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Chief Executive Officer

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GFP01-CORR-BUS-00068

GFP Proprietary

DR. NANA-OWUSUA KWAMENA

Director
Environmental Assessment Division
Canadian Nuclear Safety Commission
280 Slater Street,
Ottawa, Ontario
K1P 5S9

Dear Dr. Kwamena:

Subject: GFP Evaluation of CEEA 2012 Factors - Applicability to Updated Project Description for MMR at Chalk River

In Global First Power's (GFP) letter dated August 4, 2023 (Ref 1), GFP informed CNSC staff of recent key design updates to the proposed Micro Modular Reactor (MMR) Project at Chalk River. GFP also provided a rationale on why the factors to be considered in the development of the Environmental Impact Statement (EIS) as determined by CNSC (Ref 2) remained sufficient. The purpose of this letter is to provide CNSC staff with further information supporting GFP's assertion on this matter.

As communicated in Ref 1, five key design updates have been made to the MMR standard design. The nominal power output is increased from approximately 15 MWth to between 10-45 MWth, and the operating life is increased to up to 40 years from 20. The fuel geometry is now hollow (annular) rather than cylindrical and provision now added for on-site refueling and defueling during plant operation. The capability for interim storage of used fuel on-site during the operations phase of the facility is now included.

As a result of these design updates, GFP conducted an exercise to ensure the impact of the key design changes will be adequately characterized under the existing CEEA 2012 factors. As requested by CNSC staff in a meeting on October 3, 2023, the results of this evaluation are contained in Attachment 1 and are summarized below.

The results of the assessment show that the CEEA 2012, Section 19 (1) (a) – (h) factors to be considered remain sufficient and adequate for this project. As mentioned in the Record of Decision DEC20-H102 (Ref 2), the EIS Generic Guidelines apply to all designated projects under CEEA 2012 (and regulated under the Nuclear Safety and Control Act), and therefore continue to provide the essential guidance on how these factors should be considered in the scope of the EA. GFP has determined that since the Record of Decision DEC20-H102 (Ref 2),



no new relevant studies have been conducted by a committee under Section 73 of CEEA 2012. Lastly with respect to 19 (1) (j), Attachment 1 supports GFP's position that the changes in the project description are fully covered with the defined scope of factors identified. This assessment continues to be aligned with the Record of Decision DEC20-H102 (Ref 2) which reviewed the Impact Assessment Act (IAA) 2019 and concluded that the additional factors in Subsection 22(1) of the IAA, as well as use of community knowledge and public comments, were either sufficiently addressed in the CNSC framework or not within CNSC's mandate.

GFP is currently proceeding with the development of the EIS for the project and the process for doing so is unaffected by the project updates. All the CEEA 2012 Section 19 (1) (a) – (h) factors will be considered by GFP in the development of the EIS for the MMR project at Chalk River Laboratories. The scope for each factor will be reviewed and revised where required based on the technical and temporal changes to the project. GFP is currently in the process of confirming potential interactions, valued components, and spatial boundaries. Where appropriate, models will be re-run, new metrics calculated, and mitigation measures and residual effects confirmed. The impacts on the environment are expected to be largely unaffected due to the project changes.

In summary, GFP believes that its current process for the development of the EIS is rigorous and will adequately address the MMR project as a whole, including the project updates. This process is based on the scope of factors determined by the Commission (Ref 2) and complemented by the rigorous framework provided by CNSC guidance (Ref 3), to support the development of the EIS, including:

- CNSC's *Generic Guidelines for the Preparation of an Environmental Impact Statement*, Version 2
- REGDOC-2.9.1, *Environmental Principles, Assessments and Protection Measures*, Version 1.2
- REGDOC-3.2.2, *Indigenous Engagement*, Version 1.1
- REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*

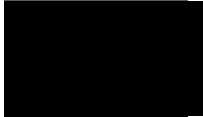
Should you have any questions regarding this letter, please contact Mr. Jordan Black, GFP Licensing and Environment Director, at [REDACTED] [REDACTED].



