Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

UNPROTECTED/NON PROTÉGÉ

SUPPLEMENTAL/COMPLÉMENTAIRE

CMD: 21-H100.B

Date signed/Signé le : 16 JULY 2021

Reference CMD(s)/CMD(s) de référence : 21-H100, 21-H100.A, 21-H100Q

A Licence Amendment

Bruce Power Inc.

Bruce Nuclear Generating Station A and B

Hearing in writing based solely on written submissions

Scheduled for:

July 2021

Submitted by:

CNSC Staff

Une modification de permis

Bruce Power Inc.

Centrale nucléaire de Bruce A et B

Audience fondée uniquement sur des mémoires

Prévue pour :

Juillet 2021

Soumise par :

Le personnel de la CCSN

e-Doc 6602399 (WORD)
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Summary

This supplemental Commission Member Document (CMD) provides CNSC staff's response to questions raised by the Commission panel member in CMD 21-H100Q.

Résumé

Ce CMD supplémentaire apporte les réponses du personnel de la CCSN aux questions posées par le membre de la formation de la Commission dans le CMD 21-H100Q.

Signed/signé le

16 July 2021/16 juillet 2021

Alexandre Viktorov, Ph. D.

Director General

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Directeur général

Direction de la réglementation des centrales nucléaires

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EXECUTIVE SUMMARY

In conducting the hearing in writing respecting CMD 21-H100, *Request for licence amendment for the production of radioisotopes at the Bruce Nuclear Generation Stations*, the panel of the Commission requested additional information about the submission from Bruce Power and CNSC staff. Pursuant to paragraphs 24(4)(*a*) and (*b*) of the *Nuclear Safety and Control Act*, this hearing in writing considers whether to amend the Power Reactor Operating Licence (PROL) for the production of radioisotopes, specifically Lutetium-177 (Lu-177) at the Bruce Nuclear Generating Station B Unit 7. This supplemental submission provides CNSC staff's responses to seven (7) questions raised in CMD 21-H100Q. CNSC staff have also requested Bruce Power to provide responses to questions 1 through 5 from the perspective of the applicant.

1. OVERVIEW

This supplemental CMD addresses a request in CMD 21-H100Q [1] for additional information from a panel of the Commission conducting the hearing in writing respecting CMD 21-H100 [2]. This hearing considers whether to amend the Power Reactor Operating Licence (PROL) for the production of radioisotopes, specifically Lutetium-177 (Lu-177) at the Bruce Nuclear Generating Station B Unit 7. This supplemental submission provides CNSC staff's responses to seven (7) questions raised in CMD 21-H100Q.

2. CNSC STAFF'S RESPONSES TO THE PANEL OF THE COMMISSION'S QUESTIONS

The panel of the Commission requested CNSC staff to respond to seven (7) questions. In turn, CNSC staff have also requested Bruce Power to provide responses to questions 1 through 5 from the perspective of the applicant. CNSC staff's responses are provided in **Table 1** below; Bruce Power's responses will be submitted separately.

Table 1: CNSC staff's responses to questions raised by the panel of the Commission

#	Commission panel questions	CNSC staff responses
1	If there is a breach in the pneumatic delivery system, Bruce Power notes that contaminated inert carrier gas would be directed to the exhaust stack and be contained by the high-efficiency particulate air (HEPA) filters. Furthermore, releases through the stack would be detected by the continuous monitoring system. Question: It is not mentioned how the carrier gas would become contaminated, but HEPA filters are designed for particulate matter capture. Therefore, are the HEPA filters sufficient to capture the contaminated carrier gas?	While the Isotope Production System (IPS) uses an inert gas (carrier gas) to pneumatically move the targets, air maybe introduced during the target loading process. Since the carrier gas is routed through the reactor core, the spent carrier gas may contain potentially activated particulates (due to activation of elements in the air, including Argon). Therefore, the spent carrier gas will be purged through the station active ventilation system. Bruce Power provided information that the existing station active ventilation system has sufficient capacity to deal with the releases from the operation of the nuclear facility, as well as the potential contaminated gases from the IPS,

