The deployment model includes a nuclear test reactor in addition to other separate and integrated effects testing to collect data and support the safety case. Westinghouse intends to pursue a DC for the commercial eVinci microreactor in the United States and follow Steps 3 through 7 in Figure 3-1 for the deployment.

As discussed in EVR-LIC-G0-003 (Reference 24), for FOAK licensing to enact deployment in the United States, Westinghouse intends to pursue DC for the eVinci microreactor in accordance with Subpart B of 10 CFR Part 52 (Reference 5). Additionally, [

]a,c The FOAK licensing strategy for the eVinci microreactor deployment applies to the first movers and early deployments and is not limited to the first eVinci microreactor licensed and deployed to an operating site.

[

]a,c In addition, Nth-of-a-kind (NOAK) is assumed to be the point where a "standard" deployment has been reached. For example, any necessary regulations have been revised/issued, technical/licensing issues related to FOAK deployment have been resolved, and eVinci microreactor deployment is in "production mode."

[

]a,c

The NRC staff issued SECY-24-0008 (Reference 9) to outline microreactor licensing and deployment considerations on fuel loading and operational testing at a manufacturing factory. As posited in SECY-24-0008 and in accordance with Subpart F of 10 CFR Part 52 (Reference 5), an ML would satisfy the statutory requirements in the Atomic Energy Act (AEA) Section 101, "License Required," that a license issued pursuant to AEA Section 103 is required to manufacture, transfer, or possess a commercial utilization facility.

The statutory requirement in AEA Section 101 can also be met by an OL issued per 10 CFR Part 50 (Reference 8) or a COL issued per Subpart C of 10 CFR Part 52 (Reference 5). In addition, the NRC staff proposed that installation of physical features to preclude criticality in a microreactor module may change the historical definition of reactor operation beginning with fuel load. Instead, the NRC staff proposed that removal of the physical features to preclude criticality from the microreactor at the operating site would be an appropriate analogue to the start of operation. In addition, the NRC staff proposed that in addition to an

ML, a license for receipt, possession, and storage of SNM under 10 CFR Part 70 would be required for a manufacturer to load fuel. With NRC approval of the proposed analogue for fuel load, a manufacturer holding an ML and a Part 70 Category II SNM license could load fuel into a microreactor at the factory. Approval of the SECY paper is important to efficient implementation of the eVinci microreactor deployment model.

For FOAK deployment, [

][a,c]

In addition, [

][a,c]

[

][a,c]

[

][a,c] As discussed in SECY-24-0008 (Reference 9), installation of physical features to preclude criticality will adjust the definition for beginning of reactor operation from fuel loading to the removal of these physical features at the operating site. For FOAK deployment, [
][a,c]

Should the NRC not approve the analogue for fuel load in SECY-24-0008, Westinghouse would propose that fuel loading of the eVinci microreactor during FOAK deployments take place at the operating site. Alternatively, Westinghouse would seek additional engagements with the NRC to explore viable options to facilitate fuel loading at the factory [ ][a,c]

For NOAK deployment of the eVinci microreactor, [

][a,c]

Additionally, [

][a,c]

As discussed above, an ML in accordance with Subpart F of 10 CFR Part 52 (Reference 5) would satisfy the statutory requirements in AEA Section 101, "License Required," that a license issued pursuant to AEA Section 103 is required to manufacture, transfer, or possess a commercial utilization facility. [

][a,c]

For manufacturing under an ML, the requirement in 10 CFR 52.167(c)(1) specifies that a holder of an ML may not transport or allowed to be removed from the place of manufacture the manufactured reactor except to the site of a licensee with either a CP under 10 CFR Part 50 (Reference 8) or a COL under Subpart C of 10 CFR Part 52 (Reference 5). [

]a,c

3.3 Canadian Licensing Strategy for Deployment

The CNSC regulatory framework for siting, construction, and operation of nuclear power facilities is similar to the NRC regulatory framework defined in 10 CFR Part 50 (Reference 8) where applicants apply for a CP, which includes the site suitability evaluation, and then apply for an OL (Reference 28). However, the CNSC regulatory framework does not include licensing processes for a design vendor like those provided in 10 CFR Part 52 (Reference 5) of the NRC's regulatory framework, [

]a,c receipt of the factory-manufactured reactor module for use in Canada would be considered an activity that would typically require an LTC to be issued by the CNSC for the specific project.

