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Update from CNSC Staff

Mise à jour du personnel de la CCSN

Update on Suncor Energy Inc. MacKay River fire incident

Mise à jour au sujet de l'incendie à l'installation de MacKay River de Suncor Energy Inc.

Action item from December 11-12, 2019 Commission Meeting (#20866)

Mesure de suivi de la réunion de la Commission des 11-12 décembre 2019 (#20866)

Commission Meeting

Réunion de la Commission

September 16, 2020

Le 16 septembre 2020



To
À
M. Leblanc
Commission Secretariat
cc: Ramzi Jammal

From
De
Karen Owen-Whitred
Director General *KOwen-Whitred*
DNSR
Canadian Nuclear Safety Commission

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Subject
Objet
Update on Suncor Mackay River fire incident and device removal

Background

On December 6th, 2019 at 11:10 pm (MST) the CNSC Duty Officer received a call from the Radiation Safety Officer at Suncor who reported a fire incident at the Mackay River site about one hour north of Fort McMurray Alberta, as seen in Figure 1.



Figure 1: Map of Suncor Mackay River site in relation to Fort McMurray

At the time of the call the fire was ongoing and there were four radiation devices (fixed gauges) involved. The four fixed gauge models were Omart Vega model SHLM- CR2 insertion gauges each containing five Cs-137 sealed sources with an activity of 1.85 GBq each. The building was empty when the fire started.

On the morning of December 7th, 2019 the RSO provided an updated to the CNSC, indicating that the fire was still active and that the roof of the building had collapsed. The RSO also indicated that electronic personal dosimeters were provided to emergency response personnel on-site and continued to maintain a safe distance around the perimeter of the building as the inside of the building was not accessible.

The fire was extinguished later on Saturday December 7th, 2019. The firefighters kept minimum distance of 5 meters while fighting the fire as per the licensee's radiation safety manual. The licensee conducted a radiation survey around the perimeter of the building once the fire was extinguished. None of the measurements exceeded background levels.

CNSC staff reported the above information verbally to the Commission at the December 12th, 2019 Commission meeting. At that meeting, CNSC staff indicated that it would take a few weeks for the licensee to gain access to the location of the four fixed gauges and perform a full assessment of their conditions, due to the need to secure the site prior to allowing access to the inside of the building.

Update

On December 20th, 2019 a platform was built, allowing workers into the area and providing access to the gauges. The licensee also took radiation measurements while workers were installing scaffold and the highest readings obtained were between 20-25 $\mu\text{Sv/hr}$. Workers who installed the scaffolding were also required to wear dosimeters and the highest reading obtained was 20 μSv .

On December 21st a third party radiation safety consultant (Stuart Hunt & Associates Ltd.), who holds a CNSC licence allowing servicing of fixed gauges, arrived on-site at the Mackay River site to assess and evaluate the damage to the gauges affected by the fire. The four insertion gauges damaged by the fire were mounted on the high temperature separator vessels shown in Pictures 1 and 2. The assessment concluded that the fire had compromised the gauges, as there was clear evidence that some of the lead shielding had melted and escaped the sealed source housing.



Picture 1: High temperature separator vessels fitted with insertion gauges



Picture 2: High temperature separator vessels fitted with insertion gauges

The technician measured a maximum radiation level of $60 \mu\text{Sv/hr}$ at approximately 60 to 100 centimeters away from the gauges, as seen in picture 3. These measurements were taken from the scaffolding installed to gain access to the gauges. There was no access to the gauges apart from the scaffolding and the entire area was cordoned off to prevent access

On January 6th, 2020, Stuart Hunt & Associates provided a plan of action for safely removing the four gauges to the CNSC for approval. The plan provided various scenarios, depending on what the technicians found after arriving on site, along with potential issues and measures to be put in place to limit exposure to workers. CNSC staff reviewed and approved the proposed plan.

Two technicians from Stuart Hunt & Associates arrived on-site on January 16th, 2020 to perform the safe removal of the gauges. A CNSC inspector, Lindsay Pozihun, was also on site to observe the removal. Once the Stuart Hunt technicians completed the setup according to the approved plan, they began the detailed assessment of the gauges. The technicians observed that the source cables were stuck in lead that had melted and escaped from the source holder and were therefore not free to move from the drywell. Based on this observation, the technicians determined that the removal scenario to be used was removal of the four empty source holders followed by removal of the drywells that contained the sealed sources from the vessel. Those would then be packaged into Type A packages that would need to be specially manufactured. Pictures 4 and 5 show the removal of the empty source holders from the drywells.



Picture 3: Dose rate measurement near the gauges



Picture 4: Source holder being prepared for lifting and removal



Picture 5: Source holder being lifted by a crane

The extent of the lead that melted and escaped the source holder was clearly visible inside the source well, as shown in picture 6, and confirmed the assumption from the technician that the sources were stuck inside the well. Stuart Hunt's technicians were able to remove all four empty source holders from their mounted position by the end of day on January 16th, 2020.

