

## AIARE 2 Pre-course Exercise

This exercise encourages the AIARE 2 participant to take time prior to the course start date and review the AIARE 1 student manual, field book and key learning concepts. The intent of the exercise is to review the AIARE 1 learning outcomes and to provide context for how the AIARE 2 course builds upon the AIARE 1. Importantly, this exercise also begins to “put the student in the learning mindset” and gain familiarity with the topics of the mountain snowpack, avalanche terrain, and avalanche risk.

### Learning Outcomes

- Re-engage in the learning process, prior to your AIARE 2 course.
- Review and define the AIARE 1 key concepts.
- Review AIARE's Decision Making Framework (DMF) and Communication Checklist.
- Discuss why small teams can make better decisions than experienced backcountry travelers in avalanche terrain.
- Refresh your memory on how layers form in the mountain snowpack and how strong over weak layers interact to create different avalanche problems.

### Task: Review And Define The AIARE 1 Key Concepts

On a separate piece of paper, write out a definition or description for each term.

- **Teamwork:** Decision-making framework, teamwork, communication checklist, public avalanche bulletin, trip plan, AIARE fieldbook, review the day.
- **Avalanche type and characteristics:** loose snow avalanche, slab avalanche, glide avalanche, cornice, avalanche problem
- **Avalanche motion:** Gliding motion, flowing motion, destructive potential and avalanche size
- **Avalanche path terminology:** Defined avalanche path, poorly defined avalanche path, start zone, track, run out, deposit, flanks, bed surface, crown fracture, stauhwall,
- **Terrain characteristics:** Elevation of the slope, aspect to wind and sun, lee slope, windward slope, cross loaded slope, drifting snow, slope angle, convex rolls, trigger point, terrain trap,
- **Snow climates:** continental climate, intermountain climate, and maritime climate.
- **Layered mountain snowpack** snowpack, rounding, sintering, faceting, melt-freeze layer, persistent weak layer.
- **Danger scale:** low danger, moderate danger, considerable danger, high danger, likelihood of avalanches, distribution and size of avalanches.
- **Avalanche rescue response:** Companion rescue checklist, transceiver, avalanche balloon pack, search for a signal and clues, search mode, send or transmit mode, point last seen, single searcher pattern, multiple searcher pattern, probing the target, effective shoveling technique.
- **Snowpack observations:** Snow profile, compression test, Rutschblock test,
- Weather observations: red flags
- **Decision-making:** Human factor traps, bias, error, uncertainty, unfamiliarity

### Task: Complete the AIARE 1 Review

The questionnaire is designed to encourage participant review and self-assessment. Please bring this filled out questionnaire to class on day 1. You will not receive grade marks on this quiz,

nor is it pass/fail. In addition to a topical review for the participant, the exercise gives the instructor an idea of incorporating topics for review during the AIARE 2 course.

This is an 'open book' exercise. Participants are encouraged to use both the AIARE 1 manual and AIARE fieldbook to help solve any unanswered questions.

## Exercise #1

On the AIARE 1, course instructors describe *human factors*, such as bias and poor communication, as conditions that commonly compromise the group's ability to make good decisions in avalanche terrain. Specifically, "human factors within the group have the potential to affect trip preparation (*Plan*), our ability to recognize clues in the field (*Observe*), and to make safe *Terrain Choices*". The antidote described to manage the situation is *Teamwork*. Describe in a paragraph why each antidote listed below is integral to ensuring that small groups make better decisions than individuals:

Discuss Goals, Experience, and Abilities—

Share Tasks and Responsibilities—

Travel together, Decide Together, Build Consensus—

## Exercise #2

The Trip Plan functions as a pre trip decision-making checklist. It also encourages backcountry travelers to take both the public bulletin and the group's pre trip discussion into the field. The Trip Plan is one of the most important "check and balances" in the decision making process as it promotes terrain choices based on information and planning, as opposed to impulse and desire when at the top of an untracked slope. It requires the group to distill key information from the bulletin including the primary avalanche concern. It also helps to anticipate what field observations they will expect to see to verify the expert's determination of the avalanche risk. Read through the following bulletin description, and answer the questions using the terms in the AIARE 1 manual and the Avalanches and Observations Reference:

