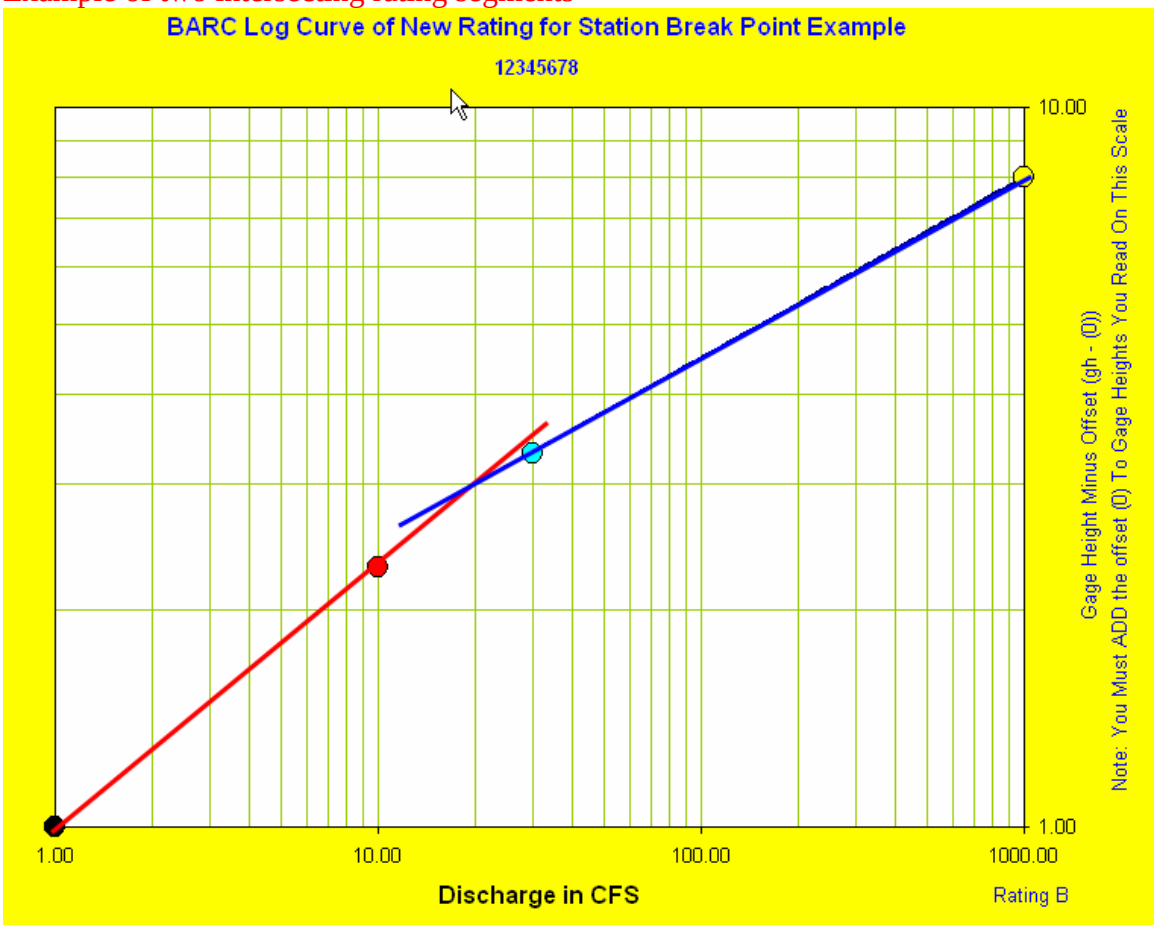
Exercise 8—Rating Curve Development, Multiple Offsets with Transition Zones

- Use results from Exercise 7 to develop a rating that transitions smoothly between rating segments. **BARC uses a single breakpoint to differentiate between rating segments. This will not be adequate for a real rating**. Real ratings will transition between segments as one control gradually gives way to another.

