Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

MEMORANDUM **NOTE DE SERVICE**

To / A
Marc Leblanc
Commission Secretary

c.c. Ramzi Jammal

From / De
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Director General, Nuclear Substances Regulation

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Subject / Objet Status Update : Significant Development at the Canadian Nuclear Laboratories, Chalk River Laboratory

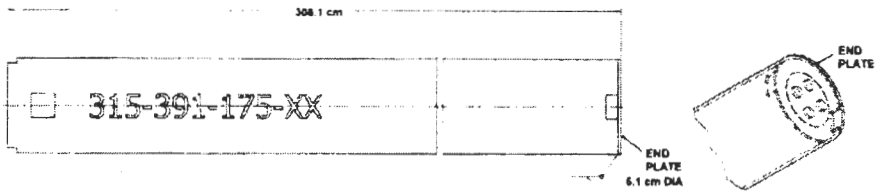
CNSC staff is reporting to the Commission a significant development following an occurrence at the Chalk River Laboratories operated by Canadian Nuclear Laboratories (CNL).

In late November 2015 the CNSC was informally notified of an occurrence at the Chalk River Laboratories in Chalk River, Ontario involving the failure of a fuel caddy during the preparation of spent National Research Experimental (NRX) fuel assemblies for transport of fuel to the U.S. as part of the repatriation project under the Global Threat Reduction Initiative (GTRI).

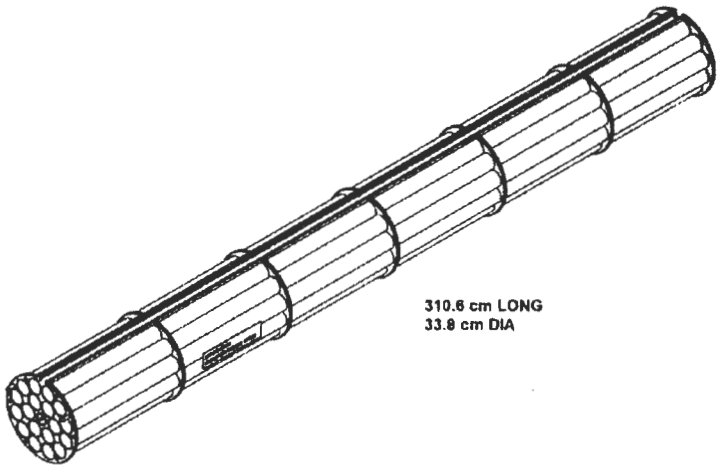
This report presents preliminary findings of CNSC staff's assessment of the licensee's response to this occurrence.

BACKGROUND

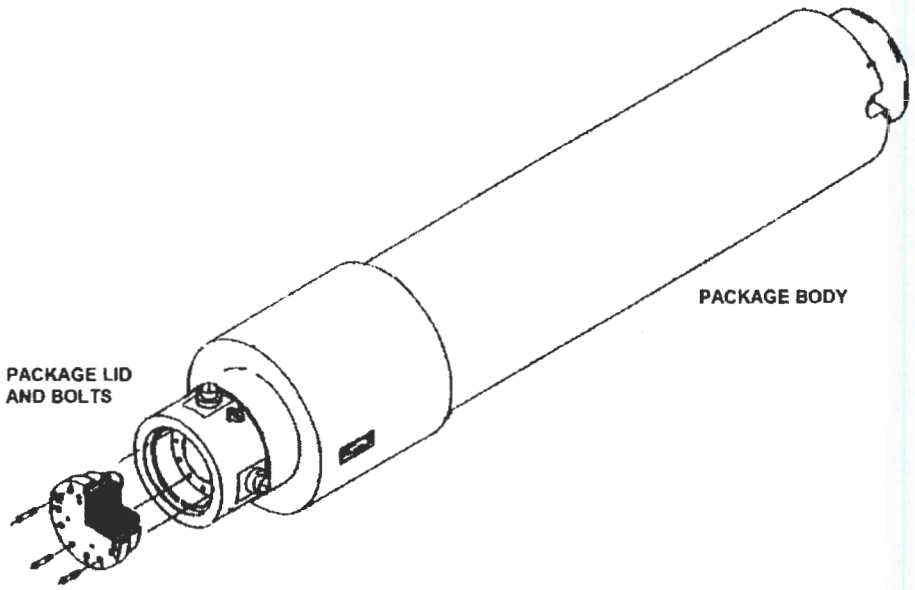
The NAC-LWT transport package, used to ship NRX fuel, is produced by American-based NAC International Inc. (NAC), who holds both a CNSC and U.S. certificate for the package. As part of the preparation for transport, each NRX fuel assembly is inserted into a caddy, consisting of an aluminum tube 5.1 cm in diameter, 0.25 cm thick and closed at one end with a welded plate. The caddy is inserted into a fuel basket which is then loaded into the transport package. These activities are conducted underwater within the NRU reactor fuel bay. Illustrations of the NAC-LWT caddy, basket and transport package are shown below.