JOS DIENING
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Sincerely,



Jos Dening
President and Chief Executive Officer,
Global First Power

cc. S. Eaton, M. Broeders, S. Belyea, S. El-Jaby, C. Ducros, H. Tadros, D. Wylie (CNSC)
cc. J. Black, S. Kaufman, I. Azevedo, J. Dunham, L. Boenheim, K. Esseghaier (GFP)

References:

1. GFP Letter, J. Dening to N. Kwamena, "Update to the Project Description in Support of Global First Power's Application for a Licence to Prepare Site for the Micro Modular Reactor™¹ Nuclear Facility at the Chalk River Site", August 4, 2023, CD# GFP01-CORR-BUS-00055.
2. CNSC Record of Decision DEC 20-H102, "Decision on the scope of an environmental assessment for the proposed Micro Modular Reactor Project at the Chalk River Laboratories", July 16, 2020.
3. CNSC Letter, N. Kwamena to D. Train, "Information package for GFP's preparation of the environmental impact statement draft EIS", March 23, 2021, CD# GFP01-CORR-BUS-00067, e-Doc: 6506844.

Attachment 1

<p>CEAA 2012 Factors to be Considered</p>	<p>Project Description (2019)</p>	<p>Updated Project Description (2023)</p>	<p>Is Impact of Project Description Change Covered under Existing Factors to be Considered?</p>
<p>19 (1) The environmental assessment of a designated project must take into account the following factors:</p>			
<p>(a) the environmental effects of the designated project, including the environmental effects of malfunctions or accidents that may occur in connection with the designated project and any cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out;</p> <p>(b) the significance of the effects referred to in paragraph (a);</p>	<p>Nominal power output of approximately 15 MWth.</p>	<p>Nominal power output of 10-45 MWth.</p>	<p>YES</p> <p>The impact on environmental effects of the higher nominal power output is being appropriately evaluated through conservative analysis up to the maximum operating power of 45 MWth as required under factors (a) and (b).</p>
	<p>Fuel geometry is cylindrical fuel pellets.</p>	<p>Fuel geometry is hollow cylindrical fuel pellets (i.e.. annular).</p>	<p>YES</p> <p>The impact on the environment of the updated fuel design is being evaluated through conservative safety analysis as required under factors (a) and (b).</p>

	<p>The MMR is designed with no provision for refueling. Therefore, there will be no additional fresh fuel or used fuel on Project's site during Nuclear Plant operation.</p>	<p>On site refueling and defueling during plant operation.</p>	<p>YES</p> <p>The impact on the environment of the operational activities of periodic on-site refueling and defueling cycles is being evaluated as required under factors (a) and (b). This also includes the impact of potential accidents and malfunctions during this activity.</p>
	<p>Anticipated operating lifespan of up to 20 years.</p>	<p>Anticipated operating lifespan of up to 40 years.</p>	<p>YES</p> <p>The impact on the environment of the extended lifespan is being appropriately evaluated as required under factors (a) and (b).</p>
	<p>Provision for interim storage of used fuel either on the Nuclear Plant site or transferred to an interim storage facility, at the end of operating life.</p>	<p>Provision for interim storage of used fuel on site from refueling cycles, prior to transfer to interim storage facility off-site, during operations phase.</p>	<p>YES</p> <p>The impact on the environment of the provision for increased interim storage capacity of used fuel at site and transfer to interim storage facility off-site during the operating phase, is being evaluated as required under factors (a) and (b).</p>

<p>(c) comments from the public — or, with respect to a designated project that requires that a certificate be issued in accordance with an order made under section 54 of the <i>National Energy Board Act</i>, any interested party — that are received in accordance with this Act;</p>	<p>Nominal power output of approximately 15 MWth.</p>	<p>Nominal power output of 10-45 MWth.</p>	<p>YES</p> <p>Through the conduct of the EIS, GFP is consulting and informing the public and indigenous communities of the changes in nominal power outputs through on-going consultation. GFP is taking into consideration comments arising in the conduct of this work as required under factor (c).</p>
	<p>Fuel geometry is cylindrical fuel pellets.</p>	<p>Fuel geometry is hollow cylindrical fuel pellets (i.e. annular).</p>	<p>YES</p> <p>Through the conduct of the EIS, GFP is consulting and informing the public and indigenous communities of the changes in reactor fuel design through on-going consultation. GFP is taking into consideration comments arising in the conduct of this work as required under factor (c).</p>

