



July 16, 2019
File No: 20190312

Farris LLP
PO Box 10026, Pacific Ctr. S.
25th Floor, 700 West Georgia St.
Vancouver, BC V7Y 1B3

Attn: Robert B. Kennedy, Q.C.

Re: Massey's Ice Climbing Accident: March 11th, 2019

Dear Mr. Kennedy,

You have asked me to provide a summary of my investigations into the Massey's ice climbing accident that occurred on March 11, 2019 in Field, BC. This letter summarizes the investigation completed. This report does not provide an opinion on this matter at this time.

1. Qualifications

I am principal of Alpine Solutions Avalanche Services, a company registered in the province of British Columbia, Canada that provides snow avalanche and mountain safety expertise to companies and organizations in Canada, the US, and other alpine countries. I am a registered professional engineer in the province of British Columbia (BC), Canada. In addition, I have professional membership with the Canadian Avalanche Association (since 1996), and am a licensed Mountain Guide with both the Association of Canadian Mountain Guides (ACMG), as well as the International Federation of Mountain Guides (IFMGA).

For the past 27 years my work has focused primarily on avalanche and mountain risk management. Throughout this period, I have worked several thousand days as an alpine guide, ice-climbing guide, heli-ski guide (full time for 12 years), and a mountain and ski-touring guide, I have worked full time as a consultant for the past 12 years. In addition, I am inspector/auditor for Helicat Canada, the helicopter and snowcat standards organization in Canada, which oversees a

trade accreditation program. I have provided expert evidence on multiple cases involving snow, ice, and the effects of avalanches.

During 2000 until 2013, I have also provided accident investigation and legal opinion on motor vehicle accidents with Robin Brown Inc., a Vancouver, BC based consulting engineering company.

Avalanche and mountain safety consulting projects have included providing training, opinions, and recommendations for management of avalanche risk for operations including guiding companies, heli-skiing, ski resorts, backcountry ski operations, Provincial and National Parks, as well as numerous industrial projects. I have also worked in research with both the University of Calgary Applied Snow and Avalanche Research group (1994/1995), as well as the University of British Columbia Avalanche Research group (1992). I am a senior instructor with the Canadian Avalanche Association Industry Training Program (since 2002) which is the training and certification body for avalanche workers in Canada. In 2014, I was retained as subject matter expert for the development of the Canadian snow avalanche guidelines document, 'Technical Aspects of Snow Avalanche Risk Management', and have co-authored a chapter on avalanche hazard assessment in the internationally recognized text 'Planning Methods for Assessing and Mitigating Snow Avalanche Risk'.

During the past 20 years of my work, I have had the opportunity to design, develop, and oversee several avalanche and mountain hazard forecasting and mitigation operations. I have extensive experience with avalanche hazard management for the guiding industry, and have completed work on projects and at sites in and around Field, BC.

A copy of my Curriculum Vitae is attached.

2. Abbreviations and Definitions

The following abbreviations and definitions are relevant to this report.

- ACMG – Association of Canadian Mountain Guides - professional association and certifying body for mountain guides, including alpine guides that guide ice climbing, in Canada.
- CAA – Canadian Avalanche Association – professional association and certifying body for avalanche workers in Canada. A Level 2 certification is required for ACMG full guide membership (e.g. Ski Guide, Alpine Guide, Mountain Guide). A Level 1 certification is required for apprentice level membership.

3. Information Sources

Information contained in this report is based on the following:

- ACMG Accident Report completed on March 13th by Merrie-Beth Board, the most senior guide involved at the accident site;
- Interviews of the guides involved with the climbing course (Table 3-1);

- Discussions with Parks Canada Visitor Safety personnel involved with the rescue;
- Photographs of the accident site provided by Parks Canada;
- Review of Parks Canada public avalanche bulletins from March 3rd to March 11th;
- Review of Parks Canada weather station records from March 3rd to March 11th;
- Review of CAA InfoEx daily condition reports from professionals operating in the region;
- Review of response letters from Merrie-Beth Board to the ACMG Conduct Review Committee, dated June 20th, 2019, and July 3rd, 2019.
- Overview helicopter flight of the accident site completed March 13, 2019; and
- Sarah Hueniken Guiding website course listing - <http://sarahhueniken.com/category/courses/ice-courses/>

Table 3-1: Guides interviewed.

