

LITIGATION RESULTING FROM
DEBRIS TORRENT ACTIVITY ALONG HOWE SOUND

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ABSTRACT

Along Howe Sound on October 28, 1981 and February 11, 1983 debris torrents took place on M Creek and Alberta Creek respectively. At each location a wooden highway trestle bridge was destroyed, a railway bridge was plugged and overtopped, there was loss of life, houses were destroyed and other property damaged.

Subsequently, property owners at both locations commenced legal actions against the Crown and the B.C. Railway. In the M Creek case, action was also initiated against logging companies and in the Alberta Creek case, against the Village of Lions Bay and the original developer of the area. The Alberta Creek case was more complicated, as there were several plaintiffs and third party actions between the defendants and engineering consultants to the Crown and the Village.

This paper describes the debris torrent events, the plaintiffs causes of action against the defendants, the methodology and some of the arguments used by the parties in preparing their cases.

Both litigations were settled out of court. The Alberta Creek action was settled just prior to trial while the M Creek action was settled after two weeks of trial.

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INTRODUCTION

Howe Sound is a fjord with densely wooded steep mountain slopes. Upon completion of the railway and highway between West Vancouver and Squamish during the late 1950's residential development followed, particularly on creek fans.

The area had a history of debris torrents, also known as channelized debris flows, along the creek channels, which was not appreciated at the time of development. During the 1980's there was an increased frequency of debris torrent events. Two of these events were at M Creek and Alberta Creek.

M CREEK DEBRIS TORRENT

Located about 12 km north of Horseshoe Bay, M Creek has a drainage area of about 3.8 km² and a length of about 3.5 km; it is one of the larger creeks between West Vancouver and Squamish. Typically the creek is incised to bedrock for most of its length and in profile consists of short gradient sections separated by waterfalls and sets of steep rapids. The gradient ranges from 23° to 42° with a low gradient fan at the mouth.

A debris torrent occurred along the creek channel during the early hours of October 28, 1981. The torrent initiated in the upper waters of the creek overtopped a logging road crossing at 680 m elevation continued down channel and removed an 18 m section of the 2 lane wooden trestle highway bridge and buried the B.C. Railway bridge with 2 m of debris. A house located on the north side of the creek was pushed off its foundations and floated out to sea when the tide came in. Nine people lost their lives as the result of vehicles plunging into the creek from the destroyed bridge, but the occupants of the house, plaintiffs in the action, suffered no personal injury.

The volume of material brought down by the debris torrent was estimated to be in the range 15,000 - 20,000 m³ and consisted of boulders up to 2 m in diameter with cobbles and gravel and a sandy organic mulch afterflow. The maximum velocity has been estimated at 5 m/sec. and it appeared that the torrent came in 2 or more surges.

Initiation occurred during a period of heavy rainfall although no recorded intensities in the surrounding area exceeded a return period of two years. There was, however, the possibility of localized rainfall of much higher magnitude. The point of initiation was never defined conclusively. Various investigators suggested that the torrent could have been started by rock falls at the 1350 or 1200 m elevation, slope failure in a gully at the 900 m elevation or a massive rockslide at 1100 m elevation.

The rock falls and rockslide occurred in unlogged parts of the drainage but the tip of the gully was located in an area that had been logged, in the late 1950's

ALBERTA CREEK DEBRIS TORRENT

With a drainage area of 1.2 km² and an overall length of 2.6 km, Alberta Creek is much smaller than M Creek. Alberta Creek is located 2.5 km south of M Creek and has built a fan into Howe Sound which is adjacent to that of Harvey Creek immediately to the south. The village of Lions Bay is built on these two fans. Like M Creek most of the channel consists of waterfalls and steep rapids separated by low gradient sections. Below the logging road at 660 m, however, there are some long sections in soil. The overall creek gradient ranges from 23° to 57° which is similar to M Creek. The gradient of the fan is about 14° which is steeper than the M Creek fan.

The debris torrent occurred in six surges spread over 2 hours during the early morning of February 11, 1983. The torrent originated below the logging road but was likely initiated by a snow avalanche that originated at a much higher level. The snow avalanche was the result of a rapid rise in the freezing level associated with a storm that dropped over 200 mm of rainfall in the Lions Bay area. On its descent, the debris torrent destroyed two local road culvert crossings and then removed most of the wooden trestle highway bridge. Downstream from the highway, two more local road culvert crossings were overtopped and partially removed and the B.C. Railway bridge was plugged, overtopped and damaged. A fifth culvert crossing below the railway was also destroyed. Three houses were destroyed and a fourth damaged. A house trailer adjacent to one of the destroyed houses was completely crushed and two youths sleeping in it were killed.

The debris from the torrent was a mixture of gravel, sand, silt and organics with cobbles and boulders up to 1.5 m in diameter.

