

## **SPEAKER SESSION 8**

### **COMPARISON OF HEC-1 WATERSHED RUNOFF PROCEDURES**

**J. J. DeVries and T. V. Hromadka  
Boyle Engineering Corporation**

#### **Abstract:**

Three different rainfall runoff calculation procedures were applied to a small multifamily catchment using the HEC-1 computer program. The methods used to compute runoff from rainfall were the kinematic wave method, the SCS dimensionless unit hydrograph procedure, and a dimensionless urban S-graph procedure. Observed hydrographs were available for four flood events. For the kinematic wave method and the SCS method two events were used for calibration and the other two events were used for model verification. The dimensionless S-graph procedure was directly applied to all four runoff events without calibration. When the results of the simulations were compared to observed hydrographs it was concluded that the unit hydrograph procedures were able to give results that were as accurate as the kinematic wave procedures and required less effort to calibrate the model.

It was concluded from this study that the simpler unit hydrograph methods give results that are as accurate as more complex methods, such as the kinematic wave method. In addition the ease of application of the simpler methods reduces the likelihood of misapplication of the runoff calculation procedure.

## **Comparison of HEC-1 Watershed Runoff Procedures**

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# COMPARISON OF HEC-1 PROCEDURES -

Why rainfall-runoff modeling?

Need for accurate models

Models need to be calibrated

CONCLUSION:

SIMPLE MODELS ARE  
AS ACCURATE AS COMPLEX MODELS

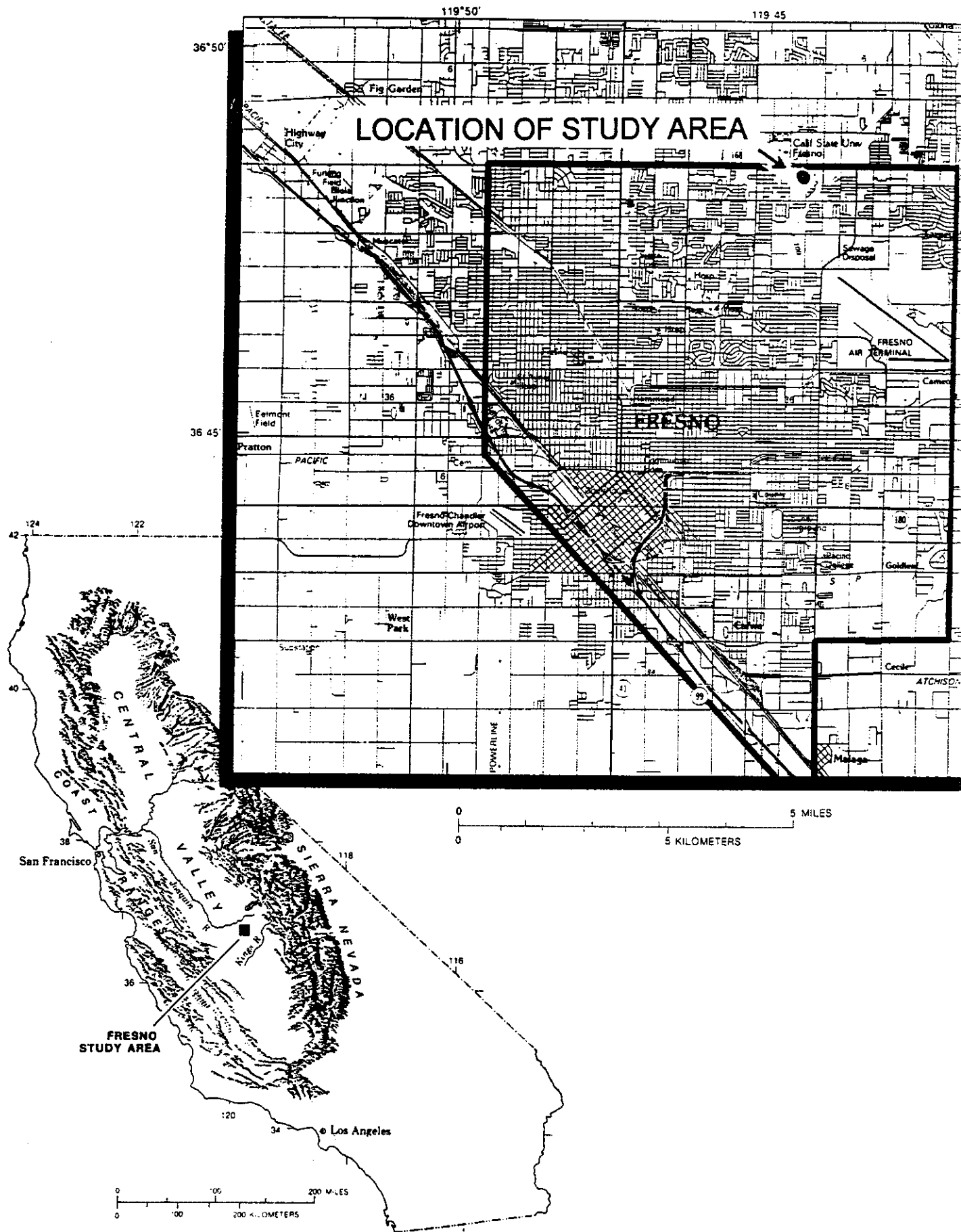
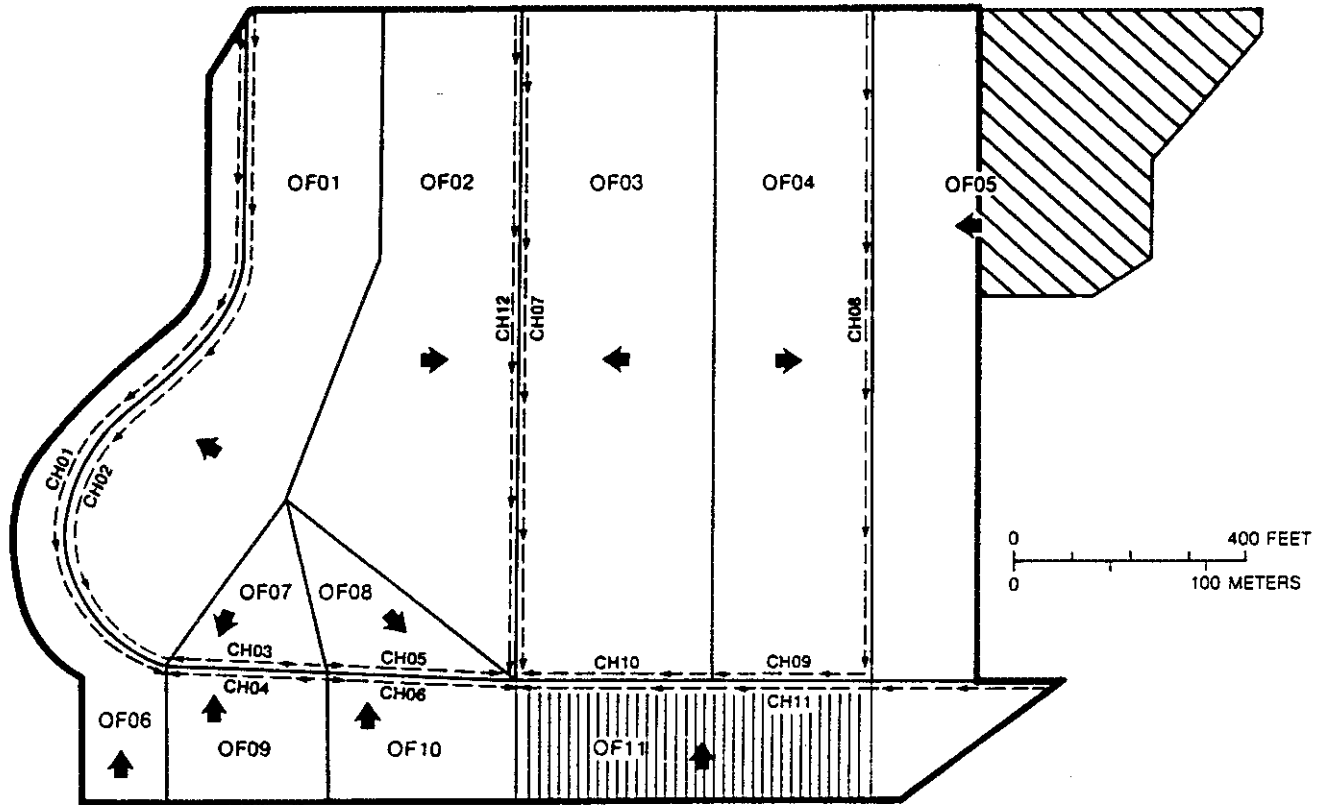


