2. UBC PEAK FLOOD ESTIMATION PROGRAM

Background

When there is ample hydrologic data, there are recognized methods for estimating design floods. However, in the more usual situation where adequate hydrologic data are not available, there are no such generally accepted methods for estimating the required design floods. In this latter case, the responsible hydrologist is simply expected to use his best judgement to "come up" with the required design floods, no one enquiring too closely as to just how it is done. This puts a burden on even the most experienced hydrologist. It is almost impossible to document the processes involved in integrating all the information relevant to a particular problem - statistical, regional, physical, and so on; and this makes it difficult to defend decisions if they are challenged.

The *UBC Peak Flood Estimation Program* was therefore developed by Dr. Denis Russell, P. Eng. (of the Department of Civil Engineering at the University of British Columbia), to assist hydrologists in estimating design floods in situations where data are not adequate by normal standards, but where design floods are nevertheless required for design purposes. It is intended to help the hydrologist exercise his judgement to the full, to concentrate on the hydrology rather than statistical manipulations and to provide documentation of the estimation process.

The program is based on using Bayesian statistics to estimate peak flood probabilities.

There is often a significant amount of hydrologic information available for a particular creek system, but the information cannot be used directly in a traditional frequency analysis. Bayesian statistics offer a framework for combining different types of information and making best use of the available information.

A paper on the program is scheduled for publication later in 1982 in the ASCE (i.e. American Society of Civil Engineering) Journal of the Hydraulics Division.

Data Input

Data input for the computer analysis is based on the type of information likely to be available to the hydrologist, including:

- estimate of "mean annual flood" (that is, the annual "maximum day discharge" with a return period of about one in two years)
- actual recorded flows or discharges
- largest or "m-th" largest discharge in "n" years
- discharge which has not been exceeded in "n" years
- discharge which has been exceeded "m" times in "n" years
- discharge data from nearby streams which may be correlated with recorded data
- discharge data estimated from other sources, such as precipitation
- regional "coefficient of variation"

Data can be entered either in the form of single valued estimates or ranges, the latter described by three values - low, probable, and high. Estimates of design discharges are prepared and displayed as soon as sufficient data have been input. These estimates are then revised when additional information has been entered, and the revised estimates are

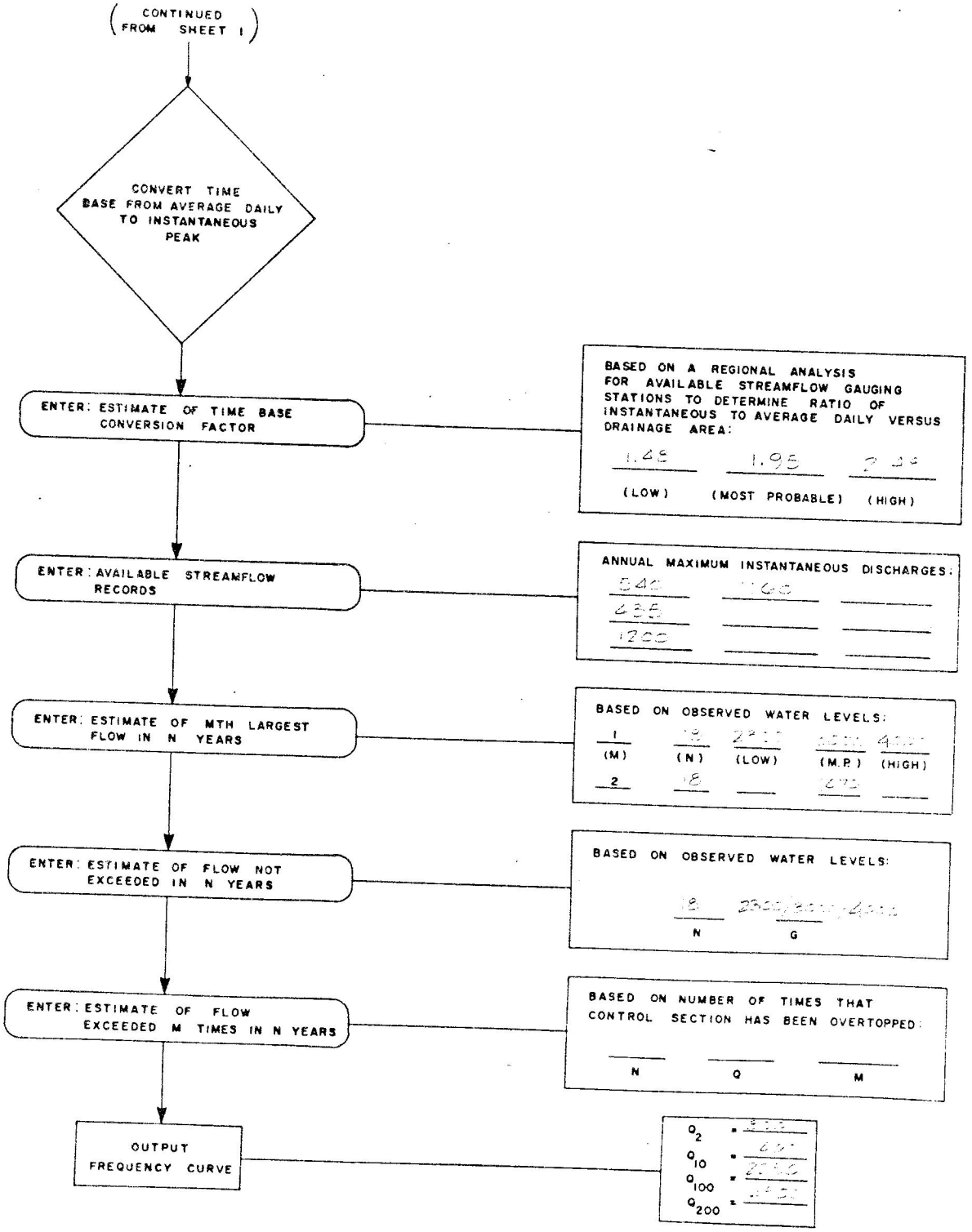
displayed. Thus, as data are entered, the hydrologist can see the evolution of the design discharge estimates, and judge the effect of each new piece of information on the results. Hard copies of the questions, answers, and the developing estimates of the design discharges can be obtained at the end, providing documentation of the progress of the analysis and an opportunity to check the accuracy of the input data. Throughout the analysis, the hydrologist need only be concerned with the accuracy and relevance of the input data - in other words, with the hydrology.

