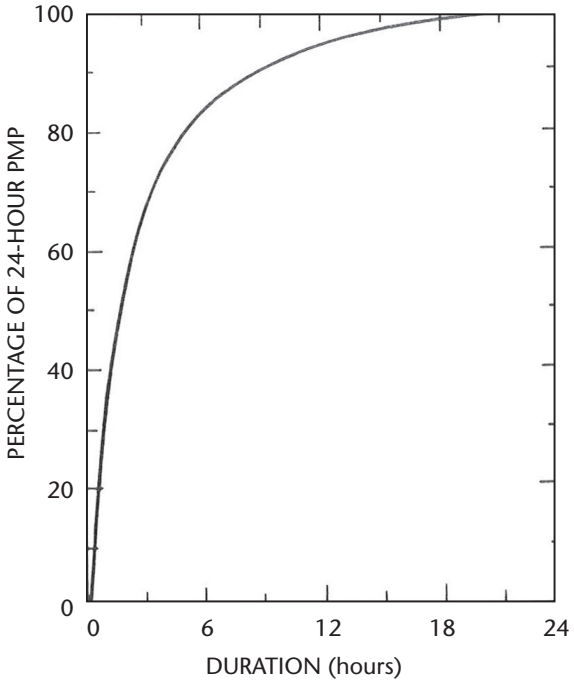

Figure 4.8. Maximum depth–duration curve (Huff, 1967)

which the PMP estimates are required. Figure 4.8 is presented here merely as an example and is not intended for general application. Figure 4.8, or similar relationships, should be used only when rainfall data for durations shorter than 24 hours are unavailable.

4.3 APPLICATION OF PROCEDURE

It is assumed that a PMP estimate is required for a basin of 500 km^2. Table 4.1 lists the annual maximum 1-, 6-, and 24-hour rainfall amounts (annual series) compiled from a hypothetical 25 year record of hourly precipitation data for a station in the problem watershed. The hourly values are thus for a clock hour – for example, 9 a.m. to 10 a.m. – and the 6-hour and 24-hour amounts consist of the greatest sums of 6 and 24 consecutive clock-hour rainfall increments, respectively. $\overline{X}_{n-m}$ and S_{n-m} are the mean and standard deviation, respectively, of the annual series computed after excluding the maximum rainfall amount in each series. $\overline{X}_n$ and S_n are for the series including all items. Means and standard deviations are computed by conventional methods and in actual practice should be compared with those of nearby stations for consistency. If inconsistent, another station should be used for estimating PMP.

After the two means and standard deviations for each series and their respective ratios have been obtained as indicated in Table 4.1, estimation of PMP proceeds as follows:

(a) $\overline{X}_n$ and S_n are adjusted for maximum observed rainfall by means of Figures 4.2 and 4.3, respectively, and for record length by means of Figure 4.4.
(b) Values of K_m corresponding to adjusted values of $\overline{X}_n$ for the various durations are obtained from Figure 4.1.
(c) Point values of PMP, or X_m, are computed as indicated by Equation 4.2.
(d) If basic rainfall data are for fixed time intervals, they are adjusted upward by applying the factor 1.13 for fixed observational periods or the factors 1.13, 1.02 and 1.01 to 1-, 6- and 24-hour amounts, respectively, compiled from hourly data (section 4.2.4).
(e) Point values of PMP are reduced to the proper areal value for the size of the basin using Figure 4.7, or a similar relation. (Note: if only 24-hour rainfall amounts are available, a maximum depth–duration curve, like that of Figure 4.8, can be used to estimate PMP for the shorter durations. The 34 and 84 per cent adjustments for the 1- and 6-hour amounts, respectively, would yield values of 155 and 382 mm, which are considerably higher than the 103 and 331 mm based on the actual data. Hence, Figure 4.8 does not very well represent the depth–duration characteristics of PMP indicated by the short-duration data for the problem basin.)

4.4 GENERALIZED ESTIMATES

Where precipitation networks are considered adequate, generalized PMP estimates may be made with relative ease by this procedure. The adjusted mean $\overline{X}_n$ and standard deviation S_n are determined (Section 4.3) for each station, and the coefficient of variation (C_v, that is, the standard deviation divided by the mean), is then computed. Values of C_v, which is considered a more stable statistic than S_n, and are plotted on a map, and two sets of isolines are drawn. Values of PMP for any point on the map may then be obtained by estimating $\overline{X}_n$ and C_v from their respective isolines and using the following relation:

$$X_m = \overline{X}(1 + K_m C_v) \tag{4.3}$$

By computing PMP for a fine grid of points, a map showing PMP values directly may then be constructed. Values of PMP, or X_m, obtained from