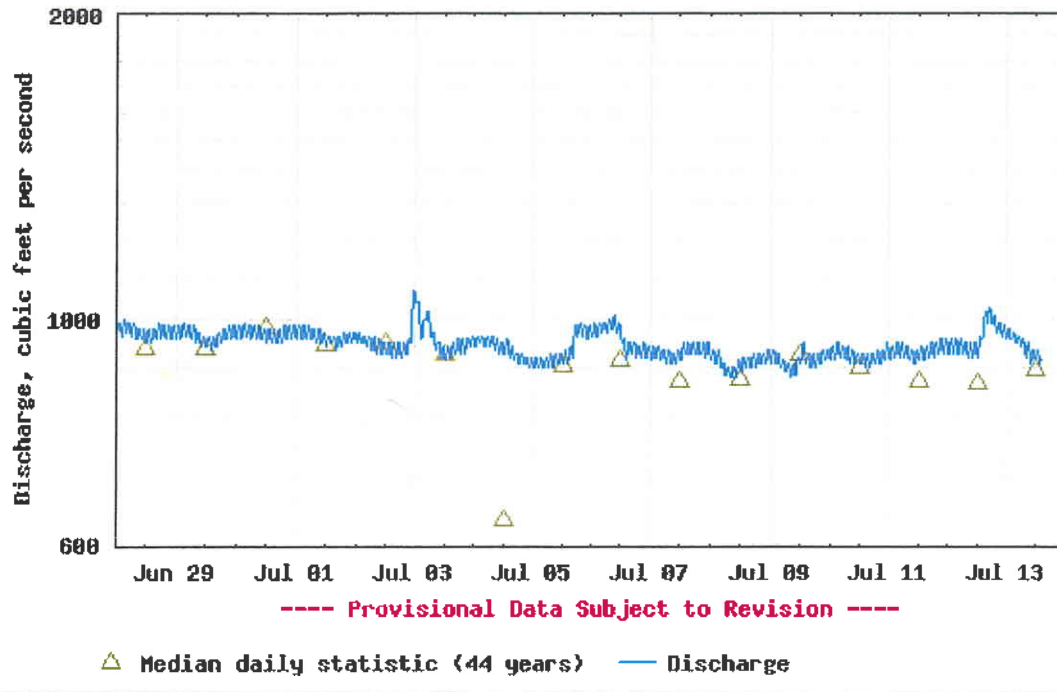


### USGS 02060500 ROANOKE RIVER AT ALTAVISTA, VA



Outflows from the Leesville Project attenuate rapidly as they progress downstream. With a peak flow of 4500 cfs for 18 minutes every two hours at the dam, flows are reduced to 1092 cfs at Cross Section 19.89, just 3 miles downstream. They further attenuate to 913 cfs reaching Alta Vista (Station 28.26). The model results are shown in Table 1.

The model was then run assuming a station operation every hour for 9 minutes (0.15 hours). The results show similar attenuation in flows. At Cross Section 19.89, flows are reduced to 1348 cfs. At Alta Vista, Cross Section 28.26, the flows peak at 1169 cfs.

Simulations were also done using similar release times but with a flow of 2250 cfs. This flow release approximates a constant minimum flow of 350 cfs. With a flow release of 2250 cfs each hour for 9 minutes, the peak flow at Section 19.89 was noted to be 760 cfs. The section hydrograph shows some pulsing of flows but over a fairly narrow range (720-760 cfs). This is substantially reduced as you move further downstream. At Alta Vista, the peak flow was noted to be 735 cfs.

At a release of 2250 cfs every two hours for 18 minutes, the model results show a higher peak flow with greater hourly fluctuations. The peak flow at Station 19.89 was computed to be 904 cfs with fluctuations ranging from 680 cfs to 904 cfs. Similar to the other simulations, this is reduced as the wave travels downstream. At Alta Vista, the peak was noted to be 856 cfs.

