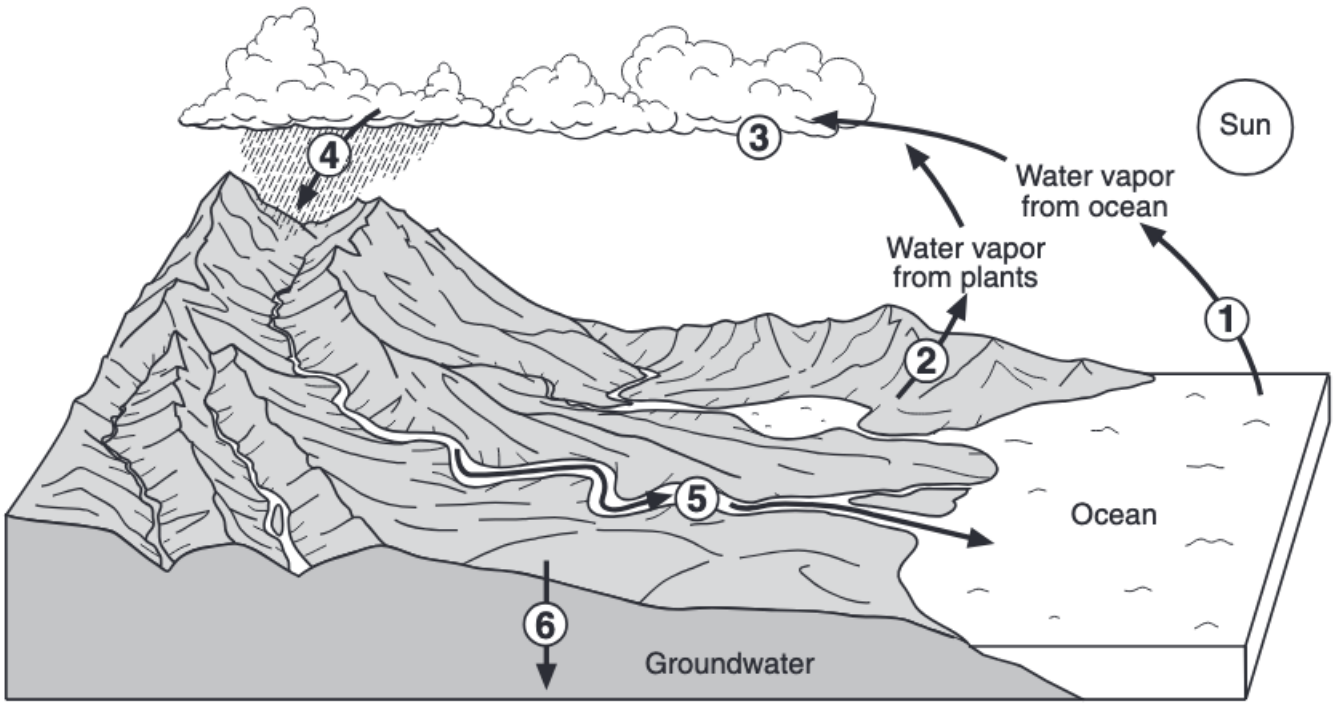
1 Multiple Choice 1 point Question

Hydrology is

- (●) The study of the occurrence, distribution, and movement of water above, on, and below the surface of the earth
- ( ) Study of the atmosphere, ocean, and surface waters
- ( ) A study of the processes of evaporation, infiltration, and storage
- ( ) The study of the relationship between rainfall and runoff

2 Matching 12 points Question

The figure below shows a model of the water cycle. The arrows show the movement of water molecules through the water cycle. The circled numbers processes that dominate as the water molecules reach the different stages of the water cycle.



Match the process (circled numbers on the figure) to the correct term (pull down menu).

Process 1	Evaporation
Process 2	Transpiration
Process 3	Condensation
Process 4	Precipitation
Process 5	Streamflow (Runoff)
Process 6	Infiltration

Possible answers

Evaporation Transpiration Condensation Precipitation

Streamflow (Runoff) | Infiltration | Constipation | Snowfall | Radiation

3 Multiple Choice 1 point Question

Rainfall behavior is expressed as a combination of

- (●) depth or intensity, duration, and probability or frequency
- ( ) intensity and probability or frequency
- ( ) duration and probability or frequency
- ( ) depth and duration

4 Multiple Choice 1 point Question

What is a flood frequency curve?

- (●) A plot of estimated exceedance probability and discharge
- ( ) A plot of the discharge magnitude and the Weibull plotting position
- ( ) A plot of the frequency and discharge
- ( ) A plot of discharge and time

5 Multiple Choice 2 points Question

An annual recurrence interval of 100-years is equivalent to an Annual Exceedance Probability (AEP) of what percent?

- (●) 1-percent.
- ( ) 10-percent.
- ( ) 50-percent.
- ( ) 100-percent.

6 Multiple Choice 1 point Question

What is a plotting position?

- (●) An estimate of probability associated with an observation based on its position within a ranked sample set
- ( ) An estimate of probability associated with an observation based on its magnitude relative to the arithmetic mean
- ( ) The multiplicative inverse of relative frequency
- ( ) Location in a chart of a data pair

7 Multiple Choice 4 points Question

Use PeakFQ or HEC-SSP to analyze the annual peak stream flow for USGS Gage 08150000, Llano River at Junction, Texas. Use the station skew option (in either software package). From the program's output chart or tabulation what value below is closest to the estimated 1% AEP (100-yr ARI) discharge in CFS?

- (●) 754,500 cfs
- ( ) 1,165,000 cfs
- ( ) 522,600 cfs
- ( ) 103,100 cfs

8 Multiple Choice 2 points Question

Use PeakFQ or HEC-SSP to analyze the annual peak stream flow for USGS Gage 08150000, Llano River at Junction, Texas. Use the station skew option (in either software package). From the program's output chart or tabulation what value below is closest to the estimated .2% AEP (500-yr ARI) discharge in CFS?

- (●) 1,165,000 cfs
- ( ) 754,500 cfs
- ( ) 341,100 cfs
- ( ) 522,600 cfs

9 Multiple Choice 4 points Question

Use PeakFQ or HEC-SSP to analyze the annual peak stream flow for USGS Gage 08165500, Guadalupe River at Hunt, Texas. Use the station skew option (in either software package). From the program's output chart or tabulation what value below is closest to the estimated 1% AEP (100-yr ARI) discharge in CFS?

- (●) 255,800 cfs
- ( ) 341,100 cfs
- ( ) 196,400 cfs
- ( ) 754,500 cfs

10 Multiple Choice 2 points Question

Use PeakFQ or HEC-SSP to analyze the annual peak stream flow for USGS Gage 08165500, Guadalupe River at Hunt, Texas. Use the station skew option (in either software package). From the program's output chart or tabulation what value below is closest to the estimated .2% AEP (500-yr ARI) discharge in CFS?

- (●) 341,100 cfs
- ( ) 255,800 cfs
- ( ) 1,165,000 cfs
- ( ) 48,460 cfs

11 Multiple Choice 2 points Question

Using the gage transposition equation described below

An estimate of the desired AEP peak flow at the ungauged site is provided by

$$Q_1 = Q_2\left(\frac{A_1}{A_2}\right)^{0.5}$$

Where:

- Q_1 = Estimated AEP discharge at ungauged watershed 1
- Q_2 = Known AEP discharge at gauged watershed 2
- A_1 = Area of watershed 1
- A_2 = Area of watershed 2

Estimate the 1% AEP (100-yr) discharge for Guadalupe River at Hunt, Texas (Station 08165500) using the 1% AEP (100-yr ARI) discharge from the Llano River at Junction, Texas (Station 08150000) as the known discharge.

- (●) 294,255 cfs
- ( ) 341,100 cfs
- ( ) 255,900 cfs
- ( ) 196,400 cfs

12 Multiple Choice 2 points Question

Using the gage transposition equation described below

An estimate of the desired AEP peak flow at the ungauged site is provided by

$$Q_1 = Q_2(\frac{A_1}{A_2})^{0.5}$$

Where:

