Field Methodologies and Parameters

The field methods employed by the sampling teams during these investigations were in accordance with standard industry practices, as well as technical direction provided by MoE (e.g., memo dated July 27th, 2013).

Samples of surface water, sediment, soil, drinking water, and recovered product collected from areas of potential impact were submitted for analysis of petroleum hydrocarbons (PHCs) present in the fuel (Jet-A1). Jet-A1 fuel is primarily kerosene and contains PHC parameters comprised of six to sixteen carbon atoms (in the C6-C16 carbon range). Based on the material safety data sheet (MSDS) for the fuel that was contained in the tanker at the time of the spill and analytical results from worst-case locations; characterization indicates the following regulated PHC parameters are potentially associated with the fuel released to Lemon Creek: ethylbenzene, toluene, xylenes, and the polycyclic aromatic hydrocarbons (PAHs); such as, naphthalene, 2-methylnaphthalene, acenaphthene, fluorene, phenanthrene and fluoranthene. In addition to these individual parameters, the following general hydrocarbon compounds are associated with Jet-A1 fuel: volatile petroleum hydrocarbons (VPHC6-C10), light extractable petroleum hydrocarbons (LEPHC10-C19), PHC Fraction 1 (F1C6-C10) and PHC Fraction 2 (F2C6-C16). Trimethylbenzene compounds, not regulated in soil or water, also have the potential to be present in the fuel.

It is noted that additional parameters beyond those listed above have been included in the chemistry tables, as several of the standard laboratory analyses include parameters not present in the Jet-A1 fuel.

Water and Sediment Sampling

During the period of July 28th, 2013 to August 8th, 2013, surface (and select sub-surface) water sampling was completed daily at designated and incidental sampling stations located in the following four general geographic areas:

- Lemon Creek: at and downstream of the accident site (approximately 4 km);
- Slocan River: upstream, at, and downstream of the confluence with Lemon Creek to the confluence with Kootenay River;
- Kootenay River: upstream, at, and downstream of the confluence with the Slocan River; and
- Columbia River: downstream of the confluence with the Kootenay River.

Designated and incidental water sampling sites included: domestic water intake areas (points of diversion [PODs]); shallow dug/drilled water wells located close to the Slocan River and Lemon Creek; identified recreational use areas (i.e., beaches and local swimming areas); agricultural water intakes (i.e., irrigation and livestock water intakes/PODs); and, select sites downstream of the Lemon Creek spill site area on Lemon Creek. Designated sites were sampled daily, and both designated and incidental sampling stations were established, where possible, at access

points (i.e., bridges, beaches, irrigation spots and points of diversion) to ensure the safety of personnel collecting the samples yet robust to cover the range of water users. Samples were collected both from shore and from boats.

Samples were sent to a certified lab for analysis; average analysis time by the lab was approximately 2-3 days.

Sediment samples were also collected at all designated and at select incidental surface water sampling locations.

Crash Site Soil Sampling

On July 30th and 31st, investigation of the spill site was conducted to identify worst-case areas of soil contamination. A remedial excavation was subsequently conducted, with confirmatory soil samples collected from the limits of the excavation to confirm the removal of the soil contamination associated with the spill. Soil impacts were limited to the upper 1 m of ground surface and all excavated soil was transferred to a permitted facility.

Drinking Water

A limited drinking water sampling program was undertaken during the spill response phase of the program. The wells sampled were either identified as shallow dug/drilled wells or points of diversion located close to Lemon Creek and the Slocan River, or, complaints had been received by the well owners regarding the detection of odours in their water supply.

Fisheries and Wildlife

A fish and wildlife salvage program was undertaken during the spill response to remove deceased specimens from the ecological food chain, given the uncertainty surrounding definitive cause of death and potential for bioaccumulation. The fish and wildlife salvage program was led by professional biologists, which covered Lemon Creek downstream of the crash site as well as key zones throughout the Slocan River and Kootenay River systems. Areas were physically inspected by a combination of foot and/or boat. Collected specimens were identified to species, where feasible (dependent on level of decomposition), with select specimens sent for necropsy and toxicity testing. The assessment of effects and the overall impact of the spill will continue and are being developed as part of a long-term monitoring plan.

Ongoing Sampling and Monitoring

Data analysis, to date, has focused on supporting regulators with decisions related to water use. Development of a long term monitoring and assessment program aimed at identifying unacceptable effects that may require further remedial attention, as well as monitoring recovery from a human and environmental (aquatic, terrestrial) health perspective, is currently underway.