

**IRISH ASSOCIATION  
OF SNOWSPORTS INSTRUCTORS**

**Level 2**

# **Off Piste Security**



## **Student Workbook**

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## **Contents:**

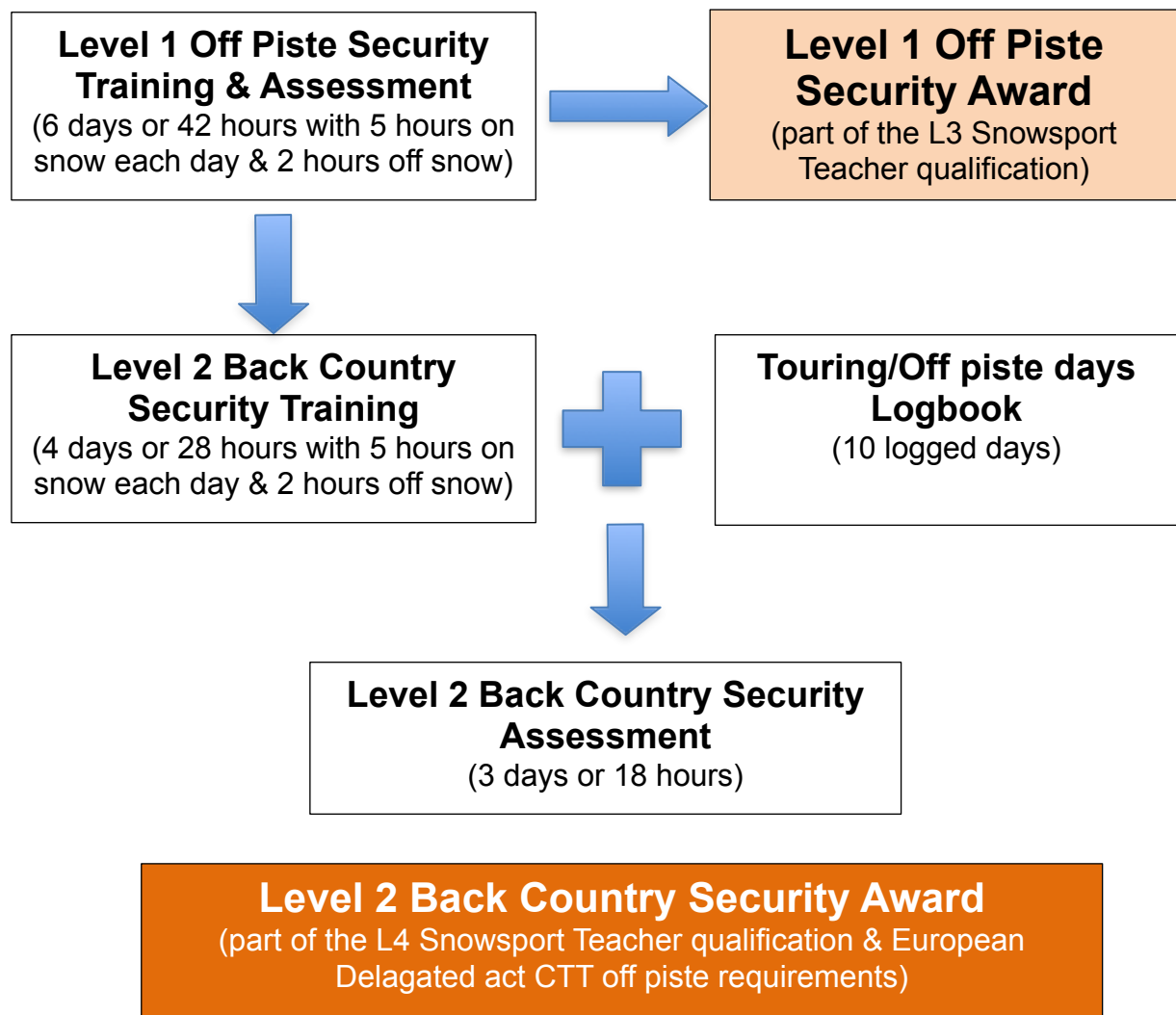
	<b>Page No.</b>
<b>1. Overview of the Award</b>	<b>02</b>
1.1. Entry Criteria	02
1.2. Qualifications Pathway	02
1.3. Outcome Standards	03
1.4. Limitations of the Award	03
1.5. Keeping Qualifications Valid	04
1.6. About this Workbook	04
1.7. Recommended Pre & Post Course Reference Materials	05
1.8. Kit List	06
1.9. Course Programme	07
 <b>2. Daily Log</b>	 <b>08</b>
 <b>3. Summary Assessment for Award</b>	 <b>14</b>
 <b>4. AIARE (The American Institute of Avalanche Research and Education ) off piste skiing/touring planning material.</b>	 <b>16</b>