#	Commission panel questions	CNSC staff responses
		excepted for Argon-41. However, the releases from the IPS is expected to be negligible and the releases through the stack are continuous monitored. CNSC staff will review the data through the annual REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants* report.
2	Bruce Power will be shipping the irradiated targets to a third party, name withheld due to commercial confidentiality, that is a licensed entity outside of Canada. Although it is stated that the recipient of the irradiated targets is a licensed entity, can CNSC staff confirm that it has validated these credentials, and that the entity is in fact known and in good international standing? The purpose of this question is not to place in doubt the business dealings of Bruce Power, but solely to ensure that withholding names of recipients of nuclear materials for business reasons does not prevent CNSC from doing its due diligence investigation for safety and international obligations. The name does not need to be revealed, the only request is for confirmation that CNSC has in fact investigated and approved the recipient.	CNSC staff confirmed that the third party company holds all appropriate licences in its own home country. However, Bruce Power has not yet finalized the exact arrangements and associated licensing requirements for the transportation of the targets within Canada and internationally. Prior to the shipment of the targets, Bruce Power will ensure that the third party vendor has met all national and international transportation requirements. Additionally, CNSC staff have also confirmed that Bruce Power's management system meets requirements and is sufficient to ensure that it has proper oversight of its contractors/vendors. Once the arrangements have been finalized, CNSC staff will perform compliance verification activities to assess whether all transportation requirements, as well as IAEA requirements, have been met.
3	Under Design Background in CNSC's CMD it was mentioned that targets that become stuck in the carrier tubes would remain in place	(i) Once the targets become stuck, the IPS will become inoperative. (i.e., no further irradiation of targets will be performed).

#	Commission panel questions	CNSC staff responses
	until the unit's next outage. Questions: (i) Would such a blockage prevent any further irradiation of targets, making the system inoperative, and (ii) Would the targets be highly radioactive after such prolonged exposure, and what would the handling and disposal implications be?	(ii) Bruce Power demonstrated in its submitted analyses that after a prolonged period in the core (i.e., until the unit's outage), there is no significant increase in heat or specific activity (measured in TBq) from the targets when compared to an assumed 30-day activation period. CNSC staff assessed the analysis and concluded that it was acceptable. In the event that the target is stuck, Bruce Power is in the process of developing procedures for the remote retrieval of the targets (e.g., by increasing the system pressure or extracting through a mechanical retrieval tool). If remote attempts fail, Bruce Power will remove the section of the tubing with the stuck targets and place it in a shielded container. The targets will be returned to the third party for disposal. As part of the regulatory hold point, CNSC staff will assess the procedure to ensure that workers are protected and that the doses will be kept As Low As Reasonably Achievable (ALARA).
4	Related to the previous issue, if targets become stuck in the delivery system, is there any risk of pressure build-up due to trapped delivery gas heating, or the possibility of the delivery tube bursting and releasing contaminated gas?	As indicated in response 3(ii), there is no significant increase in heat from the targets after a prolonged period in the core. There is sufficient capacity to cool the targets (due to the volume of moderator) to prevent the failure of the target finger tubes.

#	Commission panel questions	CNSC staff responses
		CNSC staff reviewed the submitted analysis and concluded that it was acceptable.
5	What happens to the target in the event of an unplanned shutdown? Can it be retrieved, or left in place to complete its irradiation as planned and then retrieved? Has this scenario been planned for?	The scenario of an unplanned reactor shutdown along with target seeding/harvesting has been considered by Bruce Power. In the event of an unplanned reactor shutdown, the targets will either remain inside the core or in the decay zone. If the targets are in the decay zone, as the IPS operates independently from the operation of the reactor, the targets can be retrieved and stored in the transport container. If the targets are in the reactor core, it will be up to Bruce Power to decide whether the targets can continue to be irradiated in the reactor core or be retrieved for disposal.
6	Has the Canadian endorsement certificate for the shielded transportation container been completed (estimated as May 2021, which was after delivery of CNSC's CMD)?	The container has not been endorsed in Canada yet. CNSC staff raised some questions/clarifications to the designer of the container and are waiting for a response.
7	Has the structural floor loading plan of the IPS design been revised and approved by CNSC staff? This was estimated to be completed by March 31, 2021.	CNSC staff have reviewed the structural floor loading plan and determined it to be acceptable. As part of the commissioning hold point, CNSC staff will perform compliance verifications to assess whether that the design requirements have been met.

3. CONCLUSIONS

This supplemental CMD addresses a request from the panel of the Commission [1] for additional information in respect of the hearing in writing CMD 21-H100. This hearing considers the request to amend the PROL for the production of radioisotopes, specifically Lu-177 at the Bruce Nuclear Generating Station B Unit 7.

CNSC staff's conclusion remains unchanged; CNSC staff determined that Bruce Power has adequate provisions in place to ensure the safe production of Lu-177. The installation and operation of the IPS will not result in significant doses to workers or members of the public, and will not result in significant releases to the environment. In addition, the existing security and safeguards program in place is sufficient for the production of Lu-177. Finally, Bruce Power will continue to protect the health and safety of the public, as well as the environment.

REFERENCES

1. CMD 21-H100Q, Questions from Commission Panel Members, June 29, 2021, e-Docs# 6596254.
2. CMD 21-H100, Request for licence amendment for the production of radioisotopes at the Bruce Nuclear Generating Station A and B, April 9, 2021, e-Docs# 6411164.