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Update from CNSC Staff

Mise à jour du personnel de la CCSN

Follow up from June 8, 2021 Commission meeting

Suivi suite à la réunion de la Commission du 8 juin 2021

Update from CNSC Staff on exposure above regulatory limit of a Nuclear Energy Worker at Alberta Health Services

Mise à jour du personnel de la CCSN au sujet du dépassement de la limite autorisée pour un travailleur du secteur nucléaire au Service de Santé de l'Alberta

Commission Meeting

Réunion de la Commission

October 5, 2021

Le 5 octobre 2021

Canada

ok Government of Canada / Gouvernement du Canada

MEMORANDUM NOTE DE SERVICE

To / À
M. Leblanc
Commission Secretariat
cc: Ramzi Jammal

From / De
Karen Owen-Whitred
Director General
Directorate of Nuclear Subtances Regulation
Canadian Nuclear Safety Commission

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Subject/Objet: Update on Event at Alberta Health Services involving exposure above regulatory limits for a Nuclear Energy Worker

Background

Alberta Health Services is a Provincial Health Care provider that oversees a number of health care centers across the province of Alberta. They hold a variety of CNSC licenses to cover their various activities. The activities covered under their nuclear substances and radiation devices program include; Diagnostic Therapeutic Nuclear Medicine, Human Research, Distribution, Processing as well as Laboratory Services.

On May 19, 2021, the CNSC was notified by the Radiation Safety Officer (RSO) of Alberta Health Services that a Nuclear Medicine Technologist was reported to have exceeded the regulatory effective dose limit of 50 mSv in a one-year dosimetry period based on their dosimeter result for the first quarter of 2021. The notification came through the licensed dosimetry service provider (Landauer). The technologist was immediately removed from work that could further contribute to their radiation dose and the licensee initiated an investigation. Initial indications suggested that the dose was non-personal. On June 8, 2021, CNSC staff reported this event to the Commission under an Event Initial Report CMD 21-M27 – Exposure to Nuclear Energy Worker (NEW) exceeding regulatory limits.

In 2019, the licensee reported an event of a similar nature that occurred at the same licensed location. The 2019 incident involved an exceedance of the regulatory effective dose limit of 50 mSv in a one-year dosimetry period based on the dosimeter result of one quarter of 2019. The conclusion of the 2019 event was that the dose was non-personal. The licensee submitted a Dose Change Request, which was approved by CNSC Staff.

Review of 21 Day Final Report

The licensee submitted the final report on this event for CNSC staff review on June 9, 2021. At the time of the initial report the licensee suspected that the dose reading could be due to the improper handling of the dosimeter, as the technologist acknowledged that he had been leaving his dosimeter in a cupboard beside a piece of equipment that emits radiation during his 3 week rotation in the Positron Emitting Technology (PET) suite. However, the licensee's investigation concluded that the equipment did not emit sufficient radiation to explain the high dose. Instead, the licensee concluded that the dose reading was likely due to contamination of the dosimeter. CNSC staff reviewed the event report, including calculations for various isotopes in the attempts to explain the high dose reading. The licensee suspects that the most likely isotopes to cause the contamination on the dosimeter was either Gallium-67 or Indium-111, based on the isotope properties.

The worker who was exposed to the reported dose on May 19, 2021 underwent a biodosimetry test conducted by Health Canada and the results indicated that the worker did not receive the magnitude of dose that was recorded on the dosimeter. Although there are uncertainties in measurement at these low levels, the results indicate that the actual dose received was below the effective dose limit for a NEW. As a result, the licensee submitted a request for authorization to return to work as well as a Dose Change Request to the CNSC for the Nuclear Energy Worker involved in this event. The return to work authorization was issued by the CNSC on August 3, 2021. The Dose Change Request is currently under review by CNSC staff.

While CNSC staff are satisfied that the technologist did not receive a dose exceeding the annual dose limit for a NEW, there is still the question of the anomalous dosimeter reading. CNSC staff discussed the dosimeter result with Landauer, the licensed dosimetry service provider, who confirmed that the pattern of exposure seen on the dosimeter was irregular. They indicated that the dosimeter filter readings were not consistent with a normal exposure to ionizing radiation. In addition, Landauer confirmed that they monitor incoming dosimeters for contamination and in this case, there was no evidence that the dosimeter was contaminated upon receipt from the licensee. CNSC staff recommended that the licensee reach out to Landauer to discuss their conclusions and to ensure all possible scenarios have been considered. At present, these discussions are still ongoing; CNSC staff will continue to monitor this situation.

CNSC Inspection

Since there have been two similar events at this location in the past two years, CNSC staff conducted an inspection on June 1 and 2, 2021 focusing on the implementation of a radiation protection program at the Edmonton location. The following summarizes the results of this inspection, as requested by the Commission (these results were not yet available when CNSC staff presented the EIR to the Commission on June 8).

The inspection focus was on dosimeter storage and handling. It was observed that the licensee has provided a specific area for workers to store their badges during non-working hours. CNSC staff were able to conclude that the issue was not with the storage area specifically but with the worker not following the proper procedure to store the badges. Nonetheless, the inspection confirmed the licensee's conclusion that the high dose reading was not related to the location where the technologist left his dosimeter while working in his 3 week rotation in the PET suite.