## 1. Overview of the Award

### Entry Criteria;

- The IASI Level 2 Off Piste Security Award is a stand alone qualification and is also a required module for the Level 4 ISIA card Instructor Award and forms part of the EU Delegated act CTT standards
- It is open to ski and snowboard instructors.
- To attend this course candidates must have an IASI Level 3 Ski or Snowboard Instructor Qualification or equivalent from another organisation.

## IASI Qualification Pathway – Mountain Safety Awards



**Outcome Standards; Holders of the IASI Level 2 Off Piste Security Award will have knowledge and ability in the following areas;**

- Interpreting Avalanche Report & Weather Forecast
- Personal Observations of Risk in the Local Environment
- Safe Travel Rituals -
  - Group Management
  - Terrain Management
- Navigation – putting the avalanche forecast on the map
- Avalanche Rescue
- Off Piste Skiing Tactics
- Ski Touring
- Avalanche Formation & Structure
- Snow Science

**Limitations of the award;**

- Holders of the IASI Level 2 Off Piste Security Award are permitted to take clients off piste outside the boundaries of the ski area.
- Holders are **NOT** permitted to operate on glaciated terrain.

The IASI L2 Backcountry Security is essentially a ski touring and Off Piste training and assessment course. The crucial difference between L1 Off Piste Security and the L2 Off Piste Security is that the environment in which we ski is more remote and the snow on which we ski is less effected by human contact ( if at all). We are really dealing with nature in the raw.

This implies several new challenges.

- Remoteness: we have to be able to find our own way even in bad weather/ we have to be able to deal with emergencies ourselves as help may take time to arrive/ we have to be equipped to survive./ We may be exposed to risk for longer periods of time
- Natural snowpack: The snow we ski on may not have been skied on by any other human that season or since the last snowfall. It will not have been tested or tampered with by the ski patrol. Hence we have to be able to make clear judgements about its condition.

All the material we covered on the Level 1 course is still absolutely relevant. But now we must really be more expert in using these skills and knowledge. Revise all the level one material until you are very familiar with it. In Level 2 we take all these skills up to a different level

## **Keeping Qualifications Valid;**

IASI Refresher Requirements are as follows;

- ✓ Hold a current first aid certificate
- ✓ For Level 2 Instructors - attend a recognised IASI refresher every three years (minimum one day)
- ✓ For Level 3 ISIA Instructors - attend a recognised IASI refresher one day every year or three days every three years.
- ✓ NB: If you are continuing through the system and attending official IASI courses/modules then this negates the need to do a refresher provided the modules meet the requirements in terms of the number days stipulated above.

## **About this workbook:**

This workbook is designed to allow you to record activities during the 6-day training/assessment course.

### Your role:

The workbook is designed to cover key areas of the award and contribute to your overall assessment, so, keep it:

- ◆ NEAT AND TIDY
- ◆ IN A SAFE PLACE
- ◆ AVAILABLE TO REVIEW BY AN EXTERNAL TRAINING ORGANISATION
- ◆ AS A FUTURE REFERENCE AND RESOURCE

