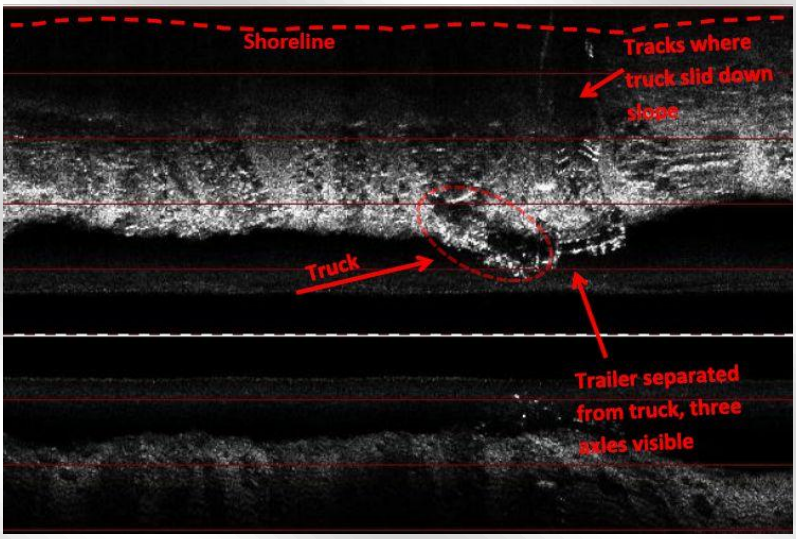
Bear Glacier Provincial Park – Strohn Lake Zinc Concentrate Spill

The Incident

On November 1, 2011 a zinc concentrate truck operated by Maple Leaf Loading Inc. left Highway 37A and crashed into Strohn Lake in Bear Glacier Provincial Park, approximately 35 km east of Stewart, BC. The truck and trailers were carrying approximately 49,000 kg of zinc concentrate in addition to diesel and miscellaneous vehicle fluids when the accident occurred. The driver managed to escape with minor injuries.

Initial Response

BC Ministry of Environment Environmental Emergency Response staff were alerted to the incident shortly after occurrence and responded to the site. Weather and road conditions at time of incident were noted to be poor. This section of highway is the most heavily prone avalanche terrain in British Columbia. Upon arrival, the vehicle was observed completely submerged and a fuel sheen was noted on the water. Several small avalanches were observed across the lake during the initial response phase. Maple Leaf Loading retained NW Response and Fraser Burrard Diving to complete dive and sonar surveys to assess condition and contents of the vehicle and trailers. Water quality and fishery assessment work were also undertaken by Triton Environmental. Due to unsafe work conditions as a result of deteriorating weather, ice and avalanche conditions, a decision was made to leave the vehicle and contents in place until the following year when conditions were more favorable for recovery operations to take place safely.



Prior to operations ceasing during this phase, the vehicle and trailers were cabled in place to prevent winter / avalanche snow loads moving the vehicles further down slope along the lake bottom and making future recovery operations more difficult.

Terms of Reference - Environmental Risk / Impact Assessment

The Ministry of Environment directed an Environmental Risk / Impact Assessment (ERIA) of the affected area be undertaken. A Terms of Reference was provided which included:

- Risk/ Impact assessment for Strohn Lake and Bear River
- Fate and effects of Zinc Concentrate in the aquatic environment
- Assessment of fish, aquatic life, and wildlife species.
- Prepare an Environmental Abatement Plan based upon the Environmental Risk / Impact Assessment
- Prepare vehicle recovery plan for the semi tractor unit, trailers and any associated mechanical debris associated with the semi tractor and trailers in Strohn Lake.

Vehicle Recovery Operations

Based upon most favorable time period for this phase, vehicle recovery operations occurred from August 7 – 17, 2012. An air bag hoist system was used to lift the units off the lake bottom. Recovery operations were successful in recovering and removing the tractor and trailer units from Strohn Lake, including the recovery of a fuel saddle tank that was partially full of diesel fuel. Sampling occurred prior to and after recovery operations including collection of lake bottom sediment cores for analysis.

Preliminary Environmental Risk / Impact Assessment Findings

An environmental risk assessment involves both measuring impacts and predicting associated risks. Water Quality sampling occurred over the 2011/12 winter and subsequent 2012 spring / summer months. A total of 8 sampling sites were selected in accordance with Ministry of Environment's direction to measure water quality at the incident site and downstream. Parameters tested for included dissolved metal concentrations, pH, dissolved oxygen, conductivity, turbidity, hardness and oxidation reduction potential. In addition lake sediments were collected and analysed. The following are preliminary findings based upon current sampling data and analysis.

- Spilled zinc concentrate appears to remain in close proximity to the spill site
- Analysis of the results did not indicate elevated levels of metals due to spill of zinc concentrate
- Surface water quality generally met the BC water quality guidelines except during one sampling event at the outlet of the lake. Higher levels were noted after a controlled avalanche event by Ministry avalanche control technicians who caused a significant disturbance of lake sediments.

- Higher concentrations of metals measured during this sampling period may be attributed to the re-suspension of natural lake sediments.
- Lack of fish capture and sampling suggests fish may not be present in Strohn Lake – either limiting or removing the potential for fish to be exposed
- Amount of zinc concentrate spilled has been estimated to be about 0.08% (less than one thousandth) of annual sediment loads
- Water Quality in Bear River downstream of Strohn Lake does not seem to have been adversely affected by the zinc concentrate.
- Natural sediment load by glacier erosion into Strohn lake will tend to bury the spilled concentrate and provide a cap of natural sediment that will afford increasing protection over time from physical disturbance. This was confirmed by the amount of sediment observed on the truck and trailer components prior to recovery operations commencing in Aug 2012.
- High suspended sediment load in lake can be attributed to near zero visibility conditions making recovery of product very difficult

Net Environmental Benefit and Preliminary Environmental Risk / Impact Assessment Conclusion

One of the guiding principles to spill response is whether a net environmental benefit is achieved through clean up/ remediation actions, natural processes or a combination of both. Response actions can incur environmental impacts thus response strategies and actions need to be weighed whereby the overall outcome is beneficial to people, property and the environment.

Based upon findings to date, there appears to be a very low environmental risk associated with the addition of the zinc concentrate to Strohn Lake and Bear River system.

A lack of fish capture during sampling suggests fish may not be present in this part of the watershed thus reducing or removing the potential for impacts to fish and other aquatic species.

Recovery of the product was considered, however diving observations revealed that due to location of where the spill occurred, zero visibility, continuous avalanche debris, and safety considerations it wouldn't be practical or possible to recover all the spilled concentrate without increasing the risk of migration and exposure.

At this time based upon all information received to date, the net environmental benefit is to leave the product in place where the large annual natural sediment load caused by glacier discharge into Strohn Lake should sufficiently cap the concentrate, thus reducing / preventing any exposure over time.