FIGURE 1. Index map of California showing Fresno study area.



**EXPLANATION**







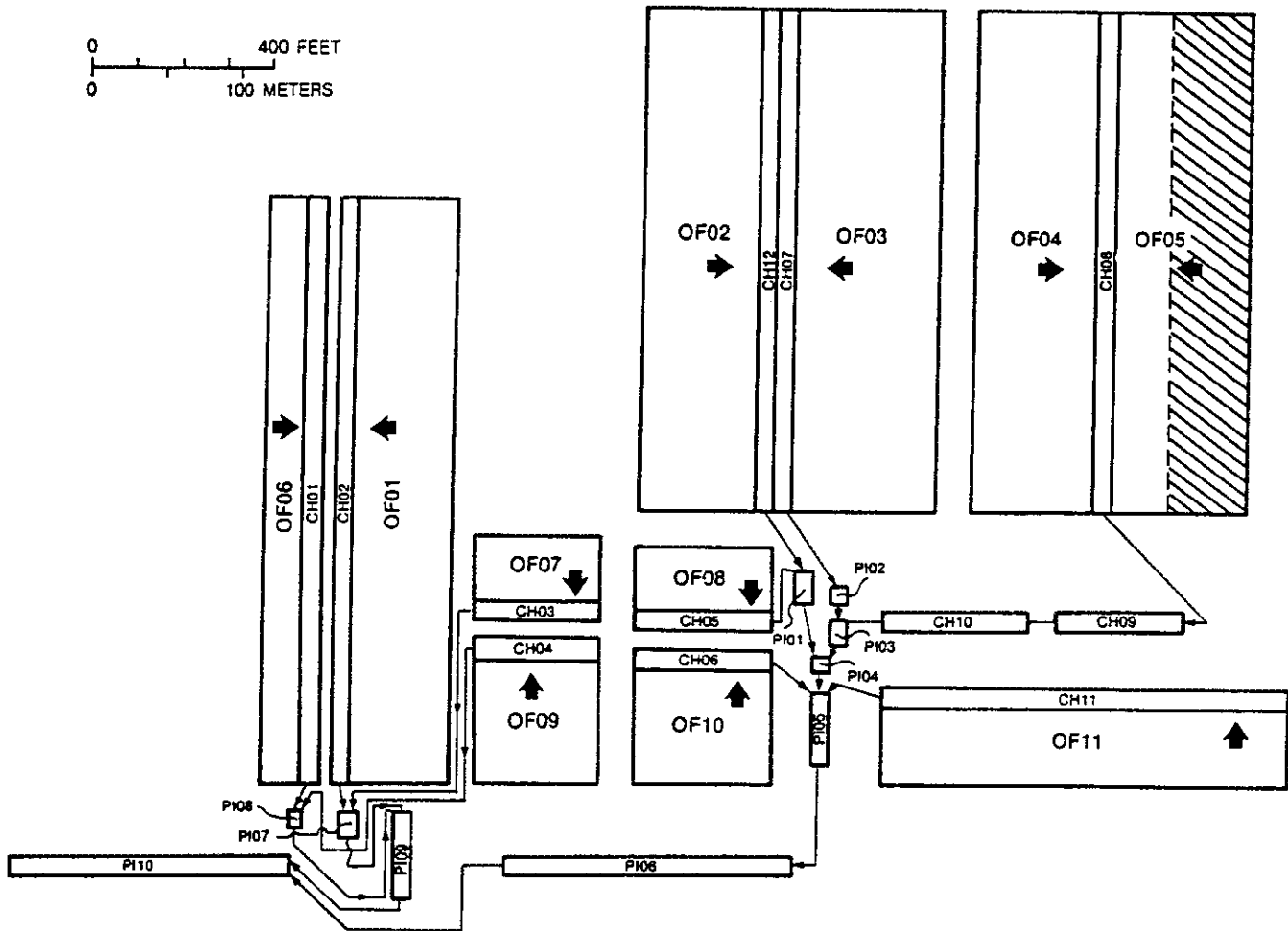
-  CATCHMENT BOUNDARY, 1981-82
-  OVERLAND FLOW SEGMENT BOUNDARY
-  DIRECTION OF FLOW FOR CHANNEL (GUTTER) SEGMENT
-  DIRECTION OF FLOW FOR OVERLAND FLOW SEGMENT
- OF05 OVERLAND-FLOW PLANE SEGMENT
- CH02 CHANNEL (GUTTER) SEGMENT
-  AREA ADDED TO CATCHMENT, 1982-83
-  NEW CONSTRUCTION, 1982-83

FIGURE 7. Schematization of overland-flow planes and channel (gutters) for the multiple(1)- and multiple(2)-dwelling residential catchment.



