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Event Initial Report

Rapport initial d'événement

McMaster University

Université McMaster

**Personal Contamination Incident at
McMaster University**

**Incident impliquant de la contamination
personnelle à l'Université McMaster**

Commission Meeting

Réunion de la Commission

August 23, 2018

Le 23 août 2018

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EVENT INITIAL REPORT (EIR)

E-DOCS-#5597285

EIR: Personal Contamination Incident at McMaster University	
Prepared by: Directorate of Nuclear Substances Regulations	
Licensee: McMaster University	Location: McMaster University
Date Event was Discovered: 2018-06-20	Have Regulatory Reporting Requirements been met? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Proactive Disclosure: Licensee: Yes <input type="checkbox"/> No <input type="checkbox"/> CNSC: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Overview	
Reporting Criteria: Issues, events, occurrences that the Directors-General (DGs) or their designates judge to have potential for repercussions outside the CNSC and for which the DGs or their designates believe the Commission should be informed	
<p>Description: On June 20, 2018 the CNSC duty officer received a call from the Radiation Safety Officer at McMaster University in Hamilton, Ontario, to advise the CNSC that a worker had potentially exceeded an action level of 1mSv/shift, as established in the McMaster Radiation Protection program.</p> <p>Cause(s): The potential action level exceedance was a result of a personal contamination incident that occurred on June 15, 2018. The preliminary dose estimate indicated that the contamination incident resulted in a worker dose exceeding the daily Administrative Control Level, without prior approval, of 1 mSv set by McMaster University. Note that the individual is a Nuclear Energy Worker and no regulatory dose limits have been exceeded, however this incident is of concern to CNSC staff as it occurred in an area that had previously been determined to be free of contamination.</p> <p>The contamination incident occurred while the worker was setting up an experiment in the hot cell. Following the completion of previous work in the hot cell, McMaster staff had monitored the hot cell and determined that the cell was no longer a designated contamination area. As a result, the worker was permitted to enter the cell without protective equipment or respiratory protection. Figure 1 shows the hot cell where the event occurred.</p> <p>During experimental setup, the worker, without wearing gloves, passed a set of control cables to the exterior of the cell using a port in the cell wall, shown in figure 2, and noted the presence of a dust on his hand and forearm. Immediately, the worker stopped his activities to monitor his hand and forearm. Observing contamination on the skin, the worker contacted Health Physics for assistance. Over a period of approximately five minutes, the worker was decontaminated using wet wipes, measured for residual contamination on a whole body monitor and changed his clothes. At this point, there was no observable contamination on the worker.</p>	
Impact of the Event	
On People: How many workers have been (or may be) affected? <u>1</u> How many members of the public have been (or may be) affected by the event? <u>None</u>	
How were they affected? The worker had potentially exceeded an action level of 1mSv/shift, as established in the McMaster Radiation Protection program.	
On the Environment: None	
Other Implications: McMaster University has discontinued the CANDU pressure tube sampling program pending review of this event and McMaster Health Physics Advisory Committee approval of corrective actions.	
Licensee Actions	
<p>Taken or in Progress: Due to the location within the work area where the contamination occurred, McMaster Health Physics staff collected a nose blow sample. Onsite analysis of the sample indicated that the worker had potentially inhaled radioactive material containing Co-60 and Nb-94. The previous work conducted in the hot cell involved cutting a CANDU pressure tube sample for analysis and these isotopes are known to be present in the CANDU pressure tube samples. As a result the McMaster Health Physicist determined this was the likely source of contamination and recognized the potential for an alpha uptake.</p> <p>McMaster initiated an internal dosimetry assessment through urinalysis. Subsequently, the worker was sent for whole body counting at OPG (Pickering NGS), completed June 19th. Analysis of these dosimetry results led to the determination that the worker had exceeded the action level, triggering a preliminary report to the CNSC. On June 25th, a fecal sample was obtained from the individual and sent to Kinectrics for analysis in order to provide a complete dose assessment.</p>	

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Review of information related to the event as it relates to other workers

In order to ascertain the possibility of internal uptakes in other workers McMaster University Health Physics staff conducted a review of activities that had taken place during the pressure tube sampling work in the hot cell. Two situations were identified. In the first, a worker's Tyvek suit ripped under his shoulder while he was removing equipment from the cell. The worker was wearing an air purifying respirator at the time which precluded an intake for that worker. The second situation involved the detection of contamination on a worker's shoe. The worker had been assisting with decontamination operations at the cell door. The workers were sent for whole body counting at the University of Western Ontario in May 2018. There were no whole body counts identified or measured. McMaster Health Physics staff has reported that there was no likelihood of internal exposures to other workers as a result of pressure tube work in the cell under this permit.

Planned: The licensee is finalizing a full root cause analysis report that will be completed August 31, 2018. McMaster has discontinued any further pressure tube analysis work. Prior to resuming any pressure tube analysis, the McMaster Health Physics Advisory Committee will conduct a full review of the work plan including corrective actions arising from this incident.

The final dose assignment taking into account the fecal analysis will be completed by 12 September.

CNSC Actions

Taken or in Progress: Upon being notified of the event, CNSC staff reviewed the information provided by McMaster and determined the need for a focused inspection at the licensee facility to obtain further information.