*January 13<sup>th</sup>, 2013. Tuesday, 0600AM*

*"20 - 70 cm of new snow fell over the weekend burying an old layer of surface hoar/facets that kicked off an avalanche cycle of sluffs that were running far and fast. While a few loose snow avalanches continue to be reported, the character of the weekend snow is changing; it's now settling into a soft slab with just enough cohesion to be triggered naturally and by backcountry users.*

*Slab avalanches with crown depths of 40 - 60 cm have been reported yesterday. Most of these slabs have been immediately lee of ridgetop, there hasn't been a whole lot of action midslope, yet. The situation will change rapidly with any sustained winds. The big thing here is how the snow feels under your skis or machine. Stiffer feeling snow indicates that the snow is taking on slab properties and if you can feel this change, you've*

*already gone too far. The loose snow avalanches were pretty easy to deal with using proper sluff management techniques, but this new slab avalanche problem is a different beast & it demands respect.*

*Use terrain to your advantage to avoid wind affected snow. Last week rain fell up to about 1400 m creating a stout crust below treeline. A surface hoar layer buried around the Christmas holiday still produces clean fast fractures results in compression tests, but, avalanche activity as of late has been confined to layers closer to the surface.*

*The region remains under the influence of a cold and mostly dry Arctic Air mass. The moderate southerly winds that were prevalent during the storm and Monday should back off leaving quite pleasant, albeit cool weather and light north winds today. Skies will be clear. A daytime high of -19C is expected at 1500m with an overnight low of -32C.*

What is the primary avalanche problem today? Describe the trend?

What was the avalanche problem during this past weekend?

What field observations and quick field tests would you observe and perform to verify the bulletin writer's (the expert's) statement?

Describe the terrain would you avoid; and describe terrain that you would use as a safer choice? Describe the elevation and aspect and terrain features in your description.

### **Exercise #3**

Why are Persistent Slab problems so challenging to anticipate and avoid as a backcountry traveler?

### **Exercise #4**

Describe two techniques for managing a cornice hazard? Why is a relatively small cornice fall still a threat to a rider on the slope below?

- a)
- b)
- c)

### Exercise #5

The public avalanche bulletin rates the danger over a large area of terrain (for example a range or drainage). To keep yourself safe it is important to anticipate where avalanches are likely to occur on the scale of a mountain slope or terrain feature. Describe why loose or slab avalanches often initiate at or near the terrain features listed below:

Convex roll –

Lateral moraine slope –

Shallowly covered or exposed rocks or vegetation –

### Exercise #6

Why is *rounding* associated with the process of snowpack *settlement* and *creep*? And, why does faceting resist snowpack settlement?

### Exercise #7

If slab avalanches are identified as a strong layer over a weak layer, describe three observations of the weak layer that required no special tools other than a shovel (and exposed snowpack wall revealing the layers), a gloved hand, and the naked eye (with prescription glasses if necessary!).

- a)
- b)
- c)

### Exercise #8

Match the following field observations to specific problems (A-I). If the observations indicate there is a likelihood of no problem, record that observation (J). The same letter can be used twice if required.

Observation	Answer	Avalanche Problem
3cm/hr snowfall for 6 hrs below treeline with no wind.		<ul style="list-style-type: none"><li>• Loose Dry Snow</li><li>• Loose Wet Snow</li><li>• Storm Slab</li><li>• Wind Slab</li><li>• Wet Slab</li><li>• Persistent Slab</li><li>• Deep Slab</li></ul>
30cm new snow plus 25kph winds at ridge top.		
Wide, and deep crevasse like cracks across the snow slope. Rock slab ground cover is		

recognizable where the fracture line is deepest.		<ul style="list-style-type: none"> <li>• Glide Slab</li> <li>• Cornices</li> <li>• No Problem</li> </ul>
No snow for 5 days, decreased foot penetration and snow cones around small trees.		
Pinwheels on sunny slopes.		
Avalanche debris has ribs and channels. The start zone shows exposed dirt and rocks.		
Whumping and shooting cracks occur under a skier's weight on a 20 degree slope.		

### Exercise #9

When it is important to dig a snow profile to complement field or bulletin observations? Why is it often not necessary? Describe the potential hazards of gathering snow profile information.