## **Recommended Pre & Post Course Reference Materials;**

### Books:

- 1) **The IASI Manual** by Derek Tate, Jamie Kagan and Federico Sollin
- 2) **Alpine Ski Leader Official Training Manual** by Drew Michie & Derek Tate, 2010, Snowsport Scotland, ISBN: 978-0-9567478-0-8, Chapter 5 - Mountain Awareness.
- 3) **Alpine Mountaineering** by Bruce Goodlad, 2011, Pesda Press, ISBN: 978-1-906095-30-7, Chapters on Alpine Weather & Navigation in the Alps
- 4) **Staying Alive in Avalanche Terrain** by Bruce Tremper, 2008, Mountaineers Books, 2<sup>nd</sup> edition, ISBN: 978-1594850844
- 5) **Free Skiing – How to Adapt to the Mountain** by Jimmy Oden, 2007, Choucas Production AB, ISBN: 978-9163313134
- 6)
- 7) **Parallel Dreams Alpine Skiing** by Derek Tate, 2007, Parallel Dreams Publishing, ISBN: 978-0-9556251-0-7 Segment 3.3.2 - Off Piste & Backcountry by Robbie Fenlon.
- 8)

### Videos:

- 1) **Off Piste Essentials** – Skills & techniques for back country skiing and ski touring by the British Mountaineering Council (BMC), 2008, ISBN: 9780903908139

### Websites:

- 1) Piste Hors – [www.pistehors.com](http://www.pistehors.com)
- 2) Meteo France – [www.meteofrance.com](http://www.meteofrance.com)
- 3) AIARE – [www.avtraining.org](http://www.avtraining.org)
- 4) Chamonix Off Piste – [www.chamonix-off-piste.com](http://www.chamonix-off-piste.com)
- 5) Wilderplaces Alpine – [www.wildreplaces.com](http://www.wildreplaces.com)
- 6) Mammut – [www.mammut.ch/barryvoxtraining](http://www.mammut.ch/barryvoxtraining)

## **Kit List;**

Students participating in the Level 2 Off Piste Security course will require the following equipment;

### General;

- Skis/Spilt board (no Snowshoes)- ideally more freeride/ powder oriented (95-115mm under foot)
- Bindings- touring bindings- preferably with some variation of the pin system
- Skins (must match the skis), ski crampons (must match the ski and binding)
- Poles (normal poles, no need for adjustable)
- Boots (touring specific boots are better- lighter and more comfortable for climbing. Alpine boots can work in certain bindings and can be a viable option for those with boot fit issues) Newer, heavier, more downhill oriented ski touring boots are probably ideal for the course
- Digital Transceiver/ beacon- (NO analog)
- Metal shovel
- Functioning probe (must be able to assemble the probe in 3 sec.)
- Backpack- 25-35l, must be big enough to fit everything inside. Ski specific backpacks with gear specific compartments are best.
- Goggles, sunglasses
- Wool hat, Buff, helmet (recommended)
- 2 pair gloves (light, heavier)
- Waterbottle (1-1.5L)
- Snacks/picnic
- Wallet with cash, i.d.
- Suitable clothing for both skiing and touring (good layering system)
- Map & compass (the map will need to be 1:25 000 for the area the course is being run). For Courmayeur based courses the map required is the Monte Bianco - La Thuile - La Rosiere Carta Scialpinistica 1:25000
- Helmet is recommended

## IRISH ASSOCIATION OF SNOWSPORT INSTRUCTORS

### Off Piste Security Award (part of the Level 3 ISIA Instructor Qualification)

The programme below is a typical example of what you can expect to cover each day. Every day the topics below will be covered on a sliding scale of progression from dependence on the guide teaching towards independent use of the candidate's personal skill and knowledge.

Beginning with the teaching of the basic skills and moving towards autonomy in the skills as the course progresses. Once you get to grips with the basics we will coach and refine these skills with the aim of you achieving autonomous use of these skills in complex situations.

Your IASI Mountain Safety Trainer will decide the exact programme details when they have considered the local variations, weather and snow conditions.

