experience, at a rate somewhat faster than average, but not excessively so. The resulting hypothetical storm sequence is intended to depict a critical, meteorologically possible transition from one storm or burst to another.

While the derived hypothetical storm sequence often consists of two unadjusted observed storms, the PMS is sometimes selected as the second storm of the sequence. In other words, the second storm has been maximized for moisture and perhaps wind so that it is equivalent to PMP for at least one duration and size of area (sections 1.1.4, 2.11.2, and 2.11.3). Sequences of two probable maximum storms are never developed, however, for two reasons. One is that a properly derived PMS has a very low probability of occurrence, and the probability of two such storms occurring in unusually close succession is so remote as to be considered unreasonable. The second reason is that the first PMS would be followed by a meteorological situation unfavourable for the rapid development of the second, and the longer transition period between the two is likely to make the sequence less hydrologically critical than a sequence of lesser storms with a shorter time interval between them.

### 2.7.3 **Spatial maximization**

Spatial maximization involves the transposition of storms that occurred in or near a project basin to one or more critical locations in the basin to obtain maximum runoff. The procedure involves determining if particular storms can be transposed to critical locations within specified time intervals and combined to produce maximum runoff rates or volumes. As in sequential maximization, the first requirement is a thorough knowledge of the storms causing heavy precipitation over the basin and surrounding region.

The following example of spatial maximization is based on a series of heavy, localized rainfall bursts occurring 14–18 June 1965 in eastern Colorado, United States. During this period, a persistent large-scale circulation maintained a pronounced inflow of moist unstable air into the storm area. Fronts and related synoptic features played a minimal role, as did high-level factors such as vorticity advection (Schwarz, 1967).

Two distinct, severe 6-hour bursts occurred on successive days, 16–17 June. Isohyetal maps for the two bursts are shown in Figure 2.8. The 16 June burst was centred over Plum Creek basin (1 100 km$^2$), while that of 17 June was centred about 40 km south-east. It is reasonable to assume that the rainfall centres could have occurred over the same location since the weather situation was very much the same on both days. Combination of the two isohyetal patterns on the basis of this assumption resulted in the pattern of Figure 2.9. In combining the patterns, the principal centre of the 17 June burst was superimposed on that of the 16 June, and the pattern was rotated about 25° anticlockwise for better agreement with the orientation of the pattern of the 16 June burst (Riedel and others, 1969). In this region, such a rotation is realistic for this type of storm. In other regions and for other storm types, examination of many storms might show that such superposition and/or rotation would not be permissible.

### 2.7.4 **Combined sequential and spatial maximization**

Sequential and spatial maximizations are generally used in combination, that is, storms or bursts within storms may be repositioned geographically in addition to shortening the time interval between them.

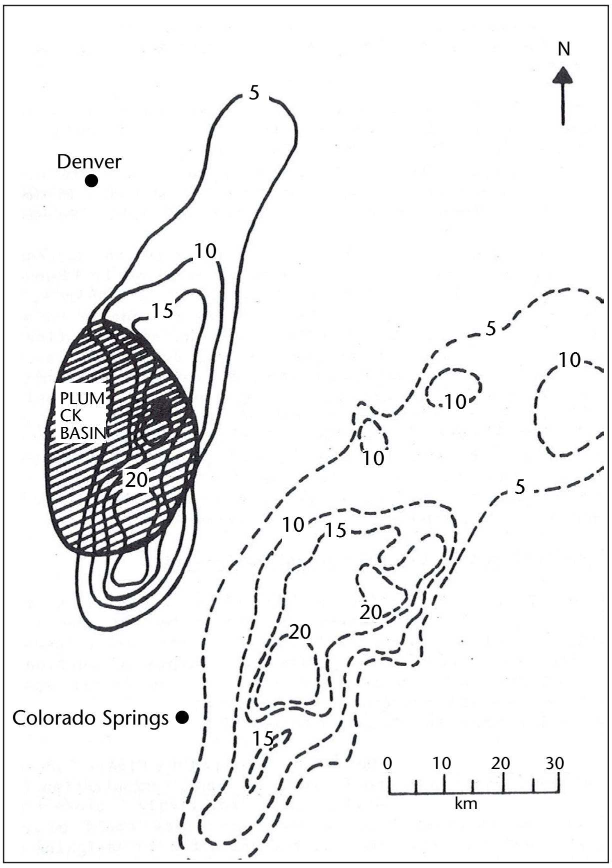


**Figure 2.8. Isohyets (cm) for the 6-hour afternoon storms of 16 June 1965 (solid lines) and 17 June 1965 (dashed lines) in eastern Colorado (Riedel and others, 1969)**