

Using a Risk-Based Approach to Achieve Net Environmental Benefit During Derailment Remediation

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In March 2020, a derailment occurred near Giscome, British Columbia (Site), which involved 20 railcars containing petroleum coke (pet coke), seven tank cars containing liquefied propane gas (LPG), and one tank car containing methanol. An estimated 50 to 100 tonnes of pet coke was released into Hay Creek (Creek), which flows west towards Willow River, a tributary of the Fraser River. When responding to a derailment involving a spill to the environment, responders constantly face the challenge of determining clean up end points. This can involve balancing regulatory requirements from one or more jurisdictions, expectations from stakeholders, and determining the point at which additional intrusive remediation would do more harm than good (i.e., net environmental benefit). Traditional contaminated sites management approaches can be used for spill remediation; however, there are circumstances when more creative approaches are warranted that look beyond directly applicable standards, guidelines, and protocols. CN and GHD used an innovative ecological risk-based framework to determine remediation end points in the Creek, which resulted in optimizing resource use, minimizing disturbance to the environment, and acceptance by the regulators. CN, GHD, and contractors conducted emergency response activities at the Site including recovery of pet coke from the ground and Creek, air monitoring, and Site restoration. This presentation will focus on the actions conducted to address sediment remediation in the Creek and the risk assessment conducted to determine remediation endpoints, such as those outlined below:

- Pet coke containment and recovery activities from the Creek Establishing practical recovery end points to avoid scouring the Creek bed
- Product sampling and analysis to evaluate fate and transport of pet coke in the environment
- Sediment sampling after pet coke recovery
- Completion of an ecological risk assessment to evaluate potential risk to ecological receptors related to residual pet coke remaining in the Creek

The pet coke released to the Creek was not expected to demonstrate chronic toxicity to aquatic organisms due to limited solubility; however, it had the potential to have a smothering effect. Recovery of the pet coke from the Creek bed was required to mitigate impacts to the aquatic environment; however, efforts were made to minimize disturbance to sediment, aquatic habitat, benthic organisms, and organic content. Once the practical limits of the

remediation were reached, trace amounts of pet coke were left in the Creek to achieve a greatest net environmental benefit. Following the pet coke recovery, a sediment sampling program was conducted to characterize and delineate remaining impacts and for use in the ERA. The ERA involved a literature review to identify applicable guidance, resources, and approaches from other jurisdictions when they were not available in BC or Canada, to more rigorously assess potential risk associated with residual impacts compared to the traditional approaches. It was concluded that the trace amounts of residual pet coke remaining in the Creek did not pose risk to environmental receptors; therefore, additional invasive remedial measures would have had limited benefit compared to the detrimental effects to the aquatic habitats and were not warranted.

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Kris is an Associate and Project Director for GHD's Emergency Response and Preparedness program (GHD FIRST) in British Columbia, currently the largest consultant-based spill preparedness and response program in Canada. She has managed, coordinated, and responded to numerous environmental emergencies including train derailments, pipeline spills, port and marine incidents, highway truck crashes, chemical fires, and residential heating oil releases in British Columbia and across Canada. Kris has gained experience working with British Columbia's regulators, stakeholders, and First Nations groups during several environmental emergency response events and exercises. Additionally, Kris brings significant experience with contaminated site remediation, risk assessment and toxicology, industrial hygiene and air monitoring, wildlife management, and site restoration.