TYPICAL DAY ON SNOW	ADDITIONAL TOPICS
<ul style="list-style-type: none"> <li>➤ <b>Interpreting Avalanche Report &amp; Weather Forecast</b> – general discussion between guide and the group</li> <li>➤ <b>Personal Observations of Risk in the Local Environment</b> – learning to read signs and assess risk in the area being used</li> <li>➤ <b>Safe Travel Rituals -</b> <ul style="list-style-type: none"> <li>○ <b>Group Management</b> – leadership, communication, group dynamics, pace setting</li> <li>○ <b>Terrain Management</b> – reading the terrain, route choice</li> </ul> </li> <li>➤ <b>Navigation – putting the avalanche forecast on the map</b> – tracing the journey, trip planning</li> <li>➤ <b>Avalanche Rescue</b> – single rescue, group rescue, rope rescue</li> <li>➤ <b>Off Piste Skiing Tactics</b> – selection of appropriate techniques for snow, terrain, personal fitness &amp; ability</li> <li>➤ <b>Ski Touring</b> – skinning techniques, route choice</li> <li>➤ <b>Avalanche Formation &amp; Structure</b> – types of avalanche, terrain factors</li> <li>➤ <b>Snow Science</b> – shear tests, layer identification</li> </ul>	<p>In addition to the on snow activities a number of topics will be covered indoors using internet, audio visual aids e.g.</p> <ul style="list-style-type: none"> <li>❖ Video of avalanches</li> <li>❖ AIARE decision making framework</li> <li>❖ Snow crystal formation</li> <li>❖ Map work</li> <li>❖ Human factors</li> <li>❖ Internet weather forecasts</li> </ul>



## 2. Daily Log

Example of how to complete the notes page from each day

**On snow session** (make some notes in relation to the topics listed in the typical daily programme on page 7):

- Noted that avalanche forecast suggested wind slab on north eastern slopes above 2000m
- Saw cornices on summit of Tete de Balme aspect NW – scoured slope on SE of summit
- Skied some powder and some wind affected snow in back bowls at Le Tour
- Practiced group rescue in trees
- Dug snow pit below cornice on Tete de Balme
- Guide demonstrated rutschblock test
- Guide showed us some depth hoar
- Practiced leading group off piste on Posettes side of mountain
- Skinning practice in Vallorcine
- Map reading self location throughout the day

**Feedback generated from your performance** (identify your strengths & weaknesses in the tasks carried out today):

- ❖ Found skiing the wind crust very difficult – getting caught on the tails
- ❖ Searching for transceiver in deep snow was more difficult than I thought – moving around in deep snow is hard work and tiring
- ❖ I communicated clearly with the group (good feedback on this from guide)
- ❖ Skins kept coming off – need to keep them dry

## Daily Log continued

### Notes from Day One

**On snow session** (make some notes in relation to the topics listed in the typical daily programme on page 7 and using the example on page 8):

**Feedback generated from your performance** (identify your strengths & weaknesses in the tasks carried out today):

## Daily Log continued

### Notes from Day Two

**On snow session** (make some notes in relation to the topics listed in the typical daily programme on page 7 and using the example on page 8):

**Feedback generated from your performance** (identify your strengths & weaknesses in the tasks carried out today):

## Daily Log continued

### Notes from Day Three

**On snow session** (make some notes in relation to the topics listed in the typical daily programme on page 7 and using the example on page 8):

**Feedback generated from your performance** (identify your strengths & weaknesses in the tasks carried out today):

## Daily Log continued

### Notes from Day Four

**On snow session** (make some notes in relation to the topics listed in the typical daily programme on page 7 and using the example on page 8):