M CREEK COURT ACTION

In 1983 the owners of the property on the north side of the creek, where the house was located, and the lessee of the property on the south side of the creek, where a house was under construction, commenced court action against the British Columbia Railway, the Crown, Deeks Creek Logging Co. and MacMillan Bloedel. The plaintiffs subsequently discontinued the action against MacMillan Bloedel due to the difficulty of proving that the company had actually carried out work in the area. Deeks Creek Logging had gone out of business some years ago.

The plaintiffs alleged four separate causes of action against the defendants:

1. Negligence
2. Nuisance
3. Strict Liability
4. Interference with the flow of a natural water course and riparian rights

The allegations of negligence fell into the following main categories:

- (a) Failure to design and erect highway and railway bridges to ensure the safety of downstream residents.
- (b) Failure to recognize the damage from debris flows and failure to take action to protect the plaintiffs.
- (c) Allowance of timber removal and inadequate reforestation which decreased soil stability.
- (d) Allowance of construction and inadequate maintenance of the logging road, the creek crossing and the creek channel.
- (e) Failure to warn defendants of debris flows on M Creek.
- (f) Allowance of construction and habitation of dwellings at the mouth of M Creek with an assurance that no damage of debris flows existed.

The allegations of nuisance were that debris from the highway bridge plugged the railway bridge and diverted the debris flow and debris and cut logs escaped from the logging road crossing.

The allegation of strict liability was that the plaintiffs suffered damage from dams formed by the plugging of the railway bridge and the logging road culvert.

The allegation of interference with the flow of a natural watercourse was that the logging culvert, the highway bridge and the railway bridge all caused an obstruction to the natural flow of the creek which contributed to the debris flow.

The defendants denied the allegations citing the following arguments:

- (a) With regard to the issue of the effects of logging, all forestry operations were carried out according to the policy of the day. Reforestation was considered adequate and the effects of logging in the late 50's dissipated, as regrowth was established and root systems increased soil stability long before the early 80's. The debris torrent, did not originate from an unstable soil area resulting from logging but rather from a natural unstable rock slope located in virgin timber, a 'seed block'. The logging road culvert produced a deposition zone which had a beneficial effect as it reduced the volume of debris which ended up on the fan.
- (b) The collapse of the highway bridge and its alleged plugging of the railway bridge was irrelevant to the plaintiffs damage as the railway bridge would have been blocked by a debris torrent with a magnitude of 20,000 m³. The blockage of the railway bridge served to protect the plaintiffs from direct impact. Both bridges were designed and constructed with good engineering practise and had sufficient opening to pass floods of any foreseeable magnitude.
- (c) Regarding the allegation of knowledge and duty to warn the defendants claimed that no statutory duty to warn existed. Debris torrents are not predictable and the defendants had no specific only general knowledge of the potential for debris torrents. Moreover, the plaintiffs, themselves had the same general knowledge of the unpredictable nature of the creeks along Howe Sound, M Creek in particular.

The arguments of both sides were essentially built around the following considerations:

1. Effect of logging operations on the origin of the debris torrent
2. Effect of the logging road crossing
3. Collapse of the highway bridge and the effect of debris from the bridge
4. Plugging of the railway bridge and the path of the debris torrent on the fan
5. Knowledge by the defendants and plaintiffs of debris torrents and their behaviour prior to 1981.

All parties retained experts who produced reports to address the above. Using reports, memos and information obtained during examination for discovery topics, the plaintiffs tried to show the government had ample knowledge of debris torrents and their effects

prior to 1981 and should have warned the plaintiffs of the hazard and replaced M Creek trestle. The defendants countered with a history of the gradual development of knowledge of debris torrents distinguishing between geological knowledge and engineering solutions. On the one hand, the plaintiffs pointed to the recorded history of Howe Sound creeks, notably at Britannia Beach in 1921. On the other hand, the defendants pointed to the plaintiffs direct experience with the unpredictability of M Creek which flooded and scoured the foundations of their house during construction.

Plaintiffs experts suggested that the torrent initiation was the result of soil failure in the gully at the 900 m elevation and was related to logging operations. These suggestions were based primarily on investigations by their own experts. The evidence regarding a causal relationship between logging and soil failure was primarily based on literature from elsewhere. On the other hand experts for the defendants noted that the point of initiation was uncertain and that the debris from the gully resulted from rock failure and weathering most likely before logging took place. In any event the rock slide, which is in an unlogged area, provided most of the debris and probably initiated the torrent which removed support from debris upstream. Even if the gully was an important factor in the initiation of the torrent, defendants experts suggested the logging had occurred too far in the past to significantly affect any failures that might be related to the 1981 event.

