BEFORE THE WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of	DOCKET UW-110436
OLYMPIC WATER AND SEWER, INC.	DECLARATION OF MAX T. WILLS, LHG

I, MAX T. WILLS, hereby declare and state as follows:

1. I am over the age of 18 and otherwise competent to testify herein, and I have personal knowledge of the facts stated herein.

2. I am a Licensed Hydrogeologist in Washington State and a Senior Hydogeologist with Robinson Noble, Inc. I have over 19 years of professional experience and a strong background in both environmental hydrogeology and groundwater resource evaluations. In the course of my work, I am responsible for collection and interpretation of geologic and hydrogeologic data, preparation of technical reports, Phase I and II Environmental Assessments, remediation and groundwater monitoring projects, and supervision of well drilling and testing projects. A copy of my CV is attached.

3. On behalf of Olympic Water and Sewer, Inc. (OWSI or the Company), Robinson Noble, Inc. (Robinson Noble) conducts an annual groundwater-resource monitoring program, concentrating on the North and South Aquifers, and the area served by OWSI surrounding each aquifer. These groundwater monitoring reports indicate that starting back in or around 1994, the

static pumping water level trends in Well #2 showed progressive divergence which is often indicative of decreasing well efficiency. A loss of efficiency associated with Well #2 was verified with pumping tests conducted in 2004.

4. In 2004, attempts were made to rehabilitate Well #2, but because of several obstructions present in the well, rehabilitation was not possible. In an attempt to mitigate against the loss of efficiency, in or around 2004, following testing and failed rehabilitation efforts, Well #2 was equipped with a new pump, which was set with the intake at a lower level to compensate for the increasing efficiency losses. However, the new pump has a higher instantaneous production rate, which may also exacerbate the long-term efficiency associated with the well.

5. As part of Robinson Noble's 2008 annual groundwater monitoring report, Robinson Noble reported that their assessment of water level trends at Well #2 indicated continued efficiency loss in the well.

6. The North Aquifer is tapped by three OWSI wells, Well #2, Well #3, and Well #4N. These three wells provide the water supply to OWSI's Service Zone A, sometimes referred to as the North Bay area.

7. In February 2008, OWSI commissioned Robinson Noble to complete an assessment of Well #3. Over the previous several years Well #3 experienced continued water level declines. Robinson Noble concluded that in most individual years, production from Well #3 exceeded estimated recharge. Robinson Noble suggested that production from Well #3 be reduced by approximately one-third (1/3). In response to this issue Robinson Noble proposed constructing a new or replacement well at the Well #2 site. At the time, Robinson Noble opined that constructing a new or replacement well at the Well #2 site was probably OWSI's best option for the short term to mitigate against and make up for production lost from reduced use of Well #3.

8. Further, in response to the loss of efficiency associated with Well #2 and the declining water levels in Well #3, OWSI shifted some production to Well #4N. However, in reducing stress on Well #2 and Well #3, the stress on Well #4N was increasing. Robinson Noble's investigation concluded that continued pumping at increased production rates, especially during the summer months, could result in water levels being drawn down to near the pump inlet at Well #4N.

9. Robinson Noble's 2008 Annual Report on the Port Ludlow Area Groundwater Monitoring Program (Feb. 2009) noted that the hydrographs for wells completed in the North Aquifer indicated that the aquifer water levels were declining in response to pumping. The 2008 Annual Report noted that, in response to aquifer conditions and the loss of efficiency of Well #2, OWSI had recently implemented plans to address this issue, which included construction of additional wells as well as exploration for an alternate--deeper source in the North Bay area, and possibly shifting production to other aquifer systems.

10. Robinson Noble completed a preliminary assessment of aquifer characteristics at each of the three well sites (Wells #2, #3, and #4N) completed in the North Aquifer. Based on this preliminary assessment Robinson Noble concluded that the aquifer at the Well #2 property could potential support an additional well, which could be used to alleviate some of the demand on the other wells, including Well #3. At the time, Robinson Noble believed that the transmissivity values at the other sites (Wells #3 and #4N) to be fairly low, probably too low to support more than one well at each site.

11. In February 2008, Robinson Noble advised the Company that regardless of the current issues with Well #3 and Well #4N, constructing a new or replacement well for Well #2 would be prudent based on the fact that Well #2 was then nearly 44 years old and showing signs of declining efficiency. At the time there was significant concern that production from the North Aquifer could be significantly curtailed, and service to the Company's Service Zone A (the

North Bay), could be compromised based on the condition of Well #2 and Well #3, and the potential loss of either. I prepared letter assessments of the declining water levels in Well #3 and other North Aquifer Wells (dated February 29, 2008) and scope of work for construction of Well #17 as an additional point of withdrawal at the Well #2 site (dated February 28, 2008). A copy of these letters are attached as Exhibit A.

12. OWSI was able to place a new or replacement well within the existing Well #2 property located at 781 Walker Way as OWSI was the owner of the property, and the property was located within the authorized place of use under OWSI's State of Washington Department of Ecology (Ecology) approved water rights. Washington's groundwater code (RCW 90.44.100) allows the construction of a replacement or new additional well or wells at the location of the original well without application to Ecology or amendment to the water right holder's water rights. Ecology typically interprets this provision as permitting a new or replacement well to be sited within the same legal description (often the ¼ ¼ section) as advertised under the original water right. This process is sometimes referred to as a "showing of compliance" for a new or replacement well. At that time, we understood that the 781 Walker Way Property was the only property owned by OWSI that could site a new or replacement well under this showing of compliance process.

13. The estimated project cost to drill Well #17 was included Robinson Noble costs of $40,597.85 Holcene Drilling's quote price (as the lowest bid) of $111,532.60.

14. Prior to commencing site activities and drilling of Well #17, Robinson Noble reviewed and considered the *Applied Geotechnology, Inc., Hydrocarbon Contamination Assessment and Underground Storage Tank Removal* (March 4, 1991) (1991 AGI Report). The 1991 AGI Report detailed the removal and investigation into three gasoline underground storage tanks (USTs) formerly located at the property. The report states that during the historic removal of the USTs, soil contamination was encountered around the northern USTs, located near and

underneath the existing garage structure. No soil contamination was reported to be located near the southern UST. The AGI Report notes that no groundwater was encountered during the site investigation.

15. Prior to commencing site activities and drilling of Well #17, Robinson Noble and OWSI personnel discussed the issue of residual soil contamination as identified in the 1991 AGI Report. At the time, Robinson Noble recommended to OWSI that the new well should be moved at least 100 feet away from any suspected contamination. Robinson Noble also suggested to OWSI that they could auger in a test well at the location of the new well prior to drilling to see if there were any issues. OWSI suggested monitoring the soils for contamination as the upper portion of the new well (the surface seal) was being drilled, and Robinson Noble concurred this would have the same effect as drilling a separate test well.