Guide	Role	Certification	Date and Location of Interview(s)
Merrie-Beth Board	Senior guide for two groups climbing Massey's (the accident site). Leader during rescue.	ACMG Alpine Guide, CAA Level 2	<ul style="list-style-type: none"> • March 13th - Golden, BC • July 9th - Telephone
Ben Paradis	Apprentice guide for two groups climbing Massey's (the accident site). Involved in rescue.	ACMG Apprentice Alpine Guide, CAA Level 1	March 13 th - Canmore, AB
Scott McKay	Senior guide on 'Carlsberg' ice climb when avalanche occurred. Arrived at rescue site after accident subjects were uncovered.	ACMG Alpine Guide, CAA Level 2	March 12 th - Canmore, AB
Sarah Hueniken	Company owner, course coordinator, and senior guide on 'Guinness Gully' ice climb during avalanche. Arrived at rescue site before accident subjects were uncovered.	ACMG Alpine Guide, CAA Level 2	March 21 st - Telephone

4. Overview

The accident occurred on the second day of a four-day ice climbing course based out of the Field, BC. The course included ten participants, one who was a volunteer worker on the course (the deceased), and one a certified ACMG Ski Guide, who was not working during the course. All participants reportedly had ice climbing experience, and several had taken the course before.

The first day of the course was spent climbing short ice climbing routes at Haffner Creek, in Banff National Park, about 35 km directly southeast of Field. This location is a popular venue for teaching basic ice climbing skills due to small size of the routes, ease of access/egress, and the limited risk from hazards such as falling ice from above, or avalanches. Two guides, Sarah and Merrie-Beth, were working on this day. The following three days of the course were intended to be larger 'multi-pitch' climbing days where participants could practice more advanced skills such as leading a rope team.

On the second day there were five guides and all ten participants climbing established icefall climbing routes in Field. Two guides and four guests were climbing on 'Massey's', the site of the avalanche. The accident occurred near the end of the field day, after both parties had climbed and then descended the ice climbing route. While organizing gear and preparing to depart the base area, a decision was made to quickly review a type of ice anchor with the group at the base of the ice climb. As group members were rotating through the teaching site, a snow avalanche impacted the route from above, dislodging two of the participants from their stance, and into the flowing mass.

When the avalanche came to rest, two participants were buried within approximately 10 m of each other, 50 to 60 m (estimated) downslope of the base of the ice climb (Figure 4-1). One of the buried participants was visible to those on the surface (Michelle), while the other (Sonja) was not. A rescue was initiated by the guides at site; however, all packs with rescue gear were also buried. Michelle was uncovered within minutes, and Sonja was uncovered after being buried for approximately 30 minutes. Michelle survived, and Sonja did not.



Figure 4-1: Accident site from above taken March 11th showing base of ice climb (orange circle) and two excavated burial sites as blue arrows with initials of those buried. Green circle is estimated location of lead guide when the avalanche occurred (Parks Canada photo).

5. Guiding Company, Guides, and Individuals Involved

The company that organized the ice climbing course is Sarah Hueniken Guiding, operated by Sarah Hueniken. The Field ice climbing course is a scheduled course that reportedly has occurred every year for several years in early March. The participants for the course are normally women, and often are repeat clientele, with the deceased having completed the course at least once previously.

The guides hired by Sarah (Table 3-1) were all 'independent guides', which are guides that are hired directly by clients, or work under contract for more than one company. All guides were ACMG certified, had several years of climbing and guiding experience, and one is an ACMG examiner. All guides were working within terrain and supervision guidelines set by the ACMG.

