

APPENDIX C

Selecting Feed Water Nitrate Concentrations for Microcosm Studies

In order to achieve the best simulation of the Occoquan Reservoir, three principal issues were considered in making up feed water:

- (1) The nitrate concentrations in the feed water should represent the nitrate concentrations in the reservoir at the beginning of the section being simulated;
- (2) The feed water should be made from the natural waters, not from laboratory reagents;
- (3) Lastly, the concentration levels should be accurately and manageably measurable for a practical purpose.

Experiment 1, 2, 3, 4, and 5 were simulations of the reservoir beginning at Bull Run marina. In order to satisfy with the first concern, the 1982-2000 nitrate concentrations recorded by OWML at Bull Run marina were examined. The median nitrate concentration during that period was 4.16 mg/L as NO_3^- -N. Therefore, it was concluded that a nitrate concentration between 4 - 5 mg/L as NO_3^- -N should be representative of the reservoir average condition. A value of 5 mg/L as NO_3^- -N was selected because it is also the concentration at which the UOSA WRF must begin to remove nitrate from its discharge (VSWCB, 1990). This concentration was readily obtained by diluting UOSA discharge with natural Bull Run water, so the second concern was satisfied. For practical reasons relating to analytical volume requirements, the volume of water that could be drawn from the reactor on a daily basis had to be considered. This volume was determined to be 200 - 300 mL could be withdrawn from the reactor everyday. The sample volume required for nitrate measurement at concentrations of 5 mg/L or lower was 50 mL, thereby leaving an adequate amount for other measurements.

In Experiment 6, the upper portion of the reservoir was also included. As a result, in order to get a representative concentration, the nitrate concentrations recorded by OWML from 1996 to 2000 at the Yates Ford gaging station (ST40) were analyzed. The more recent data were used in order to capture the effects of expanded UOSA discharges on Bull Run. The median nitrate concentration during the period was 6.02 mg/l as NO_3^- -N. For practical reasons, the author chose a slightly higher concentration, 7 mg/l as NO_3^- -N as the feed water

nitrate concentration. As in the previous case, only 50 mL was required for nitrate measurements up to 7 mg/L as NO_3^- , leaving adequate sample for other analyses.