In order to explore the possibility that the high reported dose was due to contamination of the dosimeter, the inspection also looked at the licensee's practices for hand contamination monitoring. The workers interviewed consistently described a hand monitoring practice that utilizes an area monitor mounted in the hot lab(s) with a follow-up verification using a contamination meter only if the initial area monitor check discloses possible contamination. While the inspection confirmed that the licensee was following good practice for hand contamination checks, there was no documented procedure for this monitoring and no supporting documentation to demonstrate that the hand monitoring verification had been completed by workers prior to leaving the department for breaks, lunch, or for the day. The inspection report noted this deficiency.

Overall, the inspection revealed a well-managed nuclear medicine department with some opportunities for improvement. Key radiation safety personnel were knowledgeable, trained and experienced and workers were observed following safe work practices (wearing gloves, lead aprons in some cases and using syringe shields) and using available radiation monitoring equipment at the time of the inspection. With the exception of the two reported high dosimeter reading events, all other examined worker doses align with the conducted licensed activities. Documented internal audits are conducted as per the licensee's radiation safety program.

Following the inspection, the licensee submitted revised site specific procedures for handling dosimeters and hand monitoring for each hospital site covered under the Alberta Health Services licence No. 1832-17-21.6. These procedures includes a weekly verification of the dosimeter storage rack for contamination as this allows the licensee to identify and report dosimeter contamination before they receive an unexpected high dose reading. In addition, the licensee also submitted instrumentation details and minimum detectable activity (MDA) calculations for each of the instruments referenced in the hand monitoring procedures. The information submitted by the licensee showed that the instrumentation has been calibrated and tested for its intended use(s) and was reviewed and approved by CNSC staff. Finally, in a letter dated July 19, 2021, the Applicant Authority committed to roll out training to all staff as well as to revise and implement the above noted procedures across all hospital sites.

The June inspection discovered there was no evidence to support that improper storage of the dosimeter in the 3 week work rotation led to the high dose reading reported to the CNSC. In addition, the review of the work practices and work performed at the hospital did not arrive at any conclusions with respect to the potential cause of the May 2021 reported high dose. Even though no immediate risks to health and safety were identified during the June inspection, CNSC recommendations included that the licensee

needs to further evaluate the content of its radiation safety program to identify any gaps in documented commitments that support the radiation safety program including, but not limited to hand contamination monitoring and dosimeter storage.

Additional Information

Since the May 19, 2021 event and after the CNSC's June 2021 inspection, Alberta Health Services reported two additional events to the CNSC, which occurred at one of the Calgary hospitals and are of concern for CNSC staff.

- On July 26, 2021 it was reported to the CNSC Duty Officer that a resident radiologist received a small amount of contamination to their forearm during sentinel node injection. This was due to the fact that the radiologist was not wearing appropriate PPE (lab coat) during the procedure.
- On August 6, 2021, a report was made to the CNSC Duty Officer that an I-125 seed had gone missing from a frozen tissue sample post-surgical removal. The cause was due to technologist inexperience and poor following of procedures.

While neither of these reported events were of high risk significance, upon receiving the notifications of the two additional incidents, CNSC staff felt it prudent to meet with the Applicant Authority for Alberta Health Services. A meeting between the CNSC and the AHS Applicant Authority took place on August 24, 2021 to discuss the CNSC concerns over the latest events reported, in addition to the event that occurred on May 19 and the outcome of the inspection conducted on June 1-2, 2021. The Applicant Authority provided reassurance to the CNSC that actions are underway to correct the deficiencies noted during the June inspection, and they are working on integrating the suggestions from CNSC staff for improving the radiation safety program.

Conclusion

CNSC staff reviewed all information provided by the licensee in response to the event reported to the CNSC on May 19, 2021, as well as the minor deficiencies noted during the CNSC inspection, and staff are satisfied with the corrective measures put in place by the licensee. CNSC staff will continue to monitor licensee performance and the changes to the licensee's radiation protection program. To that end, CNSC staff are planning an inspection of the central/northern region sites over the coming six months and will look at the implementation of the corrective measures.

Although the exact cause of the exposure recorded on the dosimeter has not been determined, CNSC staff confirm that a large portion of the exposure recorded on the dosimeter was non-personal; specifically, staff are satisfied that the technologist did not receive a dose in excess of the annual dose limit for NEWs. This conclusion is based on the CNSC staff inspection conducted in June, information provided in relation to the irregular exposure pattern noted on the dosimeter and the Health Canada biodosimetry test. The Dose Change Request submitted by the licensee is under review.

While CNSC staff are satisfied that the subject of this EIR has been resolved (i.e. exposure to a Nuclear Energy Worker exceeding annual regulatory limits), we nonetheless consider it important that the licensee seek to understand the cause of the high dosimeter reading. As such, CNSC staff also recommended that the licensee reach out to Landauer to discuss their conclusions and to ensure all possible scenarios have been considered regarding the anomalous dosimeter reading. CNSC staff will continue to monitor the outcome of these discussions.

CNSC staff will also be tracking the progress and implementation of new policies, which form part of the corrective action commitments made by the Applicant Authority. Tracking will also include the monthly updates promised by the Applicant Authority as well as any revisions to the Radiation Safety Policies.