The course program and all risk management associated with it was exclusively managed by the guides.

The deceased, Sonja Findlater, was working as a volunteer, cooking meals and other logistics. Michelle Kloet, was the second participant that was caught in the avalanche. Madeleine Martin-Prenney is a certified ACMG Ski Guide who was participating, and part of the climbing group at Massey's, but not working on the course.

6. Location and Avalanche Path Characteristics

The Massey's ice climb is one of several ice climbing routes in the Field, BC area, and is located approximately 1.8 km east of the townsite on the south side of the valley. The normal approach to Massey's involves walking along the Canadian Pacific (CP) Railway line from the east side of Field for approximately 1 km before following a narrow clearing for approximately 200 m up to the start of the ice. On foot, the approach would be expected to take between 20 to 30 minutes from Field during normal conditions.

Virtually all ice climbs in Field are located in established avalanche paths, and several are impacted by avalanches on a regular basis. Although snow conditions and avalanche risk for some of these paths are monitored by Parks Canada and CP Rail (due to the location of CP tracks in the extreme runouts of the avalanche paths), the Massey's avalanche path is not normally controlled with explosives.

The avalanche path that affects Massey's ranges from 3150 m elevation, near the summit of Mt. Stephen, to approximately 1250 m at the Kicking Horse River valley bottom (Figure 6-1). The path encompasses all three elevation bands that are normally associated with avalanche hazard – alpine, treeline, and below treeline.

The starting zone of the avalanche path is a large west facing alpine bowl with several small gully systems that converge into a single channeled track in the 'below treeline' elevation band, at approximately 1700 m. The slope incline of the starting zone ranges between 35° and 45° on average.