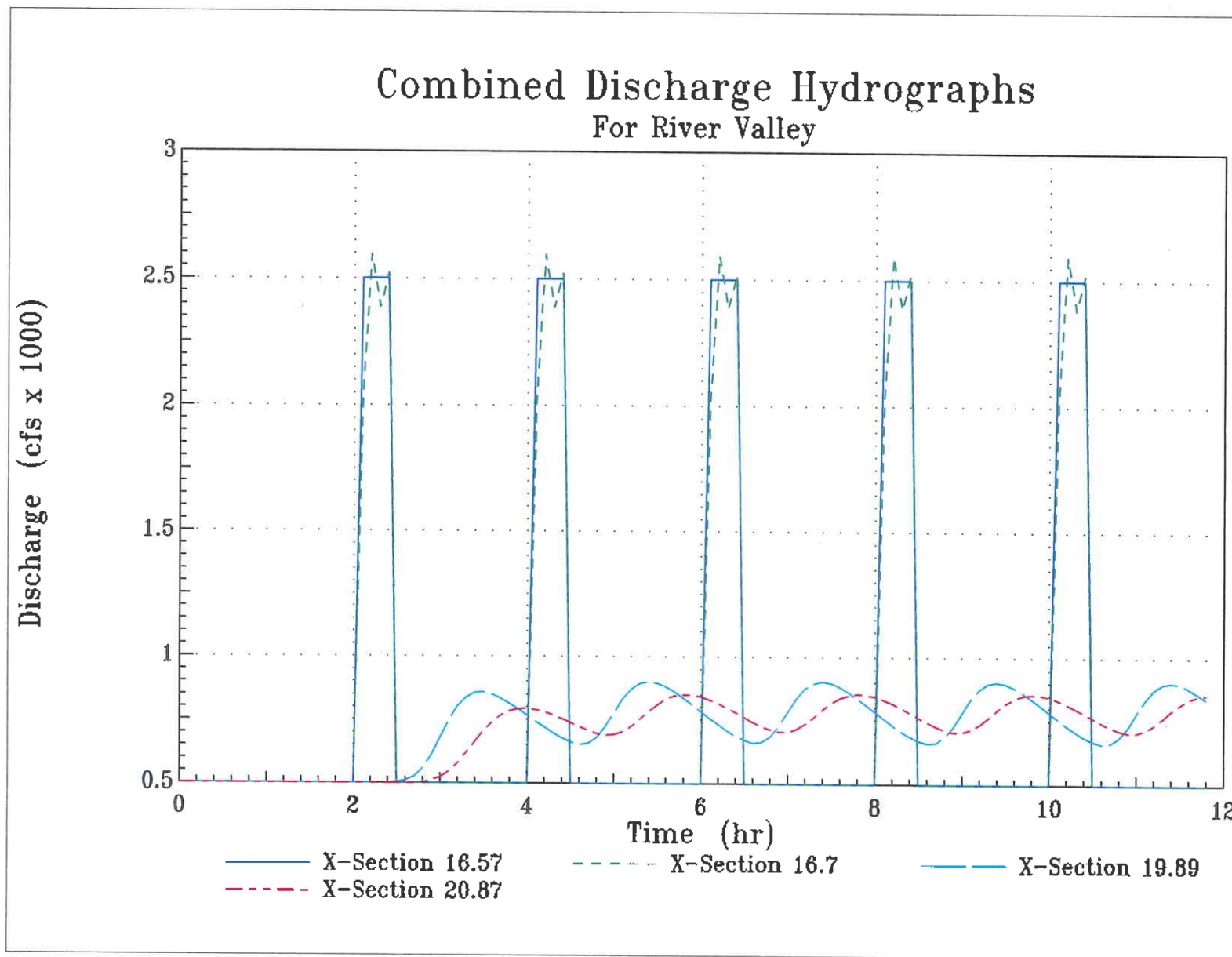
### Peak Flows

| Station               | Existing Conditions<br>4500 cfs every 2 hrs for<br>18 minutes | 4500 cfs each hour<br>9 minutes | 2250 cfs each hour<br>for 9 minutes |
|-----------------------|---|---------------------------------|-------------------------------------|
| 16.57 – Leesville     | 4500  | 4500                            | 2250                                |
| 17.7                  | 1972  | 1961                            | 970                                 |
| 19.89                 | 1092  | 1348                            | 762                                 |
| 20.89                 | 1022  | 1309                            | 751                                 |
| 28.26 – Alta<br>Vista | 913   | 1169                            | 735                                 |