In Canada, classes of licences are established by the Commission per Section 24 of the NSCA. Under the NSCA, the Commission has implemented regulations which establish requirements for various types of licence applications. For the eVinci microreactor, the applicable regulations include the General Nuclear Safety and Control Regulations and Class 1 Nuclear Facilities Regulations. Additionally, REGDOC-3.5.1 (Reference 19) provides an overview of the licensing process for all stages of licensing, from initial application to abandonment for Class I nuclear facilities, taking into consideration the requirements of the NSCA and associated regulations. For new nuclear power facilities in Canada, three licences are required prior to facility operation (note, licences can be combined to permit multiple activities):

1. Licence to Prepare Site (LTPS)
2. LTC
3. LTO

The CNSC has developed regulatory documents which establish requirements and guidance for licence applications for new nuclear power facilities in Canada for an LTPS, LTC and LTO:

- REGDOC-1.1.1, Site Preparation and Site Evaluation for New Reactor Facilities (Reference 12)
- REGDOC-1.1.2, Licence Application Guide: Licence to Construct a Reactor Facility (Reference 13)
- REGDOC-1.1.3, Licence Application Guide: Licence to Operate a Nuclear Power Plant (Reference 14)

The specific information required for an application for a licence to construct a Class I nuclear facility is provided in Sections 3 and 5 of the Class I Nuclear Facilities Regulations (Reference 11). This is further elaborated in REGDOC-1.1.2 (Reference 13), which outlines the information required to be submitted for a LTC application. The applicant is required to demonstrate that the proposed design complies with regulatory requirements for the safe conduct of activities, including the proposed construction and commissioning activities which need to meet applicable regulatory requirements such as REGDOC-2.3.1 (Reference 16). Also, licensing would be initiated only after the applicant has established a management system, in accordance with the requirements in CSA N286 (Reference 17), to carry out the oversight of the conduct of the environmental assessment, on and off-site construction activities, and procurement of goods and services.

Sections 3 and 6 of the Class I Nuclear Facilities Regulations (Reference 11) and the CNSC regulatory document REGDOC-1.1.3 (Reference 14) identify the information that is expected to be submitted in support of an LTO. A licence to operate enables a licensee to complete final commissioning activities, including nuclear commissioning, and to operate the facility. Typically, an LTO is issued with conditions and hold points, which are removed on completion of required commissioning tests. Also, the licensee is expected to have general plans for the development of the operating organization, training, certification and operational procedures in order to demonstrate that due consideration to the preparation of an operating organization that is ready to commission and operate the facility.

To implement the deployment model as described in EVR-LIC-G0-003 (Reference 24), a fully assembled and fueled reactor from a manufacturing facility would need to be shipped across the U.S.-Canada border. Manufacturing a complete reactor module and final assembly including fuel loading in a manufacturing facility have not historically been performed in the U.S. or Canada. Westinghouse recognizes that the current structure of CNSC's regulatory framework does not fully align with the eVinci microreactor deployment model since off-site assembly of a reactor module, off-site fuel loading and transportation of an assembled and fueled reactor to a site is a novel concept.

For deployment of an eVinci microreactor in Canada, Westinghouse intends to manufacture and assemble the eVinci microreactor module in a manufacturing facility, prior to issuance of an LTC. However, the functional testing and associated activities, as part of the completion of the initial assembly of the reactor module, would only proceed after the Commission issues an LTC. [ ][a,c] Performing these activities at a manufacturing facility, as opposed to an operating site, is a key element of the eVinci microreactor deployment model.

As indicated above, assembling a reactor on-site typically necessitates an LTC. However, off-site manufacturing and procurement of long-lead items, including the eVinci microreactor module is planned to occur prior to an LTC, at the licensee's risk. Therefore, Westinghouse requests feedback from the CNSC on its proposed strategy to perform assembly of the eVinci microreactor module (does not include fuel load), under its NRC-approved QMS as part of an ML prior to issuance of an LTC.

