

## **Investigation of a moving landslide in a permafrost area, triggered by an earthquake, Fort Smith, NWT**

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| <b>Project Location:</b> | Ft. Smith, NWT    |
| <b>Client(s):</b>        | Government of NWT |
| <b>Date Completed:</b>   | 1986              |
| <b>Project Budget:</b>   | \$ 50,000         |

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Immediate effect of the October 5, 1985 earthquake; split and downed trees and opening of a 50cm wide crack

### **Project Summary**

Between Fall 1985 and Spring 1986 a number of strong earthquakes occurred in the Mackenzie Mountains approximately 700 km NW of Fort Smith. Unexpectedly, they exerted an effect on the landslide area in Fort Smith causing cracks to open and accelerated creeping movements in portions of the slide area. The landslide area is the discharge point of local and regional groundwater flow systems and contains permafrost in parts.

A contract was awarded by the Northwest Territories government to identify the effects the earthquakes exerted on the landslide area in general and the water intake slope in particular, to identify the mechanisms and local conditions creating these effects, to assess their significance in regard to a permanent solution of the ongoing landslide problem and to ensure that the safety of a number of upslope buildings and their inhabitants, as well as the water plant upslope of the moving part of the water supply slope, remained secured until a solution to the landslide problem was implemented.

### **Services Provided**

- \* Emergency field investigations in response to the earthquakes of October 5 and December 22, 1985 and at the beginning of December 1985 in response to sudden acceleration of creeping movements.
- \* Supervise daily recording by town personnel of water levels in five piezometers and distance measurements and daily assessment of changes for warnings of upcoming slide failure.
- \* Review of scientific literature regarding the known effects of earthquakes on landslide areas. Informal consultations with US and Canadian earthquake agencies.
- \* Slug testing of three piezometers to determine the permeability of particular layers in the landslide area
- \* Preparation and submission of a report on the findings.

### **Deliverables or Results**

- \* The safety of upslope buildings, water intake structure and water plant was secured during the course of the project.
- \* Preparation of a report documenting and evaluating the effect of the earthquakes upon the landslide area and implications for landslide stabilization.