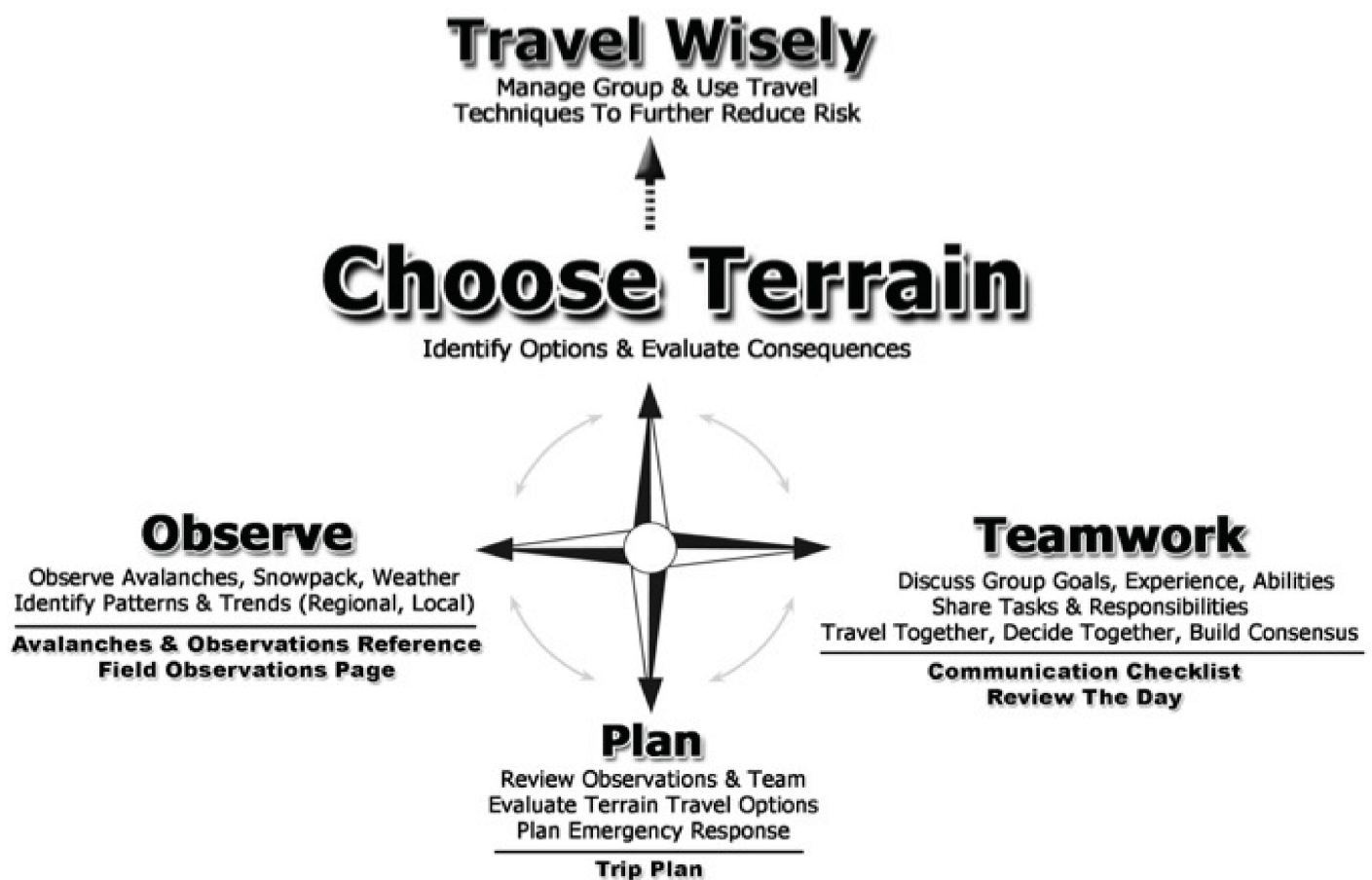
**Feedback generated from your performance** (identify your strengths & weaknesses in the tasks carried out today):

## Summary of Assessment and what is needed to pass the course;-

<b>Your knowledge &amp; ability in the following areas:</b>	Make notes to where you and the trainer feel you have strengths and weaknesses
Interpreting Avalanche Report & Weather Forecast	
Personal Observations of Risk in the Local Environment	
Safe Travel Rituals <ul style="list-style-type: none"> <li>- Group Management</li> <li>- Terrain Management</li> </ul>	
Navigation	
Avalanche Rescue	
Off Piste Skiing Tactics	
Ski Touring	
Avalanche Formation & Structure	
Snow Science	

The following material comes from AIARE (The American Institute for Avalanche Research and Education). These models are used by our lead guide in the field and will be a resource and basis for the on snow training during this course. More information about these models can be found here <https://avtraining.org>

## The decision making framework



## 3.2 – The Trip Plan / AIARE Field Book

### TRIP PLAN

DATE:	TIME:	FIELD LOCATION:
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**AVALANCHE DANGER:** AVALANCHE ACTIVITY? • BULLETIN DANGER RATINGS?

"Where are avalanches likely to occur?" "Describe the problem?" "Specifically, which slopes will we avoid?"



- Loose Dry ☐
- Loose Wet ☐
- Wet Slab ☐
- Storm Slab ☐
- Wind Slab ☐
- Persist. Slab ☐
- Deep Slab ☐
- Cornice ☐

**SNOWPACK DISCUSSION:** NEW / STORM SNOW? • WARMING? • WEAK LAYER(S) TYPE / DEPTH / PERSISTENCE?

"Where is the best snow?" "What field observations needed?" "Do we have experience w/ these conditions?"