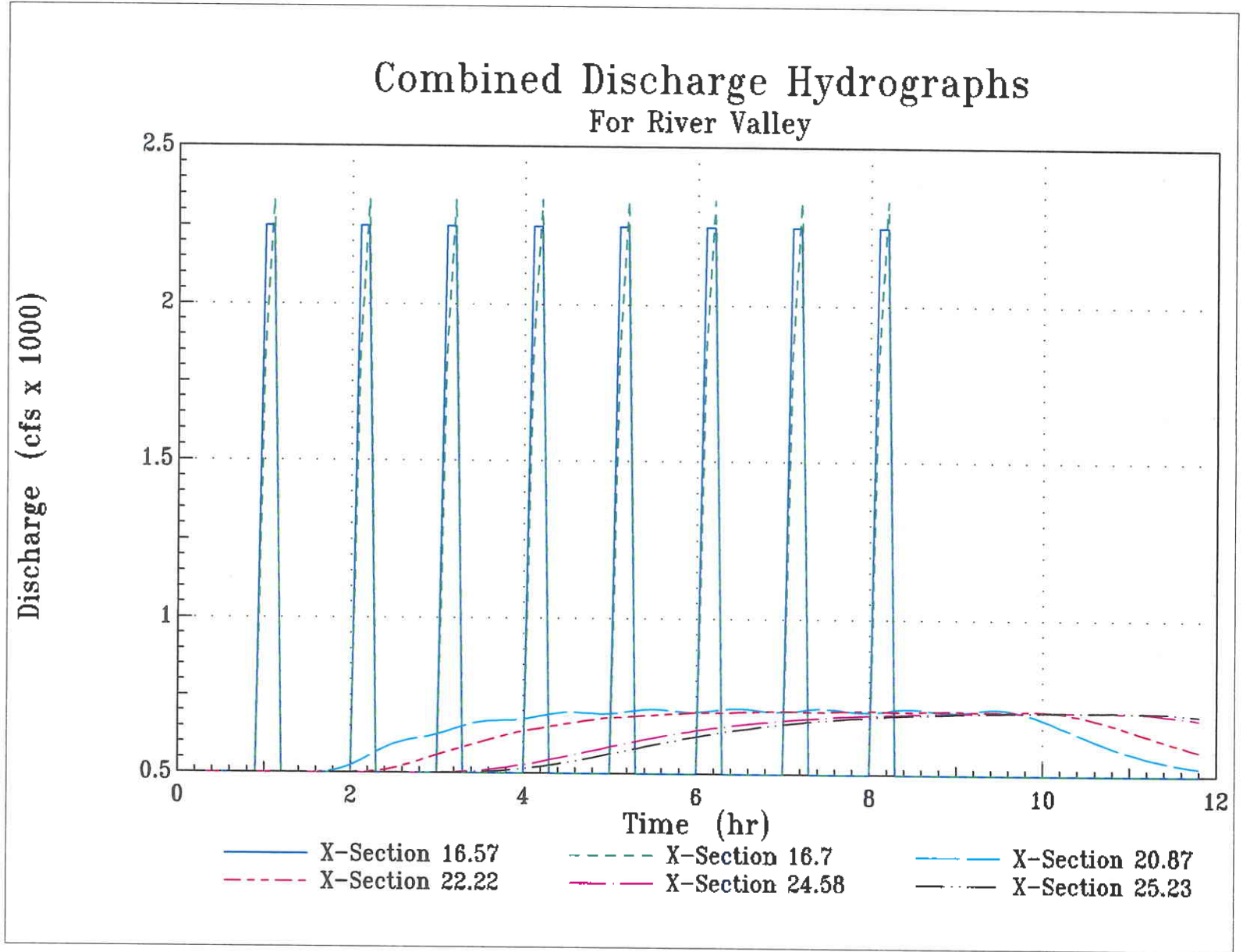
For existing conditions (4500 cfs every two hours for 18 minutes), at Station 19.89, the flows oscillated from approximately 800 to 1100 cfs. At Alta Vista, the flows had stabilized and showed little fluctuations. Reducing this to 4500 cfs for 9 minutes every hour showed a similar pattern. At Station 19.89, the flows would oscillate from 1200 to 1348 cfs. At Alta Vista, the flow was uniform at 1169 cfs. The following table summarizes the expected fluctuations at selected cross sections in the downstream of Leesville Dam to Alta Vista.

### Computed Flow Fluctuation in CFS

| Station | Existing Conditions<br>4500 cfs every<br>2 hrs for 18<br>minutes | 4500 cfs each<br>hour<br>9 minutes | 2250 cfs each<br>hour for 9<br>minutes |
|---------|--|------------------------------------|--|
| 16.57   | 50-4500  | 50-4500                            | 50-2250                                |
| 19.89   | 800-1100   | 1200-1350                          | 700-730                                |
| 20.89   | 800-1010   | 1260-1320                          | None                                   |
| 22.22   | 860-960  | 1280-1300                          |  |
| 24.58   | 910-940  | None                               |  |
| 28.26   | None   |                                    |  |



4,500 cfs Discharge for 18 minutes every two hours



4,500 cfs Discharge for 9 minutes every hour