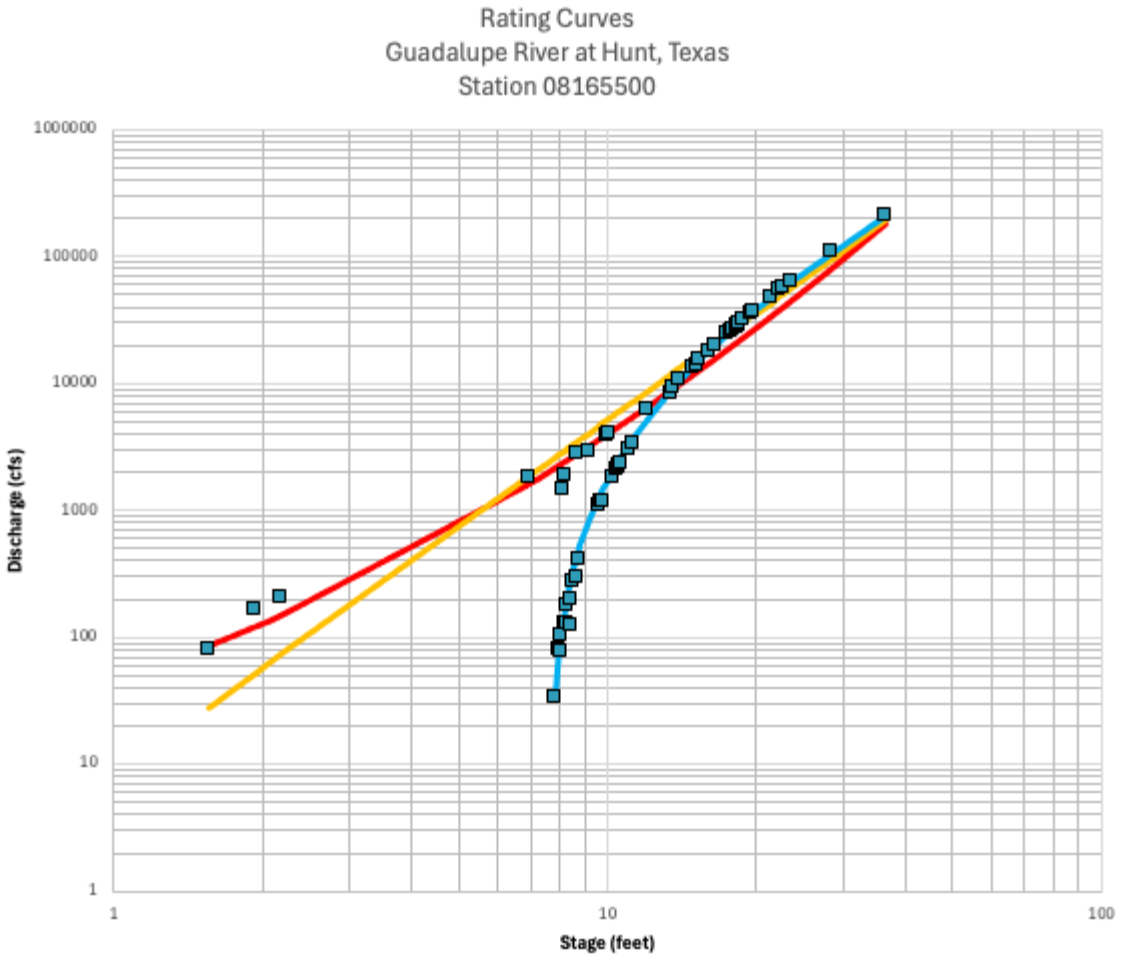
- Q_1 = Estimated AEP discharge at ungauged watershed 1
- Q_2 = Known AEP discharge at gauged watershed 2
- A_1 = Area of watershed 1
- A_2 = Area of watershed 2

Estimate the .2% AEP (500-yr) discharge for Guadalupe River at Hunt, Texas (Station 08165500) using the .2% AEP (500-yr ARI) discharge from the Llano River at Junction, Texas (Station 08150000) as the known discharge.

- (●) 459,163 cfs
- ( ) 341,100 cfs
- ( ) 1,165,000 cfs
- ( ) 196,400 cfs

13 Multiple Choice 2 points Question

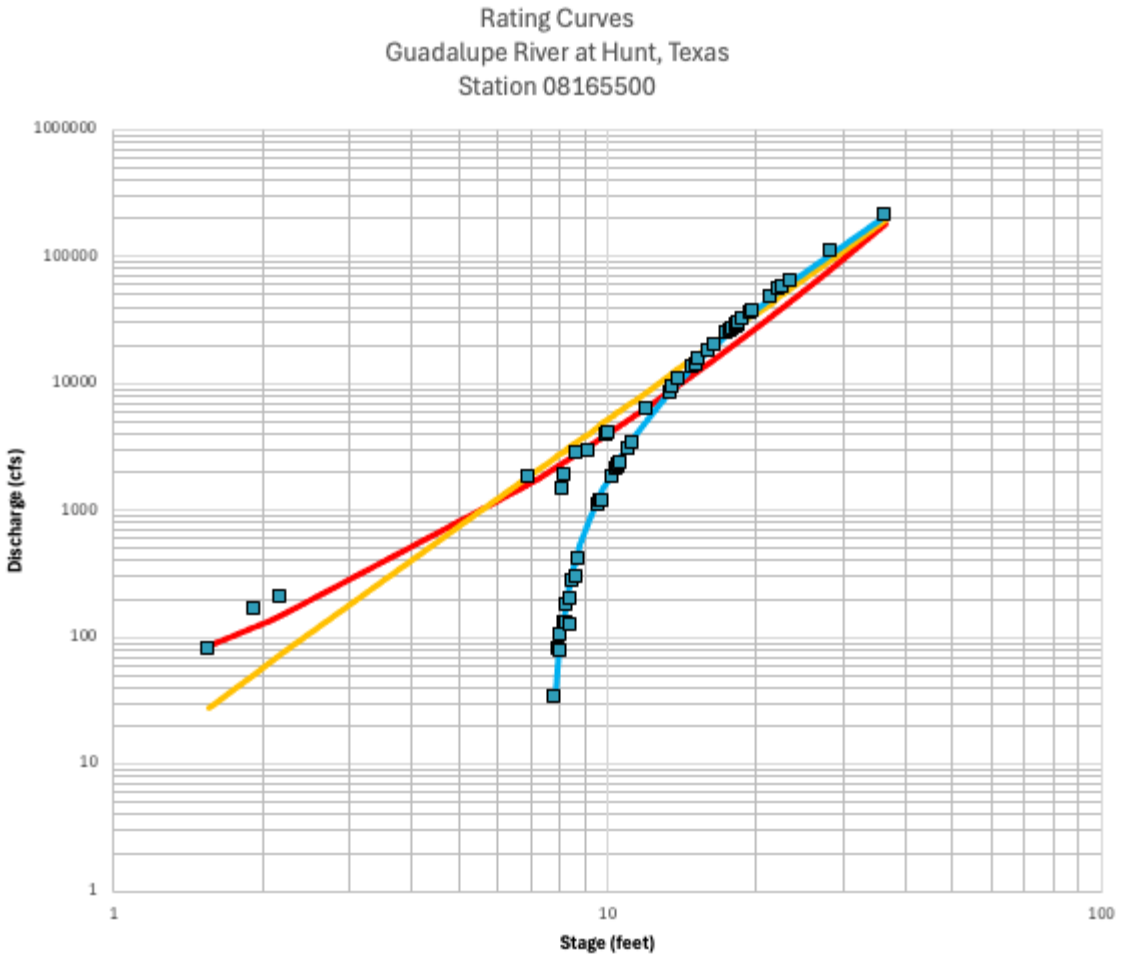
Using the "blue" rating curve below estimate the stage for the 1% AEP (100-yr ARI) discharge for the Guadalupe River at Hunt, Texas (Station 08165500). Extrapolate if necessary.



- (●) ~ 39 feet
- ( ) ~ 13 feet
- ( ) ~ 8 feet
- ( ) ~ 56 feet

14 Multiple Choice 4 points Question

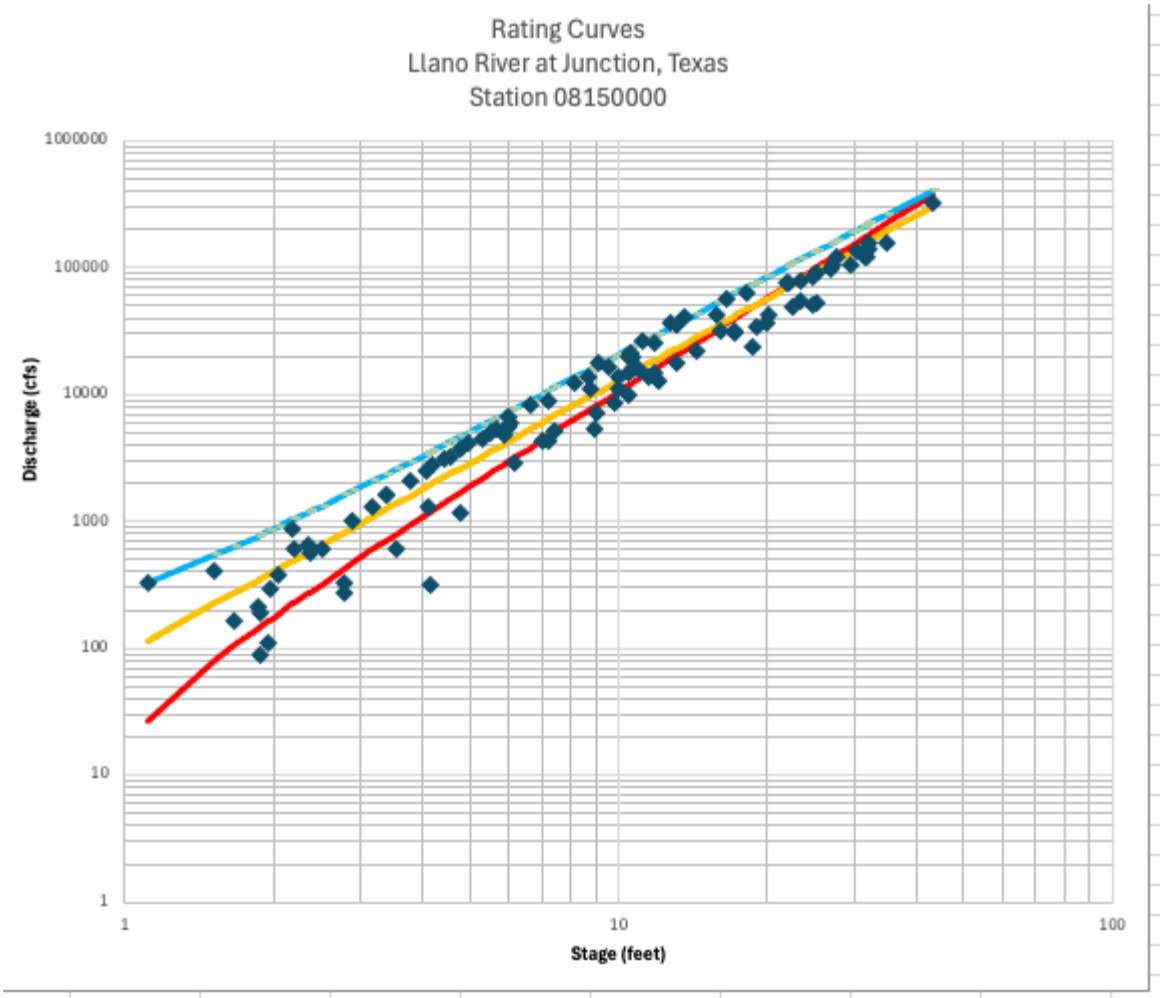
Using the "blue" rating curve below estimate the stage for the .2% AEP (500-yr ARI) discharge for the Guadalupe River at Hunt, Texas (Station 08165500). Extrapolate if necessary.