**EXPLANATION**





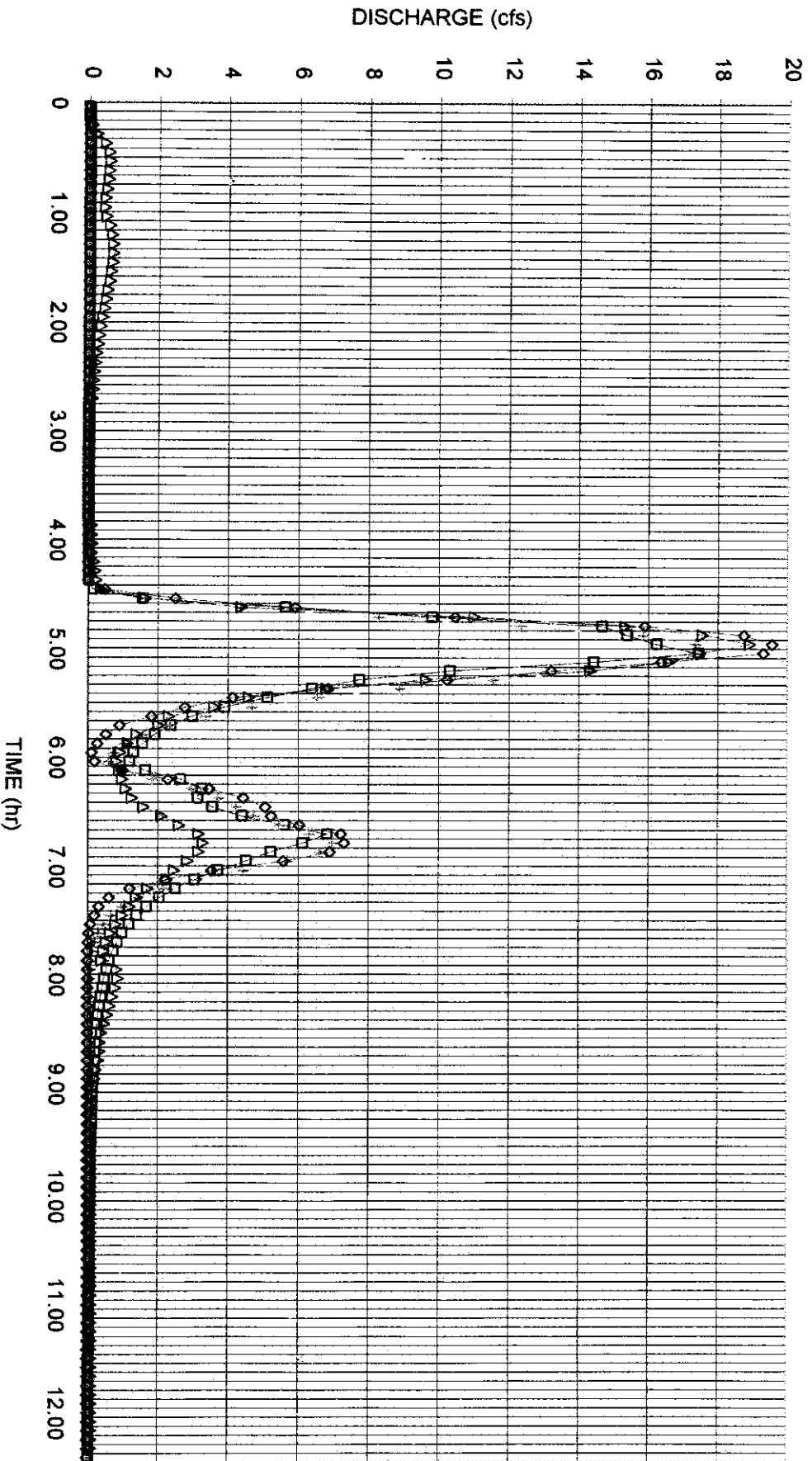
-  SEGMENT BOUNDARY
-  DIRECTION OF FLOW FOR CHANNEL (GUTTER) AND PIPE SEGMENTS
-  DIRECTION OF FLOW FOR OVERLAND FLOW SEGMENTS
- OF05**  
OVERLAND-FLOW PLANE SEGMENT
- CH01**  
CHANNEL (GUTTER) SEGMENT
- PI10**  
PIPE SEGMENT
-  AREA ADDED TO CATCHMENT, 1982-83

FIGURE 8. Segments for the multiple(1)- and multiple(2)-dwelling residential catchment.