**WEATHER FORECAST:** SKY / VISIBILITY • PRECIPITATION • WINDS / BLOWING SNOW • TEMPERATURES • TRENDS

"How will forecast affect snow conditions?" "...affect our observations? communication? decision-making?"

**TRAVEL PLAN:** OBJECTIVE • OPTIONS • ANTICIPATED HAZARDS • OBSERVATION PTS • DECISION PTS • GROUP MGMT

"Is plan appropriate for our goals, experience, abilities?" "Everyone included in discussion, w/ consensus?"

**EMERGENCY RESPONSE:** LEADERSHIP • GEAR ASSIGNMENTS • COMM. PLAN • EVAC ROUTE • EMERGENCY #'S

"Are we prepared & practiced?" "Outside help realistic?" "All concerns voiced re: dangers, risk, response?"

Review Observations & Team

Evaluate Terrain Travel Options

Plan Emergency Response



## ☒ **AIARE Communication Checklist** © ☒

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### **TEAMWORK**

- ☐ Agree to travel together? Agree to decide together?
- ☐ Agree to respect everyone's voice and anyone's veto!

### **AT THE POINT OF DEPARTURE**

- ☐ "Is anything wrong with our Plan?"
- ☐ "Transceiver check?" Batteries, SEARCH, SEND?

### **CHOOSE TERRAIN**

- ☐ "Have we ID'd the avalanche problem? What's changed?"
- ☐ "What's a realistic choice given what we see now?"
- ☐ "Why should we go there?"
- ☐ "What's the consequence if we have a problem?"
- ☐ "What's the likelihood that this problem will occur?"
- ☐ "Would another route option be better?"

### **TRAVEL WISELY**

- ☐ "How are we going to move as a group?"
- ☐ "Exactly, which terrain features will we avoid?"
- ☐ "Can we see/hear each other?"
- ☐ "Do we have an escape plan? Cell coverage?"

