

DETERMINING EROSION AND DEPOSITIONAL PATTERNS IN THE NORTH SASKATCHEWAN RIVER TO TARGET SEDIMENT SAMPLE LOCATIONS MOST LIKELY IMPACTED BY AN OIL SPILL

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On July 21, 2016, a leak on was discovered on a pipeline containing a mixture of crude oil blended with condensate where it crosses the North Saskatchewan River (NSR). An estimated 225 m³ (+/- 10%) of crude oil / condensate was released, with approximately 60% of this volume contained on land. An emergency response phase took place between July 21 and September 30, 2016, where over 5,000 water samples and 1,300 sediment samples were collected to characterize and delineate potential impacts of the spill. These samples were collected at various locations in the NSR from 53 km upstream of the spill point of entry (POE) to 618 km downstream of the POE, covering roughly the area from the Alberta-Saskatchewan border to nearly the Manitoba-Saskatchewan border.

The 2016 results determined that residual polycyclic aromatic hydrocarbons (PAHs) associated with the spill were generally adsorbed to fine / organic sediment. These sediments are most susceptible to movement during scour events, being deposited in low-energy areas such as sand bars and along certain reaches of shoreline. Determining sediment movement throughout the NSR to guide a targeted sediment sampling program was proposed to the regulators as a means to spatially characterize the detectable presence of the spill in the river sediments. To meet this objective, depth of disturbance rods (DoDs) were installed at strategic locations throughout the NSR to estimate the net sediment deposition during the 2017 spring freshet. The results from the DoD program were used to:

- identify sampling locations most likely to contain PAHs related to the spill
- determine the degree of possible entrainment of spill-related PAHs within the sediment column
- modify sampling locations from erosive to depositional areas

The presentation will focus on the rationale for the DoD program, including installation and removal methods, results, and a high-level discussion linking the program with the 2017 PAH results.

Biography

Mr. Shaun Toner is a senior aquatic biologist who specializes in the design and execution of industrial wastewater monitoring and regulatory compliance programs, which include water quantity and quality, sediment, benthic invertebrate, bio-indicator (plankton, diatoms), and wetland characterization, as well as passive water monitoring, and spill response. He is also experienced conducting environmental impact assessments, fish habitat assessments and instream construction monitoring. His expertise was gained mainly through his work in linear and infrastructure projects, as well as, oil sands and mineral mining projects with a focus on the aquatic environment all over Canada.

Shaun is an experienced project manager / senior advisor, leading large teams on complex projects such as:

- The North Saskatchewan spill water and sediment sampling program, and risk assessment / environmental protection plan
- Spill containment, wetland characterization, water management and monitoring plan development and execution for the dewatering of a shallow lake contaminated by a flow to surface bitumen emulsion
- Integrated compliance surface water quantity / quality, and wetland monitoring program for an in-situ oil sands project
- Instream monitoring program, overburden and muskeg dewatering compliance monitoring program, cumulative effects assessment, regulatory permitting (provincial and federal) and reporting during the construction of an oil sands mine

Ms. Jocelyn Fetter has experience performing extensive remote field work in Alberta, Saskatchewan, Manitoba, and Labrador, being exposed to many areas of the industry including oil and gas, gold mining, rare earth exploration, and uranium exploration, as well as Precambrian bedrock mapping. Ms. Fetter has experience on both conventional and unconventional drilling rigs for various oil and gas clients within Alberta, as well as diamond drilling rigs in northern Saskatchewan and eastern Labrador. At Matrix Solutions Inc., Ms. Fetter has experience in managing both shallow and deep groundwater monitoring and sampling programs, spill response and management, and remediation programs.