- (●) ~ 50 feet
- ( ) ~ 39 feet
- ( ) ~ 13 feet
- ( ) ~ 8 feet

15 Multiple Choice 2 points Question

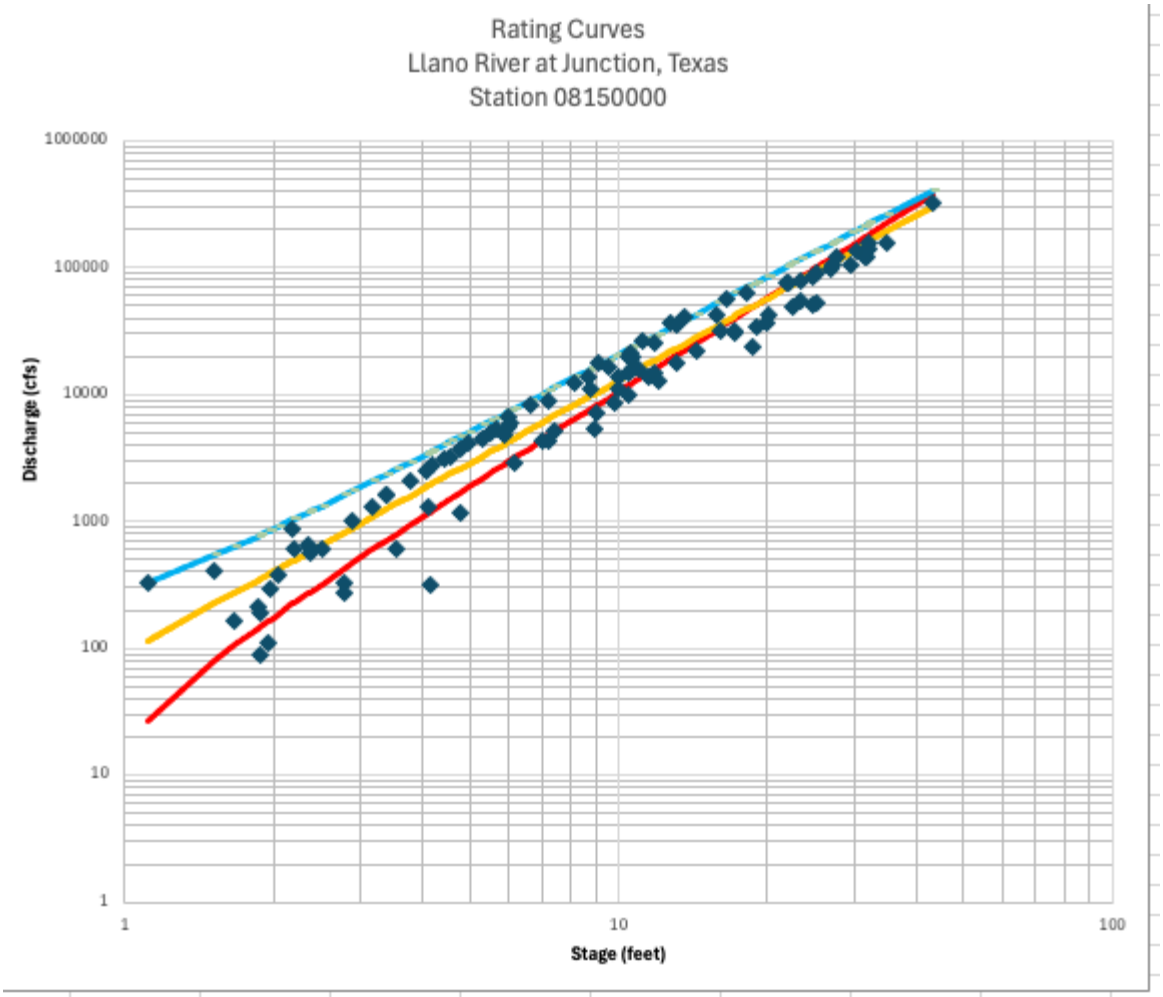
Using the "orange" rating curve below estimate the stage for the 1% AEP (100-yr ARI) discharge for the Llano River at Junction, Texas (Station 08150000). Extrapolate if necessary.



- [x] ~ 56 feet
- [ ] ~ 39 feet
- [ ] ~ 23 feet
- [ ] ~ 13 feet

16 Multiple Choice 4 points Question

Using the "orange" rating curve below estimate the stage for the .2% AEP (500-yr ARI) discharge for the Llano River at Junction, Texas (Station 08150000). Extrapolate if necessary.



- (●) ~ 71 feet
- ( ) ~ 56 feet
- ( ) ~ 39 feet
- ( ) ~ 23 feet

17 True or False 1 point Question

The observed stage at 18:00 on the Guadalupe River at Hunt, Texas was about 13-feet. This value is less than the anticipated stage for a 1% AEP (100-yr ARI) discharge based on a Bulletin 17C (station skew option) for that location.

- (●) True
- ( ) False

18 True or False 1 point Question

The observed stage at 06:00 on July 4, 2025 the Guadalupe River at Hunt, Texas was 37.52-feet. This was the last observation for several hours, as the gage failed during the catastrophic floods on that date. This value is greater than the anticipated stage for a 1% AEP (100-yr ARI) discharge based on a Bulletin 17C (station skew option) for that location.

- (●) True
- ( ) False

19 File Upload 4 points Question

! This question type cannot be printed

Upload the Flood Frequency curve (as a PDF, or PNG file) for the Llano River at Junction, Texas (Station 08150000) you generated using PeakFQ (or HEC-SSP)

Drag n' Drop here or Browse

20 File Upload 4 points Question

! This question type cannot be printed

Upload the Flood Frequency curve (as a PDF, or PNG file) for the Guadalupe River at Hunt, Texas (Station 08165500) you generated using PeakFQ (or HEC-SSP)

Drag n' Drop here or Browse

21 Multiple Choice 3 points Question

The rational runoff coefficient for a 300 X 200-meter property with a slope of 3% is 0.35. The rainfall intensity is 116 mm/hr. The peak discharge from this property is anticipated to be about

- (●) 2400 cubic meters per hour
- ( ) 2200 cubic meters per hour
- ( ) 3800 cubic meters per hour
- ( ) 7000 cubic meters per hour

22 Multiple Choice 1 point Question

A 3.2-inch storm is uniformly distributed over a 95 acre watershed. The NRCS Curve Number for the watershed is CN = 78. The anticipated watershed runoff is about

- (●) 10.0 acre-feet
- ( ) 8.0 acre-feet
- ( ) 11.0 acre-feet
- ( ) 9.0 acre-feet

23 Multiple Choice 1 point Question

A 3.5 acre drainage area receives a rainfall intensity of 0.5 in/hour; the peak runoff from the area is 500 gallons per minute. What is the runoff coefficient?

- (●) 0.64
- ( ) 0.11
- ( ) 0.31
- ( ) 0.86

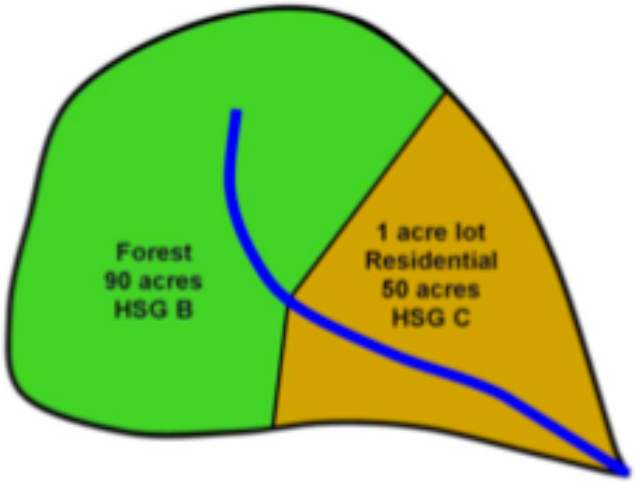
24 Multiple Choice 1 point Question

A residential lot of 0.37 acres contains a house that occupies 0.05 acres, and a driveway that covers 0.035 acres. The runoff coefficients are 0.50 for the undeveloped portions of the lot, 0.85 for the house, and 0.90 for the driveway. The peak discharge from the lot during a storm event with rainfall intensity of 0.5 inches per hour is

- (●) 0.110 cubic feet per second
- ( ) 0.085 cubic feet per second
- ( ) 0.250 cubic feet per second
- ( ) 0.320 cubic feet per second

25 Multiple Choice 2 points Question

The figure depicts a small watershed comprised of two distinct land cover types.