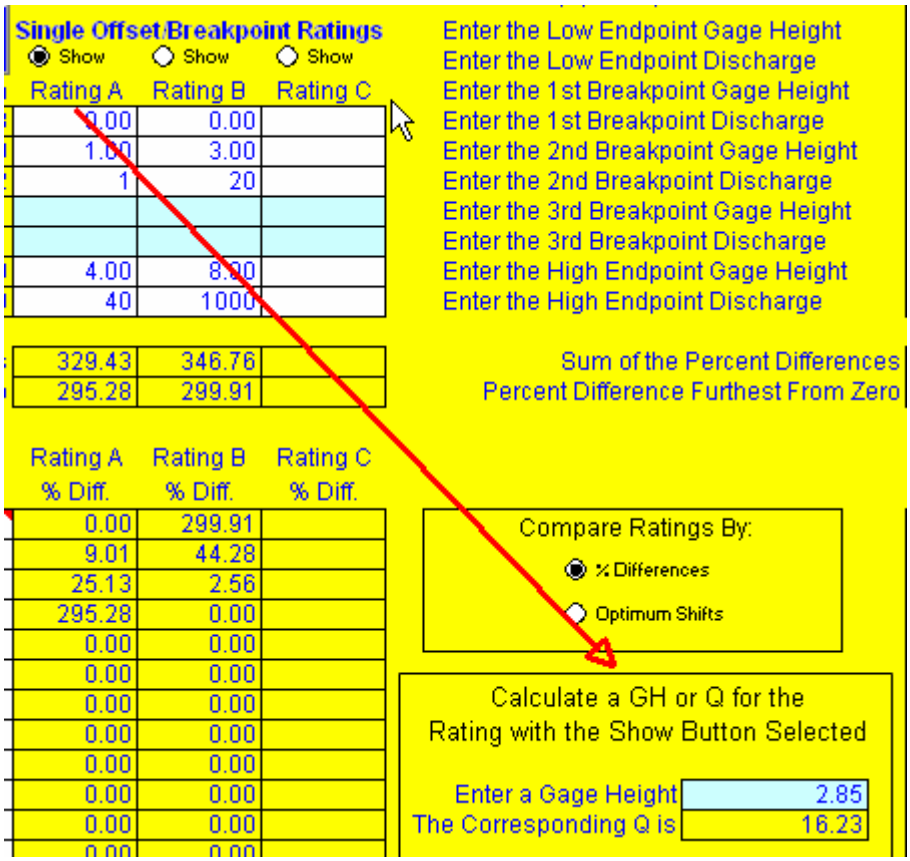
Recommended procedure:

1. Use BARC to determine the discharge associated with various gage heights for your two single-offset ratings from Exercise 7. These will be ratings B and C in BARC. Find the gage height where both rating segments give the same discharge. This will require several iterations where you will have to change the gage height in BARC's computational window and switch back and forth between Ratings B and C to determine where both ratings give approximately the same discharge for a single gage height. (see images, below).

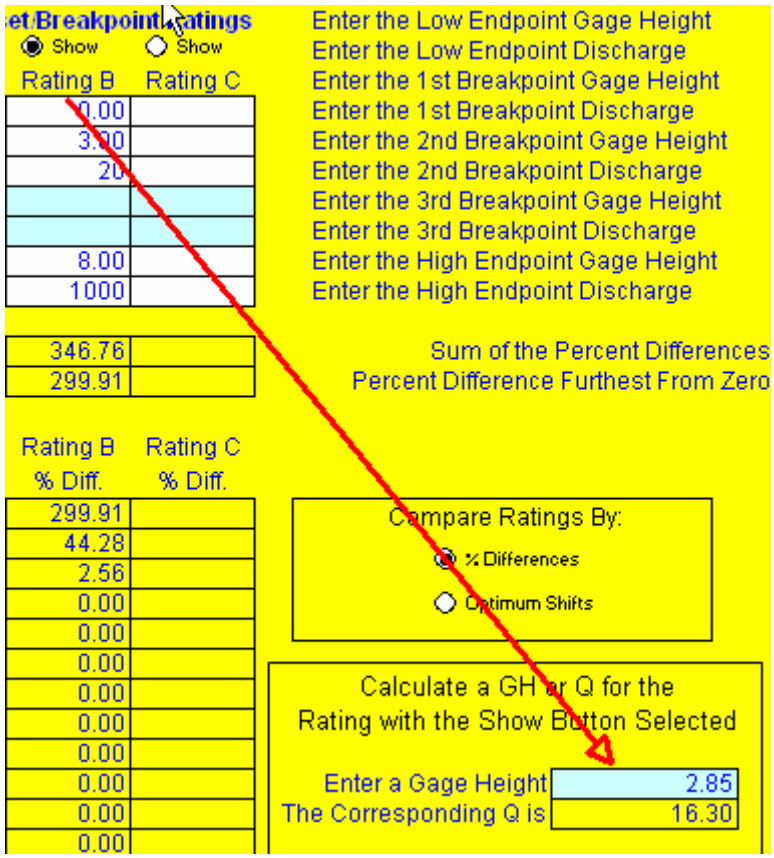
Example of two intersecting rating segments