16. The well log associated with Well #2 at the 781 Walker Way property indicated that groundwater at the site did not occur until at least 80 feet. The known residual contamination was reported to be left in place at a depth of 10 to 13.6 feet bgs and underneath a building. Given those circumstances, the contamination was presumed to be shielded from infiltrating precipitation and was believed unlikely to be mobilized. As there was no groundwater or groundwater contamination encountered during the AGI investigation, and no known shallow groundwater (above 80 feet) at the site, there was no determinable or relevant up or down gradient considerations with respect to the siting of Well #17. Of note, the existing Well #2 is located approximately 85 feet from the residual left in place soil contamination. Testing of Well #2 had not detected any relevant VOC groundwater contamination. Ultimately, it was determined to drill Well #17 at a location in excess of 100' (approximately 110') from the residual left in place soil contamination.

17. Based on standard well siting practices and the known issues that arise when multiple wells are sited at the same property and location, it is typical to recommend new wells

be located a minimum of 30 feet away (and the farther the better) from the existing wells to lessen the effects of interference pumping between wells. Because of the time it takes to bring a new well online and because OWSI intended at the time to continue to rely on Well #2 for some time, and to the extent feasible to provide water supply to the North Bay, it would have been advisable to site a new or replacement well a minimum of 30 feet from Well #2, further away would be better, to lessen the effects of interference pumping between Well #2 and Well #17.

18. To the best of my recollection, in consideration of Jefferson County Public Health Department comments (as reported to us by OWSI), and based on consultation with the Company, it was decided not to drill a separate test well. Instead, in the course of the well drilling at Well #17, Robinson Noble monitored soil conditions for signs of soil impact as we placed the surface seal and upper casing for Well #17. Robinson Noble had staff on site regularly for the first approximate 25 feet of well drilling, and spot-checked at depths thereafter.

19. Holocene Drilling performed the actual well drilling. Robinson Noble staff was also in constant communication with the driller when we were not on site. The driller on site was also experienced as an environmental driller.

20. During the drilling of the surface seal, which extended to 18 feet, and during subsequent drilling below that depth with the regular well casing, we did not observe any indications of petroleum impact within the zone that we would have expected to (0 to 25 feet). This would have likely been the extent of depth for any proposed test well. No contamination was located until the drilling reached 50 feet, in a small layer of perched groundwater between the till and the underlying clay.

21. On April 21, 2009, Holcene Drilling encountered gasoline contamination during the drilling of Well #17. Jefferson County Public Health Department and the Department of Ecology were notified of the discovery of the contamination release. I prepared a summary of

the initial findings and recommendations and presented those to OWSI in a letter dated April 26, 2009. A copy of this letter is attached as Exhibit B.

22. If OWSI had put in a separate test well, it is unlikely any test well(s) would have discovered the contamination encountered. A test well at this site, given the reported site conditions, would likely have been proposed to extend to a maximum depth of 20 to 25 feet, and would have been installed for the purpose of testing soil conditions only, not groundwater. The reports and logs all indicated that soil contamination was in this shallower zone and there was no groundwater to impact. When contamination was discovered in the course of drilling Well #17, the drilling was occurring in the till unit, which is approximately 50 feet deep at the site, and sits over an even thicker clay, neither of which is considered water bearing. The careful monitoring of the drilling of Well #17 discovered the contamination at its eventual depth, a depth that would have likely exceeded a test well or boring. Drilling immediately ceased upon discovery of the contamination.

23. Had OWSI decided to commission Robinson Noble to set a test well first, it is my opinion that it is highly unlikely that such test well would have found the contamination. Assuming no contamination was discovered, OWSI would then still have proceeded to drill Well #17, only to discover the contamination later.

24. Even if a test well (as opposed to the actual drilling of Well #17) had discovered the contamination, OWSI would still have had to report the discovery of that release to the Department of Ecology under WAC 173-340-300.

25. Upon discovery of groundwater contamination at the 781 Walker Way property, Robinson Noble recommended OWSI determine the extent of gasoline contamination to, among other things, understand the scale of the problem, and to determine whether there is any potential risk to Well #2. It was recommended that this include, among other things, investigating and

discerning a gradient and groundwater flow direction at the property and further understanding of the perched groundwater characteristics at the property.

I declare under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

DATED this 15 day of May, 2014, at Woodinville, Washington.

MAX T. WILLS

EXHIBIT A

ROBINSON NOBLE SALTBUSH INC. Established 1947
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February 29, 2008

Larry Smith
Olympic Water and Sewer, Inc.
70 Breaker Lane
Port Ludlow, WA 98365

Subject: Assessment of declining water levels in Well 3 and other North Aquifer Wells

Dear Larry,

As requested, Robinson, Noble, & Saltbush Inc. has completed an assessment of recent problems occurring with Olympic Water & Sewer, Inc.'s (OWSI) Well 3. Over the past several years Well 3 has been experiencing continued water level declines. During this past season, pumping water levels in Well 3 were sufficiently low that the well began to entrain some air.

We conducted a cursory assessment in which we compared recharge (adjusted from precipitation records) to production values for the North Aquifer for the period between 1999 and 2006. Our assessment indicates that in most individual years production exceeds the estimated recharge. This is also true when we compare the averaged values over this period. Precipitation has been generally below average for many of the individual years during this period but, because the averaged production values exceed the averaged recharge, it still appears that the total production for the North Aquifer is currently in excess of the limits of this resource.

As discussed in our e-mail response (dated January 17, 2008) we advised OWSI to reduce production at Well 3 by approximately 1/3 the current total (from an average annual total of 28 gpm to 15 gpm – the approximate production in 2000). As we discussed in the e-mail response and in our recent meeting, this reduction needs to be for the total volume removed from the aquifer over the course of the year and not just a reduction in the instantaneous pumping rate. This may be best accomplished by taking Well 3 out of auto-mode and only use it when Wells 1 and 2 can not meet demand.

Please find attached with this letter, a scope of work and cost estimate for construction of a new well at the Well 2 site. As we discussed in our last meeting together, constructing a new well at this site is probably OWSI's best option for the short term to make up some of the production that will be lost from a reduction of pumping at Well 3. Regardless of the current issues with Well 3, we feel it would be prudent for OWSI to construct a "replacement well" for Well 2 because it is nearly 44 years old and showing signs of declining efficiency. However, for the long term, we recommend that OWSI undertake a program to try to develop additional resources to augment the

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e-mail: mail@robinson-noble.com

declines in the North Aquifer area. We recommend that this program include test drilling in the area of the North Aquifer, south to southeast of Well 2 to investigate for a possible deeper aquifer that may be present in this area.

