Groundwater Quality Monitoring in the Shallow Aquifer near Sequim, Clallam County, WA

Phase I

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Summary

In the spring of 2009, Clallam County Environmental Health Services (EHS) prepared to conduct reconnaissance monitoring of groundwater quality downgradient of urban and suburban land uses in the City of Sequim. County residents outside the city are usually served by individual or shared private wells tapping the shallow aquifer, and concern about impacts to groundwater and water quality in general from stormwater runoff prompted the Clallam County Marine Resources Committee to fund this study.

A monitoring plan for a short-term field effort was prepared in consultation with Charles Pitz, a hydrogeologist from Ecology's Environmental Assessment Program and a cooperator on the EPA grant managed by Clallam County Department of Community Development investigating stormwater impacts. EHS staff coordinated the field effort with the goal of determining generalized groundwater flow patterns and vulnerability of shallow wells to impacts from surface activities. All results are presented in Appendix A; study well locations are shown in Figure 1, and groundwater flow direction and nitrate concentrations are mapped in Figures 2 and 3.

Nitrates were detected in all study wells sampled at levels below safe drinking water levels; however 5 of 16 (31%) exceeded half the drinking water standard of 10 mg/L (commonly considered a trigger for more intensive or frequent testing). Thirteen of 16 wells sampled (81%) exhibit levels considered to be evidence of impact from human activities on the land surface. Recommendations may be found at the end of the report; they include monitoring for nitrate in other areas and for stormwater contaminants in wells showing vulnerability to land activities.

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Background and Objectives

As planned with representatives of the Clallam County Marine Resources Committee (MRC), the objective of this project was to investigate groundwater quality as it might relate to marine water quality with regard to stormwater contaminants. The project was intended to build on the 2005 study by Clallam County Environmental Health (EHS) establishing baseline groundwater quality for County residents with drinking water wells downgradient of commercial/light industrial development in City of Sequim's western city limits, a.k.a. the "focus area" (Soule 2005). It also responds to goals of a concurrent stormwater assessment project managed by Clallam County Dept. of Community Development under an EPA grant.

Recommendations received by state specialists cooperating on the EPA project have been incorporated in this project (Pitz 2009a and 2009b). In particular, Pitz recommended enlarging the area of interest beyond the focus area to include a larger region downgradient from historically urban zones, and to begin the groundwater quality assessment by "screening" study wells in the shallow aquifer to determine their relative vulnerability to contamination.

Methods

A monitoring plan for the project (Soule 2009) was developed in May 2009 by EHS after a field visit and consultation with Charles Pitz of Ecology's EAP.

Soule selected wells for study which were completed in the shallow aquifer downgradient from urban areas around Sequim. Well selection priorities are fairly standard for this type of study and included:

a. Must have a willing well owner (and tenant if applicable),
b. Should have a well report (log),
c. May have records from previous investigations,
d. Should have an accessible wellhead for measurement of water level,
e. Should not be located adjacent to an unlined irrigation ditch or pond,
f. Should tap shallowest zones of the water table aquifer, and
g. Must be able to produce raw (untreated) and fresh (not from a storage tank) samples.

The study included 21 wells: three were from the 2005 stormwater study; two were considered upgradient; three were water table piezometers installed by Clallam County in 2008 (useful for water level measurement but not sampling); all others are in current use for domestic and irrigation purposes. Figure 1 shows the study area and study wells including depth. Additional well characteristics are included in Appendix A; all available well logs are found in Appendix B.

Sample analyses were selected based on recommendations (Pitz 2009a) that general vulnerability to contamination be assessed in "Phase I" before spending the resources necessary to sample and analyze for specific stormwater contaminants (potential "Phase II"). Specifically, nitrate was chosen as a good screening parameter for Phase I because it is conservative and mobile in groundwater relative to contaminants typical of stormwater such as hydrocarbons and metals, which are adsorbed by most soils for some length of time. The project monitoring plan details the selection process; Table 1 lists potential analyses and associated details for Phases I and II.

Table 1. Constituents of interest

Constituents of interest	Analytical method	Detection limit	State standard*	Price per sample**
nutrients: PHASE I Nitrate as N (NO_3 as N) Lab Nitrate as N (NO_3 as N) Field	 SM 4500-NO3-D EPA 353.3	 0.5 mg/L[2] 0.4 mg/L	 10 mg/L 10	 $25*** $1.25
other inorganics: PHASE I Chloride Field (optional)	 SM 4500-Cl- E	 2.5 mg/L	 250 mg/L	 $1
metals (total): PHASE II chromium (Cr) zinc (Zn)	 EPA 200.7 (ICP) EPA 200.7 (ICP)	 0.001 0.001	 0.1 mg/L 5.0	 $10 $10
pesticides: PHASE II Chlorinated pesticides scan	 EPA 608 (GC/EC)	 Various (ug/L)	 Various	 $75
other organics: PHASE II Hydrocarbon identification	 NW-TPH-HCID	 ?? (mg/L)	 Not defined	 $50
pathogens: PHASE II Total coliform and E. Coli	 SM 9221 B, 9222 B	 MPN or MF	 1colony/ 100mL	 $30***

*Ecology, 1996, Appendix A
**AmTest, Inc., 2004
***when included in 2009, will be by Twiss Analytical Laboratory in Poulsbo, WA

County staff and assistants visited all study sites within the 10-day period from 5/27/09 and 6/5/09.[3] Protocols established in the monitoring plan were followed for each task. Staff assistants initially visited each site to attempt access to the wellhead for measurement of static water level. At a follow-up visit Soule and volunteer assistants purged the well, collecting grab samples from a hose at 3-5 minute intervals. Dissolved oxygen, conductivity, pH and water temperature were measured from the bucket samples using hand-held probes. After field parameters stabilized (about 17 minutes on average), nitrate was measured using a Chemetrics V-2000 photometer.[4] Duplicate measurements were made for one well and a measurement was made on deionized water, for field QC purposes. Replicate samples from two wells (12.5% of the number tested) were collected in bottles, cooled and delivered to Canal Pumps for nitrate analysis by Twiss Analytical Labs in Poulsbo.

Other field activities often included tagging the well with Ecology unique ID #s (9 study wells tagged), sketching and photographing the site. Chloride was an optional test for Phase I and was not tested; it should be considered for Phase II if sources such as road salt or septic effluent are identified.

Data entry of well logs and field notes to a spreadsheet was performed by a volunteer with QC by Soule, who then mapped well locations in the County's GIS. Pitz used 2-ft. Lidar to establish the wellhead elevations, and the default Kriging method in ArcMap 9.3 to generate water level elevation contours.

The author wishes to also acknowledge and express thanks to water level field assistants Robert Knapp and Steve Bengtson (Clallam County DCD), and to sampling and tagging assistants Dick and Rhonda Dapcevich and data entry assistant Betsy Robins (Beachwatcher volunteers).

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[2] mg/L is equivalent to parts per million (ppm)

[3] One well couldn't be measured until 6/18/09

[4] Chemetrics "Nitrate3" ampoules were normally used, which measures nitrate within the range 5.0 – 50.0 ppm as nitrate (1.1 – 11.3 ppm as N). For samples expected to be near the lower end of that range, "Nitrate2" ampoules were used, with a range of 0.40 – 3.00 ppm. All results are reported here as nitrate-as-N.

Results and Discussion

Appendix A contains detailed results for all wells and all parameters tested. A discussion of each follows.

Groundwater Flow

Static water level data are fundamental to any investigation of groundwater hydrology. The direction of groundwater flow may be determined from the elevation of the water level in multiple wells tapping the same aquifer. Accurate measurements of the elevation of the ground surface at several wellheads, height of the measuring point used for each well, and depth to water when it is in equilibrium are all needed to determine flow direction accurately, in addition to details of the geologic layers each well passes through.