### Exercise #10

Avalanche occurrences are an obvious indication of unstable snow. What dangerous avalanche problems may be associated with rider-triggered avalanches, but *with no or few natural avalanches observed*?

### Exercise #11

List four field observations that indicate that a wind slab problem may be lurking in alpine terrain:

- a)
- b)
- c)
- d)

### Exercise #12

Give four reasons why it may be challenging to accurately determine slope angle on a slope that you intend to ski:

- a)

- b)
- c)
- d)

### Exercise #13

An avalanche has occurred. You are performing a single searcher pattern with a transceiver and are closing in on the signal and buried victim. Your transceiver now reads 10m distance from the burial. Describe your actions as a rescuer how to *target* and *recover* the burial from the 10m distance, as indicated by a transceiver. You have one helper to probe and dig.

### Exercise #14

In the column adjacent to each statement, regarding human triggered FATAL avalanches, describe the statement as either “rumor” or “research”. Hint, use this link to Canadian fatal accident statistics: <http://www.avalanche.ca/cac/library/patterns-in-avalanche-accidents/overview> and [http://www.wsl.ch/info/mitarbeitende//schweizj/publications/Schweizer\\_SkierTriggeredAvalanches\\_Stryn2002.pdf](http://www.wsl.ch/info/mitarbeitende//schweizj/publications/Schweizer_SkierTriggeredAvalanches_Stryn2002.pdf). While not exactly the same trends exist in the US, Europe, and other areas, the trends are close enough to be worthy of comparison.

Rumor or Research?	
<ul style="list-style-type: none"> <li>• The majority of fatal avalanches were triggered by the first skier/rider on the slope.</li> </ul>	
<ul style="list-style-type: none"> <li>• Most fatalities involved only one rider on the slope. Most backcountry travelers use the “one at a time on the slope” rule.</li> </ul>	
<ul style="list-style-type: none"> <li>• The majority of avalanche fatalities involved persons who were NOT carrying avalanche transceivers.</li> </ul>	
<ul style="list-style-type: none"> <li>• Signs of unstable snow were present in 60 percent of avalanche fatalities.</li> </ul>	
<ul style="list-style-type: none"> <li>• 96% of the fatal accidents occurred in areas where the steepest sections of the slope or adjacent terrain, were steeper than 30 degrees.</li> </ul>	

### Exercise #15

When caught in an avalanche your actions, especially in the first few seconds, may significantly increase your chances of survival. Select the statement that *best* describes your response:

Action	Circle One Answer
<p><b>A.</b> Immediately diagonal to the side attempting to escape the avalanche, pulling your avalanche balloon pack en-route.</p>	
<p><b>B.</b> You are coming out of a high mark on your snowmobile when the entire slope fractures. Point your sled downhill, hit the throttle and straight line for the bottom of the avalanche path aiming for high ground.</p>	
<p><b>C.</b> You are near the top of the slope. The snow breaks into blocks and has just started to move. You grab a nearby tree and hang on for dear life.</p>	<p>1. A.</p>
<p><b>D.</b> You traverse slowly out onto upper part of the slope. The entire slope fractures into blocks. You sink through the blocks, unable to ski away. You punch through the broken moving snow with your hands/poles and dig into the bed surface attempting to self-arrest—permitting the bulk of the snow to move downhill without you.</p>	<p>2. A and C.</p>
<p><b>E.</b> You are caught, and there is no hope of getting to the side of the avalanche. You release your skis and poles, curl into a ball and hope for the best. As the avalanche slows, and comes to a stop you fight to keep your hands around your face and mouth and your arms in close to your chest, making a breathing space and room for your chest to expand.</p>	<p>3. A, B, C, D, and E.</p> <p>4. B.</p> <p>5. For at least one reason in each paragraph, none are correct</p>

### Exercise #16

Since your last AIARE 1 course you have (circle True or False):

- Completed a Trip Plan diligently prior to every backcountry excursion. TRUE/FALSE
- Used elements of the communication checklist to encourage and value each group member's opinion in field discussions, regardless of his or her experience. TRUE/FALSE
- Have not been caught in an avalanche nor known any friend or co-worker who has been caught in an avalanche. TRUE/FALSE
- Completed this quiz with a refreshing read of your AIARE field book and AIARE 1 manual, and reviewed the answers with your friends. TRUE/FALSE