As always, it is our pleasure to be of continued service to Olympic Water and Sewer Inc. If you have any questions or would like to discuss the information in this letter further, please don't hesitate to contact me at your earliest convenience.

Respectfully submitted,
Robinson, Noble & Saltbush, Inc.

Max Wills, L. HG.
Senior Hydrogeologist

Enclosures

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February 28, 2008

Exhibit A

Larry Smith
Olympic Water and Sewer, Inc.
70 Breaker Lane
Port Ludlow, WA 98365

Subject: Scope of work for hydrogeologic services, construction of Well 17 as an additional point of withdrawal at the Well 2 site

Dear Larry,

Based on our recent meeting on February 7, 2008 and recent communications, Robinson, Noble & Saltbush, Inc. has developed the following scope of work and cost estimate to provide hydrogeologic services during the construction of a new production well (additional point of withdrawal) at the Well 2 site (designated here as Well 17). In light of current problems at Well 3 and with the North Aquifer as a whole, it was agreed upon in our meeting that constructing a second well at the Well 2 site was the best option for Olympic Water and Sewer, Inc. (OWSI) at the present time. However, as we also discussed in our meeting, there currently appears to be a problem with over production in the North Aquifer (particularly at Well 3), and eventually OWSI will likely need to develop an additional source (i.e. exploration for a deeper system below the north aquifer, transfer of water from the South Bay Wells, or some alternate program to augment current production from the North Aquifer). Additionally, there is concern that, with the current condition of Wells 2 and 3 (Well 2 is aging and showing signs of efficiency loss and, Well 3 is currently pumping at its maximum capacity), production could be significantly curtailed with the loss of either well. As such, OWSI expressed the desire (and we concur) to expedite the Well 17 project as much as possible.

Based on the construction and performance of the existing wells in the North Aquifer and our current understanding of the hydrogeology in the vicinity of existing Well 2, we have developed preliminary design recommendations for the new Well 17. The drilling of the proposed Well 17 will commence with 16-inch diameter casing with the presumption that the casing can be advanced to a total depth of 350 feet. Completion with 16-inch casing will allow for placement of a 12-inch screen assembly with sufficient room to install a filter pack. Use of a filter pack will increase the potential of completing the well with the higher efficiency, which will in turn minimize drawdown during operation and increase potential production. This will also provide a sufficiently large pumping chamber. Additionally, drilling with 16-inch diameter casing will allow for more completion options in the event that the 16-inch casing can't be advanced to depth and a casing reduction is required.

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For the purpose of organization and cost estimation, our proposed scope of services has been subdivided into five separate tasks for this project. These are designated as follows:

- Pre-drilling efforts, preparation of technical specifications, and contractor selection
- Field hydrogeology related to drilling and construction
- Pumping tests
- Hydrogeologic analysis
- Preparation of a project report

Task 1: Pre-drilling Efforts and Contracting Assistance
Pre-drilling efforts include defining the project (i.e. drilling methods, casing diameters, drilling depths, etc.), assistance in choosing appropriate well sites, and review of water rights issues specific to the project. As you are aware, a large portion of this work has already been accomplished. The information gathered during the pre-drilling phase is then used to generate an appropriate set of technical specifications. The technical specifications will initially be used to provide guidelines for bidding, and subsequently to ensure that the well is constructed properly.

Upon completing the technical specifications, Robinson, Noble & Saltbush will compile a complete bidder's package, solicit bids from appropriate contractors, and assist OWSI with the selection of a final drilling contractor. Robinson, Noble & Saltbush has standard contract documents that are appropriate for this type of work. If it is preferable, OWSI contract documents can be used to compile the bidder's package. We presume that OWSI will contract directly with the drilling company and retain Robinson, Noble, & Saltbush to act as the "Owner's Representative". This will eliminate handling charges associated with us subcontracting the drilling firm.

Task 2: Field Observation of Drilling, Well Design and Completion
A Robinson, Noble & Saltbush hydrogeologist will be on site as required throughout the drilling process, particularly during the drilling of the target aquifer. During this phase of work we will generate a geologic log of the materials penetrated, collect geological samples, and monitor water level responses in the formation. We will then use the information gained from the observations made during the drilling process to design the most appropriate completion for the well. Once the completion/screen design is complete, our on-site hydrogeologist will oversee the completion and development of the well.

Task 3: Well Testing
Once the well is completed and developed, Robinson, Noble & Saltbush will define an appropriate testing program. This typically consists of both variable-rate (step) testing to evaluate the efficiency of the new well, and long term (24-hour) constant-rate testing to evaluate the aquifer. Our hydrogeologist will direct and observe the pumping tests to gather the data needed to evaluate the aquifer and properly rate the well. During testing, water samples will also be collected and submitted to an accredited laboratory for standard potable-water analyses.

Task 4: Hydrogeologic Analysis
Upon the completion of well testing, we will employ standard analytical techniques to define the production rating for the well. Our analyses will also define and characterize the relationship between the new well and existing wells completed in the aquifer system.

Task 5: Preparation of Construction Report
At the completion of the project, we will prepare a final construction report. The report will present a description of the drilling work, diagrams of the completed well, and a summary of the testing. It will provide recommendations pertaining to appropriate pumping rates and operation parameters, and will contain information needed by your engineer to put the well into service. When completed, we will generate the required copies for distribution.

Schedule
We expect that preparation of technical specifications, solicitation of bids, and contractor selection can be completed within four to five weeks from your authorization to proceed. Upon selection of a drilling contractor, mobilization to the site typically occurs within 30 to 60 days. We anticipate that, in the absence of major drilling problems, Well 17 can be completed and tested in 60 to 90 days after the start of drilling. Our final report is expected to be completed within 30 days from the completion of final testing. In all, from specification preparation to final construction report, we estimate that Well 17 can be completed in between five to seven months from your authorization to proceed.

Cost Estimates by Task
Based on bids for recent similar projects, we estimate that it will cost approximately $125,000 to have a drilling contractor construct a 16-inch cable-tool well to a depth of 350 feet (we advise that only cable-tool methods be used in the construction of the new Well 17). This estimate will vary with different contractors, as well as the actual final depth of the well.

Robinson, Noble & Saltbush typically works on a time-and-expense basis according to the attached General Fee Schedule. We estimate the cost of our services, as described above, to be **$40,600** based upon our understanding of the project and the conditions outlined in this scope. A detailed cost estimate is enclosed with this proposal. The estimate will remain valid for 180 days from the date of this scope.

