Hydrosphere Engineering

Philip H. De Groot, Ph.D., P.E. and Michael C. Menoes, Ph.D., P.E.

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A comparison between TR-20 and TR-55

Both models compute runoff hydrographs using the SCS runoff equation and the SCS dimensionless unit hydrograph. Both models require essentially the same data: watershed characteristics (area, CN, AMC, tc...), hydrograph data, and rainfall data. So how do the models differ?

Recall the description of TR-20: "Computer program for project formulation hydrology." TR-55 is described as the Tabular Hydrograph Method and allows for graphical peak discharge computations. To utilize TR-20, the use of a computer was required. In the early 1980s, not everyone had access to a computer. To allow for greater access to the SCS methodology, TR-55 was created. Calculations using TR-55 were often performed by hand.
TR-55 was created by running numerous computer simulations with the TR-20 program. Thus TR-55 is a simplified version of TR-20.

When running the TR-20 simulations to create TR-55, the following constraints were used:

1.   A runoff CN of 75 was used.

2.   Rainfall volumes were sufficient to yield 3 inches of runoff.

According to one of the creators of TR-55, Richard McCuen (Hydrologic Analysis and Design 1989):

> "When the tabular method is applied to cases having characteristics that are significantly different from the conditions used in developing the method, the resulting hydrograph may not provide close agreement with the hydrograph that would result from a TR-20 analysis."

Consider some of the constraints on the usability of the TR- 55 program that are listed in the user's manual at the end of each chapter. Some examples of these additional constraints:

1.   Drainage areas of individual subareas cannot differ by a factor of 5 or more.

2.   The time of concentration for a subbasin cannot be greater than 2 hours.

3.   The travel time is limited to 3 hours.

The TR-20 program has none of the constraints that are shown above. With the availability of TR-20, TR-20 should always be used before TR-55, and governing agencies should require the use of TR-20. Hydrosphere Engineering does not recommend using TR-55.