Avalanches and Liability

(A case study of Avalanche Control in a highway setting, and the result when reminded that Mother Nature is ultimately in charge)

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ABSTRACT

As long as people have built roads through the mountains, there has been the threat of Avalanches. As each highway is built, the Avalanche problems of that highway become evident with the coming of the first winter's snowfall. As time goes by, Control teams learn, and develop, control measures to subdue the potential Avalanche danger. This is the case on Stevens Pass (SR2).
From the time the first automobile drove over Stevens Pass, and yet even before that time, Avalanches have had to be dealt with. In the early days the method of choice was simply to react. The driving public assumed 100% of the risk, and when an Avalanche occurred, it was cleaned up and the road was re-opened. It soon became very evident that something more needed to be done. An Avalanche Control program was developed, and suddenly the assumable risk of the driving public seemingly dropped to near 0%.
The following case study is a lesson for all of us. As we each, in our own little part of the world, go happily along controlling Mother nature the best we know how, there comes a time when we are reminded that we are indeed just doing "the best we know how".

HISTORY

Stevens Pass (SR2) is located in the central Cascade Mountains of Washington State. The highway begins at Seattle and crosses the US in the upper third of the country. The section that crosses the Cascade Mountains is bordered on the west by Skykomish and on the east by Leavenworth. Within this corridor, up to 300 Avalanche paths have the potential of putting snow onto the road. Ten of the most active paths lay just west of the summit of Stevens Pass. This area is aptly named the "Old Faithful" area. With as little as 60" of snow at the summit (4026'), the starting zones of the Old Faithful area (4800') have the potential of depositing large amounts of snow onto the road. Once the paths have been established by the first slides, new slides are all but guaranteed with every new semi-significant snowfall.

The Old Faithful area is actively controlled by two methods. A series of bomb trams have been constructed in three of the largest chutes. Fifty-pound bags of Anfo are suspended from these trams to propagate slides. These three and the remaining chutes are also controlled with 105-mm ammunition delivered by an M60A3 tank M101 Howitzer, and a 105 Recoilless.

Control in this area is carried out as much as possible during the middle of the night to lessen the effect on the highway traffic. Weather observations are taken daily both manually and by way of three remote weather stations.

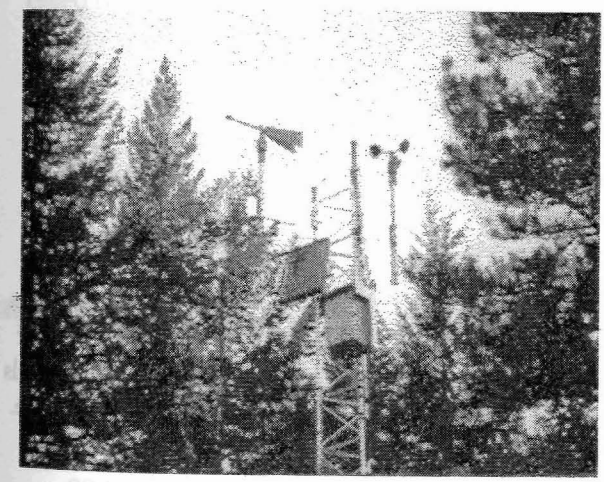
WEATHER CONDITIONS

The winter of 1994-95 was by no means a huge year. Stevens Pass received 497.5 inches of snowfall. The Avalanche Control team on Stevens conducted 21 control missions in the Old Faithful slide area.

The Stevens Pass corridor is a unique area. With its elevation and positioning, in relation to the rest of the surrounding mountains, it has a very definite "micro climate". It is by all accounts one of the most interesting to forecast. Cold air channeled from the East Side of the Cascade Range can often insulate it from the warm air approaching from the ocean. More then once have the surrounding areas received rain while we remain in snow because of our "cold air reservoir".

The Avalanche Control Department stationed on Stevens Pass handles avalanche forecasting for the Stevens Pass corridor. Information gathered from remote weather stations, the Northwest Avalanche Forecast Center, on site observations, results of previous control missions, and 53 combined years of experience of the two control personal all aid in the forecasting process..