Figure 2 shows the water level elevations in study wells for the study period and the inferred direction of groundwater flow, 20-30 degrees East of North (flow is perpendicular to elevation contours). This generally agrees with earlier estimations of groundwater flow direction for the area east of the Dungeness River near Sequim (Thomas 1999, Soule 2005); however, the interpretation around the margins is least reliable and should not be extrapolated. It also agrees with findings of Simonds and Sinclair (2002) that the Dungeness River infiltrates water to the ground over most of its lower sections (the water table mounds under a losing stream).

Nitrates

As described above, nitrate is a good parameter for tracking general trends in groundwater quality. Groundwater in the Dungeness watershed is naturally very low in nitrates (usually <1 ppm as N), but when nitrates are found, the annual high may be around June (Sinclair 2003) – the same time of year this study was conducted. Nitrate concentrations ranged from undetected to 7.9 ppm nitrate as N; the median concentration for 16 wells tested was 2.7 ppm.

Figure 3 shows the geographical distribution of nitrate concentrations, along with irrigation ditches and other surface water features. The area with the most consistently elevated concentrations is north of the city limits east of Sequim-Dungeness Way, and the areas with the most consistently low concentrations are furthest west and northwest of the city limits.

The drinking water standard for nitrate as N is 10 ppm; however, concentrations above 1-2 ppm (81% of wells tested) are not natural and indicate a degree of degradation from land activities. Nitrates above 5 ppm (31% of wells tested) indicate advanced degradation and the potential for other contaminants to be present, depending on the source of nitrates. Clallam County EHS recommends re-testing at least once per year when the concentration exceeds 5 ppm (all private well owners should test for nitrates at least once every three years).

Many activities potentially contaminate groundwater, especially where soils are very permeable and/or the water table is shallow. Nitrate contamination in groundwater can be caused by over-fertilizing, accumulations of animal waste, and septic systems.[5] Nitrate concentrations within aquifers change from season to season and time to time depending on the concentration, amount, and timing of contamination entering the aquifer, as well as the aquifer media (clay, sand, etc.) and potential for dilution and/or denitrification. Historic land uses may cause "legacy" contamination as nitrogen compounds deep in the soil continue to leach out over time, after the land use has changed. Urban stormwater does not

[5] Acid deposition from the atmosphere may also be a source of nitrogen compounds, but is expected to be minor relative to other anthropogenic sources in this region.

typically contain substantial loadings of nitrogen compounds unless the runoff contains fertilizer such as from intensively managed lawns or crops.

To further examine available data for the study area, Soule compiled and analyzed two sets of existing nitrate data. First, a plot of nitrate values associated with building permits since 2006 showed a few occurrences of nitrates in the 3-5 ppm range to the southwest and north of the city limits. There was one value >5 ppm, in an area where only the lowest levels were found in this MRC study. Second, a cursory review of nitrate results since 2006 for water systems testing at the County lab showed several occurrences of 3-5 ppm nitrates to the southwest and north of the city limits, but nothing >3 ppm in the northwestern-most area. There were also at least 6 occurrences of nitrates >5 ppm to the north of the city, and half of those were near wells found in this MRC study to be <5 ppm. Well depths were not available with these data sets, but the majority of wells drilled in the study area are completed in the shallow aquifer according to Ecology's well log database.

These analyses illustrate a common finding in local studies of nitrates in groundwater: nitrates often vary from low to high across small distances. Geologic and hydrologic variation in the subsurface, distinct well construction (and well sealing) and diverse, erratic sources of nitrogen to the environment all contribute to the inconsistency of nitrate concentrations in the shallow aquifer. Figure 3 shows well depth along with nitrate values to convey the importance of depth when comparing concentrations within a localized area, but several other factors that affect nitrates can't so readily be conveyed.

For example, the groundwater flow directions shown in Figure 2 support the theory that infiltration of relatively uncontaminated Dungeness River water[6] could be diluting nitrates to some extent, over some distance. Open irrigation ditches that may also leak water are shown on Figure 3 but high nitrate wells are found both near and distant to these. Factors to consider when testing these correlations include ditch water quality for the study period at these sites, and amount of ditch leakage, at minimum.

Dissolved Oxygen

Dissolved oxygen in groundwater plays a role in the occurrence of nitrate because the nitrification process involves oxidation of organic N and ammonia to nitrite and nitrate. Groundwater with a high level of D.O. such as might be found in shallow, fast-moving, and/or more permeable zones would probably facilitate the nitrification process when nitrogen is introduced. Likewise, low D.O. levels would inhibit nitrification (however, many other factors including presence of certain bacteria also influence nitrification).

In this study the range of D.O. was 40-102%, but all wells with the highest nitrates (>5 ppm) had D.O. above 70%. (Note that high D.O. levels can't be used to predict high nitrates since there may or may not be a source of nitrogen. In this study there were several wells with high D.O. that had relatively lower nitrates, but as expected there were no wells with high nitrates and low D.O.)

Specific Conductance

Specific conductance is highly dependent on the amount of dissolved solids in water. A correlation between field-measured specific conductance (in microsiemens per cm at 25^{o}C) and lab-measured total dissolved solids (TDS, in mg/L) was established in a prior study of groundwater quality in the western part of the study area, and is presented in Figure 4. Like nitrates, high concentrations of dissolved solids in water carry concerns for human as well as ecosystem health. Excessive concentrations of dissolved solids can render water unfit for drinking and for supporting aquatic life. The state groundwater quality criterion for TDS is 500 mg/L (Chapter 173-200 WAC).

[6] Total Nitrogen in Dungeness River samples from river miles 3.2 and 11 ranged less than 0.3 mg/L in recent sampling (2006-08) (unpublished data, Jamestown S'Klallam Tribe 2009)

Although TDS was not directly measured in this study, the correlation shown in Figure 4 was used to estimate TDS from specific conductance for each study well. Table 2 shows that no study wells are likely close to the groundwater quality criterion for TDS.

Table 2, Estimated TDS for water quality study wells

LOCAL #	Tag #	Date of WQ test	Specific Conductance	Calculated TDS (mg/L)
30N/03W-07P03	ACA599	5/29/2009	332.2	186
30N/03W-17D52	none	5/27/2009	408.6	232
30N/03W-17D78	BBB073	5/27/2009	417.1	237
30N/03W-17E01	BBB072	5/27/2009	417.1	237
30N/03W-17M01	ACA515	5/27/2009	429.2	244
30N/03W-18F03	AGN391	5/28/2009	343.8	193
30N/03W-18M77	BBB075	5/28/2009	321.2	179
30N/03W-18Q91	BBB076	5/29/2009	327.7	183
30N/03W-18R52	BBB077	5/29/2009	427.9	243
30N/03W-19D01	ACA661	5/27/2009	345.6	194
30N/03W-20C02	BBB078	5/29/2009	458.9	262
30N/03W-30D03	BBB074	5/28/2009	270.7	149
30N/04W-13J04	none	5/29/2009	270.2	149
30N/04W-24C05	BBB079	5/29/2009	277.9	153
30N/04W-24G02	ACA651	5/28/2009	335.4	188
30N/04W-24P03	BBB080	5/29/2009	259.9	142

Other Field Parameters

In this study, temperature and pH data were collected primarily for use in determining the completeness of well purging prior to nitrate testing. It is worth noting that all well water pH is within the normal range and not acidic. Summary statistics for all field parameters for the 16 wells tested follows:

Table 3, Summary of field parameters measured

Parameter	Min	Median	Max
Temperature (^oC)	10.9	11.8	12.4
pH (standard units)	7.02	7.8	7.94
Specific conductance (microsiemens/cm at 25^o C)	270	340	459
Dissolved oxygen (%)	40	75	102

Data Quality

Prior to field work, Soule used the Chemetrics photometer in the Clallam County EHS Laboratory to measure check standards and recent samples analyzed using the County's nitrate probe (SM 4500-NO3-D). The relative difference between the two methods was 2-14% in three cases where the known nitrate concentration ranged from 1-10 ppm. The RPD was 23% when nitrate was around 0.5 ppm, and 100% when nitrate was <0.5 ppm (not surprising since these are close to and below the detection limit for the photometer, respectively).