This estimate does not include cost for any extra insurance, business licenses or fees, or applicable local taxes that might be necessary to complete the project. We will request that these additional costs be added to the above total estimate when they become known to us. Rental costs for our standard field equipment and any specialized equipment as detailed in this scope are included in the above estimate. Should additional equipment be deemed necessary or warranted in order to properly complete the project, we will submit a change in scope request with estimated costs based on the equipment rental schedule included in the General Fee Schedule.

The costs for project activities will be tracked closely and any foreseeable changes to the project cost will be discussed with you at the earliest opportunity. Please find enclosed a copy of a Professional Services Agreement (PSA) outlining the specific tasks to be completed. If the terms are agreeable, please sign and return to us. We will return a fully executed copy for your files.

We hope this scope of work and cost estimate is adequate for your needs. Please contact us if we can provide additional information or modify the scope of work to better assist OWSI. If at any time prior to or during this project, the OWSI identifies a concern or problem with our work or progress that cannot be resolved by the assigned Robinson, Noble & Saltbush project manager, please contact Joseph Becker, our company President, and he will make every effort to resolve the issue to your satisfaction.

Respectfully submitted,
Robinson, Noble & Saltbush, Inc.

Max Wills, L. HG.
Senior Hydrogeologist

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Project Estimate

Olympic Water and Sewer, Inc.
Well 17

28-Feb-08

Estimated Labor Costs

Task	Total Estimated Hours	Estimated Labor Cost
TASK 1: Pre-drilling and Contracting	49.0	$5,044.50
TASK 2: Field Obs., Design and Completion	196.0	$17,715.00
TASK 3: Well Testing	60.0	$5,845.00
TASK 4: Hydrogeologic Analysis	38.0	$3,799.00
TASK 5: Report Preperation	58.5	$5,393.50
Labor Totals	401.5	**$37,797.00**

Estimated Direct Costs

General Office Supplies	--		$50.00
Insurance Fees / Miscellaneous Costs	--		$0.00
Travel Mileage	*$0.58*	2880	$1,670.40
Water Level Sounder (one-time)	*$30.00*	1	$30.00
Sieve Sample Equipment (one-time)	*$25.00*	1	$25.00
Water Level transducer (each)	*$80.00*	2	$160.00
Field Laptop (per day)	*$30.00*	1	$30.00
		Direct Cost Subtotal	**$1,965.40**
		Handling Fee	**$4.00**
		Total Direct Costs	**$1,969.40**

Estimated Subcontracted Costs

WML Water Analysis	*$650.00*	1	$650.00
Other Lab	*$73.00*	1	$73.00
		Subcontracted Costs Subtotal	**$723.00**
		Handling Fee	**$108.45**
		Total Subcontracted Costs	**$831.45**

Total Estimated Project Costs **$40,597.85**

See Attached Fee Schedule

EXHIBIT B

ROBINSON NOBLE SALTBUSH INC. Established 1947
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April 26, 2009

Larry Smith
Olympic Water & Sewer, Inc.
70 Breaker Lane
Port Ludlow, WA 98635

Subject: Well 17 site contamination, initial findings and recommendations

Dear Larry,

As you are aware, Holocene Drilling encountered gasoline contamination during the drilling of Well 17 this past Tuesday (April 21, 2009). Reportedly, the driller initially noticed a distinct gasoline odor emanating from the casing of the new well while drilling at a depth of approximately 50 feet. Holocene then halted drilling and notified water company personnel, who also reported that there was a significant gasoline odor coming from the well. Greg Rae, the Olympic Water & Sewer Inc. (OWSI) operations manager then notified Robinson, Noble, & Saltbush and asked that we evaluate the situation. We arrived on-site approximately three hours later but by this time the odor had dissipated and was no longer noticeable. In discussing the occurrence with the driller, he said that he noticed the gasoline odor at a depth of about 50 feet, just after drilling had passed out of the glacial till (which is a compacted, semi-porous, non water-bearing formation) and into an underlying clay unit. He also said that there appeared to be a minor amount of water perched on top of the clay unit, which he verified by bailing the well.

Following discussions with Greg, we decided (with Greg's concurrence) that both a soil sample and a water sample should be collected from the well and analyzed for gasoline along with several volatile components commonly associated with gasoline. Samples were submitted to Libby Environmental Laboratory in Olympia. Results of the analyses indicated the presence of gasoline and benzene (a volatile component of gasoline) in the water sample at concentrations substantially higher than current Model Toxic Control Act (MTCA) Method A cleanup limits (and therefore also significantly above current drinking water limits).

Holocene Drilling (and the other water company personnel) noticing the gasoline odor technically constitutes a "discovery" of a contamination release. Under state law (WAC 173-340-300) OWSI is required to report the release to the Department of Ecology (Ecology) and/or other appropriate agencies within 90 days of the discovery. Greg informed us that he had notified Jefferson County Health of the situation the day after the initial discovery (after the laboratory confirmed that gasoline contamination was present). Jefferson County Health then in turn notified Ecology. We have since been contacted by both agencies requesting information

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regarding this issue and have provided them with a general synopsis of the information discussed above. These agencies, particularly Ecology, will require that OWSI submit a plan of action to describe how OWSI will address this issue.

In order to minimize the cost and liability to OWSI, we recommend that this problem be approached in careful, measured stages. With this in mind, the first step is to determine the extent of the gasoline contamination to understand the scale of the problem (and to determine if there is any potential risk to Well 2). An initial characterization of the extent of the contamination can be undertaken in a relatively quick fashion, potentially using the current well drilling contractor. The outcome of this initial effort can then be used to develop an appropriate plan for longer-term remediation, which would need to be submitted to Ecology for their approval. This initial effort will hopefully allow sufficient time for OWSI to secure funding or resolve other logistical issues that might be needed.

In addition to our hydrogeologic expertise, Robinson, Noble, & Saltbush regularly provides as one of our services, environmental consultation on precisely this kind of contamination investigation and clean-up. As such, we would be pleased to provide OWSI with what ever assistance you require to address this issue. If OWSI is amenable, we recommend that we schedule a meeting as soon as is practical to discuss an appropriate initial response to the current Well 17 situation. In the interim, we have formulated a recommended initial response for your consideration.

Recommended Initial Characterization Effort

Based on our current limited understanding of the contamination, it appears that gasoline leaked from one or more of the previously removed underground storage tanks (USTs) and has subsequently migrated down through the upper till unit. It is likely (based on information provided in the UST cleanup report) that the release came from one or both of the two northernmost USTs. Upon reaching the less permeable clay unit (at a depth of approximately 50 feet), the contamination spread laterally down gradient in the minimal groundwater perched on top of the clay unit. It appears that the contamination moved generally southward, away from the area of the two northernmost USTs and toward the location of Well 17.