	<p>The MMR is designed with no provision for refueling. Therefore, there will be no additional fresh fuel or used fuel on Project's site during Nuclear Plant operation.</p>	<p>On site refueling and defueling.</p>	<p>YES</p> <p>Through the conduct of the EIS, GFP is consulting and informing the public and indigenous communities of the changes in operational activities involving periodic on-site refueling and defueling cycles through on-going consultation. GFP is taking into consideration comments arising in the conduct of this work as required under factor (c).</p>
	<p>Anticipated operating lifespan of up to 20 years.</p>	<p>Facility operating life of up to 40 years.</p>	<p>Yes</p> <p>The impact of the extended lifespan is being appropriately evaluated and covered under factor (c) through the ongoing public consultation process.</p>
	<p>Provision for interim storage of used fuel either on the Nuclear Plant site or transferred to an</p>	<p>Provision for interim storage of used fuel on site from refueling cycles, prior to transfer</p>	<p>YES</p> <p>Through the conduct of the EIS, GFP is consulting and informing the public and</p>

	interim storage facility, at the end of operating life.	to interim storage facility off-site, during operations phase.	indigenous communities of the increased interim storage capacity of used fuel at site during the operating phase through on-going consultation. GFP is taking into consideration comments arising in the conduct of this work as required under factor (c).
(d) mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project;	Nominal power output of approximately 15 MWth.	Nominal power output of 10-45 MWth.	YES The impact on environmental effects of the higher nominal power output is being evaluated through conservative analysis up to the maximum operating power of 45 MWth. Mitigation measures will be identified to address any significant adverse environmental effects that could arise from operation at a higher nominal power output as required under factor (d).

	<p>Fuel geometry is cylindrical fuel pellets.</p>	<p>Fuel geometry is hollow cylindrical fuel pellets (i.e. annular).</p>	<p>YES</p> <p>The impact on the environment of the updated fuel design is being evaluated through conservative safety analysis. Mitigation measures will be identified to address any significant adverse environmental effects that could arise from operation with the new fuel design as required under factor (d).</p>
	<p>The MMR is designed with no provision for refueling. Therefore, there will be no additional fresh fuel or used fuel on Project's site during Nuclear Plant operation.</p>	<p>On site refueling and defueling.</p>	<p>YES</p> <p>The impact on the environment of the operational activities of periodic on-site refueling and defueling cycles is being evaluated. This also includes the impact of potential accidents and malfunctions during this activity. Mitigation measures will be identified to address any significant adverse environmental effects that could arise from refuelling and defueling activities as required under factor (d).</p>

	Anticipated operating lifespan of up to 20 years.	Facility operating life of up to 40 years.	<p>Yes</p> <p>The impact on the environment of the extended lifespan is being evaluated.</p> <p>Mitigation measures will be identified to address any significant adverse environmental effects that could arise from reactor longer operational lifetime as required under factor (d).</p>
	Provision for interim storage of used fuel either on the Nuclear Plant site or transferred to an interim storage facility, at the end of operating life.	Provision for interim storage of used fuel on site from refueling cycles, prior to transfer to interim storage facility off-site, during operations phase.	<p>YES</p> <p>The impact on the environment of the provision for increased interim storage capacity of used fuel at site and transfer to interim storage facility off-site during the operating phase, is being evaluated.</p> <p>Mitigation measures will be identified to address any significant adverse environmental effects that could arise from provision of</p>

			increased interim storage capacity of used fuel at site as required under factor (d).
(e) the requirements of the follow-up program in respect of the designated project;	Nominal power output of approximately 15 MWth.	Nominal power output of 10-45 MWth.	YES The requirements of the follow-up program are being appropriately evaluated at the higher nominal power output up to the bounding 45 MWth.
	Fuel geometry is cylindrical fuel pellets.	Fuel geometry is hollow cylindrical fuel pellets (i.e. annular).	YES The requirements of the follow-up program are being appropriately evaluated for the updated fuel geometry.
	The MMR is designed with no provision for refueling. Therefore, there will be no additional fresh fuel or used fuel on Project's site during Nuclear Plant operation.	On site refueling and defueling.	YES The requirements of the follow-up program are being appropriately evaluated for the on-site refueling and defueling cycles.