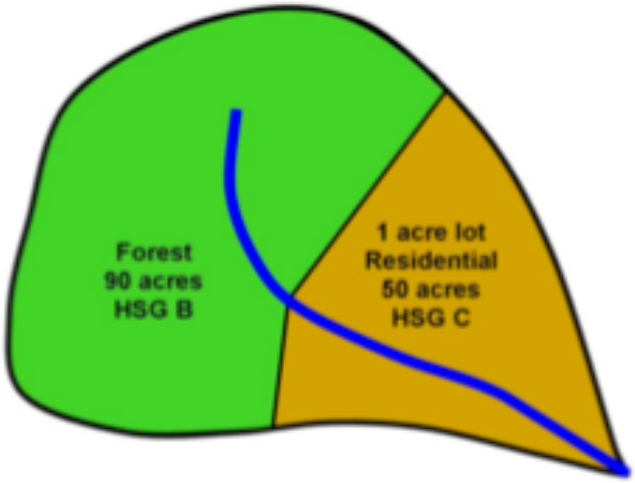
The forest portion has a flow path length of 360 feet, at an average slope of 0.01 (1%) until it reaches the residential portion whose path length is 430 feet, at an average slope of 0.005 (0.5%).

What is the best estimate of composite CN value for the watershed?

- 67
- 60
- 79
- 91

26 Multiple Choice 3 points Question

The figure depicts a small watershed comprised of two distinct land cover types.



The forest portion has a flow path length of 360 feet, at an average slope of 0.01 (1%) until it reaches the residential portion whose path length is 430 feet, at an average slope of 0.005 (0.5%).

What is the best estimate the time-of-concentration for the watershed using the NRCS-Upland method (Gupta pp. 718-720)?

- (●) 29 minutes
- ( ) 24 minutes
- ( ) 5 minutes
- ( ) 17 minutes

27 Multiple Choice 1 point Question

What is a synthetic unit hydrograph?

- (●) A unit hydrograph estimated using empirical equations and watershed characteristics.
- ( ) A unit hydrograph derived directly from observed rainfall-runoff data.
- ( ) A hydrograph that measures both rainfall and runoff over a synthetic watershed.
- ( ) A hydrograph that uses only temperature and humidity data to predict runoff.

28 Multiple Choice 1 point Question

Which of the following parameters is typically used to construct a synthetic unit hydrograph?

- (●) Watershed area, time of concentration, and peak discharge.
- ( ) Soil moisture and groundwater levels.
- ( ) Evaporation rates and relative humidity.
- ( ) Daily rainfall totals for the region.

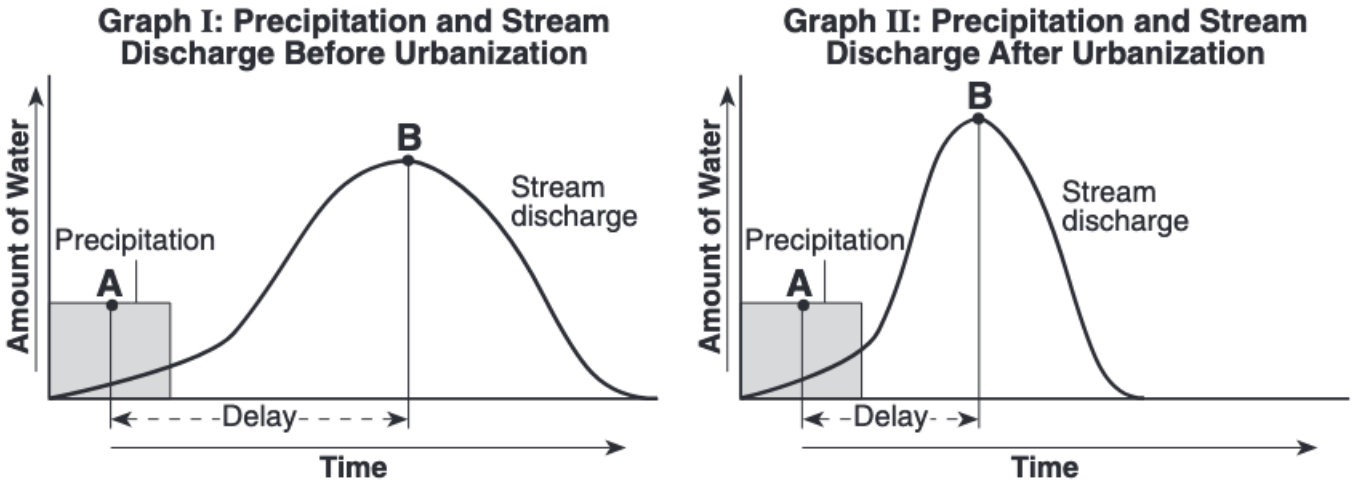
29 Multiple Choice 1 point Question

In Snyder's Synthetic Unit Hydrograph method, which factor represents the lag time between the centroid of rainfall and the peak of the hydrograph?

- (●) Basin lag coefficient.
- ( ) Peak discharge coefficient.
- ( ) Runoff coefficient.
- ( ) Time of concentration.

30 Matching 4 points Question

Consider the two graphs below which show the relationship between the amount of rainfall during a storm and the amount of discharge in a nearby stream. Letter A represents the time when approximately 50\% of the precipitation from the storm has fallen. Letter B represents the time when peak runoff from the storm is flowing in the stream. The delay is the difference in time between letters A and B on the graph. Graph I shows data before urbanization in an area. Graph II shows data after urbanization in the same area.



What is a likely explanation for the delay time between points A and B?	Travel time from various points
How did urbanization affect the delay time between points A and B?	Decreased travel time from var
How did urbanization affect the maximum stream discharge?	Increased peak discharge value

Possible answers

- Travel time from various points in the watershed to the outlet
- Decreased travel time from various points in the watershed to the outlet; caused by channelization and increased impervious fraction.
- Increased peak discharge value; reduced hydrograph duration
- Seasonal effect of changing daylight duration
- Increased travel time from various points in the watershed to the outlet; caused by infiltration and decreased impervious fraction.

Increased peak discharge value; increased hydrograph duration

Decreased peak discharge value; reduced hydrograph duration

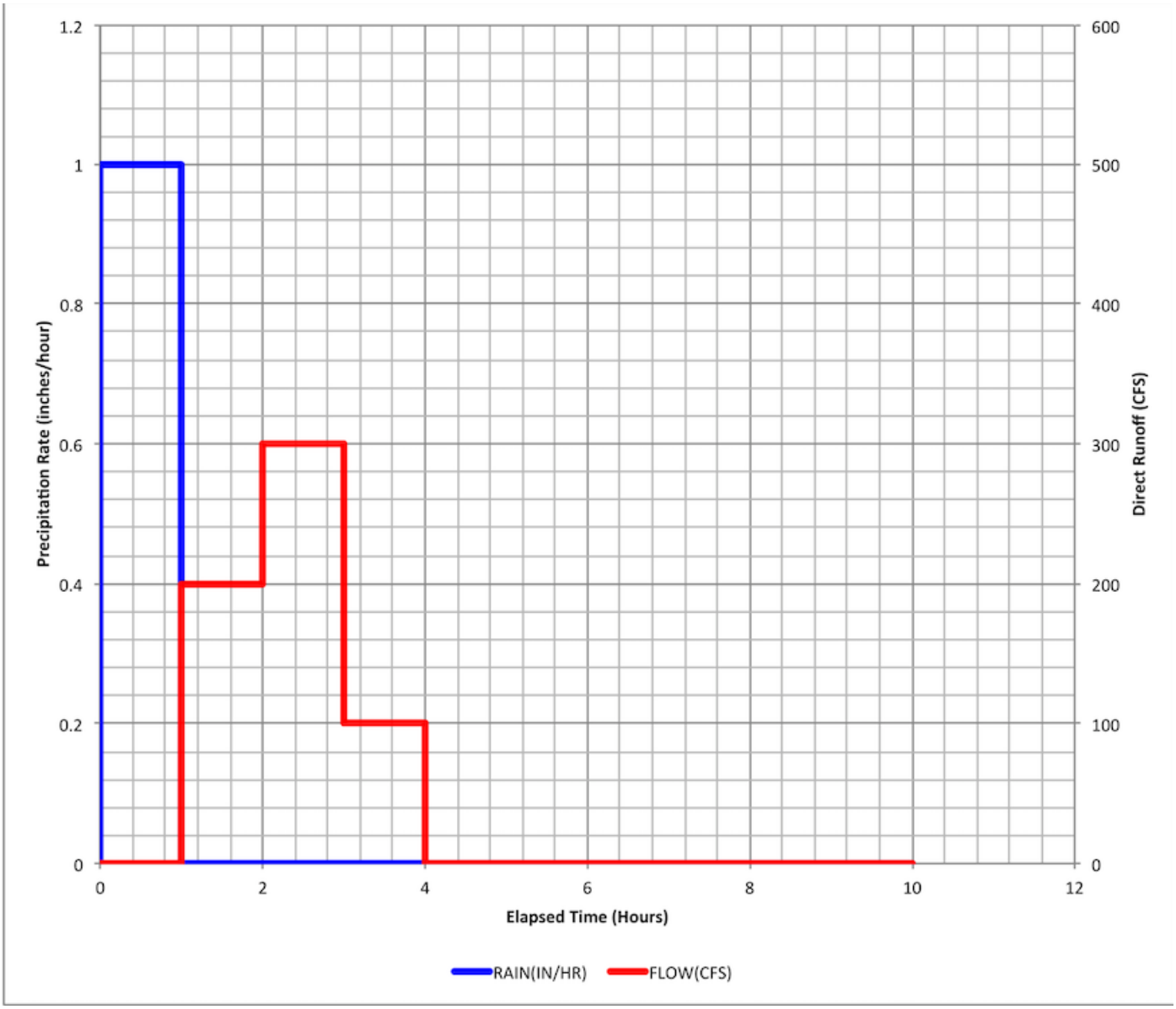
31 Multiple Choice 1 point Question

What is excess precipitation?

- (●) The amount of runoff that is produced from a watershed.
- ( ) The amount of precipitation that falls upon a watershed.
- ( ) The equivalent depth of uniformly distributed precipitation.
- ( ) A record of rainfall rates (inches/hour) versus time.