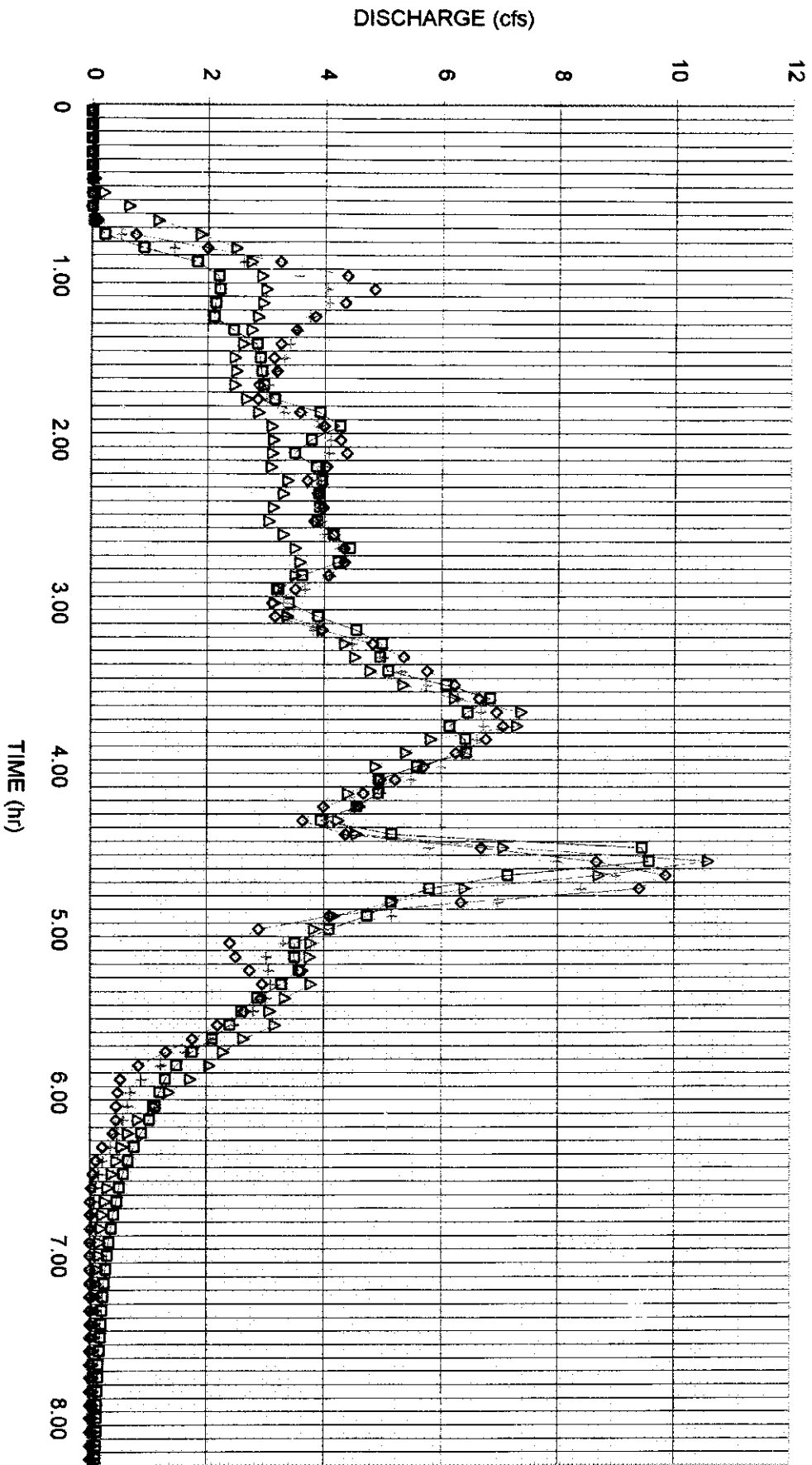
FRESNO URBAN CATCHMENT - 30 NOV 1982  
COMPARISON OF HEC-1 HYDROGRAPH METHODS



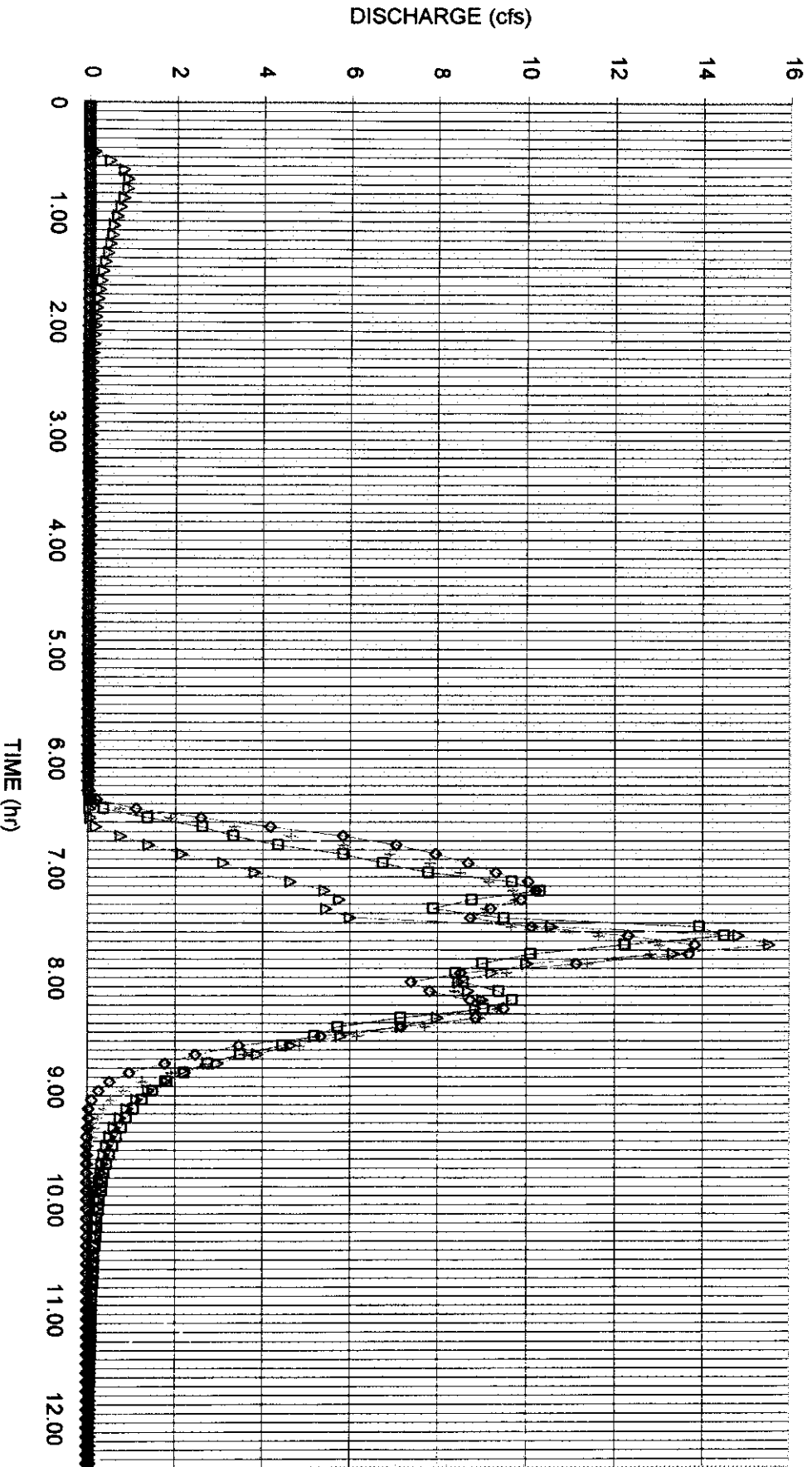
— Kinematic Wave + SCS UHG o S-Graph Δ Observed