	Anticipated operating lifespan of up to 20 years.	Facility operating life of up to 40 years.	YES The requirements of the follow-up program are being appropriately evaluated for the extended lifespan.
	Provision for interim storage of used fuel either on the Nuclear Plant site or transferred to an interim storage facility, at the end of operating life.	Provision for interim storage of used fuel on site from refueling cycles, prior to transfer to interim storage facility off-site, during operations phase.	YES The requirements of the follow-up program are being appropriately evaluated for the increased interim storage capacity of used fuel at site during the operating phase.
(f) the purpose of the designated project;	Nominal power output of approximately 15 MWth.	Nominal power output of 10-45 MWth.	YES The purpose of the project, to demonstrate the commercial viability of the MMR technology, is not impacted by the higher nominal power output. The standard MMR design has been updated to this higher nominal power output, bounded at 45 MWth.

	<p>Fuel geometry is cylindrical fuel pellets.</p>	<p>Fuel geometry is hollow cylindrical fuel pellets (ie. annular).</p>	<p>YES</p> <p>The purpose of the project, to demonstrate the commercial viability of the MMR technology, is not impacted by the updated fuel geometry. The standard MMR design has been updated to this new annular fuel geometry.</p>
	<p>The MMR is designed with no provision for refueling. Therefore, there will be no additional fresh fuel or used fuel on Project's site during Nuclear Plant operation.</p>	<p>On site refueling and defueling.</p>	<p>YES</p> <p>The on-site refueling and defueling supports the purpose of the project.</p>
	<p>Anticipated operating lifespan of up to 20 years.</p>	<p>Facility operating life of up to 40 years.</p>	<p>YES</p> <p>The purpose of the project is being appropriately evaluated for the extended lifespan.</p>

	Provision for interim storage of used fuel either on the Nuclear Plant site or transferred to an interim storage facility, at the end of operating life.	Provision for interim storage of used fuel on site from refueling cycles, prior to transfer to interim storage facility off-site, during operations phase.	YES The purpose of the project is being appropriately evaluated for the increased interim storage capacity of used fuel at site during the operating phase.
(g) alternative means of carrying out the designated project that are technically and economically feasible and environmental effects of any such alternative means;	Nominal power output of approximately 15 MWth.	Nominal power output of 10-45 MWth.	YES Alternative means of carrying out the project are being appropriately evaluated at the higher nominal power output, up to the bounding 45 MWth, with environmental effects of alternative means identified as required under factor (g).
	Fuel geometry is cylindrical fuel pellets.	Fuel geometry is hollow cylindrical fuel pellets (i.e. annular).	YES Alternative means of carrying out the project are being appropriately evaluated for the updated fuel geometry, with environmental

			effects of alternative means identified as required under factor (g).
	The MMR is designed with no provision for refueling. Therefore, there will be no additional fresh fuel or used fuel on Project's site during Nuclear Plant operation.	On site refueling and defueling.	YES Alternative means of carrying out the project are being appropriately evaluated for the on-site refueling and defueling cycles, with environmental effects of alternatives being identified as required under factor (g).
	Anticipated operating lifespan of up to 20 years.	Facility operating life of up to 40 years.	YES Alternative means of carrying out the project are being appropriately evaluated for the extended lifespan, with environmental effects of alternatives being identified as required under factor (g).
	Provision for interim storage of used fuel either on the Nuclear Plant site or transferred to an	Provision for interim storage of used fuel on site from refueling cycles, prior to transfer	YES Alternative means of carrying out the project are being appropriately evaluated for increased interim storage capacity of used fuel

	interim storage facility, at the end of operating life.	to interim storage facility off-site, during operations phase.	at site during the operating phase, with adverse environmental effects of alternatives being identified as required under factor (g).
(h) any change to the designated project that may be caused by the environment;	Nominal power output of approximately 15 MWth.	Nominal power output of 10-45 MWth.	YES Any change to the project that may be caused by the environment due to the higher nominal power output is being appropriately evaluated up to the bounding 45 MWth as required under factor (h).
	Fuel geometry is cylindrical fuel pellets.	Fuel geometry is hollow cylindrical fuel pellets (i.e. annular).	YES Any change to the project that may be caused by the environment due to the updated fuel geometry is being appropriately evaluated as required under factor (h).
	The MMR is designed with no provision for refueling. Therefore, there will be no additional fresh fuel or used fuel on Project's site	On site refueling and defueling.	YES Any change to the project that may be caused by the environment due to the on-site refueling and defueling cycles is being