After field work was completed, a data quality assessment was conducted using data from two wells for which nitrates were measured in the field and also analyzed by an accredited laboratory. The field measurements made using the Chemetrics photometer were 25% and 39% lower than the associated laboratory results (Twiss Analytical in Poulsbo using SM 4500-NO3-F) in the two cases. This high level of variability was surprising given the relative agreement between the photometer and probe results described above. However, it is likely also the result of changing conditions – there were 3 additional minutes of purging between the field measurement and sample collection in both cases. If changing conditions is the cause of the higher result the implication is that nitrate concentration increases with greater purge volume. Another possibility is that the photometer under-reports nitrate concentration, though that pattern was not evident during cross-checking in the laboratory, described above.

Duplicate field measurements of nitrate were made on the final well visited; however, both results were nondetects (below range) and therefore can't be used to statistically estimate precision. A field blank of distilled water was also measured for nitrate with a result of nondetect.

Conclusions and Recommendations

Significant conclusions that can be made from this "screening" of groundwater quality downgradient from urban land uses in Sequim include:

- Some areas north of the city limits, and several study wells in particular, are quite vulnerable to certain types of contamination from land activities, with vulnerability defined as the combination of physical susceptibility and upgradient sources of contamination.
- Nitrate can be used as an early warning system to identify zones in the aquifer system more vulnerable to degradation from land uses. In the event that consistently-elevated nitrate levels are found in a given area, tests for other contaminants should be considered, depending on the likely source(s) of nitrates.
- Nitrate concentrations vary greatly from zone to zone (horizontally and vertically) in the shallow aquifer system. This makes it difficult to generalize about or represent specific areas of better or worse groundwater quality.
- Factors affecting nitrate concentration at a given property include:
    - Zone of the aquifer, and whether clay layers are present in the geologic profile
    - Proximity to and volume/concentration of the source of contamination
        - The source may be current and ongoing or historic ("legacy" nitrogen contamination may persist in the unsaturated zone from historic land uses)
    - Integrity of the well seal around the upper casing (related to age and/or construction)
    - Rate and direction of groundwater flow, which varies by season and pumping patterns
    - Amount of dilution from uncontaminated irrigation ditches, ponds, and streams
    - Whether the sample is from the plumbing, well casing, or aquifer

Conclusions regarding the potential implications of stormwater contamination include:

- The transfer of stormwater contaminants through the aquifer system to downgradient fresh or marine surface waters is a potential concern, but the risk is likely small at this time because the majority of the contaminants of concern in stormwater are unlikely to travel such long distances in the dissolved phase in the subsurface. (Pitz 2009a)

- The concurrent EPA grant conducted by Clallam County DCD included comprehensive sampling and analysis of stormwater runoff in Sequim and around the Dungeness watershed. Pitz reviewed preliminary lab results from a groundwater perspective and concluded that there is not a strong likelihood for significant groundwater impact from the stormwater sampled. (personal communication, June 2009)
- Future stormwater treatment facilities should monitor groundwater quality from wells rather than facility effluent or lysimeters (see Appendix A for further details).

Recommended follow-up work includes:

- Conduct outreach to well owners in areas of elevated nitrates regarding health implications and the vulnerability of the well for other contaminants
- Conduct outreach to all well owners regarding the importance of a solid well seal and maintaining a contaminant-free zone (100' radius) around the wellhead
- Sample for additional contaminants in wells showing high vulnerability, including zinc, lead, chromium, iron; TPH (diesel and gas); pesticide & herbicide scan; nitrates, specific conductance, and pH
- Investigate possible correlations between nitrate concentration and proximity to surface water, well age, current land uses such as septic system density, historic land uses such as dairy farms, and other factors
- Investigate nitrate variability over different purge times
- Intensify data quality assessments when using the Chemetrics photometer to establish patterns and potential bias
- Continue to enforce and review monitoring programs required by City of Sequim

The net result of this brief investigation of groundwater quality and stormwater impacts has greatly advanced the understanding and implications of these topics for the study area. The author wishes to thank the Clallam County Marine Resources Committee for its forward thinking in associating marine water quality with the health of the upland environment, and specifically with groundwater that ultimately discharges to fresh and marine surface waters.

A final quote from my collaborator on this project summarizes the situation for the Dungeness watershed (emphasis added):

> "For the time being, I would keep the focus on characterizing the current status of the aquifer water quality [rather than on localized stormwater contaminants]. …I hope you'll use this opportunity to find support in your county for making a commitment to long-term groundwater quality monitoring, both in this focus area and beyond. I think <u>such a commitment is a necessity for any community that hopes to simultaneously use a local drinking water aquifer for the management of stormwater runoff</u>." (Pitz 2009a)