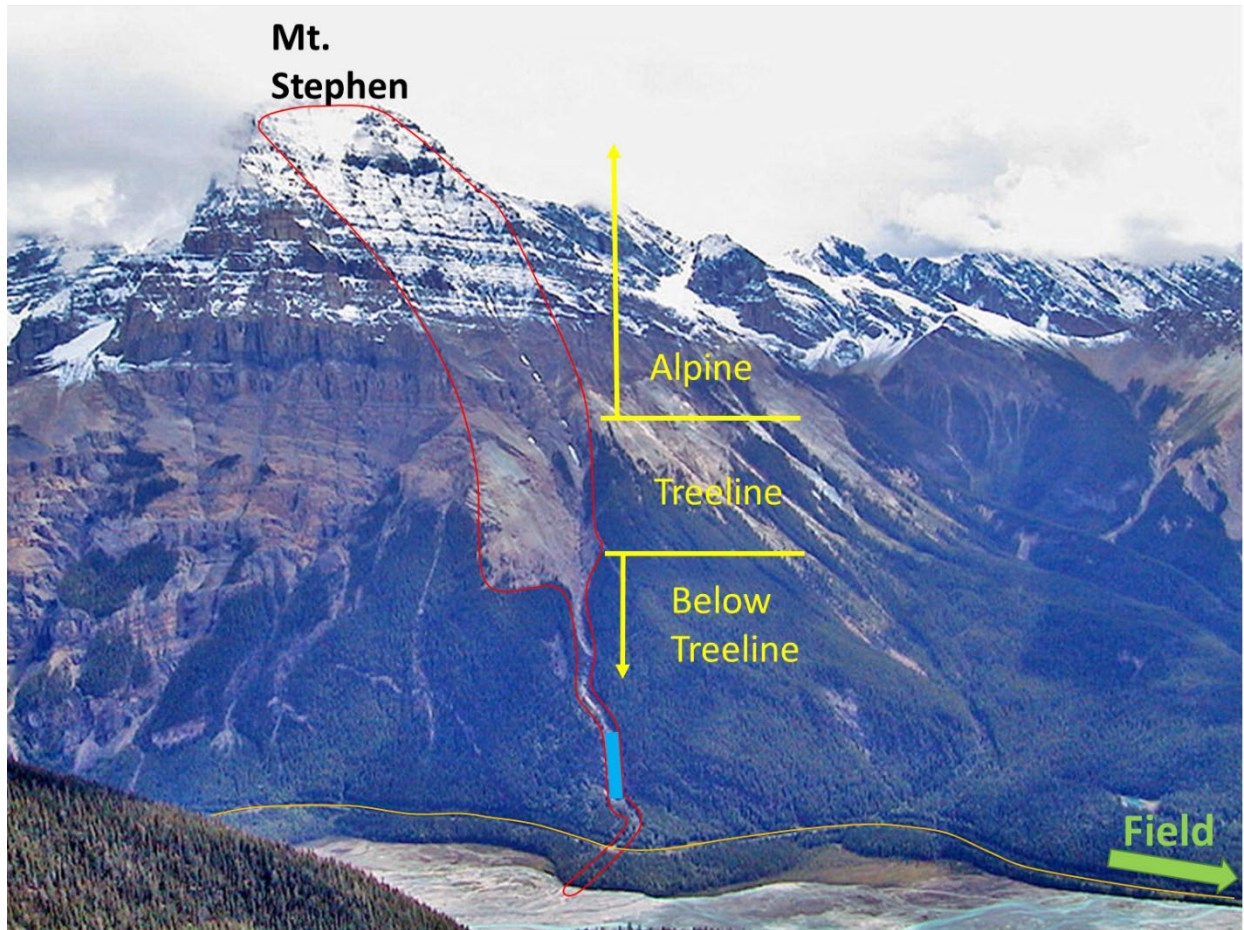


Figure 6-1: Massey's ice climb (blue). Avalanche path outline in red, CP Rail line in orange. Approximate elevation bands referenced by avalanche forecasts in yellow.

Although the starting zone is large (up to 700 m wide near the top), vegetation patterns suggest that most avalanches terminate above the convergence point at 1700 m. This is estimated to be partly due to the disconnected nature of the start zone, resulting in the vast majority of avalanches releasing with only a small segment of the start zone. This is consistent with long term observations of this avalanche path by Parks Canada.

The ice climb is located at the lower end of the track between approximately 1350 and 1450 m elevation (Figure 6-2). The track becomes steep and is stepped through this segment, with a near vertical cliff at the bottom providing the most challenging climbing section. Below the ice climb the runout zone of the avalanche path appears to follow a low incline clearing through the forest to the CP Rail tracks.



Figure 6-2: Massey's ice climb (Parks Canada photo)

Although an analysis of frequency of avalanches reaching the ice climb was not completed for this report, it is estimated that the Massey's ice climb is impacted by avalanches much less frequently than other exposed ice climbs in Field. Parks Canada Visitor Safety staff suggest it is an exceptional event for an avalanche to reach the ice climb, and it occurs with return frequency in the order of five to 10 years.

7. Weather and Avalanche Conditions

7.1. General Winter Conditions

The winter of 2018/2019 in the region was an unusual winter due to a long period of cold temperatures and very little precipitation from early February to the middle of March. During this

time, the snowpack experienced a gradual metamorphic process known as ‘faceting’, which causes the snow to become weaker, and provide poor support to any new or windblown snow that falls on top. Facets are the result of a strong temperature gradient between the surface of the snow and the ground. Although faceted snow does not normally fail and start an avalanche without additional overlying load (including new or windblown snow), once an avalanche starts, faceted snow can be entrained, resulting in a larger mass of snow than the initial release volume.

BC government snow monitoring stations in the region suggest that the general snowpack depth was below average, and discussions with Parks Canada suggests that there was less snow than usual in the starting zone of the avalanche path above Massey’s for this time of year. In an analysis of avalanche hazard, this would be a contributing factor to suggest that the likelihood of a large avalanche was very low.