	during Nuclear Plant operation.		appropriately evaluated as required under factor (h).
	Anticipated operating lifespan of up to 20 years.	Facility operating life of up to 40 years.	YES Any change to the project that may be caused by the environment for the extended lifespan is being appropriately evaluated as required under factor (h).
	Provision for interim storage of used fuel either on the Nuclear Plant site or transferred to an interim storage facility, at the end of operating life.	Provision for interim storage of used fuel on site from refueling cycles, prior to transfer to interim storage facility off-site, during operations phase.	YES Any change to the project that may be caused by the environment for the increased interim storage capacity of used fuel at site during the operating phase is being appropriately evaluated as required under factor (h).
(i) the results of any relevant study conducted by a committee	Nominal power output of approximately 15 MWth.	Nominal power output of 10-45 MWth.	Not Applicable

established under section 73 or 74; and	Fuel geometry is cylindrical fuel pellets.	Fuel geometry is hollow cylindrical fuel pellets (ie. annular).	As per Record of Decision DEC20-H102, factor 19(1)(i) is not included as there are no relevant regional studies conducted by a committee established by the Minister to consider. Since the Record of Decision DEC20-H102, no new relevant studies have been conducted by a committee under section 73.
	The MMR is designed with no provision for refueling. Therefore, there will be no additional fresh fuel or used fuel on Project's site during Nuclear Plant operation.	On site refuelling and defueling.	
	Anticipated operating lifespan of up to 20 years.	Facility operating life of up to 40 years.	
	Provision for interim storage of used fuel either on the Nuclear Plant site or transferred to an interim storage facility, at the end of operating life.	Provision for interim storage of used fuel on site from refueling cycles, prior to transfer to interim storage facility off-site, during operations phase.	

<p>(j) any other matter relevant to the environmental assessment that the responsible authority, or – if the environmental assessment is referred to a review panel – the Minister, requires to be taken into account.</p>	<p>Nominal power output of approximately 15 MWth.</p>	<p>Nominal power output of 10-45 MWth.</p>	<p>YES</p> <p>As per Record of Decision DEC20-H102, evaluation of 19 (1)(j) concluded that no additional factors needed to be included in the scope of factors for this EA.</p> <p>This included consideration of the Impact Assessment Act (IAA) 2019 and concluded that the additional factors in Subsection 22(1) of the IAA, as well as use of community knowledge and public comments, were either sufficiently addressed in the CNSC framework or not within CNSC's mandate.</p> <p>The essence of the project remains about the development of a small modular gas-cooled reactor to be hosted at the CRL; activities conducted will remain largely unaffected and as those reasonably expected from similar projects conducted internationally. The impacts on the environment are also expected to remain largely unaffected by the project</p>
	<p>Fuel geometry is cylindrical fuel pellets.</p>	<p>Fuel geometry is hollow cylindrical fuel pellets (ie. annular)..</p>	
	<p>The MMR is designed with no provision for refueling. Therefore, there will be no additional fresh fuel or used fuel on Project's site during Nuclear Plant operation.</p>	<p>On site refuelling and defueling.</p>	
	<p>Anticipated operating lifespan of up to 20 years.</p>	<p>Facility operating life of up to 40 years.</p>	
	<p>Provision for interim storage of used fuel either on the Nuclear Plant site or transferred to an</p>	<p>Provision for interim storage of used fuel on site from refueling cycles, prior to transfer to interim storage</p>	

	interim storage facility, at the end of operating life.	facility off-site, during operations phase.	updates. On this basis, GFP believes that this document demonstrates that the updates in project description are appropriately evaluated and covered by the factors determined by the CNSC on July 16, 2020 as per paragraph 19(2)(a) of CEEA 2012 and as recorded in the Record of Decision DEC 20-H102.
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