Between the dates of December 11th and December 16th 1994, Stevens Pass received 38" of new snow. The average density was .10. Rain at the 3500' level and heavy snow at the 4800' level followed this in the early morning hours of the 17th.



TRAFFIC CONDITIONS

The Stevens Pass Ski Area, located at the summit of Stevens Pass averages 400 thousand skier visits a year. Saturday morning is by far the busiest time for the ski area and for the highway leading to the ski area.

Traffic counts for this stretch of highway average 5000 cars per day. During the winter months, up to 2900 (capacity of parking lots) of those cars are headed to the ski area. The time of day for the majority of those cars to be traveling under the Old Faithful area is 8:00am to 9:00am. Within that one hour, if traffic is stopped on the highway for any reason, a line of 100 or more vehicles can be accumulated in just under 5 minutes.

It has been the policy of the Washington State Department of Transportation on Stevens for years to "delay" traffic while slides that come onto the road are cleaned up. One of the reasons is that it is easier, and safer to move the traffic in the direction they want to go, rather then trying to turn each car around and get them back down the mountain.

The traveling public is curious by nature when stopped on the highway. Each car that is approached has an array of questions as to why they can not proceed with their journey. Some have even been know not to believe the highway worker and blow past only to literally run into a slide. This action more times then not, costs the driver not only damage to their vehicle, but also a healthy fine by the local State Trooper. Another reason for the "delay" policy is that the pressure to keep the highway open and the traffic moving is high. From an Avalanche controllers viewpoint, the justification for this policy would be that you have a far less chance of being hit by an Avalanche if you are moving then if you are stopped or in the process of turning around. Considering the amount of time it takes to turn one car around, most of the time the lesser of the two evils is to clean the slide up and move the traffic on it's way.

THE STORY BEGINS

The forecast was for the warm air approaching from the west to erode our cold air reservoir by midnight on the 16th. Timing of this event can be very tricky, so the name of the game was to be prepared for it to happen when it happens. Knowing that when the rain was introduced to the new snow we would have the potential of additional slides, control was scheduled and performed at midnight on the 16th. It was however, not raining. As is the case often on Stevens, cold air was being drawn through the pass

insulating us from the rain. Control was done however, simply because of the amount of new snow we had received. Results onto the highway were very good. Confidence level was moderate to high that we were in good shape, and could tolerate at least some rain into the pack.

The revised forecast called for the snow to change over to rain by mid-day on the 17th . Control was planned again for around midday. At 7:00am on the 17th of December 1994 Mother Nature reminded us that we are players in a game directed by her. As if someone had flipped a switch, the easterly flow changed to westerly, the cold air was gone, and the snow changed to rain.

THE STORY UNFOLDS

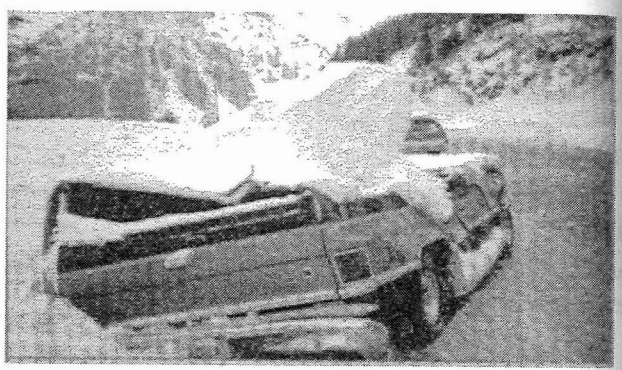
By the morning of the 17th, the control crew on Stevens felt that they had done everything they could do to keep the road reasonably safe for the traveling public. At 7:30 am, control personnel were proceeding to the summit to open snow roads to their control points with a snow cat in anticipation of the control scheduled for mid day. When they arrived at the summit, they observed that the rain had begun six hours sooner then the forecast had indicated. Immediately an avalanche technician was dispatched to the Old Faithful area to observe and watch for any movement. At the same time, other control personal were in route to prepare for a control mission that because of the arrival of the rain had been pushed up to "as soon as possible".