7.2. Snow and Avalanche Conditions Prior to the Accident

In the days leading up to the accident, the snowpack was known to be weak by Parks Canada and the ice climbing course guides. However, there was limited concern for large avalanches. Parks Canada’s public avalanche bulletin rating suggests avalanche hazard was trending downward a couple of days prior to the accident (Table 7-1). Hazard at the elevation of the ice climb, which is Below Treeline (Figure 6-1), remained at the lowest possible level (1-Low) throughout the period leading up to the accident.

Table 7-1: Avalanche danger leading up to March 11th. Danger ratings are described in Table 7-2.

Elevation Band	March 9th *	March 10th *	March 11th *
Alpine	3 – CONSIDERABLE	2 - MODERATE	2 - MODERATE
Treeline	2 - MODERATE	1-LOW	1-LOW
Below Treeline	1-LOW	1-LOW	1-LOW

***Note avalanche bulletins are normally issued the evening prior to the bulletin date**

Table 7-2: North American Avalanche Danger Scale (Statham et al., 2010¹)

Danger Level	Likelihood of Avalanches	Avalanche Size and Distribution
5 - EXTREME	Natural and human triggered avalanches certain.	Large to very large avalanches in many areas.
4 - HIGH	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 - CONSIDERABLE	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 - MODERATE	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 - LOW	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.

Additional information in the Parks Canada public avalanche bulletin suggested that conditions would be changing with the arrival of new snow and strong winds on Monday night (the evening after the accident). Although the guides did not document their hazard analysis, all of this information was reportedly considered, and had been reviewed during morning discussions. Continued observations by the guides throughout the day suggested weather conditions were not changing rapidly, and avalanche hazard was not a significant concern that day.

8. Risk Management

The risk management process for the course occurred on several levels. Although it was clear that Sarah was the course leader, all guides shared responsibility for risk management. The risk management processes that were used are described in the following six subsections.

8.1. Release and Waiver

Prior to the course all participants, including volunteers, were required to complete waivers. The waiver used was reportedly the standard ACMG 'Release of Liability, Waiver of Claims, Assumptions of Risks and Indemnity Agreement' (waiver). The waivers would be expected to have informed participants of the risks involved, and have them acknowledge this. Sarah indicated that she had asked each participant, and received confirmation, that they had read and understood the waiver.

8.2. Guide Certification and Hierarchy

The guides working were all certified, and working to within their certification standards that are set by the ACMG. All guides interviewed indicated that they had current first aid certification.

¹ Statham, G., McMahon, B. and Tamm, I., 2006. The Avalanche Terrain Exposure Scale, Proceedings of the International Snow Science Workshop (ISSW). Telluride, CO.

Although the trip was organized by Sarah, all guides were responsible for providing input as to trip objectives and risk management. When climbing, the senior-most guide on the particular climb was the lead decision maker, with the apprentice guide as secondary decision maker. Guides indicated that the working relationship was comfortable, and did not experience pressure from Sarah or other guides to operate above their acceptable risk tolerance. Sarah was characterized by the other guides as a conservative decision maker.

8.3. Participant Abilities and Expectations

All participants had previous ice climbing experience and many had participated in this course prior to 2019. According to Sarah, avalanche hazard was an ongoing discussion point, and participants were aware that exposed ice climbs are often avoided when avalanche hazard is deemed to be too high to effectively manage the risk.

8.4. Avalanche Safety Equipment and Communication Devices

Avalanche safety equipment includes avalanche transceivers (rescue beacons), lightweight shovels, and collapsible probes. Although it is not common for ice climbers to carry avalanche safety equipment, there has been a trend in the past few years for guides to consider this equipment for ice climbing when the climb is in an avalanche path. For this particular day, all guides and participants carried avalanche safety equipment. All transceivers in the Massey's group were checked for functioning prior to entering the avalanche path.

All guides carried radios with Parks Canada frequencies programmed for emergency, and mobile phone devices with emergency phone numbers known. Several participants also carried mobile phones. Scheduled check-in times of 10:00 and 13:00 were used as opportunities for the guides to discuss any issues.

