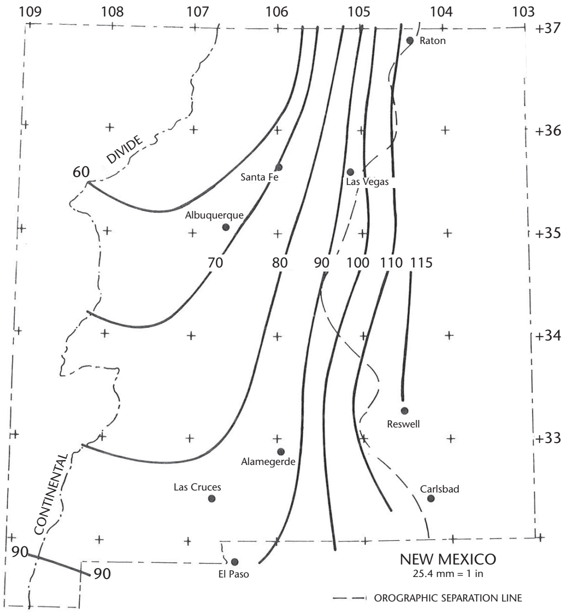

Figure 5.33. Convergence component of the 100-year 24-hour precipitation-frequency values (tenths of inches) for the state of New Mexico east of the Continental Divide (Miller and others, 1984*b*)

5.3.4.3 Storm intensity factor *M*

Precipitation at any location in a mountainous region is the result of both the atmospheric forces associated with the storm and the vertical lift imparted by the air flow against the mountain slopes. This latter effect on storm precipitation can be considered relatively constant in any specific location. There is some variation related to the magnitude of the inflow wind normal to the orographic barrier, but this is relatively small in relation to the variation of the dynamic forces during the storm. To adjust the orographic factor for this varying effect, a storm intensity factor was needed. This factor M is defined as the amount of rainfall in the most intense portion, or core portion, of the storm divided by the amount of rainfall in the duration of the storm under consideration. Although durations from 1 to 72 hours were required for this study, the primary focus of the investigation was to determine the 24-hour 25.9 km^2 precipitation. For this region, the most intense portion of this 24-hour period was determined to be approximately 6 hours, based on an examination of data from major storms within the region. The storm intensity factor is therefore a 6-hour amount divided by the 24-hour amount for each of the major storms within the region. There is some geographic variation in this factor through

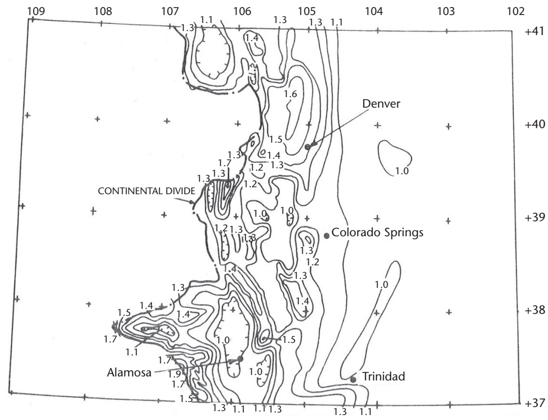

Figure 5.34. Orographic factor (*T*/*C*) map for the state of Colorado east of the Continental Divide (Miller and others, 1984*b*)

the region based on the meteorological characteristics of storms. An example of geographic variation is shown for the state of Montana east of the Continental Divide in Figure 5.35.

5.3.4.4 Computation of PMP

The three factors discussed in sections 5.3.4.1 to 5.3.4.3, were used to obtain a final estimate of PMP. The equation used is:

$$\text{PMP} = \text{FAFP}\,\#\left(M^2\left(1 - \frac{T}{C}\right)\right) + \frac{T}{C} \qquad (5.1)$$

where FAFP is free atmospheric forced precipitation (section 5.3.4.1); M is the storm intensity factor (section 5.3.4.3); T/C is the orographic factor (section 5.3.4.2)

This formulation decreases the effect of the orographic intensification factor (T/C) as the storm becomes more convective. That is, in regions where a storm is primarily of a convergence nature as reflected by highly convective activity within the major storms of record, the orographic intensification factor is reduced in effectiveness. In regions where more generally uniform rainfall prevails, such as is characteristic of the mountain slopes, T/C becomes increasingly important. It also minimizes the effect of the orographic intensification factor in the most intense or core period of the storm. Using this equation and a varying grid over the region, estimates of total PMP were computed. The resulting grid point values were analysed to provide a generalized chart of 24-hour 25.9-km^2 PMP for the region of the United States between the Continental Divide and the 103rd meridian. Figure 5.36 shows a portion of this map for northern New Mexico east of the Continental Divide. Values for