At around 8:10am Old Faithful shot # 3 deposited a small amount of snow onto the road covering one lane. Traffic was delayed at this point while the maintenance personnel cleaned the debris from the road. While this was happening, a larger slide came out of shot # 3 covering three lanes. At this point, evacuation down the mountain of the traffic stopped under the remaining Old Faithful chutes was begun. As the avalanche technician was removing the last vehicle from under shot # 4 it deposited a large amount of snow covering all four lanes.

It was at this time that an evacuation of the entire area was begun. As this task was underway, an Avalanche from Shot # 7 slid onto the road hitting several cars, completely burying three.

Shot # 7 is by no means one of the most frequent flyers of the Old Faithful slide chutes. In fact, shot # 7 had hit the road only seven times in the previous ten years. In addition, during the winter of 1996-97, the second biggest year on record for Stevens Pass with 907" of snowfall, shot # 7 never did slide.

Fortunately no one involved in the incident was seriously hurt. Both state workers and general public gave extrication and aid to the people in the cars. Several of the cars had to be towed from the site, and only two of the nine people involved were transported to the hospital and later released.



THE INVESTIGATION BEGINS

Lawsuits filed against Washington State government agencies are defended by Assistant Attorney Generals with the Washington State Attorney General's office. An investigator is also assigned to conduct a factual investigation of the allegations. Typically, upon receipt of the suit, all the legal team knows of the incident is what is alleged in the law suit. An investigation is then begun immediately so the complaint can be answered. It is the process used to gather the facts – it mainly involves identifying and interviewing witnesses as well as locating and analyzing relevant documents and materials.

On August 19, 1996, a lawsuit was filed against the State of Washington Department of Transportation

by individuals alleging they were buried alive in a December 17, 1994 avalanche which covered their Chevrolet Suburban with 15' of snow on State highway 2 just west of Stevens Pass, Washington. The plaintiffs alleged the State DOT was negligent for creating a dangerous situation and failing to warn them of the danger – specifically, DOT workers stopped traffic for over 30 minutes in an avalanche zone while they cleared the highway of an earlier avalanche. The case went to jury trial in December 1997.

There is an expression that nothing helps a your case like good facts! Identifying what the facts are can be problematic especially with the passage of time. Ideally an investigation can begin immediately after the incident while events are still fresh in people's memories.

Unfortunately, many lawsuits do not happen until years after the event. This lawsuit was filed well over 1-½ years after the incident and trial was not held until the 3rd anniversary of the slide. Memories dim with the passage of time.

The facts are typically presented to a jury by witnesses called by both parties to the case. Often a witness testifies to what s/he remembers of the event. It is not uncommon for individuals to remember events differently. Some witnesses may have some type of record of the event (notes, reports, photographs, etc.) and can refresh their recollection with those materials. Others can refresh their memories but recalling their routine – they may not know what they did at a specific time on a specific day but know from habit and custom what they're typical actions are and how long those actions take.

In this case there was no dispute that a snow slide from chute #7 occurred and covered plaintiffs' vehicle for a period of time. It was agreed the slide occurred at 9:17 AM. It was agreed that traffic was stopped for a period of time, on an approach to a mountain pass in a slide area while DOT maintenance workers cleared the road of snow from an earlier slide. But, there were still great many facts to be determined and many facts remained in dispute.

One of the first steps in the investigative process was to identify and interview the avalanche control team and obtain all records in their custody regarding the December 17, 1994 incident.

Among the facts needing to be gathered in investigation were:

who made up the DOT avalanche crew on 12/17 & the night before

what was their training and experience

what forecast information did they have available prior to 12/17

what control efforts, if any, had been done prior to 12/17 based on that forecast

were the control efforts successful

did the weather arrive on 12/17 as forecasted and if not, how was it different

when did these weather differences occur

what impact did these weather changes have on pack conditions & control plans

what control changes were required, if any, and how much time was involved to implement and accomplish them

exactly where and at what time did the slide occur that covered the plaintiffs

were there slides to the road prior to this, and, if so, where, when and what size

who was on the DOT maintenance road crew on 12/17 & what were their actions on 12/17

where on SR 2 was the slide area

what is the specific location of each avalanche chutes

what is the distance between chutes

which chutes was traffic stopped under

why was traffic stopped there

what was the control and slide history of those chutes

how long had traffic been stopped under those chutes

how many vehicles were stopped between the slide paths

did staff know or could reasonably forecast that chute #7 would slide

how many vehicles were covered

what were the rescue efforts & how long were vehicles covered

what was the nature and extent of injuries

It was necessary to determine the exact sequence of events – what happened when, who was where at what point in time, what was each person doing at specific times and what decisions were being made over time as staff continually evaluated the changing road and weather conditions.