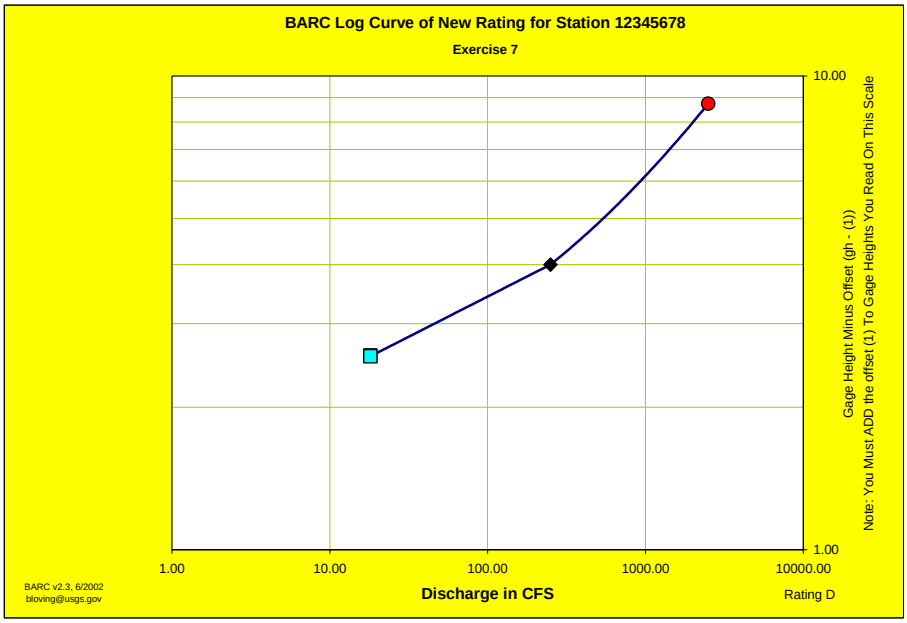
Example of output from BARC's calculation window for lower rating segment.



Example of output from BARC's calculation window for upper segment. After several trial-and-error iterations it was found that the two rating segments intersect at about a gage height of 2.85 feet.



2. This common gage height will be the point where the two equations intersect. Note that as you toggle the "show" radio button between ratings "B" and "C", BARC calculates discharge for that rating and provides that information in the calculated discharge.
3. Using the attached graph paper, draw a temporary 3-point rating using the lower end point from the lower curve (Rating B), the point you just determined where ratings B and C give the same value, and the upper end point of the upper curve. You should have a rating that looks something like the figure below.



4. Using the points you plotted on the graph paper, develop a **smooth curve** that transitions between the two rating segments. You will want to smooth the curve in the vicinity of the mid-point.
5. You will need to plot several points along the upper segment of the rating because that segment will not be straightened using the single offset, which you used to straighten the lower segment of the rating.
6. Fill out the table below showing the difference in discharge per 0.1 foot increase in stage through the transition zone between the upper and lower rating segments. Differences should increase smoothly. If they don't, re-plot your transition curve.

NOTE: When you develop ratings you will always want one rating segment to transition smoothly to another. This will require entering multiple input points so that that ADAPS knows what the discharge is for a given gage height through transition zones. You cannot adequately represent breaks in ratings using single input points. Using a french, or ship curve, will help you draw a smooth transition curve between rating segments.

Mill Brook near Dunraven, N.Y.		
G.H.	Q	Difference per 0.1 foot increase in gage height
4.5		
4.6		
4.7		
4.8		
4.9		
5.0		
5.1		
5.2		
5.3		
5.4		
5.5		
5.6		
5.7		