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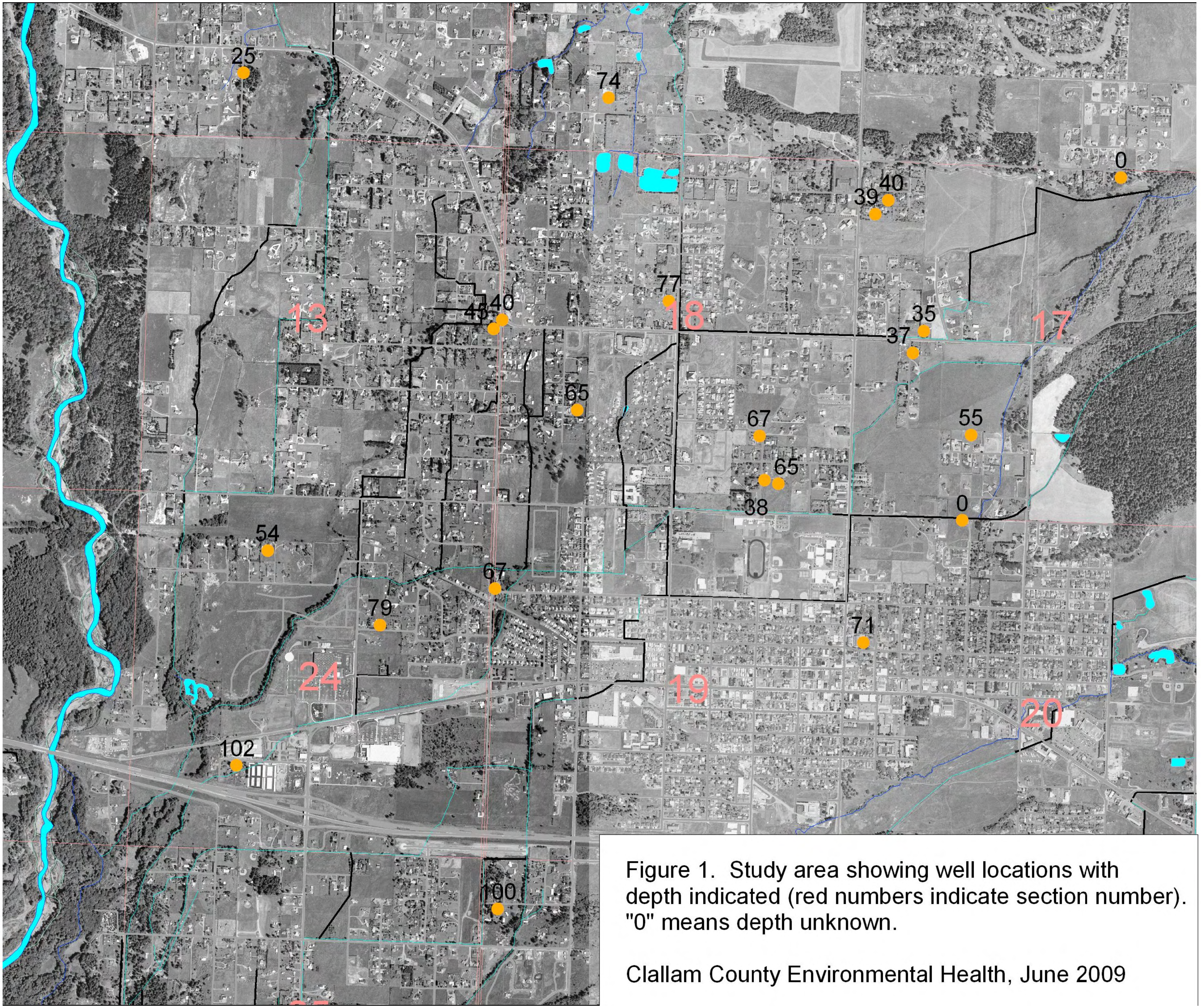
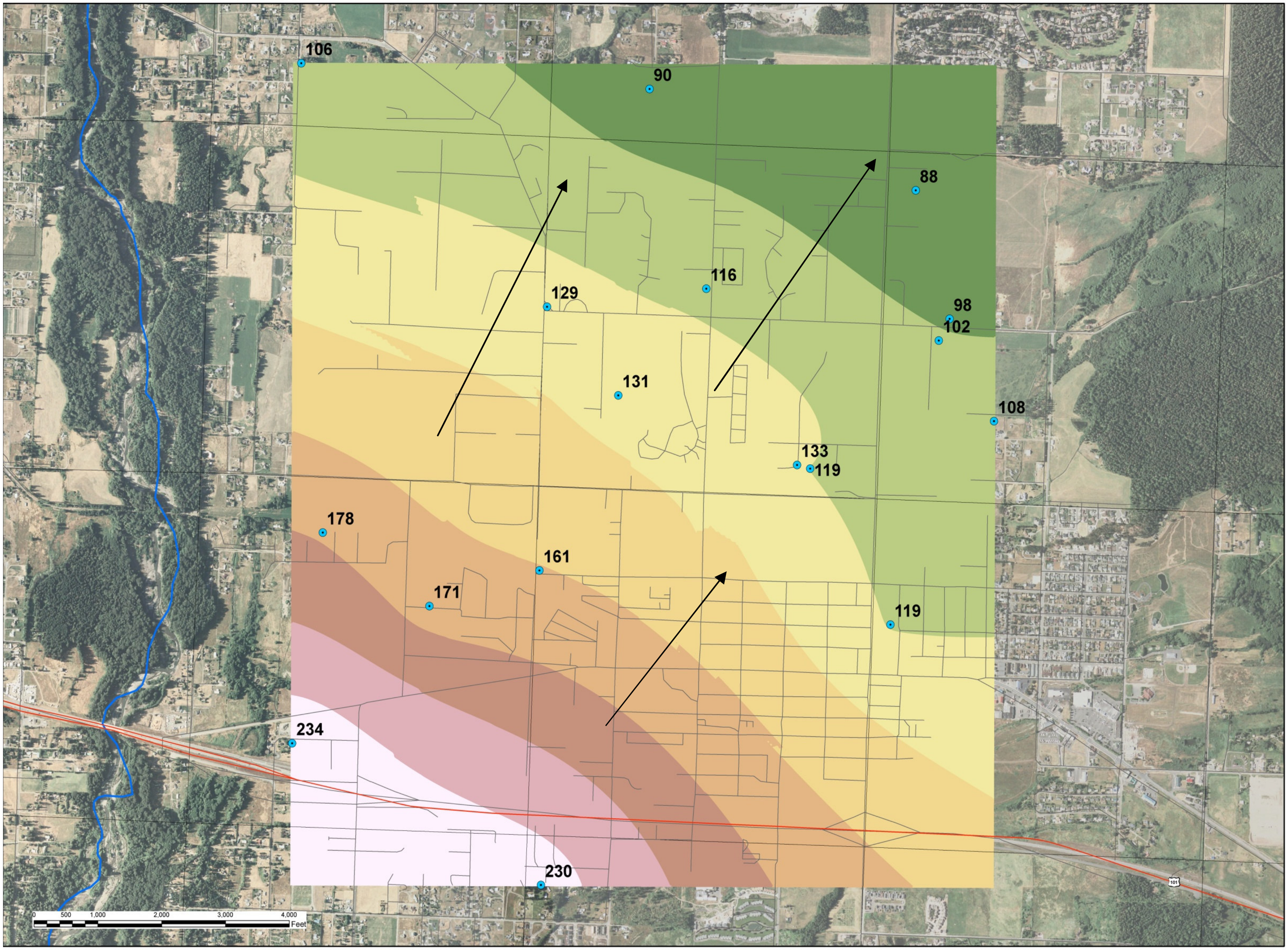


Figure 1. Study area showing well locations with depth indicated (red numbers indicate section number). "0" means depth unknown.

Clallam County Environmental Health, June 2009

Figure 2.
Groundwater-level elevations and contours, showing estimated groundwater flow direction