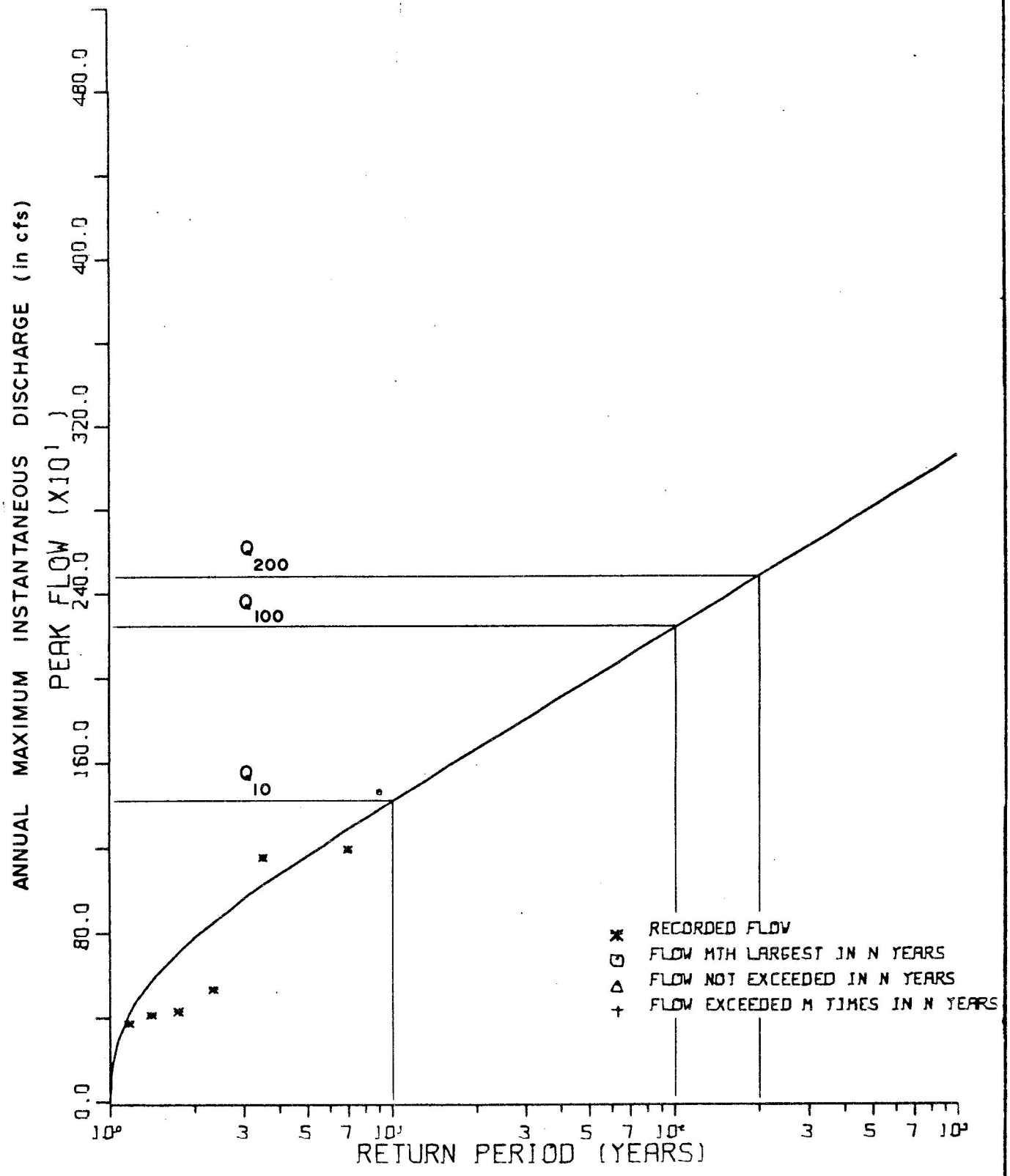
Data Output

The results of the computer analysis are presented as a table of flows for given return periods, with an option to plot a frequency curve.

APPLICATION OF UBC PEAK FLOOD ESTIMATION PROGRAM TO MOSQUITO CREEK AT EVERGREEN PL. COLLECTION BASIN

FLOOD FREQUENCY CURVE FOR ANNUAL MAXIMUM INSTANTANEOUS DISCHARGE





MOSQUITO CREEK AT EVERGREEN PLACE

FLOOD FREQUENCY CURVE

Figure 10