

# OIL EMULSION PIPELINE RELEASE INTO FLOWING RIVERINE ECOSYSTEM



Oil emulsion impacts present in creek downstream of the Point of Entry.

## Services Ridgeline Provided



### Emergency spill response management and field execution:

- » Incident command system (ICS)
- » Initial spill reconnaissance, Geographic Information System (GIS) and plume dispersion mapping
- » Development of the incident action plan(s): Site Access Plan, Containment Plan, Sampling and Monitoring Plan, Wildlife Protection Plan, Remediation Action Plan, Shoreline Cleanup and Assessment Technique (SCAT) Plan, Waste Management Plan, Public Information Plan, and Contingency Plans
- » Permitting, regulatory liaison, and landowner and stakeholder engagement
- » Developing access trails and staging decontamination areas
- » Containment and recovery within the flowing water body – containment boom, shoreline protection boom, adsorbent booms, drum skimmers, pedco skimmers, portable vacuum units, hydrovac trucks, low pressure washing, hand removal, and disposal of impacted vegetation and woody debris.
- » Surface water infiltration management, erosion control, and sediment control (silt fencing and straw bails)
- » Contractor management: Western Canadian Spill Services (WCSS) assets, labour crews, surveyors, line locators, laboratory services, technical subject matter experts, and waste disposal facilities
- » Budget forecasting and financial tracking
- » Project communications and reporting



### Environmental project management and field execution:

- » Initial environmental site assessment and spill delineation
- » Habitat assessment, ecosite classification and receptor identification
- » Conceptual site modeling
- » Ecological risk assessment
- » Environmental guideline development
- » Wildlife management – fencing, deterrents/effigies, amphibian pitfall traps, nest sweeps, recovery, identification, care, and transportation of impacted wildlife to rehabilitation facility
- » Develop and implement modified inland freshwater SCAT throughout the impacted sections of the freshwater ecosystem
- » Sampling and monitoring of soil, vegetation, sediment, wildlife and surface water
- » Laboratory analytical interpretation including – characterization of source contaminants, waste materials, and background conditions – delineation of the release area and contaminant plume – continuously monitor and assess the effectiveness of the remediation and SCAT activities – confirmatory analysis to ensure that the remediation objectives were achieved
- » Data management, laboratory quality assurance and control, GIS mapping and modelling, and data visualization
- » Remediation of impacted soil and vegetation via hand excavation and waste disposal
- » Remediation of impacted surface water via recovery, low pressure flushing, and disposal
- » Remediation of impacted shoreline via low pressure flushing, hand washing, clipping and bagging vegetation, utilizing leaf blowers and hand tools
- » Backfilling and surface restoration of disturbed areas
- » Environmental regulator reporting – initial notification, daily field activity updates, daily situational reports, laboratory analytical updates, and technical closure reporting

**Location:** Brazeau County in Central Alberta

**Industry:** Upstream Oil and Gas

**Product Released:** Oil Emulsion

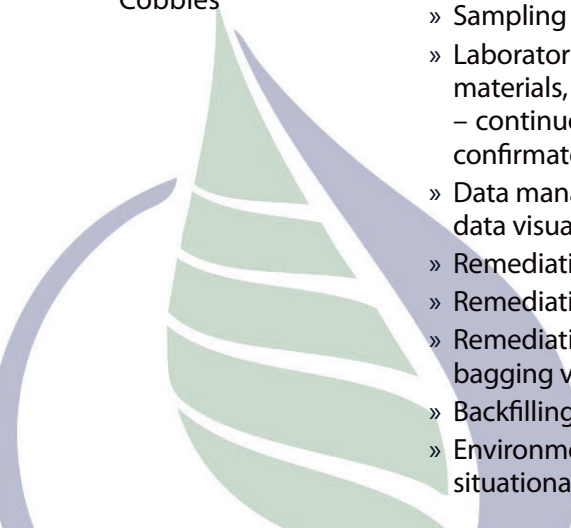
**Volume Released:** 40 m<sup>3</sup> (40,000 litres)

#### Ecosystem Affected:

- \* Old growth forest
- \* Riparian area
- \* Riverine system

#### Media Affected:

- \* Surface soil
- \* Surface water
- \* Vegetation
- \* Woody debris
- \* Wildlife
- \* Sediment
- \* Gravel
- \* Sand
- \* Cobbles





An accessible containment site located down gradient of the point of release.



Members of the SCAT crew completing the prescribed cleanup treatment on a gravel and cobble shoreline.



Throughout the duration of the recovery and SCAT programs the turbidity and contaminant levels within the surface water and sediment were continuously monitored.

## Incident Details

The incident occurred on August 15, 2019, when approximately 40 m<sup>3</sup> of oil emulsion was released from a sheared pipeline along an eroded and unstable bank of the creek. The released fluids entered the creek, resulting in petroleum hydrocarbon impacts throughout the riverine system to approximately 6 km downstream from the Point of Entry (PoE). This creek confluences with the North Saskatchewan River at approximately 12 km downstream of the PoE. Immediately following the discovery of the release, client personnel isolated the pipeline and removed it from service to prevent further release.