Records that were obtained and analyzed during the course of the investigation included:

1) written report of the incident prepared by the Avalanche Control supervisor shortly after the incident
2) Washington State Patrol accident report
3) Washington State Patrol radio logs of communications
4) Department of Transportation radio logs of communications
5) Department of Transportation traffic counts from the closest roadway count recorders
6) Historical records kept by the avalanche crew of weather, slides(both controlled & naturals), snow accumulation, control efforts
7) Post event photographs
8) Aerial photographs of road and slide area
9) Department of Transportation roadway video of warning signs on approach to slide area
10) Department of Transportation employee time sheets
11) Department of Transportation policy & procedure manuals
12) USFS Avalanche Training Materials

All of the materials played some part in putting the factual puzzle together, especially in reconstructing memories. Accident reports were used to identify time frames and witnesses. Photographs and video were used to bring the scene to the jury and identify what warning signs were in place.

The historical information was valuable in further validating the accuracy of the avalanche control technician's assessment of chute #7 as having low slide potential. It, the policy and procedure manual, training materials and experience levels of avalanche control staff led to establishing the credibility and effectiveness of the DOT Avalanche Control program.

In this instance avalanche crew members were interviewed about 2 weeks after the incident. Of the 3 avalanche control technicians on duty each had a different recollection or impression of which chutes slid, the specific time of each slide, how many lanes were blocked by particular slides, whether traffic continued to move in spite of various slides and from which direction it continued.

Given the events of the day it was not surprising for different individuals to have different impressions. Given the conditions and demands on the avalanche control & maintenance crews it was not surprising that no one really kept track of specific times of slides nor of traffic movement. But, it quickly became apparent, that the lawsuit would focus on accounting for small periods of time – minutes – and what was done in those minutes by whom and for what reasons.

The facts as they developed indicated a warming trend was forecast for 12/17 but it arrived sooner then forecast. By 7:30 AM avalanche staff were receiving their first reports of rain, and not snow, on the West Side of Stevens Pass. There was a slide at chute 3. Various individuals identified it as occurring at 7:40, between 7:55 and 8:05, 8:00 and 8:30 AM. This slide took only part of 1 lane which maintenance worked to clear while an avalanche tech stood guard. A 2nd slide occurred at chute 3 – again different times of 8:25, 8:30 and 8:40 AM were offered.

There was a record of an 8:44 AM DOT record communication to expect intermittent delays due to slides.

According to the avalanche tech on guard, she immediately began clearing traffic from under chute 4 right after #3 slid the 2nd time. She recalls directing these vehicles to turn around and leave the pass area. As she cleared the last vehicle from under #4, it slid. No one had a specific time of when #4 came in. The best investigation could reconstruct was between 9:00 and 9:05 AM.

The on site avalanche tech recalled getting in her vehicle and beginning to direct the remaining traffic to turn around. She was moving west from chute 4

and had in front of her a very long line of vehicles waiting to get to the ski area which had just opened for the morning. Her recollection is she turned only a few more vehicles before she stopped to briefly pause since it looked as if maintenance would have the road reopened. She thought it would be faster to move the vehicles up the mountain than to get them to turn around to go back down. Her recollection is 3 to 4 or no more than 10 minutes elapsed between #4 sliding and when #7 slid. She did not know what time this slide occurred.