32 Multiple Choice 2 points Question

The figure is the unit-hydrograph response for a watershed to a 1-hour long excess rainfall event of intensity equal to 1-inch/hour.

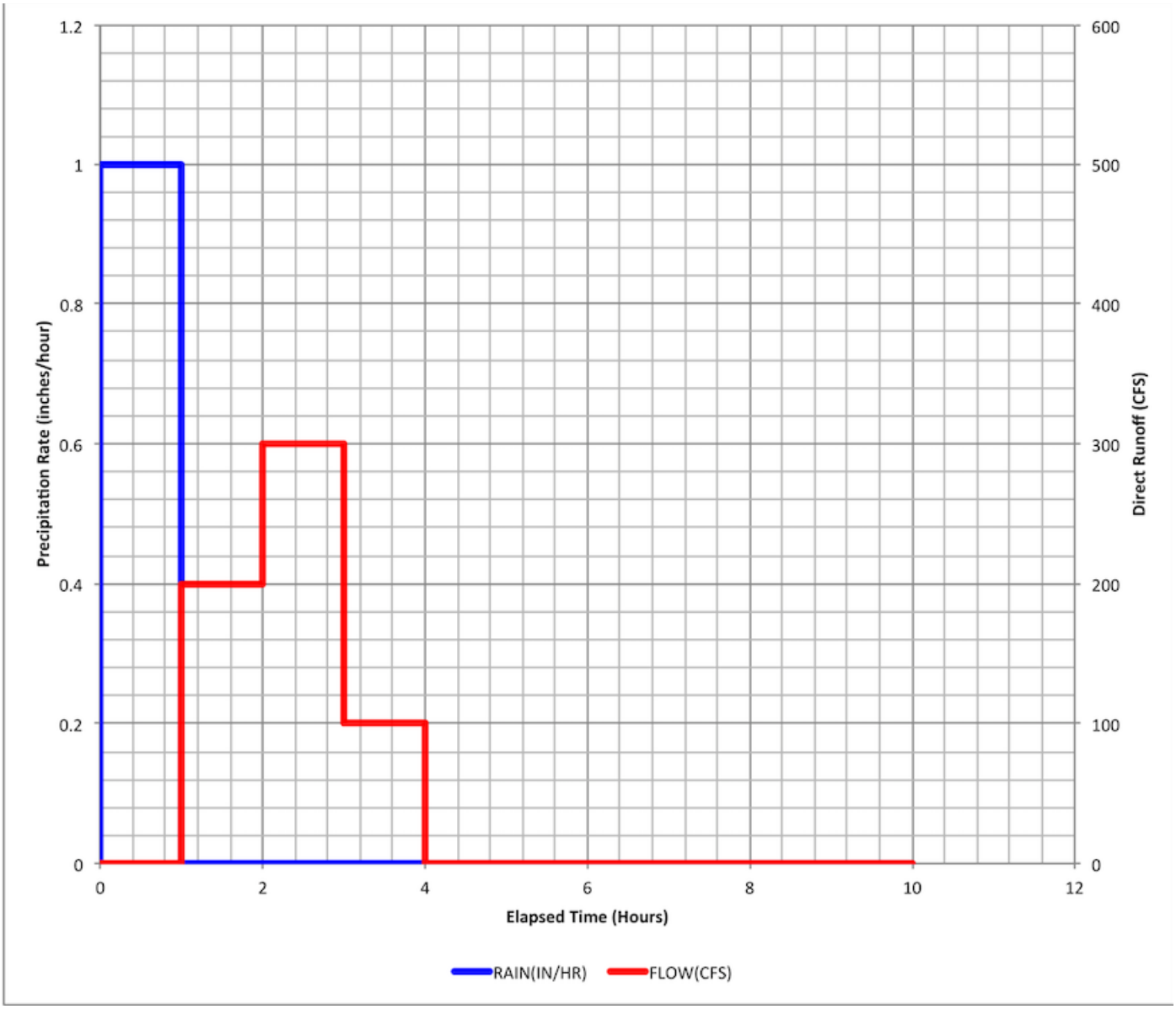


What is the maximum discharge in cubic feet per second indicated by the unit hydrograph?

- 300
- 200
- 100
- 600

33 Multiple Choice 2 points Question

The figure is the unit-hydrograph response for a watershed to a 1-hour long excess rainfall event of intensity equal to 1-inch/hour.

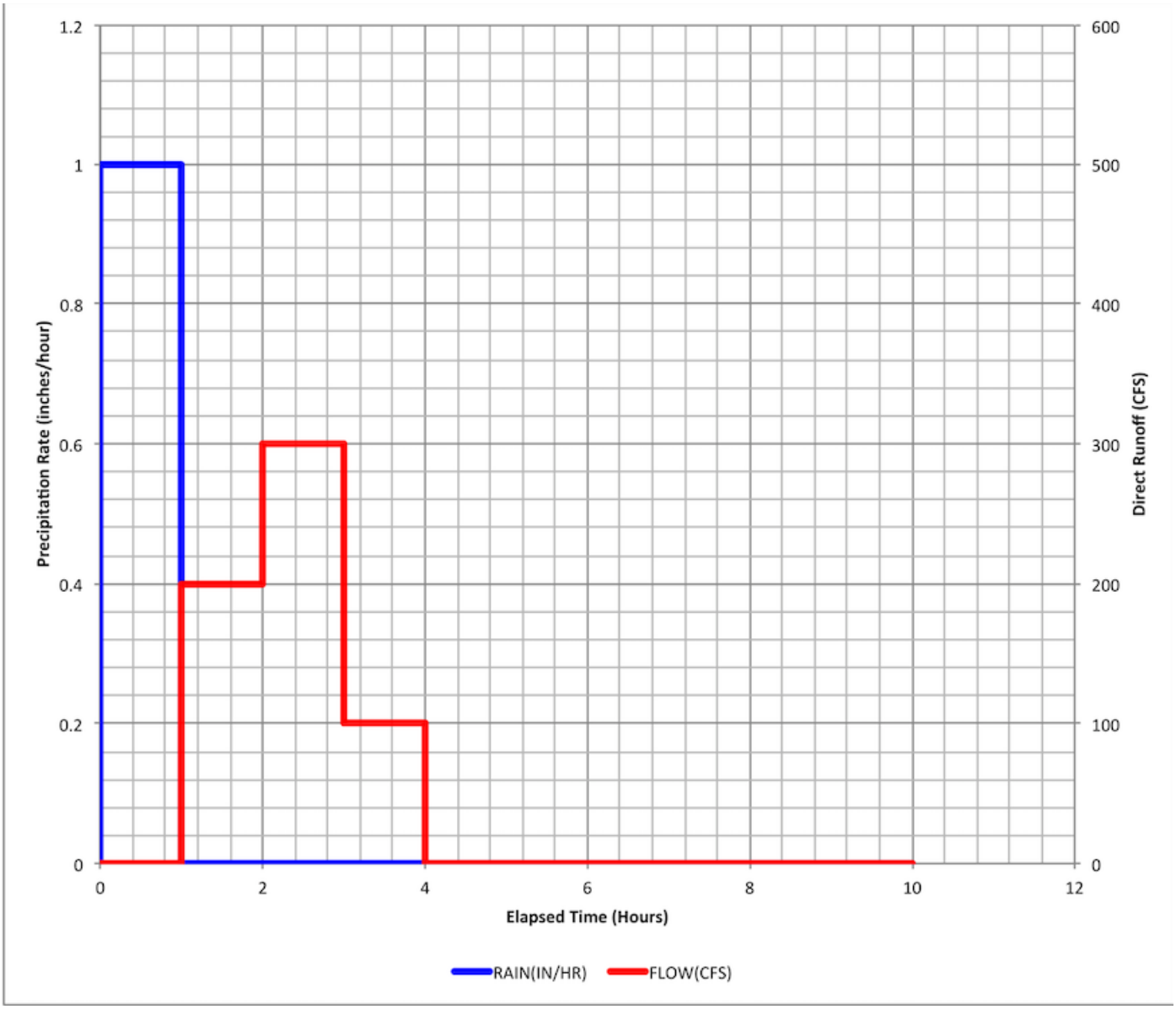


What is the total volume in cubic feet of runoff depicted by the unit hydrograph?

- 2,160,000 cubic feet
- 4,320,000 cubic feet
- 2,880,000 cubic feet
- 1,080,000 cubic feet

34 Multiple Choice 1 point Question

The figure is the unit-hydrograph response for a watershed to a 1-hour long excess rainfall event of intensity equal to 1-inch/hour.