The two primary goals of our recommended initial response are to first determine the local gradient for the perched groundwater system, and secondly to demonstrate that there is no impact at Well 2. Establishing the gradient (direction of flow) for the perched groundwater system is essential for determining the original source of the contamination (which may in part still be present), as well as the fate of the contamination (and to some degree, the extent of the current contamination plume). Groundwater gradient in these types of situations is typically determined by constructing at least three monitoring wells laid out in a triangular configuration. Water level elevations are then measured in each of these wells to determine the orientation of a groundwater plane.

To define the gradient of the perched groundwater system, we recommend that OWSI construct three monitoring wells (typically 2-inch diameter PCV wells) on the southern half of the site. As OWSI already has an investment in drilling at Well 17, we suggest that this well be converted into one of the monitoring wells. Because of the larger casing size, a somewhat larger than average monitoring well (6-inch or 8-inch casing diameter) could be constructed and possibly later used as an extraction well. Two additional 2-inch diameter monitoring wells should be constructed, one just south of the area of the two northernmost USTs, and a second one in the area of the southernmost UST.

It is our understanding, through discussions with Greg, that the Health Department has been somewhat uneasy about the use of Well 2 as a potable source, and the current situation at Well 17 will most likely increase their uneasiness. To try to alleviate some of their concerns we recommend that OWSI perform water quality analyses at Well 2 to show that no gasoline or volatiles associated with gasoline are present in the current drinking water source. We also understand from conversation with Greg that this is currently being accomplished. We further recommend that an additional 2-inch diameter monitoring well be constructed between Well 2 and the area of the two northern-most USTs. It is presumed that the gasoline plume migrated southward away from the area of the two northern most USTs (and Well 2). If this is the case then analyses of the water taken from this additional monitoring well should demonstrate that this monitoring well and Well 2 are both outside of the area of the gasoline plume and thereby not impacted by it. This well would also be useful for establishing gradient more definitively for the northern half of the site.

Selected sampling of soils will occur as each of the new monitoring wells is constructed, and initial groundwater sampling will be conducted following well completion. Once this has been accomplished, we will analyze both the soil and groundwater sample results, map the implied groundwater gradient, and provide a letter report of our results and recommendations on how OWSI should proceed. We then recommend meeting with OWSI, and possibly Ecology and/or Health Department staff if appropriate, to outline a longer-term plan for remediation.

As a possible first stage of the longer-term remediation plan, we would recommend a program of quarterly groundwater monitoring (using the newly constructed monitoring wells) for a period of at least one year to try to demonstrate that natural attenuation of the contamination is or is not occurring. Remediation in this type of situation can often be accomplished through natural attenuation with monitoring used to simply document the rate of diminishment. However, given the fact that the gasoline contamination is apparently fairly old and is still present at the high concentrations we observed at Well 17, it does not appear that much if any attenuation is occurring. Ecology presently does not allow continual monitoring without documented progress. However, a year of monitoring to document the effectiveness (or ineffectiveness) of natural attenuation is reasonable and will at least allow OWSI time to devise a more effective remediation strategy and, if necessary, to resolve any logistical or funding

issues. A follow-up meeting with the regulators will likely be needed after the year of monitoring is completed to revise the long-term remediation plan.

Since Holocene drilling is currently under contract with OWSI, it may be more expedient to have them provide services for converting Well 17 and/or construction of the three additional monitoring wells. Since there is concern over Well 2 and the required reporting period for discovery of the contamination, a quick turnaround may be warranted. We requested and received quotes from Holocene Drilling to both convert Well 17 into a monitoring well and to install three additional 2-inch diameter monitoring wells at the site. If OWSI decides to proceed as described, we can also secure bids from other drilling firms if desired.

We regret the recent turn of events on this project. We would be pleased to provide OWSI with professional assistance in addressing this problem. As always, it is our pleasure to be of continued service to Olympic Water and Sewer Inc., and we look forward to discussing this matter with you further in person.

Respectfully submitted,
Robinson, Noble, and Saltbush Inc.

Max Wills, LHG
Senior Hydrogeologist

cc: Greg Rae

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

WELL 17 PROJECT
Washington State
Robinson, Noble & Saltbush, Inc.
Client Project #1685-009A

Analyses of Gasoline (NWTPH-Gx) & BTEX (EPA Method 8021B) in Water

Sample Number	Date Analyzed	Benzene (ug/l)	Toluene (ug/l)	Ethylbenzene (ug/l)	Xylenes (ug/l)	Gasoline (ug/l)	Surrogate Recovery (%)
Method Blank	4/21/09	nd	nd	nd	nd	nd	104
LCS	4/21/09	98%	99%				108
PLD-2	4/21/09	948	208	62	153	5530	133
Practical Quantitation Limi		1	2	1	3	100	

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Trifluorotoluene): 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

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VOC - VOC1

VOC - VOC1 by Various EPA Approved Methods

Source / Point of Entry - Report of Analysis

Date Collected:	4/23/2009	Group:	A
System ID No:	68700L	System Name:	Olympic Water & Sewer
Lab - Sample #:	01018801	County:	Jefferson
Sample Location:	Well #2 Hosebib	DOH Source No:	S01
Sample Purpose:	O	Date Received:	4/23/2009
Sample Composition:	S	Date Analyzed:	4/29/2009
Send Report To:	Olympic Water And Sewer 781 Walker Way Port Ludlow, WA 98365	Date Reported:	4/30/2009
		Sample Type:	Pre-treatment/Raw
		Collected By:	Greg Rae
		Phone Number:	360-437-7898
		Bill To:	Olympic Water And Sewer 781 Walker Way Port Ludlow, WA 98365