8.5. Pre-Trip Planning and Group Decision Making

Normally guides are expected to complete pre-trip planning, which typically begins as researching the climbing route, approach trails/routes, and other logistics. Closer to the guiding day, the planning focuses on researching current and forecasted weather conditions. If avalanches are considered a hazard, then completing research on snow and avalanche conditions would normally be expected.

When there are two or more guides working together, often a group discussion or guides meeting occurs. The discussion would be expected to focus on conditions (e.g. snow and weather), risk management (e.g. client abilities, route options, rescue resources), and logistics (e.g. timing, equipment, vehicle parking, etc.). Although guides meetings can be more formalized, modern communications allows for a less structured format that occurs over phone calls, emails, and text messages, with perhaps just a short face to face meeting if the groups are starting in the same location. The extent of the guides meeting varies substantially in the guiding industry, and normally depends on the nature of the operation (large corporation vs independent guides), whether it is based out of a lodge/office or not.

Based on guide interviews it was apparent that all guides had familiarity with the Field area ice climbing routes, and the guides climbing Massey's and climbed it previously. In addition, all

guides had completed pre-trip research of current and forecasted snow and weather conditions in the area. Specifically, Merrie-Beth and Sarah had both driven through Field and stopped to observe the routes, including starting zone conditions.

Merrie-Beth and Sarah had worked together several times previously, including this particular course. Early in their working relationship, they had comprehensive risk management discussions that were relied upon for the current course.

Although formal guides meetings did not occur during the day of the accident, several pre-planning steps had occurred, and a group discussion of the climbs (including risk management) occurred when the group met in Field in the morning of March 11th. In addition, the Massey's guides had discussed risk management specific to their group during the approach walk to the climb.

8.6. Ongoing Risk Management During the Day

It is apparent that risk management was an ongoing consideration throughout the day. Merrie-Beth and Ben communicated often, and worked together to optimize time. At no point did either of the guides express that they had observed conditions that would suggest an increase in avalanche hazard was occurring.

9. Avalanche Details

Avalanche size was difficult to determine since the fracture line of the avalanche was no longer visible during the investigation and helicopter flight, due to the snowfall and wind that occurred between March 11th, and March 13th. However, the avalanche was reported by the guides involved to be a Size 2 to Size 2.5 (Table 9-1) avalanche based on the extent of debris in the runout zone. The deposit depth was estimated by guides to be 2.5 to 3.0 m. These estimates are consistent with helicopter-based observations of the runout zone on March 13th, as well as photographs of the start zone area taken by Parks Canada on March 11th, illustrating a small shallow fracture estimated to be in the order of 50 m to 100 m wide, and 50 cm deep in the lower starting zone. The estimated aerial extent of the release area is illustrated in Figure 9-1.



Figure 9-1: Estimated avalanche release area (blue square).

Table 9-1 - Canadian classification system for avalanche size (McClung & Schaerer, 2006²).

Size	Destructive Potential	Typical Mass (tones)	Typical Path Length (m)	Typical Impact Pressures (kPa)
1	Relatively harmless to people.	< 10	10	1
2	Could bury, injure or kill a person.	10 ²	100	10
3	Could bury a car, destroy a small building, or break a few trees.	10 ³	1000	100
4	Could destroy a large truck, several buildings, or a forest with an area up to 4 hectares.	10 ⁴	2000	500
5	Largest snow avalanches known. Could destroy a village or a 40-ha forest.	10 ⁵	3000	1000

² McClung, D. M., & Schaerer, P. A. 2006. The Avalanche Handbook (3 ed.). Seattle, WA, USA: The Mountaineers.

9.1. Chronology of Events

Table 9-2 provides a sequence of the accident and subsequent rescue, based on compilation of accounts by the guides.

Table 9-2: Chronology of events. Times in bold font are confirmed by phone logs, all other times estimated.