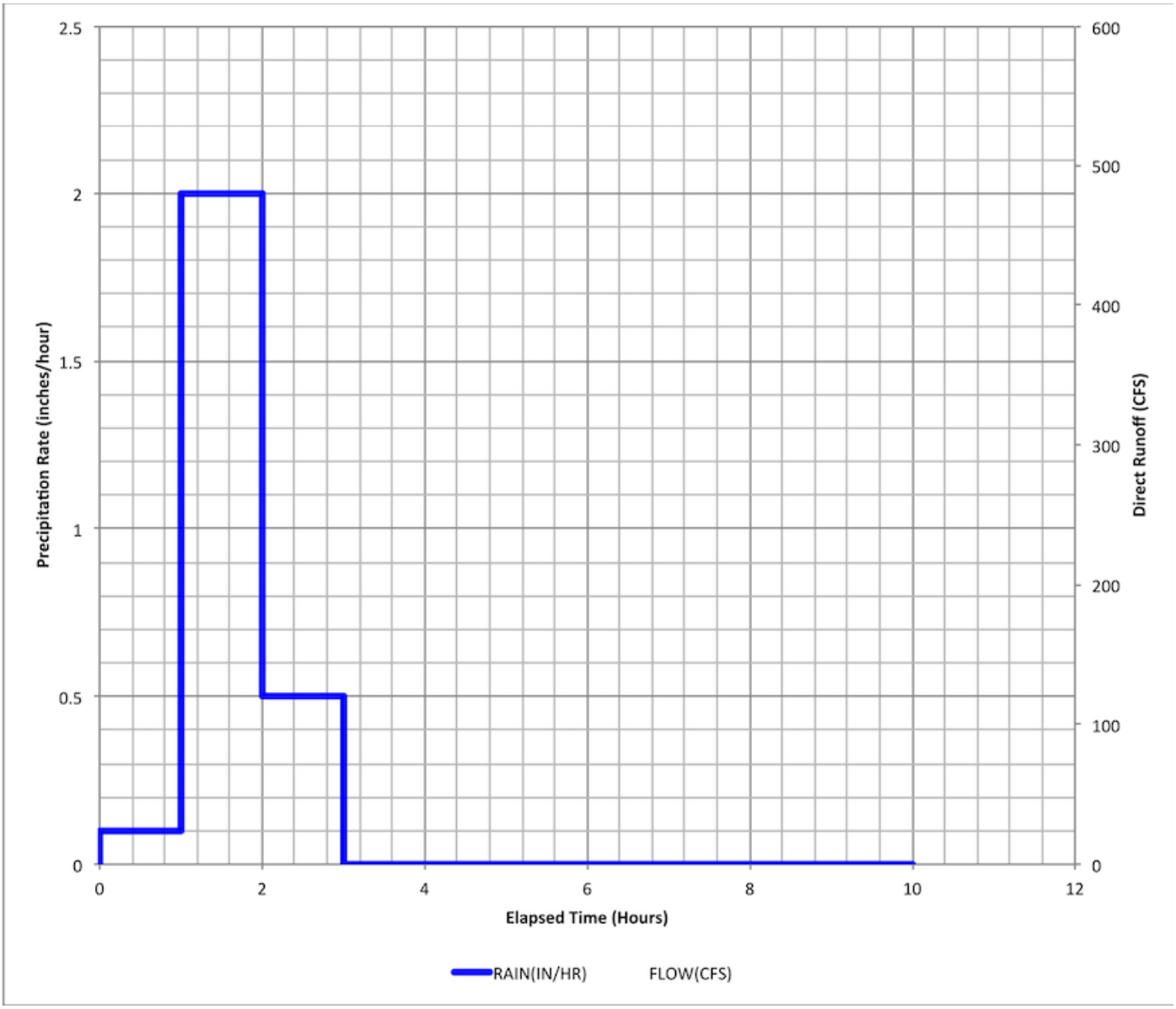


What is the watershed area in square miles for this unit hydrograph?

- 0.93 sq.mi.
- 2.16 sq.mi.
- 1.29 sq. mi.
- 4.36 sq. mi.

35 Multiple Choice 1 point Question

Now consider the excess precipitation (storm) depicted below

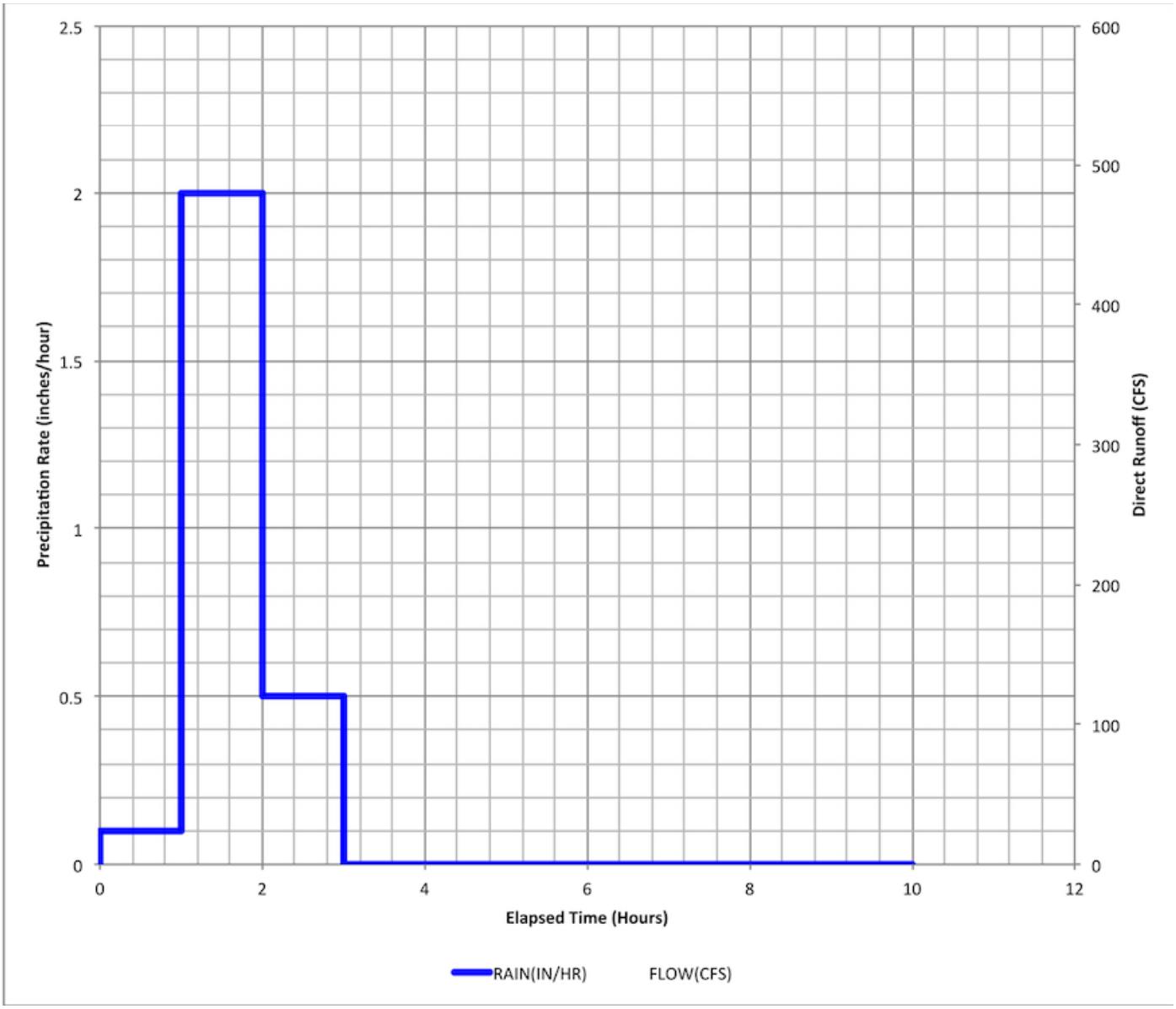


What is the best estimate of total runoff volume in cubic feet?

- (●) 5,616,000 cubic feet
- ( ) 2,616,000 cubic feet
- ( ) 2,160,000 cubic feet
- ( ) 1,080,000 cubic feet

36 File Upload 10 points Question

! This question type cannot be printed



Plot the watershed direct response to the 3 consecutive 1-hour excess precipitation events above

Drag n' Drop here or Browse

37 Multiple Choice 1 point Question

Based on the plot what is the best estimate of peak discharge from the storm?

- 710 cubic feet per second
- 430 cubic feet per second
- 600 cubic feet per second
- 350 cubic feet per second

38 Multiple Choice 1 point Question

Based on the plot when does this peak occur?