Contours by Wash. Dept. of Ecology, May-June 2009



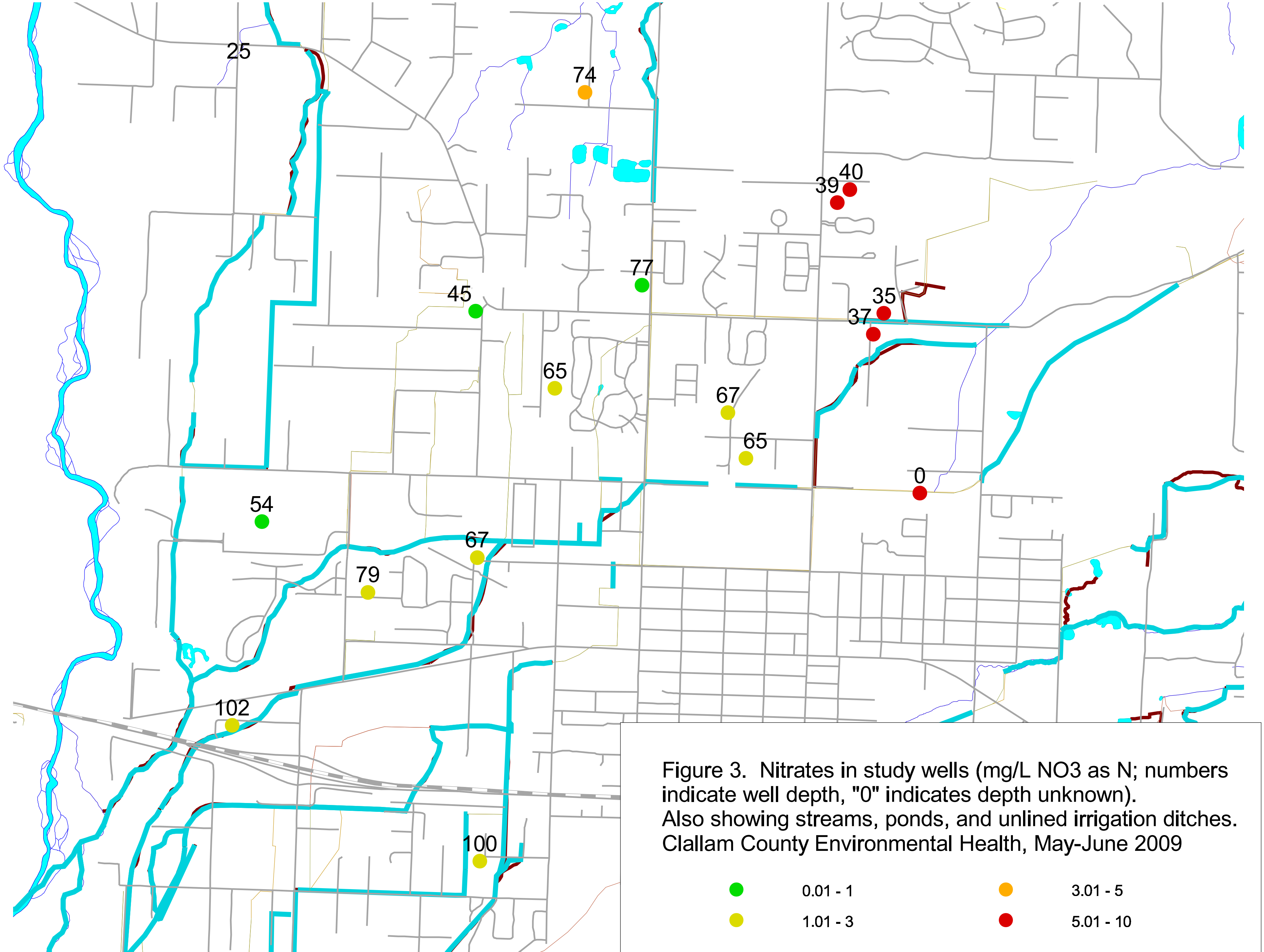
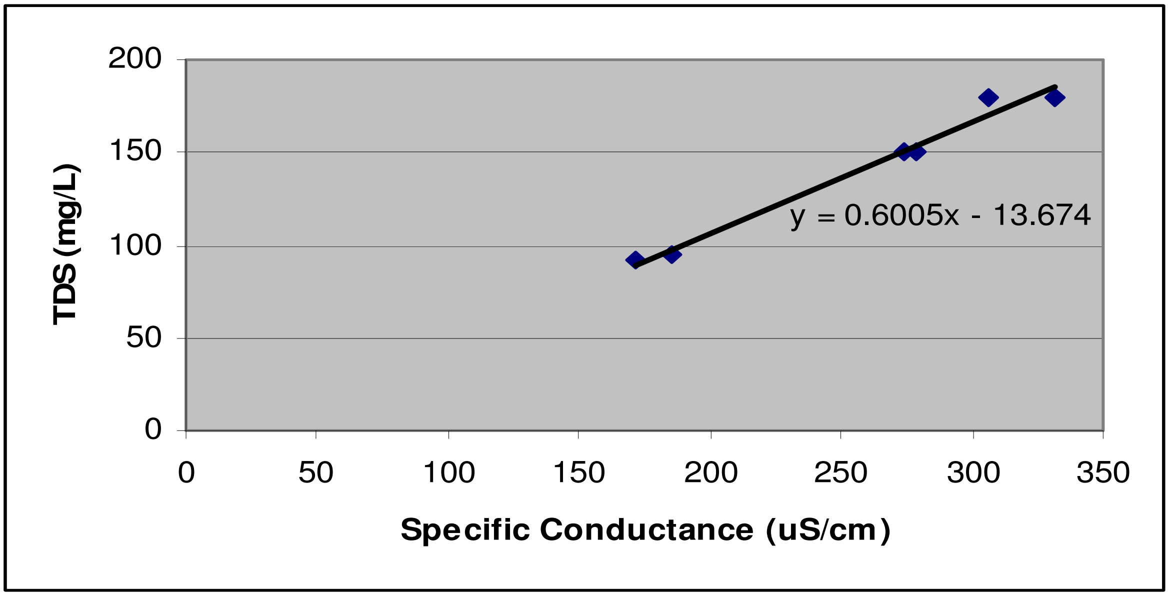


Figure 3. Nitrates in study wells (mg/L NO3 as N; numbers indicate well depth, "0" indicates depth unknown). Also showing streams, ponds, and unlined irrigation ditches. Clallam County Environmental Health, May-June 2009

Figure 4. Correlation Diagram: TDS and Specific Conductance (from Soule 2005)



Appendix A. Study Well Characteristics and Field Results, May-June 2009

			Well Characteristics (ft.)					Water Level (ft.)			Water Quality									
LOCAL #	**Tag #**	**Water Use**	**Well Depth**	**Surface seal**	**open start**	**open end**	**copy of log**	**Date of WL meas.**	**WL BGS**	**WL Elev.**	**Date of WQ testing**	**Purge time (min.)**	**pH**	**Water Temp (oC)**	**D.O. %**	**D.O. (mg/L)**	**Elec. Cond-uctivity (umhos)**	**Spec. Cond. (umhos/ cm at 25oC)**	**Nitrate as N (mg/L)**	**NOTES**
30N/03W-07P03	ACA599	domestic	74	20	74	90	yes	6/5/2009	21.43	90	5/29/2009	0:14	7.78	11.7	39.7	4.31	247.5	332.2	3.3	
30N/03W-17D52	none	public	39	18	35	39	yes				5/27/2009	0:13	7.66	11.9	87.1	9.4	308.1	408.6	5.9	
30N/03W-17D78	BBB073	irrigation	40	18	40	40	yes	5/26/2009	20.99	88	5/27/2009	0:17	7.59	11.8	74.6	8.1	312.6	417.1	6.5	
30N/03W-17E01	BBB072	domestic	35	none indicated	35	35	yes	5/27/2009	21.73	98	5/27/2009	0:41	7.67	12.1	71.3	7.7	315.2	417.1	5.6	1
30N/03W-17M01	ACA515	domestic	37	18	37	37	yes	5/26/2009	23.46	102	5/27/2009	0:11	7.67	11.6	73.8	8.03	319.9	429.2	7.4	
30N/03W-17P71	none	public	55	18	51	55	yes	5/26/2009	18.76	108										
30N/03W-18E21	BAF224	unused	40	26	30	40	yes	6/2/2009	33.11	129										
30N/03W-18F03	AGN391	domestic	77	18	72	77	yes	5/26/2009	30.93	116	5/28/2009	0:20	7.65	11.8	80.3	8.69	256.9	343.8	0.5	2
30N/03W-18M77	BBB079	domestic	65	?	?	?	no	5/26/2009	41.4	131	5/28/2009	0:18	7.89	12	78.8	8.49	241.9	321.2	2.6	
30N/03W-18Q91	BBB076	domestic	66	18	63	66	yes				5/29/2009	0:29	7.83	11.3	74.4	8.12	242.1	327.7	2.3	
30N/03W-18R21	BAF225	unused	38	26	28	38	yes	6/2/2009	30.61	133										
30N/03W-18R52	BBB077	domestic	65	?	?	?	no	6/2/2009	45.07	119	5/29/2009	0:13	7.78	11.8	63	6.8	320.2	427.9	2.8	3
30N/03W-19D01	ACA661	domestic	67	none indicated	49	67	yes	6/2/2009	52.07	161	5/27/2009	0:16	7.84	11.4	77.1	8.36	257.1	345.6	1.8	
30N/03W-20C02	BBB078	domestic	36	?	36	36	yes				5/29/2009	0:13	7.68	12	84.3	9.06	345.2	458.9	7.9	4
30N/03W-20E01		irrigation	71	18	66	71	yes	6/18/2009	55.01	119										
30N/03W-30D03	BBB074	domestic	100	18	92	98	yes	5/28/2009	72.89	230	5/28/2009	0:18	7.02	11.6	75.7	8.26	202	270.7	2.2	5
30N/04W-12P21	APJ133	unused	25	14	15	25	yes	6/2/2009	19.47	106										
30N/04W-13J04	none	domestic	45	18	41	45	yes				5/29/2009	0:15	7.75	12.4	101.7	10.91	205.9	270.2	0.6	3
30N/04W-24C05	BBB079	domestic	54	18	54	54	yes	6/5/2009	26	178	5/29/2009	0:18	7.78	10.9	60.5	6.68	203.7	277.9	0.4	
30N/04W-24G02	ACA651	domestic	79	18	79	79	yes	5/28/2009	66.29	171	5/28/2009	0:11	7.76	11.5	73.3	7.97	248.8	335.4	3.0	
30N/04W-24P03	BBB080	domestic	102	18	97	102	yes	5/29/2009	62.91	234	5/29/2009	0:19	7.94	11	80.2	8.79	191.5	259.9	1.5	
		Average:	*57.6*		*52.3*	*57.6*			*37.8*	*136.1*		*0:17*	*7.7*	*11.7*	*74.7*	*8.1*	*263.7*	*352.7*	*3.4*	
		Median:	*55.0*		*49.0*	*54.0*			*30.9*	*119.0*		*0:16*	*7.8*	*11.8*	*75.2*	*8.2*	*252.9*	*339.6*	*2.7*	
		N	*21*		*19*	*19*			*17*	*17*		*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	