NAC-LWT CADDY FOR NRX FUEL ASSEMBLIES



NAC-LWT BASKET FOR NRX CADDY/FUEL ASSEMBLIES



NAC-LWT TRANSPORT PACKAGE

EVENT AT NRU

On October 28, 2015, the bottom plate of a caddy failed during the loading of an NRX fuel assembly, resulting in the fuel assembly falling on the pool floor.

CNL retrieved the fuel assembly from the pool floor, conducted an inspection, and determined that it had not suffered any damage. CNL suspended all loading operations of caddies within the NRU reactor fuel bay and a visual inspection of 29 previously loaded caddies was performed, revealing cracks on two of them.

Although loading operations of the NRX fuel within the caddies had been suspended as a result of the failure, a NAC-LWT transport package that had been previously loaded the week before was shipped the morning after the event, on October 29, 2015.

EVENT NOTIFICATION

CNL notified NAC, the owner of the transport package, of the event on November 2, 2015.

CNL informally notified CNSC staff of the event on November 27, 2015 during a regular progress meeting on NRU operations, and at a CNSC-CNL monthly meeting December 3, 2015 and a senior-level meeting on December 4, 2015 including CNSC's Executive Vice-President and Chief Regulatory Officer, Mr. Ramzi Jammal. At that time, he requested a formal report on the event, as required by the *Packaging and Transport of Nuclear Substances Regulations, 2015*.

A preliminary report providing general details of the event was submitted to the CNSC on December 11, 2015. This was followed by a formal event report on December 17, 2015.

U.S. NRC – CNSC COMMUNICATIONS

CNSC staff informed the U.S. Nuclear Regulatory Commission (U.S. NRC) of the event on December 7, and has been in communication with the U.S. NRC on a regular basis since becoming aware of the event. As required by U.S. regulations, NAC has submitted a report on the event to the U.S. NRC which is currently under review. This report was also provided to the CNSC.

The U.S. NRC is expected to complete their assessment of the report submitted by NAC in February 2016 and will provide a copy to the CNSC once completed.

ACTIONS TAKEN BY CNL

CNL is in the process of completing a root cause analysis of the event and developing appropriate corrective actions. This includes an analysis of the caddy failure, as well as the failure in conduct of operations and communications that allowed a shipment to occur on the day following the caddy failure.

CNL is communicating with Savannah River National Laboratories in the U.S. (recipient of the NRX fuel shipments) to develop a strategy for the safe unloading of the NRX fuel from the package shipped on October 29, 2015. They expect to complete the strategy by mid-February. CNL has also issued a request to NAC to assess the condition of all related components, which must meet design requirements specified in

the safety report submitted for certification and approved by the U.S. NRC, U.S. Department of Transport, and CNSC.

CNL has scheduled an onsite audit of the NAC Quality Program during the first week of February 2016, for activities related to components involved in the repatriation project. In addition the audit will verify NAC's corrective actions.

INITIAL ANALYSIS OF PROBABLE CAUSES OF WELD FAILURE

NAC's preliminary assessment of the weld failure indicates that the failure is likely a result of work having been performed by welders who were not adequately qualified for the type of welds found on the caddies. NAC has removed all existing caddies from service and are proceeding to produce new ones.

CNSC STAFF'S INITIAL ASSESSMENT

After review of the information submitted to date by CNL and NAC, CNSC staff concur that only the caddy was affected by the weld deficiencies and that the integrity of the transport package was not compromised. In addition, there was no damage to the fuel or releases as a result of this occurrence. Although there was no impact on the health and safety of persons or the environment as a result of this event, a review of the information provided by CNL identified deficiencies in their management system.

The *Packaging and Transport of Nuclear Substances Regulations, 2015* require an immediate report to the CNSC of any package showing evidence of damage that may impair its ability to comply with its certificate. A full report is required within 21 days of the occurrence, which must include the specifics of the event and an assessment of probable cause and effects as well as corrective actions. Despite these requirements, verbal notification was provided only after 30 days, and the formal report was provided 50 days after the occurrence.

Additionally, the report submitted by CNL indicated that an NRX fuel shipment, already loaded with 18 caddies, took place about 12 hours after the failure of a caddy in the NRU reactor fuel bay, on the morning of October 29th, this despite the event from the previous day. The delay in reporting to the CNSC, and the fact that a shipment proceeded shortly after the event, and before the implications of the event could be adequately be assessed, are indicators of potential weaknesses in CNL's management system and safety culture.

CNL have subsequently performed a cause analysis of the event and the failures in their management system and safety culture, which was submitted to the CNSC on January 25, 2016. The cause analysis identifies corrective measures to be implemented.

NEXT STEPS

CNSC staff will assess the information submitted by CNL to ensure that the proposed corrective measures to be put in place by CNL will address both the specific circumstances of the event, as well as any potential weaknesses in their management system and safety culture.

CNSC staff will also review the U.S. NRC assessment report of the event, once it is completed (expected February 2016), and finalize its assessment of the event. CNSC staff will follow up on any actions that may affect the Canadian certification or use of the NAC-LWT transport package within Canada as appropriate.

CNSC staff will consider appropriate regulatory action based on its assessment of the information submitted by CNL and the circumstances of the event, and will report the results of the CNSC staff assessment at the Commission meeting in April, 2016.