Time	Event
6:45	Group meeting time in Field, with departure for all climbs shortly after.
7:00	Merrie-Beth and Ben check that participants have required equipment, including transceivers on their body, and depart Field for Massey's at 7:05.
7:35	Transceiver check completed.
9:00	Massey's climb underway with both groups as top of first steep segment of ice.
13:00	Start of descent from top of Masseys.
14:10	<p>All guides and participants back at base of Massey's.</p> <p>Merrie-Beth was organizing equipment and assisting Sonja with her crampons.</p> <p>Others opened their packs to organize their equipment.</p> <p>Ben went back up to base of route (estimate 10 to 20 m) with two participants to review ice anchor building technique. Packs are left in the snow, and none of the participants are anchored at the base of the route.</p> <p>Sarah had descended Guinness Gully, and was back in Field.</p>
14:23	Merrie-Beth sent a text message to Sarah to inform her that the group was off of the climb.
14:27	<p>Sarah was in a vehicle driving back to the centre of Field, and observed an avalanche powder cloud in the starting zone above Massey's. She immediately calls Merrie-Beth on the phone to tell her to 'get everyone behind the curtain' (meaning behind the curtain of ice). Merrie-Beth begins to yell to the group to stay close to the wall when the start of the avalanche impacts the area approximately 3 to 5 seconds after the phone rang.</p> <p>Sonja and Michelle are caught in the avalanche, while all others manage to maintain their stance.</p>
14:29	<p>Sarah calls Parks Canada to notify them that an avalanche has occurred, and requests a rescue.</p> <p>Merrie-Beth, Ben, and Madelaine immediately start a rescue, realizing quickly that one participant is partially buried and one participant is fully buried. Ben digs out Michelle to the point where she is stable and there are no breathing restrictions.</p> <p>A transceiver signal is acquired below Michelle. All packs are buried, and no avalanche rescue equipment is available. Realizing this, Merrie-Beth searches for her pack digging with her ice-axe at the suspected location for few minutes. At the same time, she instructs Ben and Madelaine to dig with anything they had – helmets, crampons, and sticks.</p>

Time	Event
14:36	Sarah calls Scott, who was descending Carlsberg ice climb, and tells him there has been an avalanche on Massey's and is concerned that the Massey's group has been impacted. Sarah runs down CP Rail tracks to Massey's.
14:40	Michelle (partially buried participant) calls two of her contacts, and notifies them to call 911.
14:47	Sarah arrives at the accident site, provides avalanche rescue probe and shovel.
15:00	Sonja uncovered and dug up unconscious and not breathing. No snow found in mouth. Burial depth estimated at 1.8 m. CPR initiated by guides immediately.
15:07	Scott arrives at the accident site, provides additional first aid equipment including an 'airway', and assists with CPR. Sonja CPR thought to be helping as pink skin colour is returning.
15:10 and ongoing	Sonja was relocated approximately 10 m to the side of the avalanche path in case additional avalanches occurred. CPR is continued at new location. Scott establishes himself in lead communication role with Parks Canada. Michelle is uncovered between 15:10 and 15:20.
15:45	Parks Canada rescuers arrive with 'AED Defibrillator' device and additional CPR equipment.
15:53	Sonja is packaged and flown to an ambulance at a staging area nearby. Later, guides are informed that she had regained a pulse and was breathing on her own.

10. Further Observations

Additional details gathered and observations made during the investigation include the following:

1. It is apparent that the Massey's avalanche was an unusual event in the region that day due to the length of run of the avalanche.
2. Other guided parties were reportedly on other avalanche exposed ice climbs in Field on March 11th. In addition, Parks Canada Visitor Safety staff, who are also mountain guides, suggested that the Massey's ice climb was not something they would have avoided that day based on conditions. Guides were not avoiding ice climbing in avalanche terrain in Field on March 11th.

Please contact me if you have any questions.

Yours very truly,

A handwritten signature in cursive script that reads "Brian Gould". The signature is written in a dark, fluid style with a large initial 'B' and a stylized 'G'.

Brian Gould, P. Eng., ACMG/IFMGA
Mountain Guide and Professional Engineer