

## **7Q10 for High Flows on the Columbia/Snake Rivers**

During very large natural runoff events, the resulting high river flows make it impossible for dam operators to abate dissolved gas. Washington's water quality standards (wqs) exempt these occurrences, since they are of natural origin and occur relatively infrequently. The typical criterion for expressing the wqs exemption is called the 7Q10, which is the average peak annual flow for seven consecutive days that has a recurrence interval of ten years. A *minimum* 7Q10 is used in the water quality permit arena to designate a minimum flow to which permit conditions apply. However, for dissolved gas standards, the maximum 7Q10 is used.

### **Guidelines for Arriving at 7Q10**

To come up with the 7Q10 number:

- Use observed flow data from water year 1974 to the present. 1974 is the year when the last major storage reservoir was built in the Columbia River Basin. If not available, make reasonable calculations based on an approved 7Q10 for up-river or down-river locations. Reasonable could mean calculations based on a 7Q10 for an up-river or down-river dam. Be sure to include total river flow.
- May extend period of record by including modeled or transformed data prior to 1974 that represents the current condition of the basin with all dams in place. If this is done, be sure to compare results of using data from the observed period of record (1974 to the present) with the results of using the data from the extended period of record. This is a check to see if the proposed method for extending the period of record gives results that are in the right ballpark.
- To the extent possible, take into account any trends or anticipation of changes in flows for the future.
- Use daily average flows to calculate the 7Q10.
- Determine the highest 7-consecutive-day average peak flow for each year.
- Use standard hydrology methods for calculating frequency/return interval. (For details about calculating frequency, may refer to USGS bulletin 17B, *Guidelines for Determining Flood Flow Frequency* or any standard hydrology textbook).
- Document methods of calculating 7Q10 including assumptions about data, current trends, anticipated changes, quality assurance, methods of measurement, methods of transforming historic data.
- Check for consistency with 7Q10 values for other dams.

### **Determining Design Spill**

The following is suggested for arriving at the design spill. The goal is to arrive at likely spill during a high flow period. The ability to sell power is the prime determinant of the powerhouse flow, and hence spill, in these high flow situations. The months of May and June 1997, flows were high and the river operations and power marketing were done with water quality in mind.

- To determine your design spill for gas abatement purposes, look at May and June 1997 hourly data to see what you were actually spilling during total river flow close to the 7Q10 value. Include documentation to support design spill.

Please send your 7Q10 and powerhouse flow calculations and documentation to Ecology concurrent with year-end reports, by February 27, 2000.