Information collected by CNSC staff while on site

On June 25, CNSC staff conducted a site inspection at McMaster University. As part of the inspection, CNSC staff performed a walk down of the hot cell area and related equipment with McMaster staff in order to gain a better understanding of the work flow associated with the performed activities. Individual interviews were conducted by DNSR Inspectors, DNSR Licensing Staff and a Radiation Protection Specialist with the contaminated worker, the health physics staff member who assisted in the decontamination and the Health Physicist responsible for the activity. McMaster Health Physics staff was also asked to provide additional records which, in combination with the information gathered onsite, contributed to the preliminary inspection report provided to McMaster on June 26.

CNSC staff have determined that the contaminated worker and the McMaster Health Physics staff reacted appropriately to the incident based on the interviews and site visit of June 25th. The situation was quickly brought under control and remediation actions taken were effective. McMaster Health Physics was proactive in ordering the internal dosimetry analysis and promptly informing the CNSC upon becoming aware of the action level exceedance.

Procedures and equipment used to control the operation and release of the hot cell are of particular interest to this event. The licensee followed their protocol for decontamination when active work was completed, yet the worker was still exposed to contamination.

No regulatory dose limits have been exceeded as the contaminated individual is a Nuclear Energy Worker. McMaster has continued to update the CNSC on this incident as information becomes available. McMaster estimated a preliminary dose of 1.79 mSv. An independent review by OPG concluded that the dose is between 1.3 and 6.5 mSv. CNSC staff agrees with OPG's dose estimate. These results are based on urinalysis results and use conservative assumptions.

Planned: CNSC staff concluded that McMaster Health Physics have responded appropriately to the event. The contamination was limited to one person and suitable measures have been taken to ascertain that individual's dose. McMaster voluntarily stopped the pressure tube analysis work.

CNSC staff is awaiting the root cause analysis and final dosimetry evaluation for further review and analysis.

Additional reporting to the Commission Members anticipated:

Yes

No*

If Yes, provide method of reporting: *Unless the final dosimetry indicate a higher than anticipated worker dose

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Name and Title	Signature
Colin Moses Directorate of Nuclear Substances Regulations	 Director General
	 Date



Figure 1: Interior of hot cell, viewed from service area

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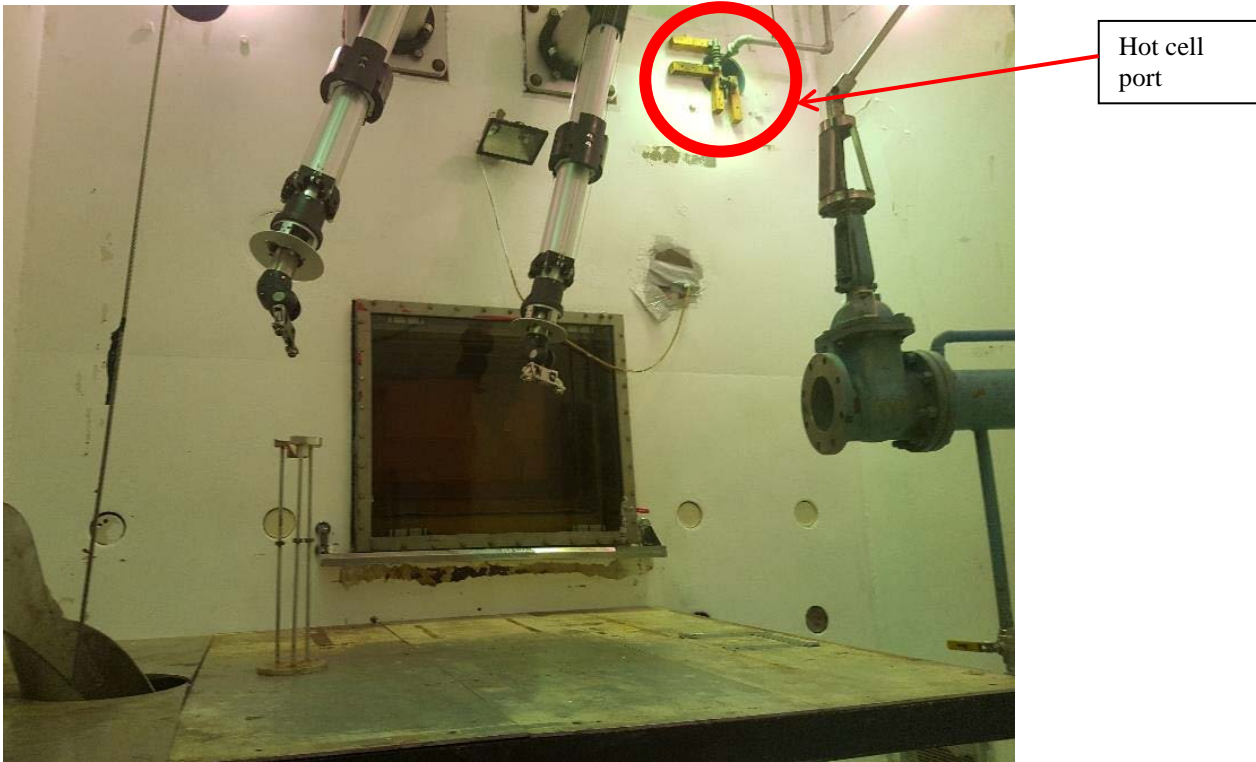


Figure 2: Interior of hot cell, location of hot cell port