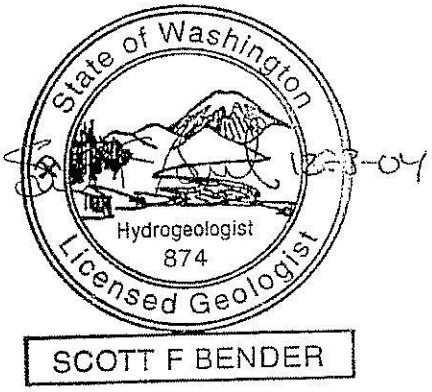
In our opinion, the well will provide a suitable groundwater supply source that will meet the water system's goals. Though the redevelopment performed prior to the second step test did increase the well yield, the test results indicate that the well may still be partially clogged. Since the well became partially plugged between the time of drilling and the pumping tests, the potential for additional clogging may exist. We recommend that additional redevelopment methods be employed prior to connecting the well to the water system. Development methods and treatment options will be best addressed after review of the water quality results by HCWL.

Thank you again for the opportunity to be of service, please call us at (425) 828-7545 if you have any questions.

Sincerely,

Robert O. Middour L.H.G.



Scott F. Bender L.H.G., C.G.W.P.

Enclosures:
Figure 1. Site Location Map
Figure 2. Production Well Boring Log
Figure 3. Production Well Step-Pumping Test, Drawdown
Figure 4. Production Well Pumping Test, Drawdown and Recovery
Figure 5. Production Well Pumping Test, Drawdown Analysis
Figure 6. Production Well Pumping Test, Recovery Analysis
Figure 7. Projected Theoretical Drawdown at Various Pumping Rates

the drawdown and recovery data were 0.14 and 0.20 ft^2/min, respectively. The storage coefficient cannot be calculated from a single well test.

The measured drawdown in Figure 5 deviates from the theoretical straight line fit at about 65 minutes; indicating the presence of a recharge source to the aquifer. In our opinion, the source of recharge to the aquifer is through leakage from the overlying silty sand aquitard as opposed to leakage from Stevens Creek. The drawdown patterns, and fluctuations in water levels suggest drainage of the aquitard into the aquifer, and that barometric pressure fluctuations are driving a confined groundwater level response.

Micro Particulate Analysis Test Results

The MPA testing was performed under the procedures recommended by Edge Analytical Inc. and by using equipment supplied by them. Collection of the MPA sample started at 15:40 on November 3, 2004; the sampling was stopped at 8:50 on November 4, 2004 and the filter sample was packed in a cooler and submitted to Edge Analytical within 24 hours of sample collection. 773 gallons were routed through the filter.

The micro particulate analyses did not detect any of the primary or secondary bioindicators resulting in a score of zero (low risk) as per the US EPA Consensus Method for determining if groundwater is under the direct influence of surface water. The test results will be provided with the water quality results.

Discussion and Recommendations

Analysis of the pumping test data provided consistent values for aquifer transmissivity. Based on a saturated thickness of 11 feet and an average transmissivity of 0.17 ft^2/min, the hydraulic conductivity of the aquifer is about $1.5x10^{-2}$ ft/min. Theoretical drawdown calculations indicate that ~~PW-2~~ PW-1 would be able to provide 20 gpm with about 15 feet of drawdown over a 10-day pumping period (Figure 7). Typically, the theoretical calculations are not conservative as pumping inefficiencies will lower the actual well yield. However, it is our opinion that the well should have a reliable yield of 20 gpm with less than 25 feet of drawdown. This opinion is based on the assumption that the well screen does not become clogged with mineral scale or organic build-up.

The aquifer does not appear to be hydraulically connected to the creek for two reasons: first, the water level in the aquifer is above that of the creek. The elevation of Stevens Creek was measured to be about 14 feet below the ground surface at the wellhead. The static water level prior to the constant-rate pumping test was 7.41 feet below the ground surface. Secondly, the pumping test data do not indicate a positive hydraulic connection with the creek; rather, they indicate groundwater leakage from the overlying aquitard. In addition, the MPA test results do not indicate the presence of bioindicators that would suggest such a connection (though this is not a conclusive test).

Micro-particulate analysis (MPA) sampling was performed in conjunction with the 24-hour pumping test to evaluate whether the groundwater source contained microorganisms associated with surface water. We understand that this test is one method recommended by the Department of Health to evaluate if the aquifer is hydraulically connected to surface water. MPA sampling involves routing water through a filter at a controlled pressure over a 12 to 24 hour period. Hammond, Collier, Wade, and Livingstone (HCWL) collected field and analytical water quality samples at the end of the step- and constant rate pumping tests for water system design purposes.

Production Well PW-1 Step Pumping Test Results

An initial step pumping test was attempted on October 4, 2004. Upon initial pumping of the well, the water color was dark red and the water level in the well reached the pump intake almost immediately. As such, the well yielded less than 10 gpm. After discussions with you, we re-mobilized to the site on October 6 to redevelop the well. Redevelopment was performed by recirculating a chlorine solution in the well for about 40 minutes.

The PW-1 step-pumping test was then performed after re-development. The static water level in PW-1 was 8.7 feet prior to the start of the test. The pump intake was set above the well screen at a depth of about 37 feet, therefore, providing about 28 feet of available drawdown. The production well was pumped at 13.5 gpm for two hours followed by a second one-hour pumping interval at 25 gpm. The drawdown data for the step pumping test is shown in Figure 3. The resulting drawdown at the end of each step was about 7.5 and 15 feet. The well specific capacity calculated from the first step was 1.8 gpm/ft. The groundwater level did not stabilize during the second step, and indicates that the well efficiency was decreasing with increasing yield.

HCWL collected water quality samples at the end of the step-pumping test for field and laboratory analyses. The water quality data will be presented in a following letter.

