Development of Macrofractures

The lengths, widths, surface areas, and the abundance of macrofractures are important from a mechanical viewpoint and are amenable to quantitative description (see e.g., Silveira et al., 1966). The genetic factors controlling the first three of these characteristics are too poorly understood to mention them further. Several generalities can be made on abundance, however, as determined from a review of the comments by our theme contributors. The abundance of macrofractures:

a) increases in the vicinity of faults and other areas of high strain,

b) increases with decreasing bedding thickness, other variables being equal,

c) is greater in brittle as compared to ductile rocks, and

d) increases in localities that are near the air-rock interface and particularly near steep topographic slopes.

One measure of abundance is spacing. This applies once the macrofracture array has been characterized into sets. For each set the spacing is the mean distance between individual fractures as measured along a direction perpendicular to the fracture surface. Another measure is the number of fractures per linear distance along this same direction (Stearns, 1964). Still another locally useful measure is the number of macrofractures that intersect a surface of a given orientation and area (Silveira et al., 1966).

Permeability and Water Saturation

The discontinuities in the rock mass, particularly the macrofractures, provide permeability channels for the circulation of ground waters. Chemical alteration of wall rock and fracture filling are enhanced and the strength of the rock mass may be correspondingly decreased to a degree dependent upon the permeability and the time available for alteration. Serafim (1964) has