DOH#	Analyte	Results	Units	SRL	Trigger	MCL*	MCL Exceeded	Method (Analyst Init.)
EPA/State Regulated								
	1,2-Dibromo-3-Chloropropane	ND	µg/L	0.5		0.2		EPA 524.2 (TM)
160	Total Xylenes	ND	µg/L	0.5	0.5	10000		EPA 524.2 (TM)
57	T-1,2-Dichloroethene	ND	µg/L	0.5	0.5	70		EPA 524.2 (TM)
60	Cis-1,2-Dichloroethene	ND	µg/L	0.5	0.5	70		EPA 524.2 (TM)
47	1,1,1-Trichloroethane	ND	µg/L	0.5	0.5	200		EPA 524.2 (TM)
48	Carbon Tetrachloride	ND	µg/L	0.5	0.5	5		EPA 524.2 (TM)
49	Benzene	ND	µg/L	0.5	0.5	5		EPA 524.2 (TM)
50	1,2-Dichloroethane	ND	µg/L	0.5	0.5	5		EPA 524.2 (TM)
51	Trichloroethene	ND	µg/L	0.5	0.5	5		EPA 524.2 (TM)
63	1,2-Dichloropropane	ND	µg/L	0.5	0.5	5		EPA 524.2 (TM)
66	Toluene	ND	µg/L	0.5	0.5	1000		EPA 524.2 (TM)
67	1,1,2-Trichoroethane	ND	µg/L	0.5	0.5	5		EPA 524.2 (TM)
68	Tetrachloroethene	ND	µg/L	0.5	0.5	5		EPA 524.2 (TM)
71	Chlorobenzene	ND	µg/L	0.5	0.5	100		EPA 524.2 (TM)
73	Ethyl Benzene	ND	µg/L	0.5	0.5	700		EPA 524.2 (TM)
158	M/P Xylene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
45	Vinyl Chloride	ND	µg/L	0.5	0.5	2		EPA 524.2 (TM)
159	O-Xylene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
76	Styrene	ND	µg/L	0.5	0.5	100		EPA 524.2 (TM)
52	P-Dichlorobenzene	ND	µg/L	0.5	0.5	75		EPA 524.2 (TM)
84	O-Dichlorobenzene	ND	µg/L	0.5	0.5	600		EPA 524.2 (TM)
95	1,2,4-Trichlorobenzene	ND	µg/L	0.5	0.5	70		EPA 524.2 (TM)
46	1,1-Dichlorgethylene	ND	µg/L	0.5	0.5	7		EPA 524.2 (TM)
56	Methylene Chloride	ND	µg/L	0.5	0.5	5		EPA 524.2 (TM)

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VOC - VOC1

VOC - VOC1 by Various EPA Approved Methods

Source / Point of Entry - Report of Analysis

Date Collected:	4/23/2009	Group:	A
System ID No:	68700L	System Name:	Olympic Water & Sewer
Lab - Sample #:	01018801	County:	Jefferson
Sample Location:	Well #2 Hosebib	DOH Source No:	S01
Sample Purpose:	O	Date Received:	4/23/2009
Sample Composition:	S	Date Analyzed:	4/29/2009
Send Report To:	Olympic Water And Sewer 781 Walker Way Port Ludlow, WA 98365	Date Reported:	4/30/2009
		Sample Type:	Pre-treatment/Raw
		Collected By:	Greg Rae
		Phone Number:	360-437-7898
		Bill To:	Olympic Water And Sewer 781 Walker Way Port Ludlow, WA 98365

DOH#	Analyte	Results	Units	SRL	Trigger	MCL*	MCL Exceeded	Method (Analyst Init.)
EPA Unregulated								
58	1,1-Dichloroethane	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
59	2,2-Dichloropropane	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
86	Bromochloromethane	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
62	1,1-Dichloropropene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
162	Dichlorodifluoromethane	ND	µg/L	0.5	0.5	530		EPA 524.2 (TM)
64	Dibromomethane	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
65	Cis-1,3-Dichloropropene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
69	Trans-1,3-Dichloropropene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
53	Chloromethane	ND	µg/L	0.5	0.5	1.3		EPA 524.2 (TM)
70	1,3-Dichloropropane	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
72	1,1,1,2-Tetrachloroethane	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
87	Isopropylbenzene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
79	1,2,3-Trichloropropane	ND	µg/L	0.5	0.5	21		EPA 524.2 (TM)
78	Bromobenzene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
80	1,1,2,2-Tetrachloroethane	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
81	O-Chlorotoluene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
88	N-Propylbenzene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
89	1,3,5-Trimethylbenzene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
54	Bromomethane	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
82	P-Chlorotoluene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
90	Tert-Butybenzene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
91	1,2,4-Trimethylbenzene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
92	Sec-Butylbenzene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
83	M-Dichlorobenzene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
93	P-Isopropyltoluene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
94	N-Butylbenzene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
55	Chloroethane	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
97	Hexachlorobutadiene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
96	Naphthalene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
98	1,2,3-Trichlorobenzene	ND	µg/L	0.5	0.5			EPA 524.2 (TM)
85	Trichlorofluoromethane	ND	µg/L	0.5	0.5	1300		EPA 524.2 (TM)
EPA Regulated - Trihalomethanes Program								
31	Total Trihalomethanes	ND	µg/L		60	80		EPA 524.2 (TM)
27	Chloroform	ND	µg/L	0.25				EPA 524.2 (TM)
28	Bromodichloromethane	ND	µg/L	0.5				EPA 524.2 (TM)
29	Dibromochloromethane	ND	µg/L	1.5				EPA 524.2 (TM)
30	Bromoform	ND	µg/L	0.6				EPA 524.2 (TM)

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TPH (Hexane Extractable Material with SG cleanup)

TPH (Hexane Extractable Material with SG cleanup) by Various EPA Approved Methods

Source / Point of Entry - Report of Analysis

Date Collected:	4/23/2009	Group:	A
System ID No:	68700L	System Name:	Olympic Water & Sewer
Lab - Sample #:	01018802	County:	Jefferson
Sample Location:	Well #2 Hosebib	DOH Source No:	S01
Sample Purpose:	O	Date Received:	4/23/2009
Sample Composition:	S	Date Analyzed:	5/5/2009
Send Report To:	Olympic Water And Sewer 781 Walker Way Port Ludlow, WA 98365	Date Reported:	5/6/2009
		Sample Type:	Pre-treatment/Raw
		Collected By:	Greg Rae
		Phone Number:	360-437-7898
		Bill To:	Olympic Water And Sewer 781 Walker Way Port Ludlow, WA 98365

DOH#	Analyte	Results	Units	SRL	Trigger	MCL*	MCL Exceeded	Method (Analyst Init.)
	TPH	ND(3.6)	mg/L					EPA 1664 (TM)

SRL: (State Reporting Level), indicates the minimum reporting level required by the Washington Department of Health (DOH).

Trigger Level: DOH Drinking Water response level. Systems with compounds detected at concentrations in excess of this level are required to take additional samples. Contact your regional DOH office for further information.

MCL: (Maximum Contaminant Level), If the contaminant amount exceeds the MCL, immediately contact your regional DOH office.

NA: (Not Analyzed), in the results column indicates this compound was not included in the current analysis.

'D: (Not Detected), in the results column indicates this compound was analyzed and not detected at a level greater than or equal to the SRL

(0.00x): indicates the compound was not detected in the sample at or above the concentration indicated.

* The 0.010 mg/L MCL for Arsenic is for Group A NTNC systems. All other systems should check with their county Health District to determine what level is applicable.