Production Well PW-1 Pumping Test Results

The PW-1 pumping test was started on November 3, 2004 at 10:35 p.m. and was pumped at a relatively constant rate of 10 gallons per minute for about 24 hours. The weather was partially cloudy and no precipitation fell during the test. The test was monitored initially by our staff and later by a Yodelin representative. Maximum drawdown at the end of the pumping phase for the pumping well was about 6 feet. The complete water level data set (pumping and recovery phases) for the pumping well is presented in Figure 4.

The drawdown and recovery data were analyzed using the Cooper-Jacob (1946) straight-line method for the pumping and water level recovery data (Figures 5 and 6). Calculated values of transmissivity using

December 3, 2004

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Mr. Al Hunter
Yodelin Water System
2080 Valleybrook Lane
Bellingham, Washington 98229

RE: LIKANE WELL SITE AQUIFER TESTING SUMMARY, YODELIN WATER SYSTEM, STEVENS PASS

Dear Al:

This letter presents the results of the groundwater development work performed at the Likane well site. Yodelin Water System chose to drill at the Likane Site after permitting complications prohibited drilling at other selected well sites. Between August 31 and September 8, 2004, a six-inch-diameter boring was drilled to 83 feet and completed as a production well. Pumping tests were then performed to evaluate well and aquifer conditions. Water quality analysis results will be presented in a subsequent letter following receipt of the sample results.

The site is located about 200 feet north of Yodelin Place Drive along the east side of the power line (Figure 1). Stevens Creek is located about 80 feet east of the production well. Holt Drilling Inc. was subcontracted by Yodelin Water System to perform the drilling.

The purpose of our work was to evaluate the suitability of the site as a groundwater supply source. Once the well was drilled, testing was performed to evaluate the aquifer supply potential, and to satisfy other water quality requirements for system engineering and permitting purposes. Because the site is proximate to surface water and the well has a relatively shallow completion depth, development of this groundwater source will need to satisfy the Washington State Department of Health's Groundwater Sources Under the Direct Influence of Surface Water (GWI) requirements. MPA and other water quality samples were collected for these purposes.

PRODUCTION WELL DRILLING

Two borings were drilled to bedrock (about 83 feet) between August 31 to September 8, 2004. After drilling the first boring, a bend in the casing was identified at a depth of about 25 to 30 feet. After attempting to remove the drilling rods from the cased borehole, Holt did not believe a well screen could be lowered pass the bend without jeopardizing the integrity of the well screen. Cobbles/boulders were encountered in the upper 30 feet and it was likely that a cobble or boulder shifted against the casing and changed the alignment of the borehole. As such, the well was abandoned by Holt by pulling the casing and filling the borehole with a bentonite grout (satisfying the requirements of WAC 173-160).

A second boring was drilled about 5 feet west of the first boring and was ultimately completed as a production well (PW-1) with a screened interval from 39 to 44 feet. Bender Consulting was on site for

only limited observation of the construction and development of the second boring. Therefore, we provide below the boring log from the first boring along with the driller's comments from the second boring. The boring log is provided in Figure 2.

The first boring encountered moist silty sand down to about 7 feet. Underlying the surficial soils was a wet, slightly silty, gravelly fine to coarse sand grading to silty, gravelly, fine to coarse sand from 7 to 37 feet. A water bearing, slightly silty, gravelly, medium to coarse sand was encountered from 37 to 48 feet and was underlain by 22 feet of fine sandy silt. The silty sand unit between 28 to 37 feet deep appears to be a confining layer (aquitard) to the underlying aquifer (as discussed in the pumping test results). A wet, slightly silty, gravelly, fine to coarse sand was then encountered from 75 feet to the top of bedrock (about 83 feet). Holt noted in the second boring that the contact between the first water bearing zone and the underlying silt was about 5 feet higher than logged in the first boring.

Air-stem testing of production rates during drilling indicated two potential water bearing zones: 37 to 48 feet (20-25 gpm) and 75 to 83 feet (10-15 gpm). Air-stem (well development) testing of the deeper zone in the second boring showed that with time a well yield greater than 5 gpm could not be achieved. Therefore, the casing was pulled up and the well was screened from 39 to 44 feet. The well was developed for about 1 hour by injecting air through the drill stem. With the drill stem set at about 31 feet, the well produced about 25 gpm during development.

The boring specifications and final well construction are presented as follows; the subsurface conditions encountered and well construction are shown in the boring log in Figure 2. The boring was drilled to a depth of 18 feet using a 10-inch-diameter tri-cone bit and 10-inch-diameter temporary steel casing. Below 18 feet, the boring was drilled using a 5 7/8-inch-diameter tri-cone bit and 6-inch steel casing. Upon installation of the first 20-foot section of 6-inch-diameter casing, a bentonite surface seal was installed between the 10- and 6-inch-diameter casings to a depth of 18 feet. The temporary 10-inch-diameter casing was then removed. The well consisted of 6-inch-diameter steel casing with a 5-inch-diameter telescoping well screen assembly. The screen assembly consisted of a 1 foot sump, 5 feet of 20-slot stainless steel well screen, and about a 2 foot riser/ K-packer section. The 6-inch-diameter steel casing was pulled back exposing the sump, well screen, and about 0.5 feet of the riser.

AQUIFER CHARACTERIZATION

Step-drawdown and constant rate pumping tests were performed to gain an understanding of the well yield and the hydraulic properties of the aquifer. Step-drawdown pumping tests were performed in the production well (PW-1) on October 4 and October 6, 2004; a 24-hour constant-rate pumping test was then performed on November 3, 2004. For both pumping tests, the pumping well was equipped with a 1.5 horsepower pump and drawdown was measured by hand and datalogger methods.

December 3, 2004

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