Section 4.3 discusses construction and commissioning and regulatory oversight requirements for the eVinci microreactor deployment in Canada.

4.0 eVinci Microreactor Manufacturing, Inspection, and Oversight

4.1 eVinci Microreactor Manufacturing

Westinghouse has a well-developed management system that supports the company's ability to consistently provide products and services that meet customer needs and applicable statutory and regulatory requirements. The Westinghouse QMS (Reference 20) has evolved over decades into a mature program. Throughout this period, Westinghouse has applied the QMS to various projects. Lessons learned from these projects have been evaluated and incorporated into development of the eVinci microreactor program. The NRC approved the Westinghouse QMS in a safety evaluation report (Reference 26), concluding that it meets the requirements of Appendix B to 10 CFR Part 50 (Reference 7) and Subpart H of 10 CFR Part 71 (Reference 27).

Westinghouse's QMS is an NRC-approved quality assurance plan that serves as a directive for all organizational functions in establishing the necessary policies and procedures that comply with the requirements of ISO 9001 (Reference 21). Westinghouse will comply with the most recent ISO 9001 standard before the required compliance date. In addition, the Westinghouse management system has been approved by LRQA to ISO 19443:2018 (Reference 22).

Westinghouse expects that equipment and components for the eVinci microreactor will be manufactured, fabricated, and/or supplied by qualified vendors located primarily in Canada and the United States. However, some equipment and components may be manufactured, fabricated, and/or supplied by qualified international vendors. Final assembly, including fuel load, of the eVinci microreactor will be performed at the manufacturing facility located in the United States. Westinghouse will ensure that procurement, manufacturing, fabrication, inspection, testing, and assembly of all eVinci microreactors is performed in accordance with its approved QMS.

For deployment in Canada, for construction and commissioning of the reactor module, the licensee would need to ensure that contracted work and procurement of the reactor module align with the requirements in N286-12 (Reference 17) and REGDOC-2.3.1 (Reference 16).

As documented in FA21, "Manufacturing" (Reference 25), Table 4-1 provides a summary of the Westinghouse manufacturing and assembly strategy for the eVinci microreactor.

Table 4-1 Manufacturing and Assembly Strategy

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	-	
		][a,c]

Consistent with previous Westinghouse experience with long lead procurement items (e.g., reactor vessels, reactor vessel heads, and steam generators), procurement and fabrication of equipment and components for the eVinci microreactor by Westinghouse or its qualified vendors and suppliers (approved in accordance with the QMS) may be performed at risk prior to issuance of any operating licenses that reference the eVinci microreactor facility design. Westinghouse and its suppliers would be subject to inspection, oversight, or audit by the operating license holders and/or regulatory authorities. As discussed in Section 3.2, [

]a,c For deployments in the United States, inspection and oversight of ITAAC closeout activities are subject to NRC inspection and oversight.

As discussed in Section 3.2, for NOAK deployments, [
]a,c
Procurement and fabrication of equipment and components for the eVinci microreactor by Westinghouse or its qualified vendors and suppliers (approved in accordance with the QMS) [
]a,c
However, Westinghouse and its suppliers would still be subject to inspection, oversight, or audit by these operating license holders and/or regulatory authorities. As discussed in Section 3.2, [

]a,c For deployments in the United States, inspection and oversight of ITAAC closeout activities are subject to NRC inspection and oversight.

Also, for an ML application, 10 CFR 52.157(f) (Reference 5) requires the following:

> A description of the management plan for design and manufacturing activities, including:
> (i) The organizational and management structure singularly responsible for direction of design and manufacture of the reactor;
> (ii) Technical resources directed by the applicant, and the qualifications requirements;
> (iii) Details of the interaction of design and manufacture within the applicant's organization and the manner by which the applicant will ensure close integration of the architect engineer and the nuclear steam supply vendor, as applicable;
> (iv) Proposed procedures governing the preparation of the manufactured reactor for shipping to the site where it is to be operated, the conduct of shipping, and verifying the condition of the manufactured reactor upon receipt at the site; and
> (v) The degree of top level management oversight and technical control to be exercised by the applicant during design and manufacture, including the preparation and implementation of procedures necessary to guide the effort;

[ ]a,c may help to streamline the scope of inspection of oversight of manufacturing at the factory by the regulators and facilitate a more efficient and effective process. Section 4.2 discusses plans and strategies for inspection and oversight of advanced reactors by the NRC. Section 4.3 discusses CNSC construction and commissioning requirements. Section 5.0 provides proposed suggestions for improving cooperation consistent with the MOC between the CNSC and NRC on inspection and oversight activities to facilitate more efficient implementation of eVinci microreactor deployment in both Canada and the United States.

