Deep Tap Test

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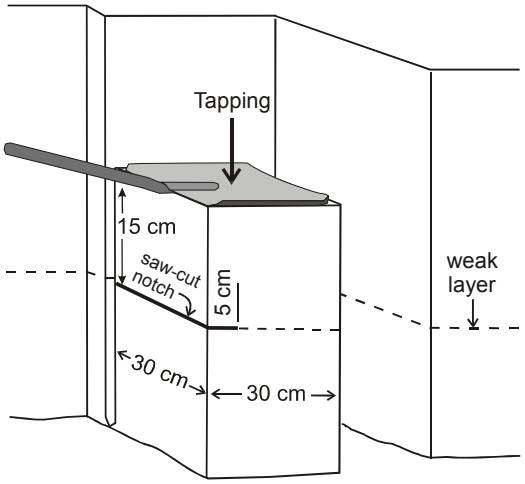
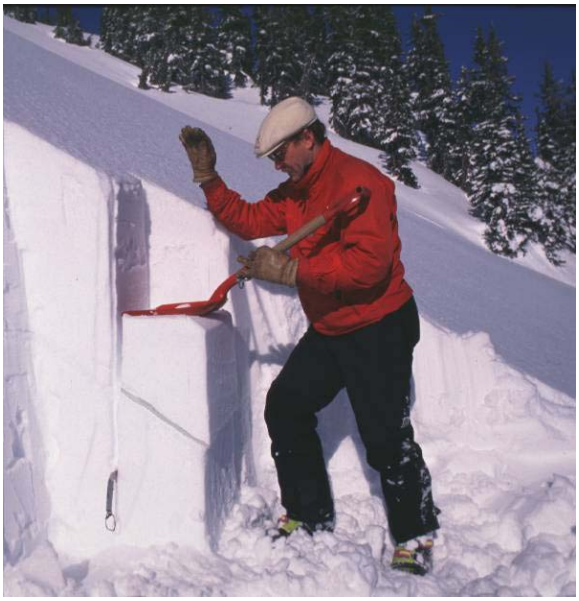
The deep tap test is an experimental snowpack test that may indicate the resistance to fracture propagation in a specific deep weak layer; Low scores may be associated with "easy" or extensive propagation. Variations on this test have been done by some guides for at least 10 years. Because the Deep Tap Test does not involve (near) surface loading, *it is not a stability test*. The scores (number of taps) associated with fracture propagation is a research topic.

7.6 Deep tap test *(Excerpt from ASARC Field Manual, 9 January 2003)*



1. Prepare a 30 cm by 30 cm column as for a compression test. To reduce the likelihood of fractures in weak layer below the target layer, it may be advantageous not to cut the back wall more than a few centimetres below the target weak layer.
2. Remove all but 15 cm of snow above the weak layer, measured at the back of sidewall. The distance should be constant, regardless of slope angle.
3. With a snow saw, cut a 5 cm notch into the weak layer along one of the side walls. The LL snow saw is 4.5 cm wide so it is sufficient to cut until the saw is just out of sight. (There is no notch in the variation of this test done by some guides and avalanche workers.)



4. Apply taps as for compression test (10 easy taps, 10 moderate, and 10 hard). (Because of the relatively hard snow below the shovel, this test is harder on the hand than the compression test. Better not to do the test, not to do hard taps, or not to do three tests, than to hurt your hand.)
5. Note the number of taps to fracture the target weak layer, fracture character, damping snow (measured at the back of the sidewall), depth of weak layer and comments. For testing deep weak layers in the Columbia Mountains, there will often be no crushing of the damping snow. Ideally the damping snow should be 1F or harder.

Fracture Character

Fracture character	Other terms	Fracture crosses column in one loading step	Description	Shear Quality (Birkeland and Johnson, 1999; Johnson and Birkeland, 2002)
Progressive Compression (PC)	Indistinct, rough, slow	Inconsistent	Weak layer compresses with additional loading steps	Q2 or Q3
Sudden Collapse (SC)	Collapse, drop	Yes (sudden)	Layer collapses with a single loading step	Q1
Sudden Planar (SP)	Shear, pop, clean, fast	Yes (sudden)	Thin planar fracture; block slides easily	Q1
Resistant Planar (RP)	Shear, clean	No	Thin planar fracture; block does not slide easily	Q2 or Q3
Non-Planar Break (B)	Break, rough	Inconsistent	Non-planar break	Q3

Based on experience and Johnson and Birkeland (2002), layers that produce *Sudden Collapse* and *Sudden Planar* fractures (coloured in table) in snowpack tests are expected to be associated with the failure layers from slab avalanches more often than layers that produce *Progressive Compression* fractures*, Resistant Planar* fractures and *Non-Planar Break* in snowpack tests.

On slopes greater than about 28° “Block slides easily” means the block slides off the column. On less steep slopes, the sides of the block should be gripped and the ease of sliding assessed subjectively.