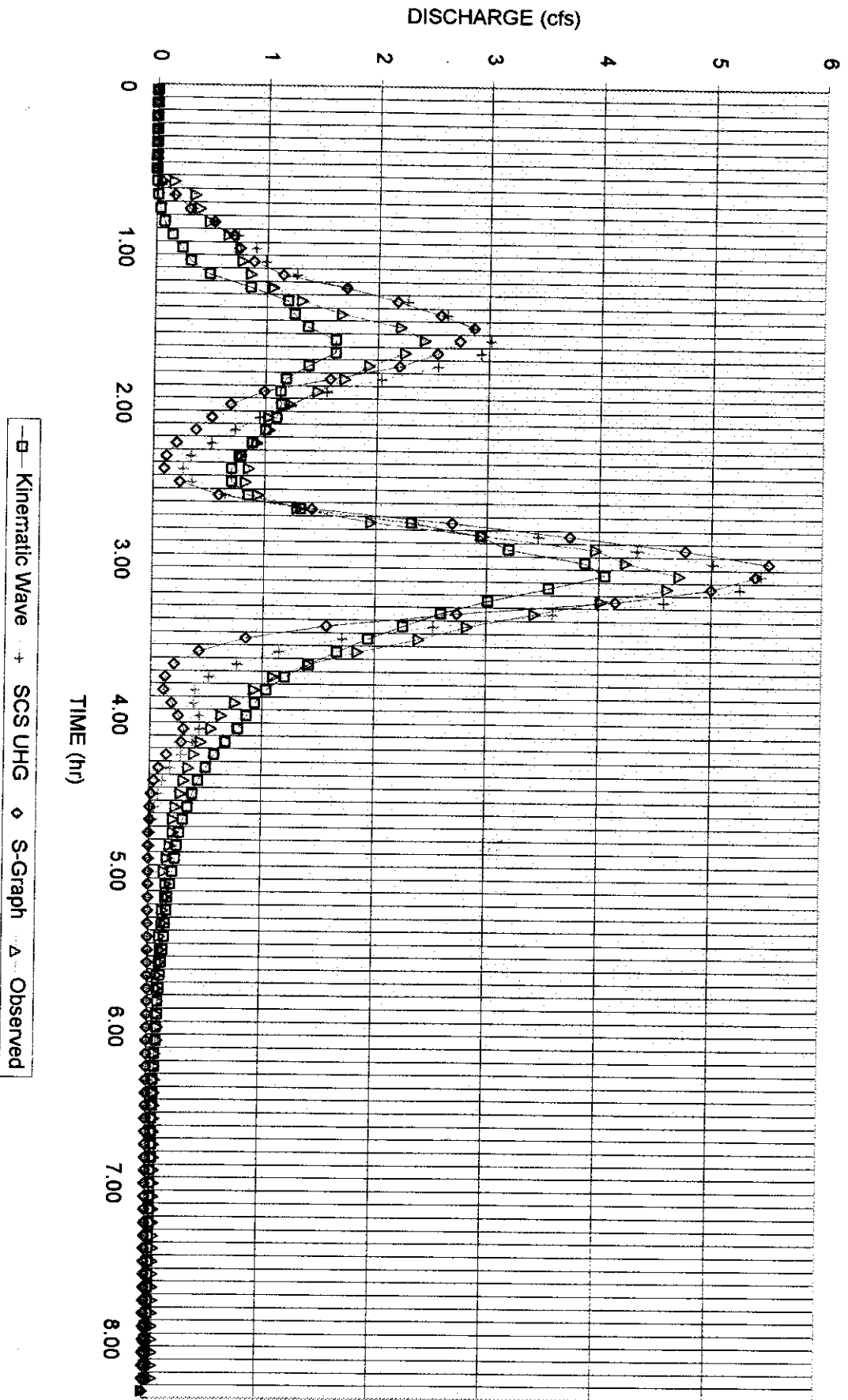
FRESNO URBAN CATCHMENT - 8 NOV 1983  
COMPARISON OF HEC-1 HYDROGRAPH METHODS



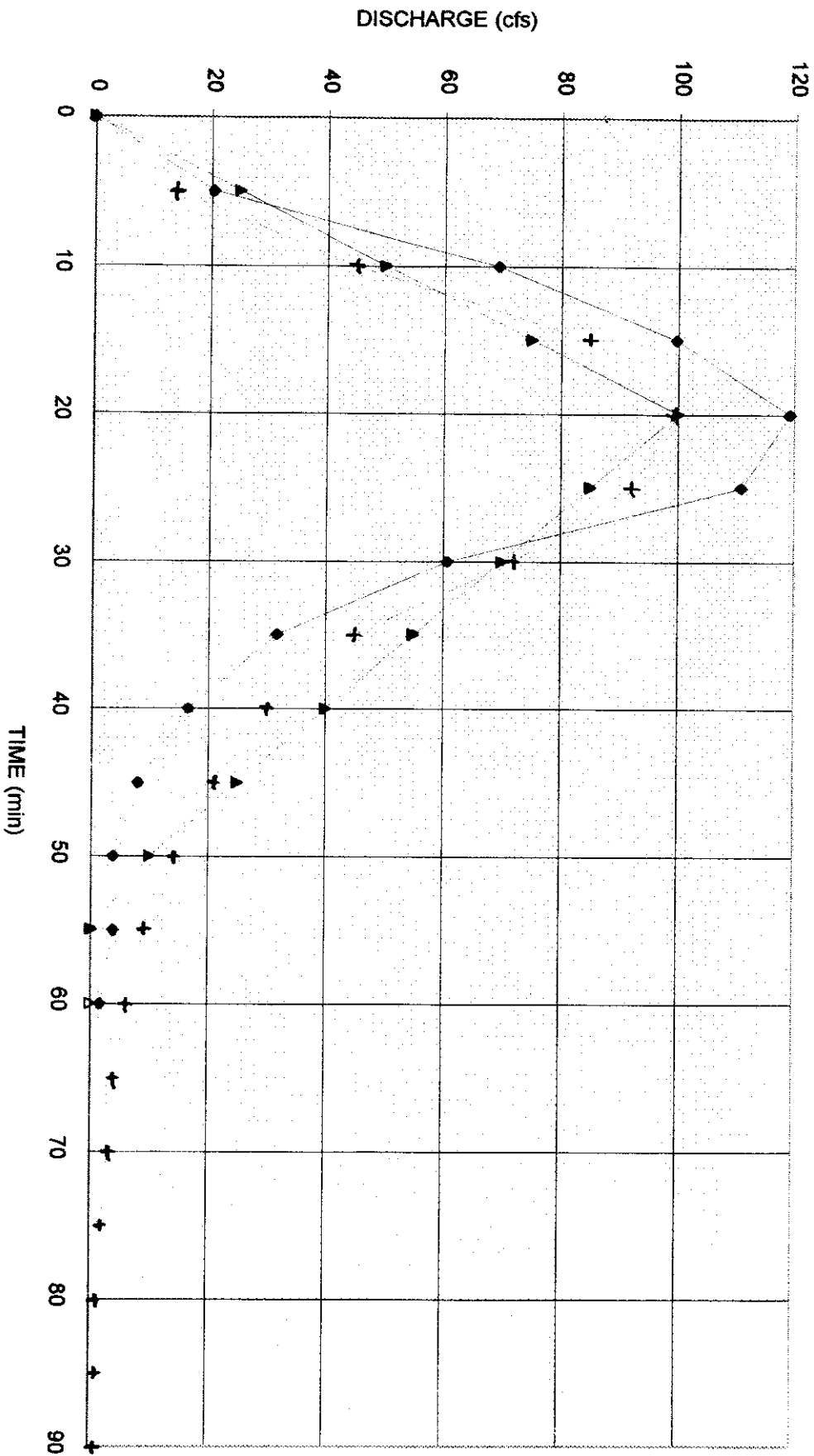
FRESNO URBAN CATCHMENT - 7 FEB 1983  
COMPARISON OF HEC-1 HYDROGRAPH METHODS



FRESNO URBAN CATCHMENT - 20 MAR 1983  
