2.13 CAUTIONARY REMARKS

Preparation of PMP estimates for specific basins requires considerable effort to ensure appropriate values are determined. Where estimates are required for more than one or two basins in a region, generalized PMP studies combined with an applications manual for developing estimates for individual basins is a preferred procedure (see Chapter 5). If individual PMP estimates are prepared, the procedures discussed in this chapter should be followed comprehensively with special notice taken of these cautionary remarks.

2.13.1 Importance of adequate storm sample

Transposition and maximization of a few storms is unlikely to yield reliable PMP estimates for an individual basin. It is important that all outstanding storms recorded over the project basin and areas of transposability be used in making such estimates. Comparison of storms in the areas of transposability with those outside should be made. If such comparison indicates that only a few storms within the area reach the magnitude of generally greater storms outside the areas, the transposition limits should be re-examined and relaxed, if at all possible, to include storms in the marginal areas just outside the limits originally determined.

Storm surveys and analyses should be extended to meteorologically comparable regions no matter how far removed from the project basin. If synoptic storm types are kept in mind, far distant areas of the world may sometimes provide better clues to PMP than nearby areas. This not only applies to precipitation data, but to other factors instrumental in developing concepts for understanding storm precipitation-producing mechanisms.

The greater the number of carefully selected extreme storms transposed and maximized, the greater the reliability of the resulting PMP estimates. Under ideal conditions, some two dozen major storms might be important for determining PMP. Of these, probably fewer than half a dozen might provide control points on the PMP DAD curves.

2.13.2 Comparison with record rainfalls

The final results of any PMP estimate should always be compared with observed record values. The world record values of point rainfall, presented in Annex 2, very probably approach PMP magnitude. Estimates appreciably exceeding these values, say by 25 per cent or more, may be excessive. Most estimates of point PMP might be lower than these record values for durations of approximately 4 hours and longer since few basins are so favourably located as to experience rainfalls of these record magnitudes.

Table A.2.3 in Annex 2 presents enveloping values of DAD data from over 700 storms in the United States. Many values are from storms in the southern part of the country near the moisture source – the Gulf of Mexico. These enveloping values from such a large sample of major storms may approach PMP magnitude for this region, especially for areas larger than around 25 km^2.

It should be noted that PMP values are considered estimates of the upper limit of precipitation potential over a basin. The comparison of these estimates with maximum observed precipitation over a limited geographic region will considerably exceed observed values unless some storms of great magnitude have occurred in the immediate vicinity. Comparisons between PMP estimates and maximum observed precipitation should be made over very large regions and include a range of area sizes and durations. Figure 2.18 shows the results for one area size and duration from such a comparison study for the United States (Riedel and Schreiner, 1980).

2.13.3 Consistency of estimates

PMP estimates for various basins in a meteorologically homogeneous region should be compared for consistency. Appreciable differences should be studied to see if they are supported by climatic or geographic factors. If not, it can be concluded that the differences are not valid and the various steps involved in the procedure for estimating PMP should be re-examined thoroughly. When PMP estimates are made basin by basin at various times, consistency is difficult to maintain. The generalized estimates approach, described in Chapter 5, is recommended for achieving consistency.

2.13.4 Regional, durational and areal smoothing

It is important when developing PMP estimates to recognize the continuity of the field of precipitation potential. When examining major rainstorms for one area size or duration, it is possible that no storm in a region has occurred with an optimum combination of the factors involved in the precipitation process. For this reason, it is important that a wide range of area sizes and durations be used in developing the DAD relation for the PMP estimate