4.2 NRC Inspection and Oversight

The NRC is developing a framework for a construction oversight program for advanced reactors as described in SECY-23-0048 (Reference 10). In SECY-23-0048, the NRC acknowledges that technologies being considered by the advanced reactor community are diverse and the risk profiles of potential new designs vary considerably. In addition, many advanced reactor construction projects are likely to rely more on factory assembly of safety significant (i.e., safety-related (SR) and non-safety-related with special treatment (NSRST)) SSCs than previous projects. Therefore, onsite construction inspection may only be a small part of the integrated oversight of project quality.

Given the expected diversity of advanced reactor projects and increase in offsite manufacturing and assembly of safety significant SSCs, the NRC acknowledges that its ARCOP warrants a different approach to manufacturing and construction oversight than taken previously for large light water reactors (LWRs). The ARCOP is intended to provide reasonable assurance that advanced reactor facilities are built and will operate in accordance with their approved designs and licensing bases.

Per SECY-23-0048, the ARCOP framework will optimize the NRC's established oversight framework to ensure the program is responsive to the evolving landscape of advanced reactor technologies and provides flexibility to ensure that the level of regulatory oversight is commensurate with the risk posed by a variety of new facilities.

The NRC staff monitors performance during construction through inspection programs, allegations programs, and operational experience. The NRC relies on these programs to establish reasonable assurance that facilities are built and will operate in accordance with their approved design and licensing bases. Currently, NRC uses baseline inspection plans that rely on sampling when evaluating performance of licensees and their contractors, coupled with inspection of QA program implementation to ensure that a facility will meet design and licensing requirements. The NRC identified several actions where ARCOP performance monitoring could optimize its inspection samples. At the same time, the ARCOP will incorporate new inspection technologies and risk insights into its program for safety-significant SSCs, the novelty of safety features in the design, and the use of FOAK construction and manufacturing techniques.

In SECY-23-0048, the NRC staff acknowledges that increased inspection of manufacturing activities in locations other than the facility construction site, and the potential for reduced dependence on predetermined SSC inspection samples, would be considered for the ARCOP and that it would be designed to promote a more dynamic and scalable inspection footprint. Further, as inspection experience is gained on a standardized design, the NRC staff may determine that further adjustments are reasonable for the construction of the NOAK facilities.

Under the ARCOP element of enforcement, the NRC staff's goal is, where appropriate, to simplify enforcement, improve its timeliness, reduce the need for design-specific construction significance determination processes, and optimize the risk assessment efforts associated with construction non-compliances. Under the ARCOP element of assessment, the NRC staff would evaluate the quality of construction, security programs, and operational programs and use this assessment to adjust its inspection program. The NRC considers inspections, assessments, and evaluation of overall project quality during construction important to support their applicable licensing decisions. For example, NRC inspection results are used to inform decisions to issue a license as required by 10 CFR 50.57(a)(1) and 10 CFR 52.103(g).

For eVinci microreactor deployment, Westinghouse expects that under the ARCOP, at a minimum, NRC staff may conduct readiness reviews [ ][a,c] per Inspection Manual Chapter (IMC) 2694 (Reference 29). Westinghouse also expects the NRC will perform inspections on the manufactured reactor modules in accordance with IMC 2503 (Reference 30).

Westinghouse intends to continue its engagement with the NRC staff during its development of the ARCOP to ensure efficient and effective implementation of its activities supporting eVinci microreactor deployments. [ ][a,c] as discussed in Section 3.2, as well as on NRC inspections of these ITAAC activities.

In addition, the NRC staff recognized in SECY-23-0048 that the ARCOP could leverage available information, such as domestic and international vendor and manufacturer oversight information, to inform the inspection scope and provide the NRC staff with additional performance monitoring data. For example, the NRC staff could consider pooling inspection resources with other countries and crediting other countries' oversight activities when a manufacturer is producing SSCs for more than one country's licensees.

