

THEORETICAL SNOWPACK BEHAVIOR ASSOCIATED WITH POSTCONTROL AVALANCHES

Thomas E. Pratt, Department of Earth Sciences, Montana State University, Bozeman, Montana 59717

Postcontrol avalanches are commonly associated with two conditions: (1) inability of explosives to produce slope failure even though unstable conditions are present; and (2) skiers acting as triggers for slope release. After neglecting all avalanches which appear to result primarily from changing weather conditions following control work, there remains a group of postcontrol avalanches which are not presently understood.

I suspect that two snowpack characteristics may be intimately involved with postcontrol avalanches. The first characteristic is the shock absorbing effect of the snowpack. This is caused by the relatively low density of the snowpack compared with other materials in which explosives are used to initiate fracture propagation, i.e., bedrock, cornice snow, etc. The low density impedes the transmission of shock waves and this characteristic hinders the effectiveness of the explosive. The second characteristic is the reduction in the creep rate in the immediate area of the bomb crater if the explosive does not trigger an avalanche. This is due to an anchoring effect which accompanies the compressional blast of the explosive. Preliminary field work suggest that the reduced creep rate, which is initially localized at the bomb crater, may propagate radially from the crater through the internal bonding of the snowpack. Therefore, contrasting rates of snow creep occur simultaneously in the vicinity of the bomb crater and this causes a redistribution of strain within the area. A tension zone then develops directly down slope of the crater and this zone may then become the area of initial fracture propagation for postcontrol avalanches.