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Assessing Sydney Tar Ponds Remediation and Natural Sediment Recovery in Nova Scotia, Canada

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Abstract : Sydney Harbour, Nova Scotia has long been subject to effluent and atmospheric inputs of metals, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) from a large coking operation and steel plant that operated in Sydney for nearly a century until closure in 1988. Contaminated effluents from the industrial site resulted in the creation of the Sydney Tar Ponds, one of Canada's largest contaminated sites. Since its closure, there have been several attempts to remediate this former industrial site and finally, in 2004, the governments of Canada and Nova Scotia committed to remediate the site to reduce potential ecological and human health risks to the environment. The Sydney Tar Ponds and Coke Ovens cleanup project has become the most prominent remediation project in Canada today. As an integral part of remediation of the site (i.e., which consisted of solidification/stabilization and associated capping of the Tar Ponds), an extensive multiple media environmental effects program was implemented to assess what effects remediation had on the surrounding environment, and, in particular, harbour sediments. Additionally, longer-term natural sediment recovery rates of select contaminants predicted for the harbour sediments were compared to current conditions. During remediation, potential contributions to sediment quality, in addition to remedial efforts, were evaluated which included a significant harbour dredging project, propeller wash from harbour traffic, storm events, adjacent loading/unloading of coal and municipal wastewater treatment discharges. Two sediment sampling methodologies, sediment grab and gravity corer, were also compared to evaluate the detection of subtle changes in sediment quality. Results indicated that overall spatial distribution pattern of historical contaminants remains unchanged, although at much lower concentrations than previously reported, due to natural recovery. Measurements of sediment indicator parameter concentrations confirmed that natural recovery rates of Sydney Harbour sediments were in broad agreement with predicted concentrations, in spite of ongoing remediation activities. Overall, most measured parameters in sediments showed little temporal variability even when using different sampling methodologies, during three years of remediation compared to baseline, except for the detection of significant increases in total PAH concentrations noted during one year of remediation monitoring. The data confirmed the effectiveness of mitigation measures implemented during construction relative to harbour sediment quality, despite other anthropogenic activities and the dynamic nature of the harbour.

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