Victoria's McLoughlin Point Wastewater Treatment Plant and 100 Years of Fuel Storage. What Could go Wrong?

Craig Harris, AECOM Canada ULC

This is a case study example of the construction of the Capital Regional District McLoughlin Point WWTP on the site of Victoria's former bulk fuel distribution terminal. The project was a joint venture design-build with AECOM leading the environmental / engineering and Graham Construction the build. In addition to providing the overall environmental oversight on the project, AECOM's local contaminated site team provided geological, hydrogeological and risk assessment expertise critical to the success of the Certificate of Compliance issued at the termination of the WWTP. The presentation will highlight the challenges of undertaking contaminated site investigation and remediation concurrent with the building of the WWTP.

Since 1910 the Site was operated as a bulk fuel storage and distribution terminal with a marine fuel jetty. Between 1975 and 1985, it was reported that the total capacity of stored fuels on the site was12.4 million litres. Petroleum products were conveyed to the upland tanks from barges via a series of pipes and manifolds from the marine fuel jetty. The Victoria Distribution Terminal and fuel jetty was closed and decommissioned in 2009.

Past investigations and limited source remediation efforts took place between 2011 – 2013. During this time roughly 5,000 tonnes of impacted overburden and roughly 1,200 liters of oily wastewater, pooling above the bedrock, were removed for disposal. A marine waterlot risk assessment was completed during this period which helped support the conclusions from the future marine exposure assessment.

The setting is complicated with overburden overlying metamorphic fractured granodiorite bedrock cut with gabbro and andesitic dykes. Tidal influences and construction dewatering confounded the hydrogeological interpretation. Non aqueous phase hydrocarbons were discovered in the bedrock, at depths beyond the planned construction subgrades. There was no plan or time in the WWTP schedule for removed or physically remediation of the inaccessible bedrock hydrocarbon. This necessitated the pivot from a planned numerical to a risk-based Certificate.

A hydrogeological conceptual site model (CSM) was developed that included reliance on early works geotechnical data, a predictive hydrogeological dewatering model, bedrock mapping and fracture analysis, bedrock well yield testing, bedrock well transducer gauging with precipitation and conductivity data. The CSM described the fate and transport patterns under two scenarios: the current construction phase and the future fully constructed phase. Despite the robust CSM, uncertainty around bedrock contaminant fate and transport remained. If schedule and budget were unlimited,more efforts would have been directed to hydro-chemical and hydrogeological assessment of the bedrock.

The AECOM team focused in on key bedrock fractures daylighting in the marine foreshore as the likely conduits through which hydrocarbon could reach the marine receiving environment. Unique quantification techniques based on Solid-Phase Micro Extraction were used to directly measure hydrocarbons entering the marine environment.

The weight of evidence that included the hydrogeological CSM, past waterlot ecological risk assessment and direct exposure quantification supported a risk based Certificate of Compliance.

Craig Harris

Craig Harris is a professional geologist, biologists and risk approved professional in the province of BCwith 20+ years of experience in environmental consulting spanning across the three western provinces. Mr. Harris served as the environment manager on the joint venture WWTP project and was involved inthe contaminated site aspects, including senior technical lead on the risk assessment.