As the NRC continues to further develop ARCOP, Westinghouse intends to remain engaged with a focus on deployment in the United States and Canada and on potential efforts to improve cooperation between the NRC and CNSC on appropriate inspection and oversight activities necessary for efficient and effective eVinci microreactor deployment.

4.3 CNSC Construction and Commissioning Requirements

Considering the off-site manufacturing and assembly of the reactor module and fuel loading, as described in EVR-LIC-G0-003 (Reference 24), overseeing the manufacturing, assembly and commissioning processes would require a different approach compared to past practices for CANDU reactors in Canada, especially as it relates to regulatory oversight. REGDOC-2.3.1 (Reference 16) outlines the requirements and guidance for the construction and commissioning of nuclear reactor facilities in Canada. The licensee is responsible for overseeing the manufacturing, assembly, and testing of a Class 1A Nuclear Facility, as well as the safety and quality requirements. REGDOC-2.3.1 requires that all construction, commissioning, and related activities be developed and implemented under the control of the licensee using a management system meeting the requirements of CSA N286 (Reference 17). Per Section 3.1 of REGDOC-2.3.1 (Reference 16), Role of Licensee, states:

> *The licensee shall have the primary responsibility for safety and security of all construction activities, including work carried out on its behalf by contractors. The licensee shall also have within its organization the knowledge, expertise and resources to maintain control and oversight of safety at all times.*

For deployment in Canada, the licensee would therefore need to demonstrate compliance with REGDOC-2.3.1 (Reference 16). Also, the LTC application requires that contracted work and procurements align with the requirements in N286-12 and REGDOC-2.3.1. Westinghouse will provide the necessary assistance to the Canadian licensee in complying with these documents.

[

]a,c Westinghouse's QMS-A (Reference 20) serves as a directive for all organizational functions in establishing the necessary policies and procedures that comply with the requirements of ISO 9001 (Reference 21). Westinghouse will comply with the most recent ISO 9001 standard before the required compliance date. Furthermore, the Westinghouse management system has been approved by LRQA to ISO 19443:2018 (Reference 22). The NRC has accepted the Westinghouse QMS in accordance with 10 CFR Part 50, Appendix B (Reference 8). Westinghouse will ensure that the manufacturing, assembly, testing, and commissioning processes meet the intent of the requirements in REGDOC-2.3.1 (Reference 16).

In addition to CSA N286-12 and REGDOC-2.3.1, CSA N299.1 (Reference 23) defines minimum requirements for a supplier's quality assurance program for nuclear power plants. As the supplier of the eVinci microreactor to Canada, Westinghouse intends to comply with the requirements of CSA N299.1 or provide adequate justification for any alternative approaches. Where required, Westinghouse will submit to the Canadian licensee for review and acceptance the methodology and justification for crediting work done by its supply chain, including procurement of goods and services associated with construction and commissioning activities, and address any gaps that may be introduced between Canadian and U.S. requirements. Note, Westinghouse is currently performing a clause-by-clause assessment against CSA N286-12, CSA N299.1 and REGDOC-2.3.1 as part of the VDR Phase 2 submissions.

As required by REGDOC-2.3.1, the licensee will need to develop a plan with timelines for the development, verification, validation and implementation of commissioning programs and procedures to be completed. Section 3.1, Role of Licensee, for example states:

> *Contractors at all levels in the supply chain should expect to be audited on a regular basis as part of contractual arrangements. Contractors could also be visited by the CNSC as part of regulatory oversight, particularly if the equipment they are manufacturing has high nuclear safety significance.*

Therefore, the licensee would monitor performance during construction through inspection programs, and the CNSC expects well-developed commissioning plans to establish reasonable assurance that the facility is built and will operate in accordance with their approved design and licensing bases. In addition, the CNSC as part of regulatory oversight, evaluates performance of licensees and their contractors, coupled with inspection of QA program implementation to ensure that a facility will meet design and licensing requirements.

Westinghouse, as the manufacturer of the eVinci microreactor, [

]a,c The facility level integrated tests will be performed at the operating site.

