

December 8, 2011

Jim Dahlquist  
Fishhawk Lake Rec. Club  
9997 Beach Drive  
Birkenfeld, OR 97016

**Re: Tracer Study, Plan Review # 83-2011  
Fishhawk Lake Rec. Club, PWS ID # 41 00124  
Final Approval**

Mr. Dahlquist:

I have received and reviewed the Disinfection Contact Time Tracer Study at Fishhawk Lake performed by HBH Consulting Engineers on February 7, 2011, as well as Fishhawk's May 16, 2011 response to the Drinking Water Program's May 3, 2011 letter on the study. **The tracer study is approved without conditions.** HBH's engineer Robert Henry is copied on this correspondence. The results of the tracer study for contact time at the water system are summarized below. Thank you for using the contact time figure below for disinfection verification at the water plant.

Flow leaving the 13,000 gallon clearwell: 67.7 gallons per minute (gpm)  
Volume at the beginning of the test: 8,616 gallons  
Volume at the end of the test: 7,090 gallons  
Contact time: 62 minutes  
Baffling factor of clearwell determined from study: 48.6 %

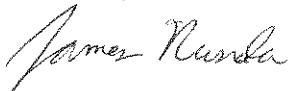
I have the following comments regarding the implementation of the study:

1. As outlined in your May 16<sup>th</sup>, 2011 correspondence, Fishhawk Lake will maintain at least 37 inches (6,641 gallons) of water in the clearwell at all times. This will ensure that the volume attained at the end of the test of 7,090 gallons is no more than 10 % greater than the minimum volume of the clearwell. The tracer study-derived contact time of 62 minutes is valid as long as the minimum storage volume in the clearwell is at least 6,380 gallons, or 90 % of 7,090 gallons.

2. The 62 minutes of contact time is also valid as long as the peak hourly demand flow (effluent pump flow capacity out of the clearwell) is no greater than 10 % over the peak flow simulated during the tracer study, or 74.5 gpm.
3. It is understood that the previously identified minimum chlorine residual level at the water treatment plant of 1.0 milligrams per liter (mg/L) has been lowered to minimize the potential for disinfection by-product formation, while still ensuring that adequate disinfection is occurring.

Thank you for your assistance in completing this tracer study. If you have any questions, or would like this letter in an alternate format, please contact me at either (971) 673-0459 or [james.b.nusrala@state.or.us](mailto:james.b.nusrala@state.or.us).

Sincerely,



James Nusrala, P.E.  
Regional Engineer

cc: Scott Shulda, City of Clatskanie, P.O. Box 9, Clatskanie, OR 97016  
Robert Henry, P.E., HBH Consulting Engineers