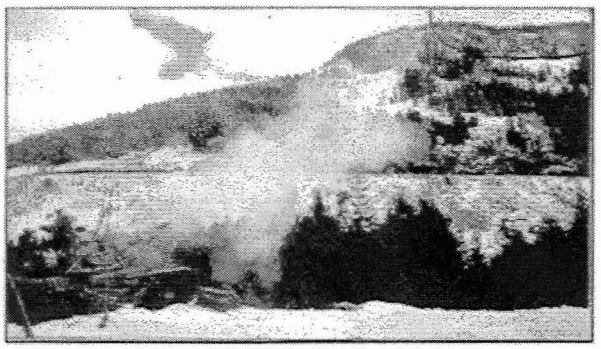
Interviews were also conducted with individuals who were among those waiting for the road to be cleared. They saw the female avalanche control technician and watched maintenance in its road clearing activities. They were certain no cars passed them going west back down the mountain. They did not see the avalanche control technician turn anyone. They believed they sat in line, waiting, for 20 to 25 minutes before #7 slid. The plaintiffs also testified they believed they were waiting in line for 20 to 30 minutes before being covered.

There were 2 avalanche control technicians at the pass, east of chute 7, en-route to a control mission. They heard of #7 coming in on the radio. One thought #7 came in between 8:50 - 9:00 AM. The other tech was not sure of a time. During subsequent investigation we were able to reconstruct his activities that morning and establish a time line of how long these activities typically take. He was then able to recall he most likely heard about #7 around 9:15 AM.

There was record of a 9:17 AM DOT radio communication to call for AID units as a slide buried 2 cars and some people.

The plaintiffs testified they were buried 30-60 minutes while those who assisted in the rescue testified access to them in their vehicle was completed in about 5 minutes.

Investigation can and does turn up discrepancies that are not always resolved. This is one reason records maintained contemporaneous to the event become so important.



THE LAWSUIT

The lawsuit was premised on claims of negligence. By this, the plaintiffs claimed that the Department of Transportation acted, or failed to act, in a way that a reasonably prudent person would not have acted, or have failed to act. Essentially, the suit said that the Department failed to get the cars beneath the avalanche paths out from under the paths in a reasonably timely way.

To succeed on a negligence claim, the plaintiffs had to prove four things: (1) that the Department owed a legal duty to evacuate them from the avalanche area; (2) that the Department failed to do so; (3) that the plaintiffs suffered damages, and (4) that the Department's acts (or failure to act) was the cause of the plaintiffs' damages. The Department did not dispute that the plaintiffs had suffered damages—indeed, a totaled vehicle and understandable emotional distress from being caught in an avalanche could not be denied. However, the Department denied the remaining three elements of plaintiffs' lawsuit.

THE STATE'S POSITION

On the issue of a legal duty, the Department argued that they owed no duty to these plaintiffs because there was nothing that singled them out from all other users of the state's highways. This theory is called the "public duty doctrine", and in essence it

says that when a duty is owed to an undifferentiated public, there is a legal duty owed to no one, and a member of this undifferentiated group cannot sue the state when something bad happens to them. However, this argument failed because the court ruled that the Department owed all the drivers stopped behind the first slides a duty once the Department undertook efforts to rescue these drivers by turning the traffic back down the mountain.

The Department was more successful in another argument regarding whether the entire highway should have been closed down earlier in the day because of the warming weather and the previous snow. The Department argued that such decisions are not subject to lawsuit because they are decisions left to the sound discretion of the transportation agency. This theory is known as discretionary immunity; the theory being that the courts should not engage in second guessing executive agencies' decisions because the courts, legislature, and executive branch are designed to be free from interference from each other to keep from over-concentrating the power of government in one place. The Department here relied on a case decided by Alaska's highest court, Arrowwood vs. Alaska. The Alaska court ruled that deciding when to close a state highway in response to icy weather is a decision vested with the Secretary of Transportation. Because the Secretary cannot be in all places at once, the actual decision can be delegated to a Department employee able to assess the conditions in person. In the Barnhart case, the court agreed that decisions about closing the highway were not subject to suit. This precluded the plaintiffs from arguing to the jury that the highway should have been closed altogether in response to conditions. This also prevented arguments being made regarding whether the avalanche technicians and highway maintenance personnel would have made the same decisions regarding closing the highway at any given time.