The plaintiffs asserted that the railway and highway bridges were not designed according to good engineering practice and should have been replaced prior to the event. The debris from the wooden trestle, particularly portions of the deck, it was suggested, plugged the concrete railway bridge, that had insufficient clearance, causing diversion of the torrent into the plaintiffs house on the north side of the creek. The crown pointed out that this bridge had performed satisfactorily for over 20 years. Given the volume of debris involved, the railway bridge would have plugged without the additional debris from the trestle. Also it was suggested that the plugged railway bridge acted as a dam, retained debris and slowed the torrent which prevented a more catastrophic impact on the plaintiffs' house. Given the nature of the debris torrent and the topography of the fan, the defendants experts suggested that the plaintiffs house would have been engulfed even if the two bridges had not been there.

Besides the causation aspects of the case there was also the question of quantum - the extent and value of the damage sustained by the plaintiffs. A considerable amount of effort was spent by both parties in attempting to evaluate the damage by the use of expert appraisers.

As the case proceeded, both parties had offered to settle but no agreement was reached on terms. The case went to trial on August 31, 1987 with an estimated trial length of 5 weeks. After 2 weeks of testimony from the plaintiffs and some of their experts a new offer to settle by the plaintiffs was accepted by the defendants.

ALBERTA CREEK COURT ACTION

Although this action had many similarities to that at M Creek, there were more parties, including Village of Lions Bay, the Crown and the B.C. Railway as defendants. The original claim against the developer of the area was discontinued. The separate actions were consolidated. The defendants had also third partied each other and each others engineering consultants.

The causes of action cited by the plaintiffs were very similar to the M Creek case:

- (a) Negligence - failure to warn where there was knowledge of danger, poor construction and maintenance of the logging road, inadequate design of bridges and culverts to withstand debris torrents, allowance of subdivision and building permits and alteration of the natural flow of the creek.
- (b) Nuisance - the torrent originated on crown land and/or land controlled by the Village and interfered with the private property rights of the plaintiffs.
- (c) Strict liability - under the Rylands v. Fletcher doctrine the debris torrent originated from man made conditions, namely the logging road and other structures across the creek.

Following disclosure of documents and examination for discovery of the plaintiffs and representatives of the defendants a large number of expert reports was produced. These reports outlined the origins of the torrent, the effect of the bridges and culverts and the path of the torrent. However, in this action, the main focus was on the 'duty to warn' aspect particularly as the event had occurred over 15 months after the M Creek event. Various reports and memoranda that had been prepared since the highway had been completed were used to suggest that the defendants had substantial knowledge about the problems of debris torrents on creeks along Howe

Sound. These reports were either not specific to M Creek or general in nature. A minor debris torrent event occurred on Alberta Creek in December 1982, and this event was focussed on, as it was reported by a consultant working for the government. This consultant had been hired, as a result of the M Creek event, to carry out a major study of all the creeks between Horseshoe Bay and Squamish. Unfortunately, the study was not completed until after the Albert Creek event in February, 1983.

From a review of air photos taken in 1939, it appeared that a debris torrent had occurred on Alberta Creek in the 30's. The plaintiffs also used this evidence to show that the government had knowledge, or should have had knowledge, about the potential for debris torrents on Alberta Creek. However, such evidence worked both ways. Although the plaintiffs argued that the bridges and culverts caused the debris to be directed towards their properties, it could be shown that, if the 1983 torrent followed the same path on the fan as the 1930's torrent, then the destruction would have been even more severe.

The effect of logging operations was not so prominent in this case as Alberta Creek drainage was essentially unlogged. However, it was crossed by a logging road and the crossing was targeted as having a causal relationship with the torrent. The defendants' position was that the torrent actually started below the logging road and no debris from the crossing was involved.

This case was settled prior to trial but with settlement or discontinuance with each plaintiff occurring at different times.

CONCLUSIONS

There was a considerable volume of technical expert evidence in these cases which required a high level of effort on the part of all parties to promote their cases. From the defendants' point of view, this effort was divided up among lawyers, hired experts and government or company officials.

Officials involved were required to search files to provide all relevant documents, answer questions at examinations for discovery, liaise with lawyers and expert witnesses, review expert reports, assist in trial preparation and attend at trial. This process shows the high cost (both in time and finances) of defence against these types of claims.

The cases were resolved without a judicial decision. Essentially, the defendants paid to settle on a business basis. In other words it would have cost more to carry on with the trials than to make an out-of-court settlement, aside from the possibility of losing the actions.

However, if one or both cases had gone full course there would have been some legal precedents to follow on this kind of natural hazard action. Even if such a decision may not have been to the benefit of the government, it would have given some basis upon which future policy could be based. As future 'natural' catastrophes occur, it can be expected that affected parties will continue to sue the 'deep pocket' of government.

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Much of the information in this paper has been derived from numerous unpublished reports prepared for the two litigations.