COMPARISON OF HEC-1 HYDROGRAPH METHODS



COMPARISON OF UNIT HYDROGRAPHS  
FRESNO URBAN CATCHMENT



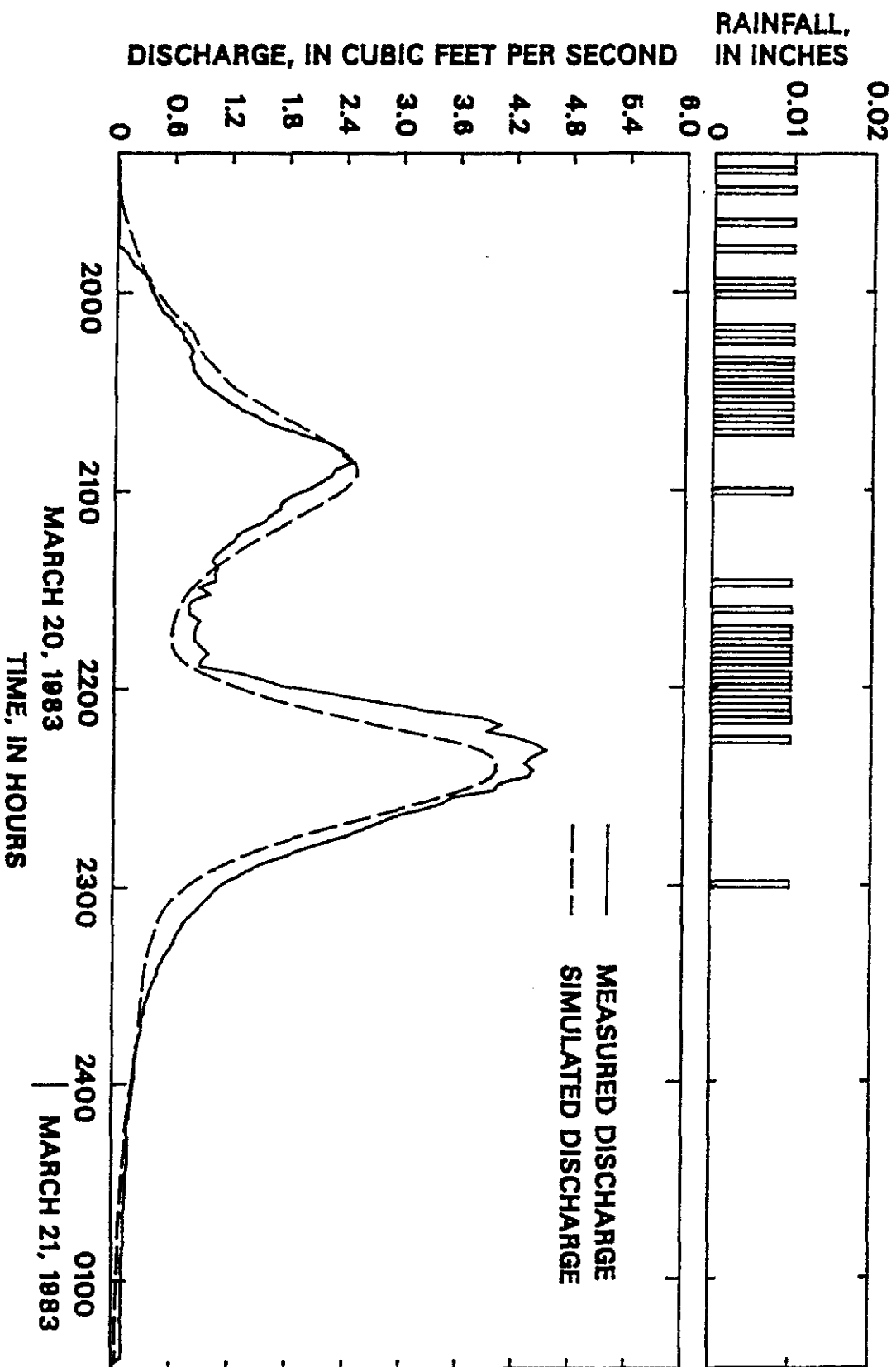


FIGURE 15. Comparison of measured and simulated discharge for selected storms used to calibrate the rainfall-runoff model for the multiple (2)-dwelling catchment--Continued.