95188

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VOC - VOC1

VOC - VOC1 by Various EPA Approved Methods

Source / Point of Entry - Report of Analysis

Date Collected:	4/23/2009	Group:	A
System ID No:	68700L	System Name:	Olympic Water & Sewer
Lab - Sample #:	01018801	County:	Jefferson
Sample Location:	Well #2 Hosebib	DOH Source No:	S01
Sample Purpose:	O	Date Received:	4/23/2009
Sample Composition:	S	Date Analyzed:	4/29/2009
Send Report To:	Olympic Water And Sewer 781 Walker Way Port Ludlow, WA 98365	Date Reported:	4/30/2009
		Sample Type:	Pre-treatment/Raw
		Collected By:	Greg Rae
		Phone Number:	360-437-7898
		Bill To:	Olympic Water And Sewer 781 Walker Way Port Ludlow, WA 98365

DOH#	Analyte	Results	Units	SRL	Trigger	MCL*	MCL Exceeded	Method (Analyst Init.)

SRL: (State Reporting Level), indicates the minimum reporting level required by the Washington Department of Health (DOH).
Trigger Level: DOH Drinking Water response level. Systems with compounds detected at concentrations in excess of this level are required to take additional samples. Contact your regional DOH office for further information.
MCL: (Maximum Contaminant Level), If the contaminant amount exceeds the MCL, immediately contact your regional DOH office.
NA: (Not Analyzed), in the results column indicates this compound was not included in the current analysis.
ND: (Not Detected), in the results column indicates this compound was analyzed and not detected at a level greater than or equal to the SRL
< (0.00x): indicates the compound was not detected in the sample at or above the concentration indicated.
* The 0.010 mg/L MCL for Arsenic is for Group A NTNC systems. All other systems should check with their county Health District to determine what level is applicable.

SITE MAP/DIAGRAM

Site Name: Port Ludlow Well #17 (SEE ATTACHED)

North

Approximate scale: _____inch = _____feet

ERTS Number 612343

County Jefferson

Inspector Marjorie Boyd, JCPH

Date 4/30/09

WASHINGTON STATE DEPARTMENT OF ECOLOGY

INITIAL INVESTIGATION FIELD REPORT

ERTS Number: 612343
Parcel #: 821-084-004
COUNTY: Jefferson

SITE INFORMATION

Site Name (e.g., Co. name over door): Port Ludlow Well #17	Site Address (including City and Zip+4): 781 Walker Way Port Ludlow, WA 98365	Is property > 10 acres? Yes ☐ No X
Site Contact and Title: Larry Smith, president Olympic Water and Sewer, Inc.	Site Contact Address (including City and Zip+4): 70 Breaker Lane Port Ludlow, WA 98365	Site Contact Phone: 360-437-8246 lsmith@portludlowassociates.com
Site Owner: Olympic Water and Sewer, Inc Larry Smith, President	Site Owner Address (including City and Zip+4): 70 Breaker Lane Port Ludlow, WA 98365	Site Owner Phone: 360-437-8246 lsmith@portludlowassociates.com
Site Owner Contact: Greg Rae Water System Mgr, Port Ludlow OWS	Site Owner Contact Address (including City and Zip+4): 70 Breaker Lane Port Ludlow, WA 98365	Owner Contact Phone: 360-301-0820
Other: Robinson, Noble, and Saltbrush Inc. Max Wills, Hydrogeologist	3011 South Huson Street, Suite A Tacoma, WA 98409	253-475-7711 206-550-7215 (cell) Fax: (253) 472-5846
Other: Hollocene Drilling James Niederkorn	Address: 10621 Todd Road East Edgewood, WA 98372	Tel: 253-848-6500

Location: Quarter-Quarter: SE 1/4	Section: 8	Township: 28N	Range: 1E
Latitude: Degrees:47	Minutes:46	Seconds: 57.9	
Longitude: Degrees: 122	Minutes: 47	Seconds: 26.8074	

INSPECTION INFORMATION

Inspection Date:4-23-09	Inspection Time: 14:50		Entry Notice:	Announced X	Unannounced ☐
Photographs	Yes X	No ☐	Weather:	Clear X Rain ☐	Temperature: _60's_ ° F
Samples	Yes ☐	No X	Wind Direction:	none	Wind Speed: none

RECOMMENDATION

No Further Action (Indicate NFA in box below):		**LIST on ISIS** (Indicate in box below):	
Release or threatened release does not pose a threat	☐	Site Hazard Assessment	X
No release or threatened release	☐	Interim Action	☐
Educational mailing	☐	Emergency Action	☐
Refer to program/agency (Name:_____)	☐	Independent Cleanup Action In progress	☐
Independent Cleanup Action Completed (i.e., contam, removed)	☐		

COMPLAINT (Brief Summary of ERTS): A new public water well was being drilled for the Port Ludlow Resort Community at a site where there is an existing public water well and a site where three gasoline USTs were removed in 1990. At 50 feet in depth the well drillers found water and stopped for the day. The next morning they smelled gasoline at the well. Work was halted and water and soil samples were obtained. The water samples came back above MCTA for gasoline and benzene. Toluene, ethylbenzene, and xylenes were found as well.

SITE STATUS (Brief Summary of site condition(s) after investigation): Drilling work has been halted. The well casing has been tarped to prevent rain and surface water from entering.

Investigator: Marjorie Boyd	Date Submitted:

OBSERVATIONS

Background: The Port Ludlow Resort Community has several public water wells serving its residents. The existing well at 781 Walker Way (well #2) is losing production so the Resort's water company applied to dig a second well at the site (#17). Routine questioning by JCPH staff Susan Porto revealed that three underground gasoline storage tanks had been removed from the site in 1990 (two 2,000 gal tanks, one 1,000 gal tank).

Two of the USTs under and alongside a shop showed soil contamination with levels above MCTA clean-up levels of100 mg/kg. (TPH 3000 mg/kg & 963 mg/kg) The third UST showed no contamination. Most contaminated soil was removed except where it might compromise the shop structure. Re-testing of UST below the shop floor after excavation showed remaining soil with TPH of 1237 mg/kg.

The existing public well is approximately 70 feet from the shop. The new well is approximately 100 feet downgradient from the shop and 50? Feet from where the third UST was removed. This site was not listed on Ecology's confirmed and suspected list. Port Ludlow Resort did have two other sites which received site hazard assessments where underground storage tanks were removed (751 Highland Drive/ 181 Cameron Drive, Port Ludlow. Ecology Facility Site ID No.: 91762839).

In light of the UST sites being so close to the proposed site of the new well, Washington State Department of Health (DOH) made the recommendation that a test boring be done first before drilling. No test boring was performed and well-drilling commenced. On April 20, 2009 Hollocene Drilling hit water at 50" depth. They halted for the day. On 4/21/09 when they returned to the site they smelled gas. No further drilling was done, and Robinson and Noble hydrogeologist Max Wills obtained water and soil samples from the well. These were sent to Libby Environmental Lab. Water results reveal gasoline and benzene levels above MCTA clean-up levels. (gas 5530 ug/l, benzene 948 ug/l). Toluene, ethylbenzene, and xylenes were found as well.