Given the off-site manufacturing and assembly of the reactor module and fuel loading, the regulatory oversight of commissioning of safety significant SSCs which is typically caried out at the operating site, would instead require CNSC staff to perform these activities at the manufacturing facility in the US. Therefore, Westinghouse has identified the following considerations for the CNSC, for which requests have been specified in Section 1.3:

- Westinghouse requests feedback from the CNSC for regulatory oversight of manufacturing and initial assembly, except for fuel load, as well as commissioning of the eVinci microreactor module under an LTC at the manufacturing facility in the U.S.
- Westinghouse requests feedback from the CNSC on [ ]a,c

5.0 Proposed Suggestions for Improving Cooperation Consistent with the MOC

Westinghouse maintains that improved cooperation consistent with the MOC between the CNSC and NRC could improve the efficiency and effectiveness of eVinci microreactor deployment in Canada and the United States.

One of Westinghouse's primary goals for eVinci microreactor deployment is to maintain a singular reactor design capable of being deployed in Canada and the United States. Accordingly, Westinghouse maintains that a standardized eVinci microreactor design facilitates efficiencies that could be leveraged for applicable regulatory inspection and oversight activities. Westinghouse offers the following suggestions for improving cooperation consistent the MOC between the CNSC and the NRC on applicable regulatory inspection and oversight activities for manufacturing, assembly, fuel load and associated commissioning activities for the standardized eVinci microreactor facility.

1. Leverage the ARCOP Vision and framework development for the NRC advanced reactor inspection and oversight program to improve cooperation between the NRC and CNSC for inspection and oversight.

2. Potential cooperation between CNSC and NRC on inspection and oversight activities [

]a,c

6.0 Conclusions

This report provides a more focused discussion of eVinci microreactor deployment in Canada and the United States that includes licensing strategies, factory manufacturing, assembly, and fuel loading. In addition, this report includes suggestions for potential opportunities for improved cooperation between the CNSC and NRC that could advance specific goals and recommendations discussed under Goal 2, “Regulatory Cooperation Agreements.” Westinghouse considers the focus on regulatory cooperation agreements to be important to its goal for deployment of a standardized eVinci microreactor in both Canada and the United States. Westinghouse supports the efforts of the CNA and NEI to develop recommendations for improving regulatory cooperation between the CSNC and the NRC, as documented in their joint report (Reference 7).

Westinghouse has analyzed the licensing strategies to enact the eVinci microreactor deployment model in both Canada and the United States and has identified topics where joint review by the CNSC and NRC could provide feedback to improve the efficiency and effectiveness of eVinci microreactor deployment in both countries.

Westinghouse has identified the following key topics associated with eVinci microreactor deployment:

- Commencing factory manufacturing and assembly of the eVinci microreactor at risk [ ]a,c and under the approved Westinghouse QMS prior to issuance of an LTC
- For deployments in Canada under an LTC, performing CNSC regulatory oversight of manufacturing and assembly of the eVinci microreactor at the manufacturing facility in the U.S.
- [ ]a,c

Westinghouse maintains that improved cooperation between CNSC and NRC could improve the efficiency and effectiveness for eVinci microreactor deployment in both countries. Westinghouse will follow regulatory and policy developments associated with advanced reactors and microreactors in both countries that could further inform eVinci microreactor deployment and support further engagements with CNSC and NRC that could facilitate improved cooperation.

Westinghouse requests joint review of this report and specific responses from each regulator to help inform its strategies for licensing and deployment, including factory manufacturing. In addition, Westinghouse requests responses to proposals in this report where cooperation could improve regulatory efficiency and effectiveness. Westinghouse believes that responses from each regulator on this report is important to refining its strategies for successful deployment of the eVinci microreactor in Canada and the United States. In addition to this report, Westinghouse will continue to engage with both the CNSC and NRC in pre-application activities to improve understanding of the eVinci microreactor design and deployment plans while supporting the strategic goal of maintaining a singular reactor design for deployment in Canada and the U.S.

Timely responses from CNSC and NRC on the requests provided in Section 1.3 will help ensure efficient and effective regulatory interactions associated with licensing and deployment of the eVinci microreactor in Canada and the United States.