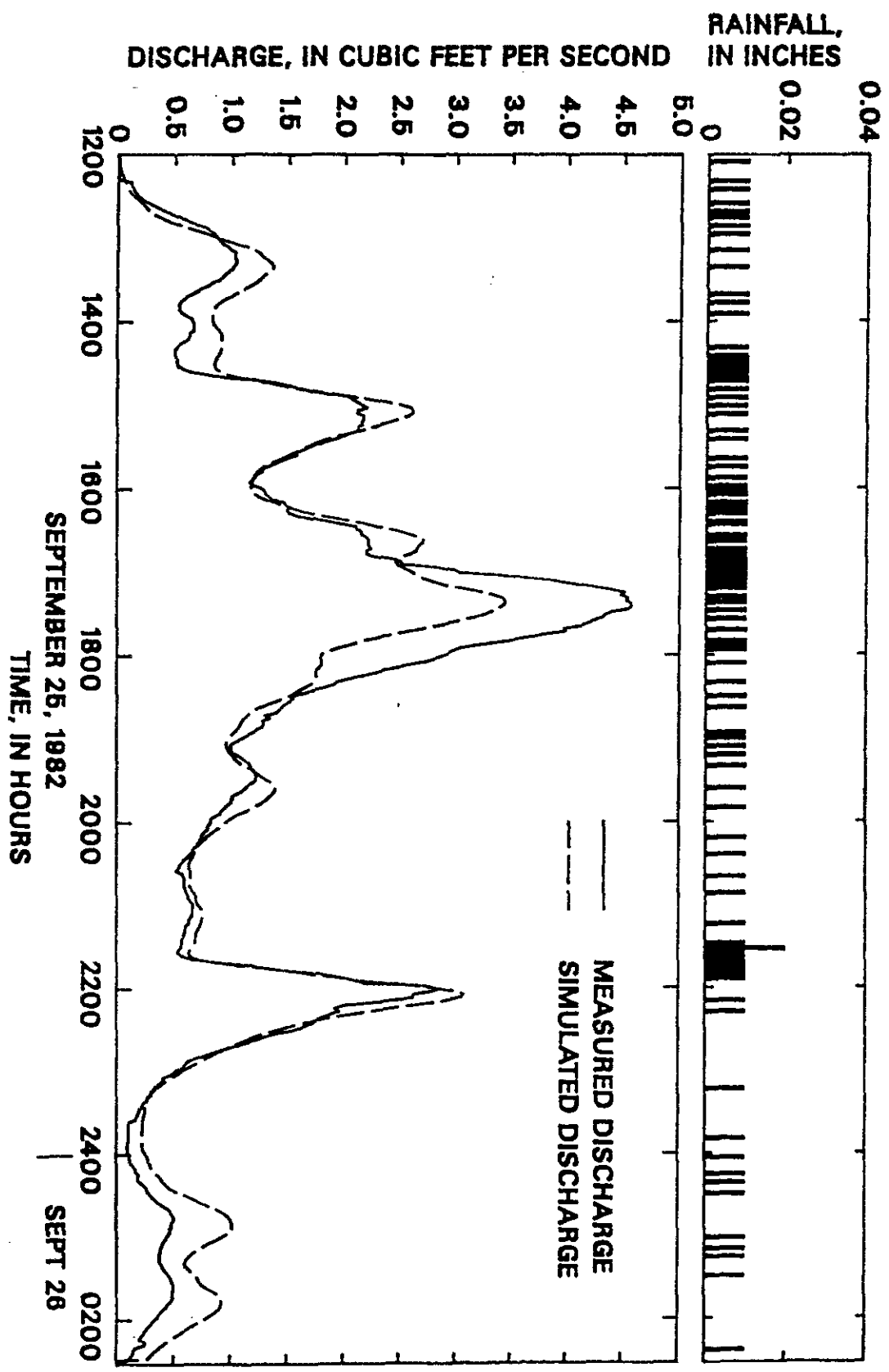


FIGURE 16. Comparison of measured and simulated discharge for selected storms used to verify the rainfall-runoff model for the multiple (2)-dwelling residential catchment.