On January 17th, 2020 the technicians set up a work area in preparation for the removal of the four drywells containing the sealed sources from the vessels. All other work in the area surrounding the vessels was suspended and the area was cordoned off and monitored to prevent access while work was underway to remove the drywells. The drywells were lifted by a crane and removed from the vessels and loaded directly at the back end of a long flatbed truck. An exclusion zone was created while the flatbed truck was moved to a freight container that served as temporary storage. The temporary storage was located in an unoccupied area at the back of the yard.

The technicians tagged the four drywells with the source information once stored in the freight container and then locked the freight container. The technicians set up a safe perimeter around the freight container, and installed warning signs and 24-hour emergency contact information. The sources remained in the freight container until Stuart Hunt & Associates was ready to prepare the sources for safe disposal.

The technicians took swipes on the four drywells and the results showed that there was no evidence of removable contamination.



Lead



Picture 6: Inner view of the drywell following removal of the source holders showing presence of lead

Stuart Hunt & Associates Ltd. submitted a plan for the preparation of the packages and safe disposal to the CNSC for review and approval. The plan consisted of cutting a portion of the length of the drywells to allow them to be inserted in a Type A package designed for the transport of source rods. Each of these packages was manufactured specifically for this purpose since the total length of the packages had to be sufficient for the portion of the drywell containing the sources. The packages were delivered to Stuart Hunt & Associates Ltd. on July 6, 2020. Picture 7 shows the Type A packages manufactured for the recovery of the sources.

On July 30 2020, Stuart Hunt & Associates resumed work at the Suncor site and provided a report on the work performed on site to the CNSC on August 21. CNSC staff were not present for this portion of the work due to COVID travel restrictions. Picture 8 shows the freight container used to store the four drywells containing the sources. Picture 9 shows the four drywells inside the container.



Picture 7 : Type A packages for the transport of the drywells (photo provided by Stuart Hunt and Associates Ltd.)



Picture 8 : Freight container used for the storage of the drywells provided by Stuart Hunt & Associates Ltd.



Picture 9 : Drywell inside the container provided by Stuart Hunt & Associates

The preparation of the packages involved a cutting operation for loading the drywells into the Type A packages. From the assessment and radiation survey performed in January, it was believed that the five sources of each drywell were located in the straight portion of the well. Their plan was to slide the drywell into the package and confirm that all sources are inside the package and shielded. The curved portion of the drywell would then be cut to allow the drywell to fit into the package.

In the report submitted to the CNSC, Stuart Hunt and Associates Ltd. noted that the initial indication that all sources were in the straight position of the drywell was not confirmed when the drywells were inserted into the packages, and that at least one had sources located in the curved portion.

The technicians created a setup, shown in picture 10, allowing them to approach, locate and cut the drywell while being shielded for the sources using the concrete blocks shipped to the site for this purpose. The setup allowed them to accurately determine the position of the sources. For the cutting operation, it was not possible to shield the sources due to the location of the saw and the shape of the drywell as seen on picture 11. The maximum dose rate measured at the torso of the worker performing the cutting operation was 600 $\mu\text{Sv/h}$ and varied for each drywell due to the amount of lead that melted down into the drywell due to the fire. The total recorded dose for the two technicians who performed the recovery were reported as 199 μSv and 175 μSv , respectively.



Picture 10 : Setup to measure dose rate provided by Stuart Hunt & Associates Ltd.



Picture 11 : cutting of a drywell provided by Stuart Hunt and Associates Ltd.

Each drywell was inserted in a separate package and each package was surveyed to verify the dose rate on surface. The packages were then prepared for shipment to the Stuart Hunt & Associates location in Mississauga in accordance with the *Packaging and Transport of Nuclear Substances Regulations (2015)* and the *Transport of Dangerous Goods Regulations*, using a commercial carrier. The shipment arrived at the Stuart Hunt & Associates location on August 4th where the sources will be stored until disposal.

CNSC staff reviewed the report provided by Stuart Hunt and Associates following the removal of the source from the Suncor McKay River site and confirms that the packaging and transport was done safely and in accordance with regulatory requirements.

Conclusion

Suncor indicated that the plant is now back in operation although there are still many areas that remain under construction, as the rebuild is still ongoing. The licensee has purchased new insertion gauges to replace the four that were damaged and they are in the process of installing these gauges.

CNSC staff are satisfied with the response from the licensee on this event and considers the event closed. CNSC staff are not planning any further actions in relation to this event.

Note that Suncor reported a fire at another one of their facilities in August 2020. While the licensee's initial investigation indicates that none of the fixed gauges were affected by this fire, CNSC staff provided the Commission with an Event Initial Report on September 16, 2020.