The incident was reported to the Alberta Energy Regulator (AER) on August 15, 2019 and assigned an incident number. The AER assigned the uncontrolled release with emergency status and deployed the AER incident command centre to the site.

The creek is confined by steep, u-shaped banks. The channel width is approximately 15 m and the wetted width is approximately 10 m. The sediments consist mainly of cobble, sand and gravel. Large sections of exposed bedrock are present in reaches of the creek near the confluence with the North Saskatchewan River. Instream vegetation is limited; however, large and small woody debris is present throughout the watercourse. Water depth ranges between 0.50 m and 1.5 m and the water level fluctuates drastically due to precipitation events. Riffles, runs, and plunge pools are common throughout the work area. The riparian area is dominated by large stands of mature mixed wood forest.

This creek contains suitable habitat waterfowl, amphibians and small mammals such as beavers or muskrats. The riparian area may support ungulates and other large mammals.

## Project Objective

Ridgeline was responsible for all aspects of the spill response efforts from emergency containment and recovery to the environmental sampling and monitoring, wildlife management, remediation, site restoration, and closure.

Upon completing an ecological risk assessment, Ridgeline liaised with the regulator, and established modified site closure objectives that considered the net environmental gain of minimal disturbance response tactics and remediation. These tactics included the development and implementation of a modified version of SCAT to be effectively applied to an inland freshwater riverine ecosystem. Throughout the response efforts, Ridgeline directed and worked alongside over 75 personnel including labourers, service companies, and subject matter experts, to ensure that the technical objectives of the incident action plan were successfully achieved.

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Oil containment and recovery operations being completed within the creek.



Portable drum vacuum units were used to recover oil in remote locations throughout the release area.



The SCAT crew utilizing portable low flow pumps to wash the impacts from the fallen woody debris within the release area.

## Project Objective (continued)

Initial containment was achieved on August 15, 2019 through river boom deployment downstream of the plume leading edge in the creek. Additional locations for containment boom deployment were selected throughout the emergency response program to maximize the effectiveness of the containment and recovery operations. In total, approximately 1,200 m of boom were deployed in the creek. The boom sets were inspected daily and replaced as needed throughout the duration of the emergency response program.

Wildlife deterrents were installed throughout the creek and were inspected and maintained daily by specialized wildlife biologists.

Free phase petroleum hydrocarbon was recovered from the creek by skimmers staged at each boom set. Vacuum trucks were used for recovery in locations where truck access was feasible. In the remote sections of the creek, product was recovered via portable drum vac and was temporarily stored in barrels, then transported from the creek via helicopter. All recovered fluids were disposed of at an approved waste management facility.

The modified SCAT program was used to determine the treatment technique required for each shoreline classification and to monitor the effectiveness of the recovery and remediation activities. Within the effected section of the creek, four different types of shoreline were identified – cobble, sand, vegetated bank and woody debris. The treatment for cobble was to scrub with brooms to loosen the oil then to wash using 2-inch trash pumps and low-pressure water. The treatment for sand was to rake the heavily stained areas to loosen the oil then to wash using 2-inch trash pumps and low-pressure water. The treatment for vegetated banks was to remove the impacted vegetation with hand tools and place in cube sacks to be transported from the water course via helicopter prior to being disposed of at an approved waste management facility. The treatment for woody debris included cutting the large pieces into manageable sizes and removing from the creek banks. All impacted woody debris was staged in an approved location to be burned during the subsequent winter.

Throughout the duration of the environmental spill response activities, fixed sampling and monitoring locations were established throughout the watercourse to evaluate the effectiveness of the remediation and recovery activities. Thirteen surface water and four sediment sampling locations were established within the creek, one sampling location was established at the point of confluence with the North Saskatchewan River, and one was established in the North Saskatchewan River downstream of the point of confluence. During high-risk activities, turbidity monitoring was conducted and surface water samples were collected and submitted for laboratory analytical on a daily basis.





Transporting a captured beaver to a wildlife rehabilitation facility.



River boom was staged throughout the creek to prevent the oil from migrating downstream.



Using a helicopter to longline impacted material from the creek to the staging area in preparation for disposal.

## Project Challenges

Ridgeline encountered numerous challenges throughout this project. As most of the creek was only accessible on foot, the majority of the recovery and remediation tactics deployed were very labour intensive and the equipment was transported via helicopter.

Due to the ecology of the creek, water levels fluctuated significantly throughout the response. The containment boom sets and recovery equipment required modification and constant supervision to ensure containment was continuous and recovery was effective.

The riparian area of the creek was also ecologically significant as an old growth forest. Access and decontamination areas were strategically chosen and managed to ensure that they could be restored following response activities.

## Project Outcome

A total of 1,297.50 m<sup>3</sup> of impacted fluids, adsorbent boom, and impacted vegetation was recovered and disposed of at an approved waste management facility. The data collected from the modified SCAT, water quality, sediment monitoring, and confirmatory analytical results determined that the creek successfully met the remediation closure objectives. Access, staging, containment, recovery, and decontamination areas were subsequently restored to an acceptable condition.

This specific spill response has been selected by WCSS as a successful example of an inland freshwater water spill response to be developed as a video case study and will be used as a training aid in future industry spill response training sessions.