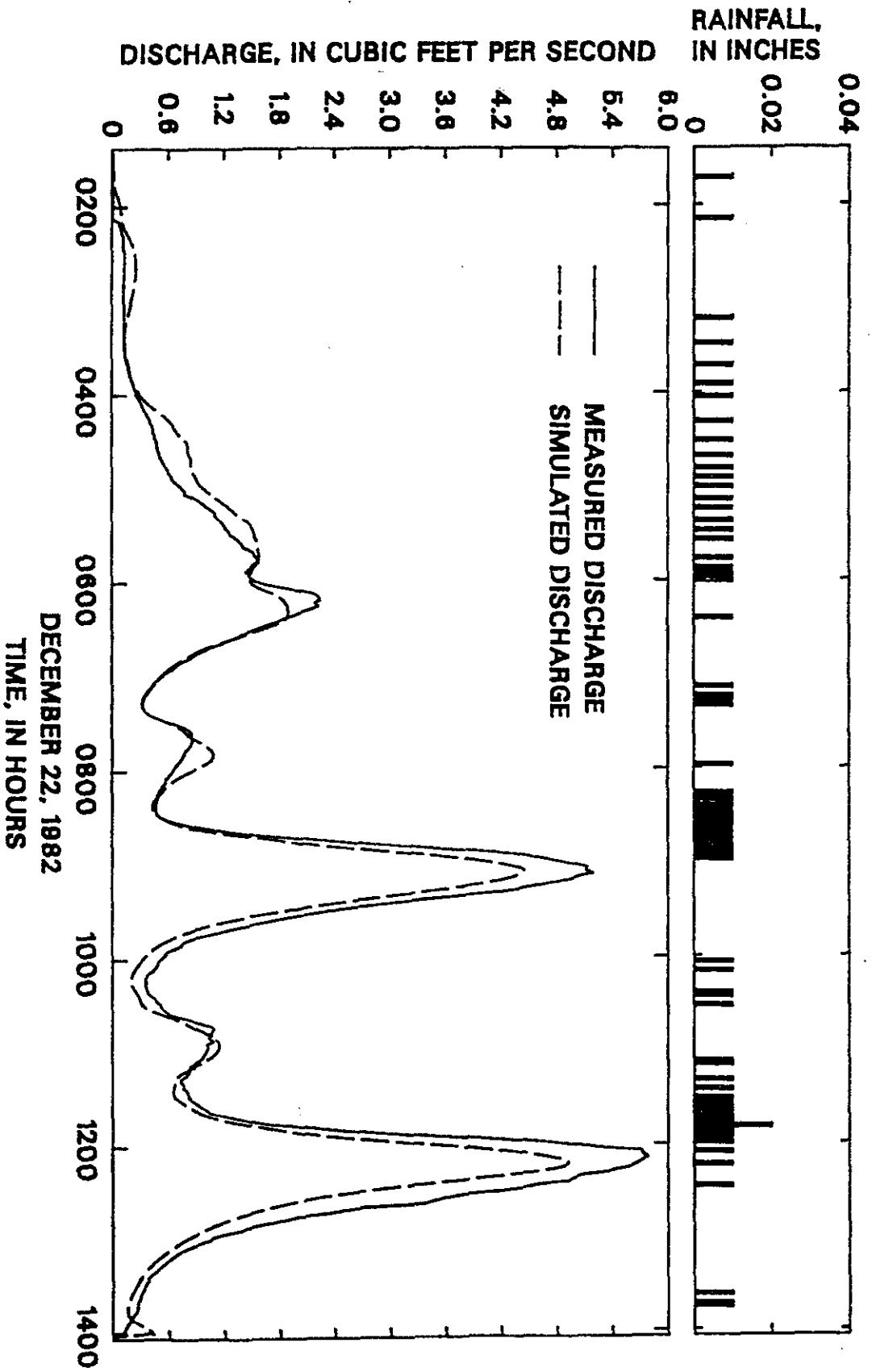


FIGURE 16. Comparison of measured and simulated discharge for selected storms used to verify the rainfall-runoff model for the multiple (2)-dwelling residential catchment--Continued.

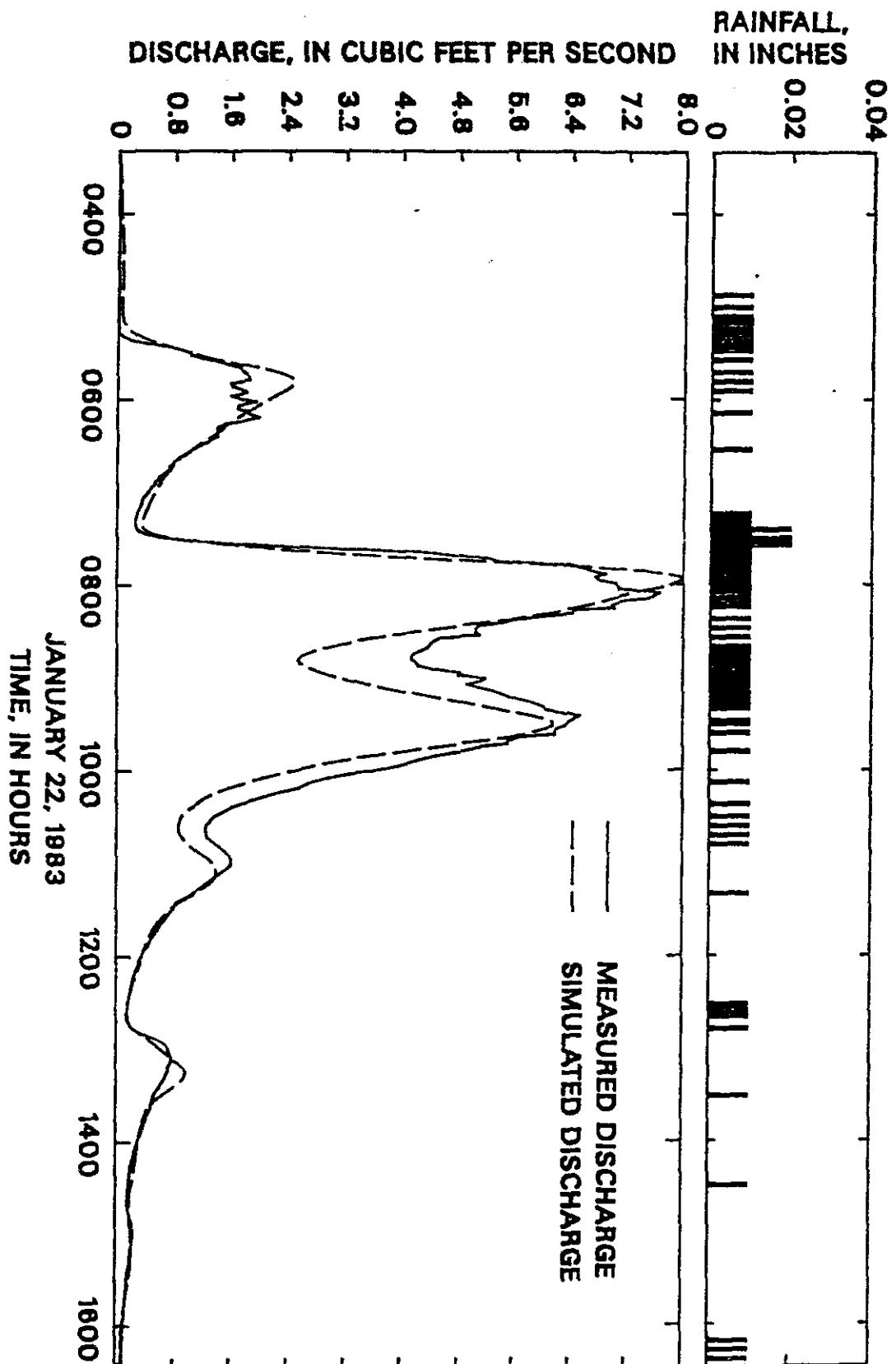


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