**[www.avtraining.org](http://www.avtraining.org)**

# AVALANCHES & OBSERVATIONS REFERENCE

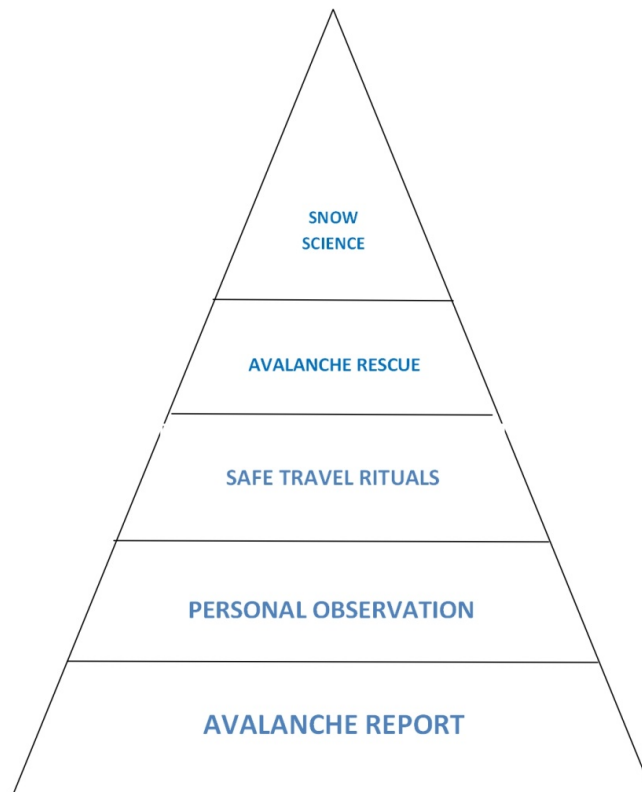
© 2012



"The Problem"	Critical / Red Flag Observations	Field Tests & Relevant Observations	Important Considerations
<b>Loose Dry Snow</b>	<ul style="list-style-type: none"> <li>Fan-shaped avalanches: debris fine.</li> <li>Loose surface snow <math>\geq 12"</math> (30 cm) deep.</li> </ul>	<ul style="list-style-type: none"> <li>Boot / ski penetration <math>\geq 12"</math> (30 cm).</li> <li>Slope tests / cuts result in sluffs.</li> <li>Loose snow surface texture (as opposed to wind-affected, refrozen, or other stiff snow textures).</li> </ul>	<ul style="list-style-type: none"> <li>Can be triggered by falling snow, cornice fall, rock fall, a brief period of sun, wind, or rider.</li> <li>Sluffs can run fast and far.</li> <li>Small slides dangerous with terrain traps / cliffs.</li> <li>Sluffs can trigger slabs in certain conditions.</li> </ul>
<b>Loose Wet Snow</b>	<ul style="list-style-type: none"> <li>Rain and / or rapid warming.</li> <li>Air temp <math>&gt; 0^{\circ}\text{C}</math> for longer than 24 hours (cloud cover may prevent nighttime cooling).</li> <li>Pinwheels or roller balls.</li> <li>Fan shaped avalanches: debris lumpy and chunky.</li> </ul>	<ul style="list-style-type: none"> <li>Observed and forecast temp trend.</li> <li>Temps (Air, Surface, T20) / freezing level indicate near surface snow temps at <math>0^{\circ}\text{C}</math>.</li> <li>Note slopes receiving / will receive intense radiation.</li> <li>Wet snow surface: water visible between the grains with a loupe, may be able to squeeze water out with hands.</li> </ul>	<ul style="list-style-type: none"> <li>Timing is critical. Danger can increase quickly (minutes to hours).</li> <li>No freeze for multiple nights worsens condition. However, nighttime freeze can stabilize.</li> <li>Gullies and cirques receive more radiation and retain more heat than open slopes.</li> <li>Shallow snow areas become unstable first - may slide to ground in terrain with shallower, less dense snowpack.</li> </ul>
<b>Wet Slab</b>	<ul style="list-style-type: none"> <li>Rain on snow, especially dry snow.</li> <li>Current or recent wet slab avalanches: debris has channels / ridges, high water content, may entrain rocks and vegetation.</li> <li>Prolonged warming trend, especially the first melt on dry snow.</li> </ul>	<ul style="list-style-type: none"> <li>Consider Loose Wet Snow observations.</li> <li>Observed melting snow surface (rain or strong radiation) of a slab over weak layer.</li> <li>Tests show change in strength of weak layer due to water and / or water lubrication above crust or ground layer.</li> <li>Identify the depth at which the snow is <math>0^{\circ}\text{C}</math>.</li> <li>Monitor liquid water content and deteriorating snow strength using hardness and penetration tests.</li> <li>Nearby glide cracks may be widening during rapid warming.</li> </ul>	<ul style="list-style-type: none"> <li>May initiate from rocks or vegetation.</li> <li>Can occur on all aspects on cloudy days / nights.</li> <li>Conditions may also include cornice fall, rockfall or increased icefall hazards.</li> </ul> <p>-----</p> <ul style="list-style-type: none"> <li>Snow temp of slab at or near <math>0^{\circ}\text{C}</math>.</li> <li>Loose wet snow slides can occur just prior to wet slab activity.</li> <li>Possible lag between melt event and wet slab activity.</li> </ul>
<b>Storm Slab</b>	<ul style="list-style-type: none"> <li>Natural avalanches in steep terrain with little or no wind.</li> <li><math>\geq 12"</math> (30cm) snowfall in last 24 hours or less with warmer heavier snow.</li> <li>Poor bond to old snow: slab cracks or avalanches under a rider's weight.</li> </ul>	<ul style="list-style-type: none"> <li>Observe storm snow depth, accumulation rate and water equivalent.</li> <li>Observe settlement trend: settlement cones, boot / ski pen, measured change in storm snow (<math>&gt;25\%</math> in 24 hours is rapid).</li> <li>Tests show poor bond w/ underlying layer (Tilt and ski tests). ID weak layer character.</li> <li>Denser storm snow over less dense snow (boot / ski penetration, hand hardness).</li> </ul>	<ul style="list-style-type: none"> <li>Rapid settlement may strengthen the snowpack, or form a slab over weak snow.</li> <li>When storm slabs exist in sheltered areas, wind slabs may be also present in exposed terrain.</li> <li>May strengthen and stabilize in hours or days depending on weak layer character.</li> <li>Potential for slab fracturing across terrain can be underestimated.</li> </ul>