THE CASE PROCEEDS

The Department presented the case to the jury on the theme that despite the best efforts of a highly trained avalanche control team, no one could have predicted this accident. The Department's case centered on the actions of the technicians as events unfolded, and the importance the historical knowledge regarding slide number seven played in those actions. Essentially, the Department argued that the history of these slides could not have lead any reasonable person to expect slide number seven to come onto the highway when it did.

As is generally the case, the witnesses to the events around the slide did not agree on the particulars of these events. Important disparities included how long a line of traffic the Avalanche technician was faced with behind the initial slides on chute number three, and whether any cars had been turned back in the time between the slides on chute four and chute seven.

However, despite these points of disparity, the Department was able to make its case for why the actions of the avalanche control team were reasonable. This was based on two key factors. First, the avalanche team had detailed historical records of both natural and controlled slides in the Old Faithful zone. This was crucial, because it allowed the jury to find that the Department had a solid understanding of what was ***reasonably likely*** to occur in the area. This emphasizes the point that it is critical for avalanche control efforts to include careful documentation of the past to predict likely events in the future in any given avalanche area. The second key factor was the meeting of professional standards for taking control measures. This was also crucial, because the jury had to be convinced that the plan to control later in the morning was a reasonable plan. Here, expert witness Edward LaChapelle played a key role. Dr. LaChapelle was able to testify that, based on the known history of the area and the weather forecasts the control team had received, the control plan was a reasonable one. Dr. LaChapelle's testimony was also important because it represented an expert opinion regarding the control plan from someone outside of the Department.

THE OUTCOME

On conclusion of the trial, the jury deliberated for less than four hours before returning a verdict finding that the Department was not negligent in its response to the situation. Based on this finding, the plaintiffs recovered no damages from the Department. Those

jurors polled following the verdict cited the historical knowledge upon which the control team had to base their actions as being determinative as to whether the decisions made were unreasonable. Dr. LaChapelle was also cited by the jurors as being particularly important to their decision that the control plan itself was a good one, and that the control members did everything that they could given the situation. Some jurors would have found the Department negligent for not closing the highway earlier, had they not been specifically instructed by the judge that this issue was not before the jury for decision, based on the discretionary immunity ruling referred to above.

LESSONS LEARNED

One of the first inclinations after being draged through our legal system is to change the way we do things completely to make it more accurate, or not to keep any records so they have nothing to look at. After the dust has settled however, the lessons that were learned from this experience become very clear.

Responsibility for Avalanche safety must be a combined effort between the user and the controller. There truly is no such thing as an "Avalanche Expert." To call someone an expert is to imply that they know all there is to know about a certain topic. Any true Avalanche Professional will tell you that they do not know everything about snow, and avalanches. If we did, we would all be out of a job.

A smart Avalanche Professional uses past experiences to broaden their experience level and make their "Avalanche Eyes" sharper. Some of the things that have come out of this experience are:

Records- Accurate records are a must. Records of Avalanches are an interpretation of a certain person. A different person may interpret the same event completely differently. Have a well-defined method for recording Avalanche events. Have the path locations and danger zones well documented so the members of your team know where they are and are not safe.

Times- Remember to designate a scribe when an event occurs. Someone who is physically looking at a watch, and writing down times. As was the case here, many lawsuits are not even filed until many months have passed. The human memory will never be as good as something written down on paper.

Flexibility- Having a good sound control program is a given. We must however also be willing to adapt that plan when our "Avalanche Eyes" notice something out of the norm. Remember that Mother Nature creates things from scratch.

Policy- Whether you are part of a public or private entity, be sure that you know what the policies are, and who is going to carry out and assume responsibility for those polices.

Documentation- Document everything. When documenting things that have happened or are in the process of happening, stick to the facts. Never extrapolate on an event. Photos are extremely valuable as is video if at all possible.

Educate- If at all possible, educate your users. You are less likely to have a problem if as many of your users know of and understand something about Avalanches, and the control of them.

The authors of this report are very pleased that no one was seriously hurt by this event. We feel fortunate to have been given the opportunity to broaden our Avalanche knowledge and feel that this event can only make our program stronger as we grow from our experiences.