NOTES

BGS Below Ground Surface
1 purge was not continuous; may not have been complete
2 under-range for Nitrate3, tested twice, screen went blank; assume negligible/near zero
3 under-range for Nitrate3 but still reported
4 well may have been deepened from 36'
5 pH meter drifting lower

Appendix B

Study Well Logs

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

ACA599

Application No. ....
Permit No. ....

(1) OWNER: Name Paul Billingsley Address Route 6 Box 110-56 Sequim

(2) LOCATION OF WELL: County Clallam Tract 4 ... SW ¼ SW ¼ Sec 7 T 30 N., R 3 W W.M.
Bearing and distance from section or subdivision corner Aaron Miller acreage tracts

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)....
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☑ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 90 ft. Depth of completed well 74 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from 0 ft. to 74 ft.
Threaded ☐ ....." Diam. from ..... ft. to ..... ft.
Welded ☑ ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☑
Type of perforator used..........
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☐ No ☑
Manufacturer's Name..........
Type.......... Model No..........
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☑ No ☐ Size of gravel: 3 in
Gravel placed from 74 ft. to 90 ft.

Surface seal: Yes ☑ No ☐ To what depth? 20 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☑
Type of water?.......... Depth of strata..........
Method of sealing strata off..........

(7) PUMP: Manufacturer's Name..........
Type: .... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 165 ft.
Static level 19 ft. below top of well Date 5-10-78
Artesian pressure ..... lbs. per square inch Date.....
Artesian water is controlled by.......... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?.....
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 20+ gal./min. with 60 ft. drawdown after 2 hrs.
Artesian flow..... g.p.m. Date.....
Temperature of water..... Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:
Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Rocky top soil	0	7
sandy hardpan	7	18
W.B. sand & gravel	18	78
gray Clay	78	90

RECEIVED
JUN 5 1978

Work started 5-1, 1978. Completed 5-9, 1978

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Richard Bekkevar (Person, firm, or corporation) (Type or print)
Address Route 2 Sequim WA.
[Signed] Richard Bekkevar (Well Driller)
License No. 779 Date 5-10, 1978

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

16 NOV 5

Start Card No. 069737

30N/03W-17D52 (no tag)

Water Right Permit No.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

(1) OWNER: Name Emile Lasrange Address 982 Sequim Dungeness Way

(2) LOCATION OF WELL: County Clallam NW ¼ NW ¼ Sec 17 T. 30 N., R. 3 W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) Sequim, 98382

(3) PROPOSED USE: ☑ Domestic ☐ Irrigation ☐ DeWater ☐ Industrial ☐ Test Well ☐ Municipal ☐ Other

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned ☐ New well ☑ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☐ Rotary ☑ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 39 feet. Depth of completed well 39 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: " Diam. from ft. to ft.
Welded ☑ 6 " Diam. from 01 ft. to 35 ft.
Liner installed ☐ " Diam. from ft. to ft.
Threaded ☐

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☑ No ☐
Manufacturer's Name Johnson
Type Stanlers Model No.
Diam. 5 Slot size 20 from 35 ft. to 39 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal Benitte
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 17 Ft ft. below top of well Date 10/21/91
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 60 GPM gal./min. with 35 ft. drawdown after 1½ hrs.
Airtest gal./min. with stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
top Soil	0	2
Sand Loom	2	12
Hard Pan Brown	12	31
Sand + Gravel W.B.	31	37

Work started 10/18/91, 19. Completed 10/19/91, 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Louis Well Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 1652 Baro Rd. Port Angeles WA
(Signed) Louis Rychelik (WELL DRILLER) License No. 0858
Contractor's Registration No. LOUIEWD137MA Date 10-21, 1991

(USE ADDITIONAL SHEETS IF NECESSARY)

050-1-20 (10/87) -1329- 3

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 064959
BBB073
Water Right Permit No.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

(1) OWNER: Name Bob Dickerson Address 192-P Sequim Dungeness Way

(2) LOCATION OF WELL: County Clallam NW ¼ NW ¼ Sec 17 T 30 N., R 3 W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address)

(3) PROPOSED USE: ☑ Domestic ☐ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned ☐ New well ☑ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☐ Rotary ☑ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 40 feet. Depth of completed well 40 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: " Diam. from ft. to ft.
Welded ☑ 6 " Diam. from 0 ft. to 40 ft.
Liner installed ☐ " Diam. from ft. to ft.
Threaded ☐

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☑
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal Benit
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 15 ft. below top of well Date 8/22/90
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " "
" " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 30+ gal./min. with @ 35 ft. drawdown after 1/2 hrs.
Airtest gal./min. with stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
top Soil	0	2
hard pan Brown	2	21
gravel w B.	21	40

Work started 8/22/90, 19. Completed 8/22/90, 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Louie Well Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 165R Barr rd Port Angeles
(Signed) [signature] (WELL DRILLER) License No. 0848
Contractor's Registration No. LOUIEWD137PA Date 8-27, 1990

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329-

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT BBB072
STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) OWNER: Name Kettel Lawrence Address Rt5 Box306 Sequim Wash 98382

(2) LOCATION OF WELL: County Clallam × E½ E½ 4 W ½ NW¼ Sec 17 T 30 N., R 3 W.W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)....
New well ☐ Method: Dug ☐ Bored ☐
Deepened ☒ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 35 ft. Depth of completed well ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 35 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☐ No ☒ To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level. APPROX 185 ft.
Static level 12 ft. below top of well Date 4/17/76
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 40 gal./min. with 2 ft. drawdown after hrs.
Artesian flow g.p.m. Date 4/17
Temperature of water 50 Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Old Well	0	20
Brown W.B. Sand & Gravel	1	21
Brown Gravely Clay	21	28
Brown Water Bear Sand & Gravel	28	35

Lawrence Kettle

RECEIVED
JUN 25 1976
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started 4/15, 1976. Completed 4/17, 1976.

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Stoican Drilling Co Inc (Person, firm, or corporation) (Type or print)

Address P.O. Box 161 Sequim Wash- 98382

[Signed] Valier Stoican (President) 0473 (Well Driller)

FRED Kuboni

License No. 0258 Date 5/10, 1976

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71)
ECY-070-28

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT ACA515
STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) OWNER: Name M.A. Olson Address PO Box 1437 Sequim Wn

(2) LOCATION OF WELL: County Clallam — NE ¼ SW ¼ Sec. 17 T. 30 N., R. 3 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☑ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 37 ft. Depth of completed well 37 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 37 ft.
Threaded ☐ .... " Diam. from .... ft. to .... ft.
Welded ☑ .... " Diam. from .... ft. to .... ft.