Description of past practices likely to be responsible for contamination: Leaking underground gasoline storage tanks, removed in 1990.

ACTIVITIES OR PRACTICES RESPONSIBLE FOR CONTAMINATION:

Spill	☐	LUST	X
Pesticide disposal	☐	Tank	☐
Landfill	☐	Improper handling	☐
Drums	☐	Improper disposal	☐
Other – Describe:			

Are discharges permitted (if yes, describe): No X Yes ☐

Standard Industrial Code(s)

CONTAMINANT(S)

AFFECTED MEDIA	CONTAMINANTS (#1-16: See contaminants key) Enter letter designating status of contaminant: C = Confirmed (above cleanup levels); S = Suspected; R= Remediated															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ground Water							C									
Surface Water																
Drinking Water																
Soil							C									
Sediment																
Air																

1 Base/neutral organics	7 Petroleum products	13 Corrosive wastes
2 Halogenated organic compounds	8 Phenolic compounds	14 Radioactive wastes
3 Metals - Priority pollutants	9 Non-halogenated solvents	15 Conventional contaminants, organic
4 Metals - Other	10 Dioxin	16 Conventional contaminants, inorganic
5 Polychlorinated biPhenyls (PCBs)	11 Polynuclear aromatic hydrocarbons (PAHs)	
6 Pesticides	12 Reactive wastes	

SITE INFORMATION

Soil type: silty sand with some gravel

Slope: Relatively flat with slight slope to south-west.

Site vegetation/cover present:

Forest	X	Pasture/open field	☐
Bare soil	X	Wetlands	☐
Brush	☐	Pavement	X
Landscaped	☐	Surface water	☐

Other – Describe: Relatively flat area with slight slope to south-west. Woods along East and west edges, wooded ravine along southern edge. Paved drive into site, then dirt drive. Sparse grass along southern ravine edge.

Are there any drinking water systems affected?	☐ Yes	X No
Municipal, private, or both? (Circle one)		
How many people are estimated to be affected? _____		
Is there a potential for a release or threatened release to affect a drinking water source? (public)	X Yes	☐ No
Are there monitoring wells in the vicinity?	☐ Yes	X No
Are there dry wells in the vicinity?	☐ Yes	X No

CONTAMINANT PATHWAYS AND TARGETS

	Ingestion	Inhalation	Contact
Ground Water			
Surface Water			
Drinking Water	X		
Soil			
Sediment			
Air			

Targets possible:			
Human, adult	x	Residential	x
Human, children	x	Industrial	☐
		Commercial	☐

Sensitive environments (See WARM Scoring Manual for definition): X Yes ☐ No If yes, describe: Fish habitat stream runs along eastern edge of property into ravine south of property.

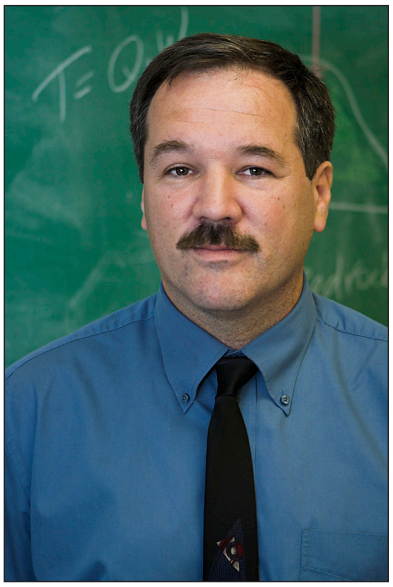
General Comments:

CV – Max T. Wills, LHG

MAX T. WILLS, LHG
SENIOR HYDROGEOLOGIST

BACKGROUND

Max is a Senior Hydrogeologist with 19 years of professional experience. He has an extensive background managing both hydrogeologic and environmental projects and has been a member of Robinson Noble since 1998. Max began his consulting career in 1991 while serving as a US Navy Reserve officer after three years active duty as a lieutenant. He worked in the environmental and geotechnical divisions of several prominent firms in the Puget Sound area. He is a licensed Hydrogeologist in Washington State and is responsible for performing various environmental and hydrogeologic studies, managing municipal well construction projects, and consulting with clients on regulatory issues ranging from water rights to environmental compliance. Max has managed numerous environmental site investigations and soil and groundwater remediation projects. He has also worked on a number of computer modeling projects of varying size and complexity, involving both analytical and numeric modeling approaches.



RELEVANT EXPERIENCE

***Project Manager*—Emergency and On Demand Environmental Services Contract 2007-2010, Tacoma Public Utilities.** Max has provided on-going project coordination and oversight to numerous emergency and routine TPU transformer remediation projects. He has been instrumental in completing dozens of successful remediation projects under the current contract through diligent management of subcontractors, implicit coordination with TPU managers and line crews, and effective training and oversight of field staff.

***Project Manager and Lead Hydrogeologist*—Well Site Acquisition, Environmental Assessment, and Production Well, City of Sumner, Washington.** Max has provided his hydrogeologic expertise to the due-diligence Phase II groundwater assessment to provide source approval data for siting the City's new production well in a former industrial area. Successful completion of this project has allowed the City to construct a new production well in an area with prolific groundwater resources, despite apparent adverse environmental restrictions. Max will be managing the production well project scheduled to start in July of this year.

***Project Manager and Lead Hydrogeologist*—Groundwater Monitoring System, Firgrove Mutual Water Company, Puyallup, Washington.** Over the past decade, Max has established and maintained a monitoring network for the Mutual's system of 23 production wells. This monitoring network, which culls data from the Mutual's SCADA and a variety of data-loggers and transducers, has been instrumental to the efficient management of the Mutual's groundwater resources. Currently, the data and trends established by the network are being used by the Mutual for managing an effort to reallocate a major portion of their water rights and by the USGS to assist in the production of a regional numerical groundwater model for the WRIA 10 (Clovers-Chambers Creek) drainage basin.

EDUCATION

M.S., Geology, 1998
Western Washington University

B.S., Geology, 1988
Central Washington University

PROFESSIONAL REGISTRATIONS

State of Washington
Licensed Hydrogeologist #783

PROFESSIONAL AFFILIATIONS

American Water Resources Assn.

WA State Groundwater Assn.

WA Hydrologic Society

CERTIFICATIONS & TRAINING

OSHA 29 CFR 1910.120

AHERA Asbestos Building Inspector

ROBINSON NOBLE