

## Integrated Environmental Risk Assessments of Crude Oil Releases in Northern Ontario

Aaron Stadnyk ..... CN  
Andrew Pawlisz.....GHD  
Laura Lawlor .....GHD

Derailments of February 14 and March 7, 2015 near Gogama, Ontario resulted in releases of crude oil to aquatic environments of freshwater creeks, a river, and lakes. The derailment locations and community of Gogama are situated within rural northern Ontario, where consumption of local wildlife is prevalent amongst the public, tourists, and First Nations residents. The potential for effects on human and ecological receptors was assessed by collecting data on multiple lines of evidence and performing integrated ecological and human health risk/impact assessments. As part of the emergency response activities GHD collected air, surface water, sediment, benthic macroinvertebrate, and fish samples from the study areas for the analysis of crude oil constituents (CROCs), including parent and alkylated polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, xylene, and petroleum hydrocarbons (PHCs). GHD also prepared detailed records of local avian and mammalian wildlife. Based on the results of the air, surface water, and fish sampling, no risks to human health were anticipated since the concentrations of CROCs at exposure points were either non-detect, or were detected at concentrations below those associated with the potential for adverse effects. In contrast, the results of the ecological risk assessment for benthic macroinvertebrate communities at the March 7, 2015 derailment suggested the potential for adverse effects within an approximately 200-meter river section encompassing the source area. The main risk drivers were PAHs. The October 2015 post-remediation confirmatory sediment sampling and the ecological risk assessment indicated that there were no remaining risks to ecological receptors inside and outside of the remediation area.

Consistent communication and coordination with the agencies, public, and First Nations through the development of the integrated environmental risk assessments was a key component of obtaining acceptance of the integrated assessments and results within an emergency response framework. This presentation will outline the unique process and scale implemented in the preparation of this integrated risk assessment approach, the challenges of conveying the assessment results to both the agencies and non-technical stakeholders concurrently, and the lessons learned while working through a detailed technical evaluation in a condensed timeframe.