Perforations: Yes ☐ No ☑
Type of perforator used ....
SIZE of perforations .... in. by .... in.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.

Screens: Yes ☐ No ☑
Manufacturer's Name ....
Type .... Model No. ....
Diam. .... Slot size .... from .... ft. to .... ft.
Diam. .... Slot size .... from .... ft. to .... ft.

Gravel packed: Yes ☐ No ☑ Size of gravel: ....
Gravel placed from .... ft. to .... ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? .... Depth of strata ....
Method of sealing strata off ....

(7) PUMP: Manufacturer's Name ....
Type: .... H.P. ....

(8) WATER LEVELS: Land-surface elevation above mean sea level .... ft.
Static level 10 ft. below top of well Date Dec. 21
Artesian pressure .... lbs. per square inch Date ....
Artesian water is controlled by .... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? ....
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ....
Bailer test 25 gal./min. with 13 ft. drawdown after .... hrs. approx.
Artesian flow .... g.p.m. Date Dec 21, 1976
Temperature of water .... Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
topsoil	0'	2'
clay brown gravel	2	13
clay brown	13	27
clay brown sand	27	30
gravel	30	37

RECEIVED
JAN 11 1977
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started Dec. 20 1976. Completed Dec. 21, 1976

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Van Ausdle Well Drilling (Person, firm, or corporation) (Type or print)
Address Rt 5 Box 1118 - Sequim
[Signed] Melvin Williams (Well Driller)
License No. 0524 Date Dec 27 1976

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

30N/03W-17P71 (NO TAG)

WATER WELL REPORT
STATE OF WASHINGTON

Start Card No. 63297
Water Right Permit No.

(1) OWNER: Name REMAK JOHN   Address BROWN RD.&GLACIER DR. SEQUIM, WA 98382-

(2) LOCATION OF WELL: County CLALLAM   - SE 1/4 SW 1/4 Sec 17 T 30 N., R 3 WWM
(2a) STREET ADDRESS OF WELL (or nearest address) SAME

(3) PROPOSED USE: DOMESTIC

(4) TYPE OF WORK: Owner's Number of well (If more than one)
NEW WELL   Method: ROTARY

(5) DIMENSIONS: Diameter of well 6 inches
Drilled 55 ft. Depth of completed well 55 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Dia. from 01 ft. to 51 ft.
WELDED " Dia. from ft. to ft.
" Dia. from ft. to ft.

Perforations: NO
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: YES
Manufacturer's Name COOK
Type SLOTTED Model No.
Diam. 5 slot size 12 from 51 ft. to 55 ft.
Diam. slot size from ft. to ft.

Gravel packed: NO Size of gravel
Gravel placed from ft. to ft.

Surface seal: YES To what depth? 18 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? NO
Type of water? Depth of strata ft.
Method of sealing strata off NONE

(7) PUMP: Manufacturer's Name
Type NONE H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level 11 ft. below top of well Date 09/21/92
Artesian Pressure lbs. per square inch Date
Artesian water controlled by NOT ARTESIAN

(10) WELL LOG

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change in formation.

MATERIAL	FROM	TO
TOPSOIL	0	2
BROWN CLAY AND GRAVEL	2	22
BROWN SAND&GRAV WATER BEARING	22	40
BROWN CLAY	40	42
BROWN SAND&GRAV WATER BEARING	42	49
BROWN W.B. SAND	49	55

Work started 09/21/92   Completed 09/21/92

(9) WELL TESTS: Drawdown is amount water level is lowered below static level.
Was a pump test made? NO If yes, by whom?
Yield: gal./min with ft. drawdown after hrs.

Recovery data
Time Water Level Time Water Level Time Water Level

Date of test / /
Bailer test gal/min. ft. drawdown after hrs.
Air test 60 gal/min. w/ stem set at 45 ft. for 1 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? NO

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME LOUIE'S WELL DRILLING,INC
(Person, firm, or corporation) (Type or print)

ADDRESS 363 S BARR RD PORTANGELES

[SIGNED] License No. 0868

Contractor's
Registration No. LOUIEWD137PW   Date 09/23/92

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. RE02495

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☒ Construction
☐ Decommission 313025

ORIGINAL INSTALLATION Notice of Intent Number:

Consulting Firm Pacific Groundwater Group

Unique Ecology Well IDTag No. BAF 224

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☐ Driller ☐ Engineer ☒ Trainee

Name (Print Last, First Name) Knoef, Neil

Driller/Engineer /Trainee Signature [signature]

Driller or Trainee License No. T2872

If trainee, licensed driller's Signature and License Number: [signature] 2508

Type of Well *("x in box)*

☒ Resource Protection
☐ Geotech Soil Boring

Property Owner Clallam County

Site Address Old Olympic Hwy & ~~Fitzgerald~~ Kendall Rd

City Sequim County Clallam

Location NW1/4-1/4 NW1/4 Sec 18 Twn 30 R 03

EWM ☐ or WWM ☒

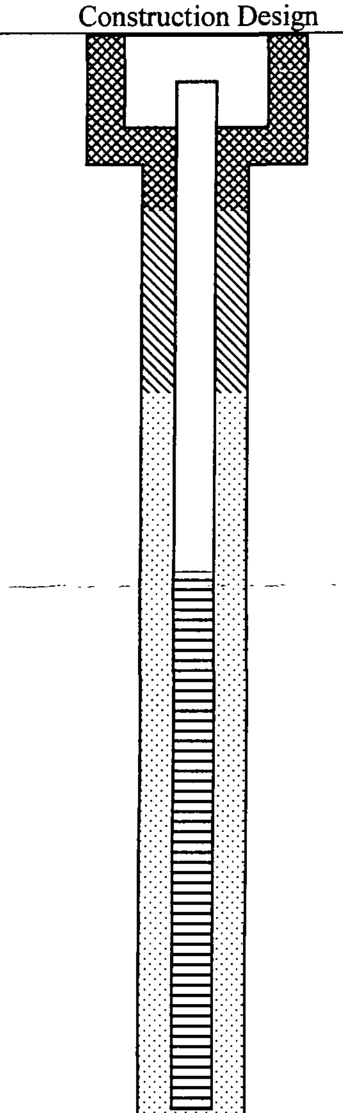
Lat/Long (s, t, r still REQUIRED) Lat Deg ___ Min ___ Sec ___ Long Deg ___ Min ___ Sec ___

Tax Parcel No. unknown

Cased or Uncased Diameter 3½" Static Level 35'

Work/Decommission Start Date 8-21-08

Work/Decommission Completed Date 8-21-08

Construction Design	Well Data	Formation Description
	MONUMENT TYPE: 8" flush CONCRETE SURFACE SEAL: 0'-1' ANNULAR SPACE: ___ BACKFILL: 1'-26' TYPE: bentonite slurry PVC BLANK: 0'-30' SCREEN: 30'-40' SLOT SIZE: 0.010" TYPE: prepack 1" sch 80 PVC SAND PACK: 26'-40' MATERIAL: 10/20 silica DRILLING METHOD: D.P. WELL DEPTH: 40' BORING DIAMETER: 2"	(N/A) RECEIVED SEP 22 2008 Washington State Department of Ecology

SCALE: 1"= ___ PAGE 1 OF 1

ECY 050-12 (Rev. 7/06)

Ecology is an Equal Opportunity Employer

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

WATER WELL REPORT

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

Construction/Decommission ("x" in circle)
⊗ Construction
○ Decommission ORIGINAL CONSTRUCTION Notice of Intent Number ~~W046385~~ 131869

CURRENT Notice of Intent No. W046385
Unique Ecology Well ID Tag No. AGN391
Water Right Permit No. This log is for deepening of orig.
Property Owner Name Julia McLean
Well Street Address 91 Evans
City Sequim County: Clallam
Location 1/4-1/4 NW 1/4 Sec 18 Twn 30 R 3 EWM circle or one (WWM)
Lat/Long: (s,t,r still REQUIRED) Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____
Tax Parcel No. 033018249120000

'03 FEB 13 P2:13 DEPT. FISCAL & BUDGET

PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other

TYPE OF WORK: Owner's number of well (if more than one) ____
☐ New Well ☐ Reconditioned ☒ Deepened
Method: ☐ Dug ☐ Bored ☐ Driven ☒ Cable ☐ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 77 ft.
Depth of completed well 77 ft.