- Hour 3 to Hour 4
- Hour 1 to Hour 2
- Hour 2 to Hour 3
- Hour 5 to Hour 5

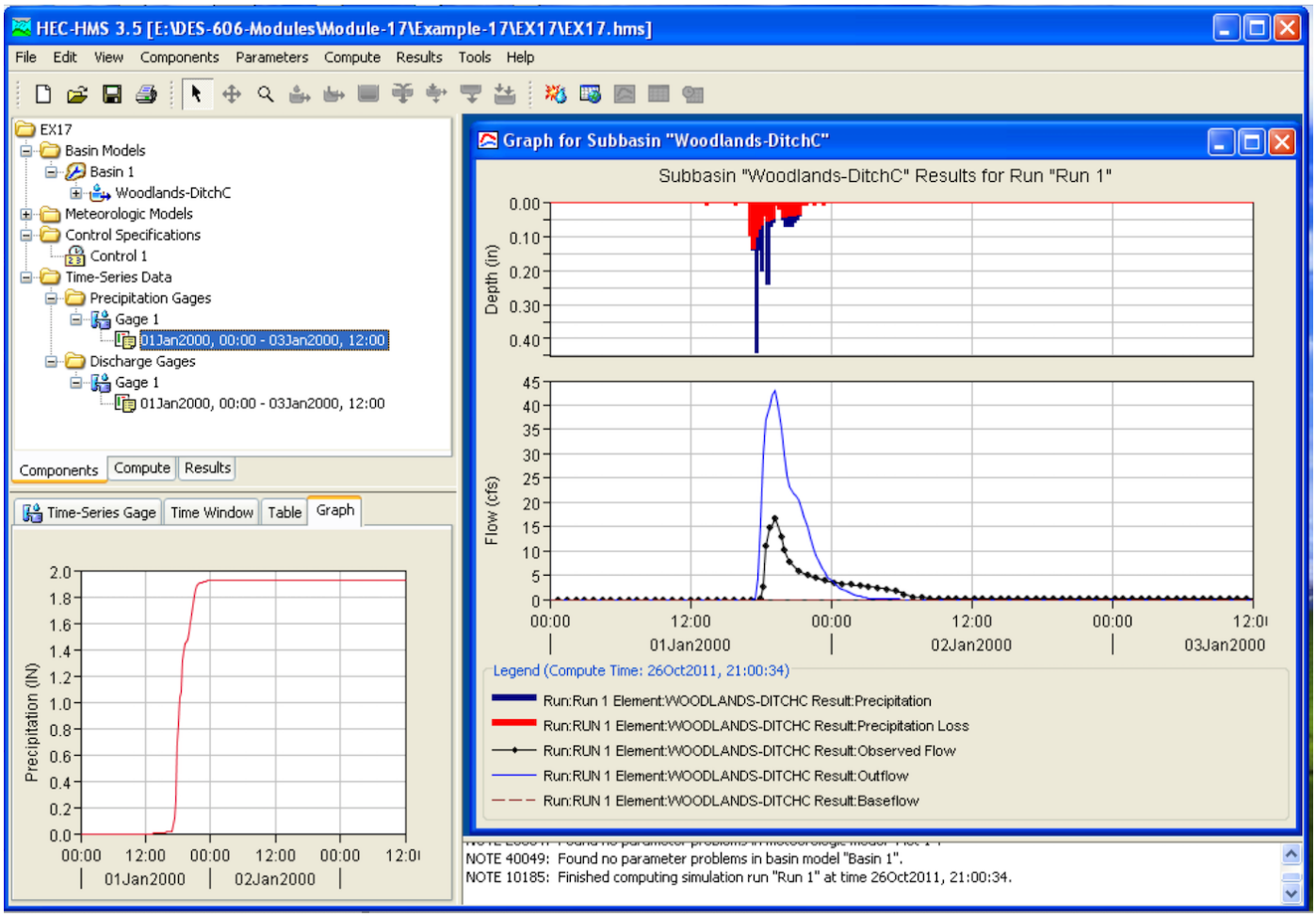
39 Multiple Choice 1 point Question

What is one advantage of using a synthetic unit hydrograph over an observed unit hydrograph?

- It can be applied to ungauged watersheds where no direct runoff data is available.
- It requires extensive streamflow data from multiple storm events.
- It eliminates the need for watershed parameterization.
- It provides a more accurate prediction of runoff for every storm event.

40 Multiple Choice 1 point Question

The figure is a screen capture of a HEC-HMS model run.

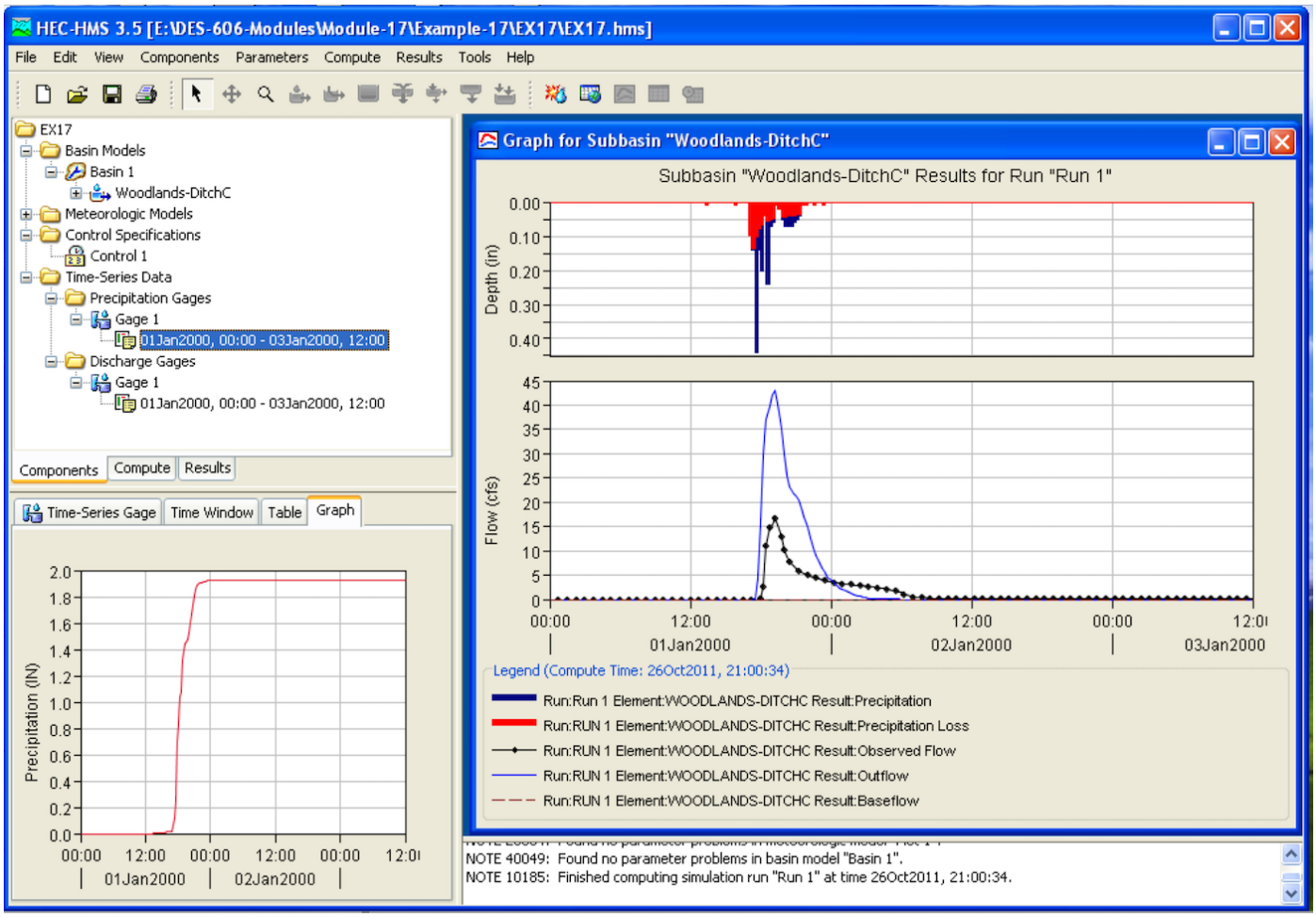


What is the best estimate of total **RAW** input precipitation for the Woodlands-DitchC sub-basin?

- (●) 1.9 inches
- ( ) 0.5 inches
- ( ) 19 cubic feet per second
- ( ) 44 cubic feet per second

41 Multiple Choice 1 point Question

The figure is a screen capture of a HEC-HMS run

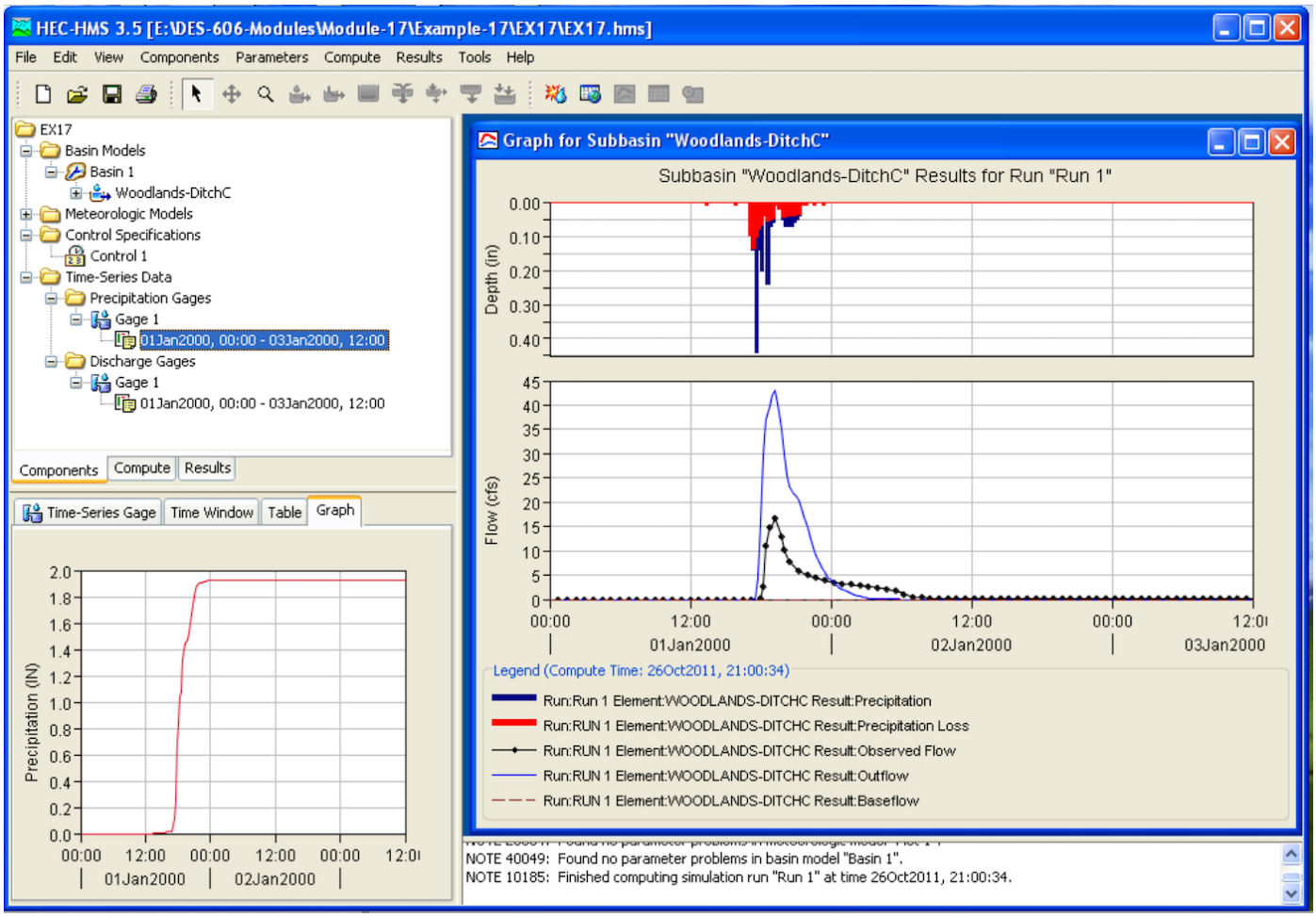


What is the best estimate of the total **EXCESS** precipitation for the Woodlands-DitchC sub-basin?

