Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

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Update from CNSC Staff

Suncor Energy Inc.: Fire at Suncor Tar Island location, near Fort McMurray – Event Initial Report presented at September 16, 2020 Commission meeting

Responses from CNSC staff to questions from Commission members on fixed gauges

Commission Meeting

January 21, 2021

Mise à jour du personnel de la CCSN

Suncor Energy Inc. : Incendie au site de Suncor Tar Island, près de Fort McMurray – Rapport initial d'événement présenté à la réunion du 16 septembre 2020

Réponses du personnel de la CCSN aux questions des membres de la Commission sur les jauges fixes

Réunion de la Commission

Le 21 janvier 2021

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Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

MEMORANDUM NOTE DE SERVICE

To
Marc Leblanc
Commission Secretary

A
CC:
Ramzi Jammal
Executive Vice-President and Chief Regulatory Operations Officer

From
De
Karen Owen-Whitred
Director General
Directorate of Nuclear Substance Regulation

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Subject
Objet
Responses to questions on fixed gauges raised by the Commission during the September 16, 2020 Public Meeting

During the September 16, 2020 Commission meeting, CNSC staff presented an Event Initial Response (EIR) report on a fire at Suncor's Tar Island location, near Fort McMurray [1][2][3]. The Commission asked several questions on the design of fixed gauges, since fixed gauges were involved in the fire. CNSC staff committed to answering these questions after the meeting [4].

The attached table provides responses to the questions raised by the Commission on the design of fixed gauges during the September 16 Commission meeting.

Staff are available to provide further information upon request.

REFERENCES

[REF 1] CMD 20-M19.A Agenda for Commission meeting, September 16, 2020 (e-doc #6379760)

[REF 2] CMD 20-M29 Event Initial Report: written submission from staff concerning a fire at Suncor's Tar Island location, near Fort McMurray, September 3, 2020 (e-doc# 6373150)

[REF 3] Transcript of the Commission Meeting of September 16, 2020 (e-doc# 6388950)

[REF 4] Draft Minutes of the Meeting of the Canadian Nuclear Safety Commission held on September 16, 2020 (e-doc# 6410527)

#	Question	Response
1	What are the specifications for heat tolerance for a fixed gauge? Are they built so they could tolerate a fire or what is the safety profile for these devices relative to fires? Questions from Member Demeter, bottom of page 157 and top of page 158 of the English transcript.	- The fixed gauges (or radiation devices) are designed and assessed based on a risk-based, graded approach. - Each radiation device design containing more than the exemption quantity of a nuclear substance must be certified by the CNSC prior to its use in Canada. - There are ANSI, ISO and IAEA standards that provide guidelines for heat tolerance and other environmental conditions for these gauges and the sealed sources that they contain, depending upon their use, activity and radionuclides. - The sealed sources used in these gauges are made of stainless steel and most of the time consist of a double encapsulation. The sealed sources are tested to demonstrate that they can withstand the environmental conditions to which they are expected to be exposed considering the risk consequences. - Nuclear substances in these gauges are in sealed source form and are not likely to disperse even in fire conditions. - Lead shielding is typically used in the devices, contained within a welded steel shell that allows the shielding to be maintained at temperatures higher than the melting point of lead (327°C). The sources are held in place within the device. Should the lead shielding melt out of the device, adequate distance from the sources would still be maintained, therefore limiting the dose rate.
2	Is there any requirement to do a risk assessment about environmental hazards that a gauge might be exposed to, such as fire or other hazards that could cause damage to the device, before being put into service? Question from Member McKinnon, bottom of page 159 and top of page 160 of the English transcript.	- As indicated above, hazard assessment is implicit in the design of the sealed sources contained within the gauge. While there is no specific requirement in the certification process to conduct an environmental hazard assessment of the gauge, sealed sources are tested to demonstrate that they can withstand the environmental conditions to which they are expected to be exposed considering the risk consequences. These gauges contain quantities of radioactive material that are less than or equal to the activity limits for a Type A transport package, which are set to ensure that the radiological consequences of severe damage to a package are limited. - A person must hold a CNSC-issued licence before they can possess, use, and service or store a radiation device that contains more than ten times the exemption quantity of a nuclear substance. - A licensee is required to have programs in place for radiation protection, emergency response, servicing and leak testing. - Radiation device manufacturers provide emergency procedures for certification that generally consider fire and other hazards. - An attachment to the certificate (called the Summary Evaluation) lists the conditions under which the radiation device is to be used, stored, serviced, leak tested and transported.
3	Why is lead used for shielding in fixed gauges even though its melting point is just above 300°C? Question from Member Lacroix, top of page 163 and follow-up	Lead is generally the shielding of choice for fixed gauges over other alternatives such as depleted uranium or tungsten for the following reasons: - The activity of the sealed sources used in fixed gauges is relatively small compared to other applications such as exposure devices where tungsten and depleted uranium are typically used.

	question middle of page 164 of the English transcript.	- Depleted uranium is itself naturally radioactive (very low emissions) and requires encapsulation. If there is a loss of structural integrity, the depleted uranium can represent potential problems of contamination, waste management and chemical toxicity. It is also combustible which can cause additional contamination problems in the event of a fire. - In use, depleted uranium can oxidize, and should this oxidized material become airborne, it can present a hazard. - Tungsten is very expensive and difficult to machine. - Lead provides high-performance shielding, is inexpensive and its manufacturing process is well proven. - The lead in the devices is typically contained within a welded steel shell that allows the shielding to be maintained at temperatures higher than the melting point of lead (327°C). The sources are held in place within the device. Should the lead shielding melt out of the device, adequate distance from the sources would still be maintained, therefore limiting the dose rate.