<b>Wind Slab</b>	<ul style="list-style-type: none"> <li>Recent slab avalanches below ridge top and / or on cross-loaded features.</li> <li>Blowing snow at ridgetop combined with significant snow available for transport.</li> <li>Blowing snow combined with snowfall: deposition zones may accumulate 3-5x more than sheltered areas.</li> </ul>	<ul style="list-style-type: none"> <li>Evidence of wind-transported snow (drifts, plumes, cornice growth, variable snow surface penetration with cracking).</li> <li>Evidence of recent wind (dense surface snow or crust, snow blown off trees).</li> <li><math>\geq</math> Moderate wind speeds observed for significant duration (reports, weather stations and field observations).</li> </ul>	<ul style="list-style-type: none"> <li>Often hard to determine where the slab lies and how unstable and dangerous the situation remains.</li> <li>Slope-specific observations, including watching wind slabs form, are often the best tool.</li> <li>Strong winds may result in deposition lower on slopes.</li> <li>Commonly triggered from thin areas (edges) of slab.</li> <li>Wind transport and subsequent avalanching can occur days after the last snowfall.</li> </ul>
<b>Persistent Slab</b>	<ul style="list-style-type: none"> <li>Bulletins / experts warn of persistent weak layer (surface hoar, facet/crust, depth hoar).</li> <li>Cracking, whumping.</li> </ul>	<ul style="list-style-type: none"> <li>Profiles reveal a slab over a persistent weak layer.</li> <li>Use multiple tests that will verify the location of this condition in terrain.</li> <li>Small column tests (CT, DT) indicate sudden (Q1) results; large column tests (ECT, PST, RB) show tendency for propagating cracks.</li> </ul>	<ul style="list-style-type: none"> <li>Instability may be localized to specific slopes (often more common on cooler N / NE aspect) and hard to forecast.</li> <li>Despite no natural occurrences, slopes may trigger with small loads - more likely when the weak layer is 8-36" deep (20-85cm).</li> <li>Human triggered avalanches are still possible long after the slab was formed.</li> </ul>
<b>Deep Slab</b>	<ul style="list-style-type: none"> <li>Remotely triggered slabs.</li> <li>Recent and possibly large isolated avalanches observed with deep, clean crown face.</li> </ul>	<ul style="list-style-type: none"> <li>Profiles indicate a well preserved but deep (<math>\geq 1\text{m}</math>), persistent weak layer.</li> <li>Column tests may not indicate propagating cracks; DT and PST can provide more consistent results.</li> <li>Heavy loads (cornice drop or explosives test) may be needed to release the slope - large and destructive avalanches result.</li> </ul>	<ul style="list-style-type: none"> <li>May be aspect / elevation specific - very important to track weak layer over terrain.</li> <li>Slight changes, including mod. snowfall, and warming can re-activate deeper layers.</li> <li>May be dangerous after nearby activity has ceased.</li> <li>Tests with no results are not conclusive.</li> <li>May be remotely triggered from shallower, weaker areas.</li> <li>Difficult to forecast and to manage terrain choices.</li> </ul>
<b>Cornices</b>	<ul style="list-style-type: none"> <li>Recent cornice growth.</li> <li>Recent cornice fall.</li> <li>Warming (solar, rain at ridge tops).</li> </ul>	<ul style="list-style-type: none"> <li>Note rate, extent, location and pattern of cornice growth and erosion.</li> <li>Photos tracking change over time.</li> </ul>	<ul style="list-style-type: none"> <li>Cornices often break further back onto ridge top than expected.</li> <li>Can underestimate sun's effect on the back of cornice when traveling on cool, shaded aspects.</li> </ul>

## MOUNTAIN SAFETY PYRAMID

What's important to know?



The “Mountain Safety Pyramid” helps to clarify what is most important to know starting with the most important at the bottom. Topics such as Navigation, Off Piste Skiing Tactics, Ski Touring, Weather and Avalanche Formation & Structure are all part of the headings above. The first THREE steps of the pyramid are all about prevention and even if you don't know much about snow science knowing and applying these first three will help to keep you and your clients safe.

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