- (●) 0.5 inches
- ( ) 1.9 inches
- ( ) 44 cubic feet per second
- ( ) 19 cubic feet per second

42 Multiple Choice 1 point Question

The figure is a screen capture of a HEC-HMS model run.

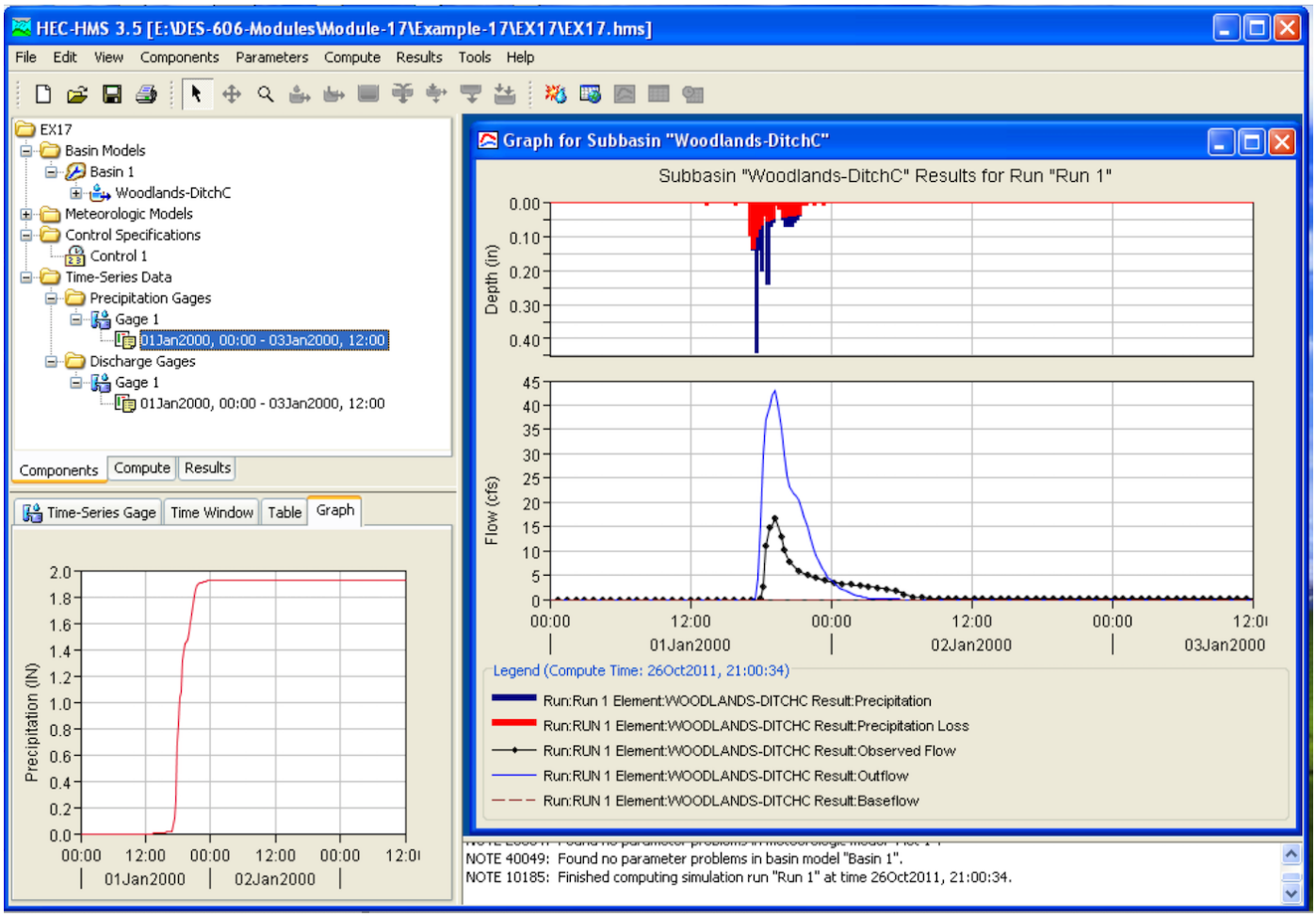


What is the best estimate of the **OBSERVED** peak discharge for the Woodlands-DitchC sub-basin?

- (●) 19 cubic feet per second
- ( ) 44 cubic feet per second
- ( ) 0.5 inches
- ( ) 1.9 inches

43 Multiple Choice 1 point Question

The figure is a screen capture of a HEC-HMS model run.

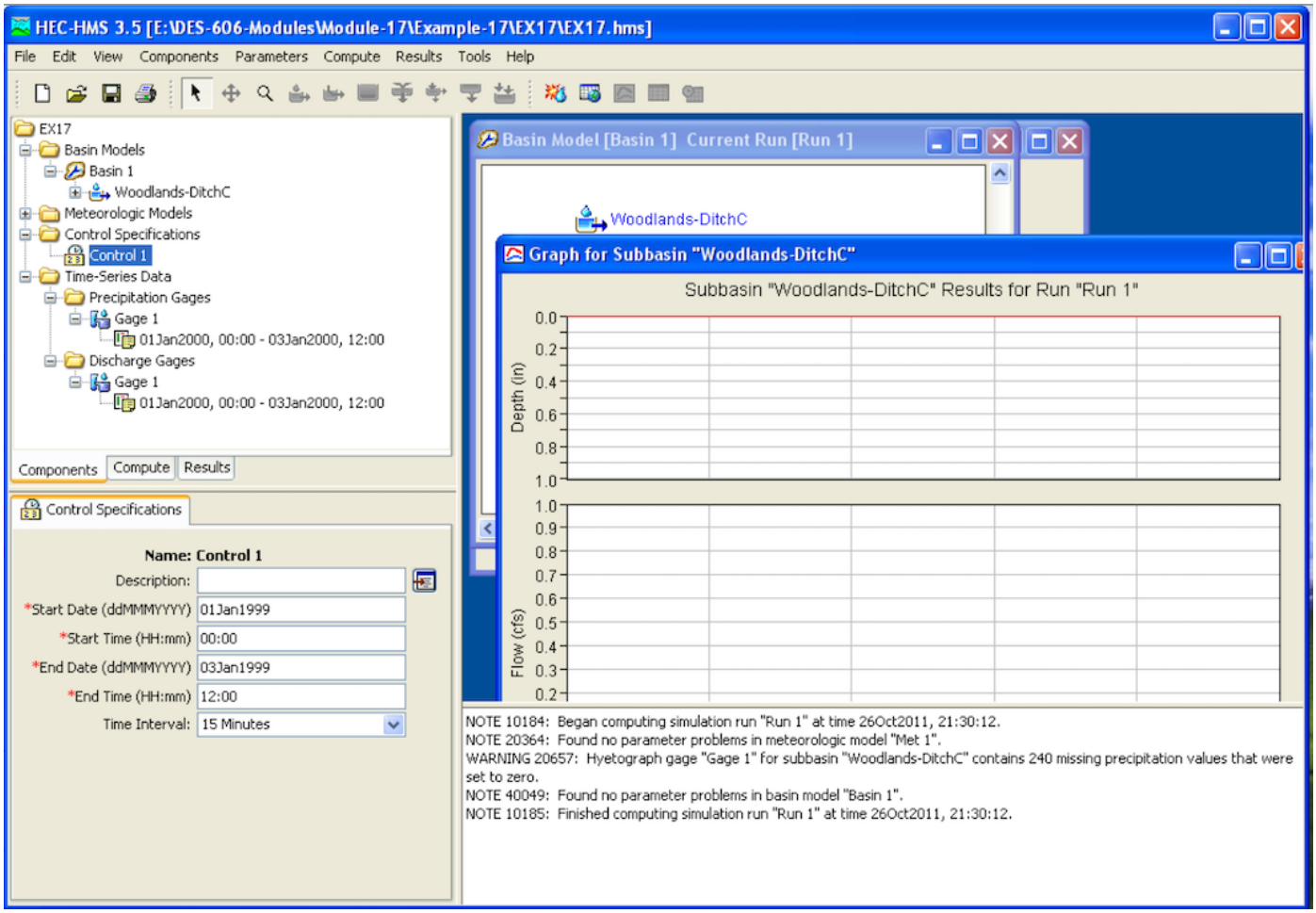


What is the best estimate of the **COMPUTED** peak discharge for the Woodlands-DitchC sub-basin?

- (●) 44 cubic feet per second
- ( ) 19 cubic feet per second
- ( ) 1.9 inches
- ( ) 0.5 inches

44 Essay 1 point Question

The figure is a screen capture of a HEC-HMS run.



The model appears to have successfully run, but when the output graph is selected there in no hyetograph nor hydrograph displayed. What is a likely explaination for the unanticipated output?

45 Multiple Choice 1 point Question

What is the best estimate of curve number (CN) for the Woodlands-DitchC sub-basin?

- (●) 81
- ( ) 69
- ( ) 58
- ( ) 93