CONSTRUCTION DETAILS
Casing Installed: ☒ Welded 6" Diam from 0 ft to 72 ft.
☐ Liner installed ____" Diam from ____ ft. to ____ ft
☐ Threaded ____" Diam from ____ ft. to ____ ft.

Perforations: ☐ Yes ☒ No
Type of perforator used ____
SIZE of perfs ____ in by ____ in and no of perfs ____ from ____ ft to ____ ft

Screens: ☒ Yes ☐ No ☐ K-Pac Location ____
Manufacturer's Name Johnson
Type Stainless Steel Model No ____
Diam 6 Slot Size 15 from ____ ft to ____ ft
Diam ____ Slot Size ____ from ____ ft to ____ ft

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand ____
Materials placed from ____ ft to ____ ft

Surface Seal: ☒ Yes ☐ No To what depth? 18 ft
Materials used in seal Bentonite
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? ____ Depth of strata ____
Method of sealing strata off ____

PUMP: Manufacturer's Name ____
Type ____ HP ____

WATER LEVELS: Land-surface elevation above mean sea level ____ ft
Static level 29 ft below top of well Date 8-20-02
Artesian pressure ____ lbs per square inch Date ____
Artesian water is controlled by ____ (cap, valve, etc)

WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes ☒ No If yes, by whom? ____
Yield ____ gal./min with ____ ft drawdown after ____ hrs
Yield ____ gal./min with ____ ft drawdown after ____ hrs
Yield ____ gal./min with ____ ft drawdown after ____ hrs
Recovery data (time taken as zero when pump turned off)(water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ____
Bailer test 15 gal./min with 30 ft drawdown after 1 hrs.
Airtest ____ gal./min with stem set at ____ ft for ____ hrs
Artesian flow ____ g p m Date 8-20-02
Temperature of water ____ Was a chemical analysis made? ☐ Yes ☒ No

CONSTRUCTION OR DECOMMISSION PROCEDURE
Formation Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY)

MATERIAL	FROM	TO
Gravel	37	43
Clay Brown Sand gravel	43	69
Sand w/B	69	77

'03 APR 17 P1:16 DEPT. OF ECOLOGY FISCAL

RECEIVED FEB 19 2003 DEPARTMENT OF ECOLOGY WELL DRILLING UNIT

Start Date 8-15-02 Completed Date 8-20-02

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Mel Williams
Driller/Engineer/Trainee Signature Mel Williams
Driller or Trainee License No. 0524

If trainee, licensed driller's Signature and License no. ____

Drilling Company Mel Williams Drilling Inc
Address 741 W. Sequim Bay Rd.
City, State, Zip Sequim, Wa 98382
Contractor's Registration No. MELWIDI93109 Date 8-22-02

Ecology is an Equal Opportunity Employer ECY 050-1-20 (Rev 4/01)

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

BBB079

STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) OWNER: Name Wm D Alkins Address 1711 S. Fruitland Kennewick WA

(2) LOCATION OF WELL: County Clallam Lot 4, Elliots addition ¼ Sec 18 T 30 N., R 3 W.M.

Bearing and distance from section or subdivision corner South on paved Road off old Hway ½ mile east of

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☑ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 50 ft. Depth of completed well 50 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: ...." Diam. from .... ft. to .... ft.
Threaded ☐ ...." Diam. from .... ft. to .... ft.
Welded ☑ 6" Diam. from 01 ft. to 50 ft.

Perforations: Yes ☐ No ☑
Type of perforator used........
SIZE of perforations .... in. by .... in.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.

Screens: Yes ☐ No ☑
Manufacturer's Name........
Type........ Model No........
Diam. .... Slot size .... from .... ft. to .... ft.
Diam. .... Slot size .... from .... ft. to .... ft.

Gravel packed: Yes ☐ No ☑ Size of gravel: ....
Gravel placed from .... ft. to .... ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal Benton
Did any strata contain unusable water? Yes ☐ No ☐
Type of water?........ Depth of strata........
Method of sealing strata off........

(7) PUMP: ~~Manufacturer's Name~~........
Type: .... H.P. ....

(8) WATER LEVELS: Land-surface elevation above mean sea level........ft.
Static level 19 ft. below top of well Date aug 27 84
Artesian pressure .... lbs. per square inch Date........
Artesian water is controlled by........ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?........
Yield: .... gal./min. with .... ft. drawdown after .... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ....
Bailer test 25 gal./min. with 47 ft. drawdown after ½ hrs.
Artesian flow........ g.p.m. Date........
Temperature of water........ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG: Evans road function

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Bolders & gravel	0	8
Compacted Gravel	8	24
gravel w.B	24	29
clay & sand Brown	29	36
hard pan Brown	36	48
gravel w.B.	48	50

Owner in May 2009 reports well was deepened to 65 ft.

RECEIVED
SEP 1 0 1984
Department of Ecology
Southwest Regional Office

Work started Aug 27, 1984 Completed Aug 27, 1984

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Louies well Drilling (Person, firm, or corporation) (Type or print)

Address Box 1652 Barr rd ext, PA

[Signed] [signature] (Well Driller)

License No. 0848 Date aug 27, 1984

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Notification ~~Start Card~~ No. 34313

BBB076

Water Right Permit No.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

(1) OWNER: Name DARLEN BEACH Address 935 N. SEQUIM AVE, SEQUIM WA 98382

(2) LOCATION OF WELL: County CLALLAM NE ¼ SE ¼ Sec 18 T. 30 N., R. 3W W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) NORTH BEVERAGE ST. LOT 1 DURAN S.P. SEQUIM

(3) PROPOSED USE: ☑ Domestic ☐ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned ☐ New well ☑ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☑ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 66 feet. Depth of completed well 67'5" ~~ft.~~

(6) CONSTRUCTION DETAILS:
Casing Installed: 6" Diam. from 1½ ft. to 63 ft.
Welded ☑ " Diam. from ft. to ft.
Liner installed ☐
Threaded ☐ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☑ No ☐
Manufacturer's Name HOUSTON
Type FREE FLOW STAINLESS Model No.
Diam. 5 Slot size 012 from 63 ft. to 66 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth? 18+ ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes ☐ No ☑
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level 100 ton— ft.
Static level 31'6" ~~ft.~~ below top of well Date 9/1/93
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☑ No ☐ If yes, by whom? DRILLER
Yield: 20 gal./min. with 2'6" ft. drawdown after 1½ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
10:30	34	10:31	31'6"		

Date of test Sept. 1, 1993
Bailer test 30 gal./min. with 5 ft. drawdown after 1 hrs.
Airtest gal./min. with stem set at ft. for hrs.
Artesian flow g.p.m. Date 9-1-93
Temperature of water 51° Was a chemical analysis made? Yes ☑ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
TOPSOIL LOAM BLK GRAVEL PTOM	0	8"
ROCKS STOM GRAY		
ROCKS STOL GRAVEL PTOL SAND	8"	
FTOC GRAY CLAY BRN		28
GRAVEL PTOL SAND C GRAY WB	28	32
GRAVEL PTOL SAND C GRAY CLAY BRN	32	38
SAND BLK VF CLAYEY BRN WB	38	40
CLAY BRN SOFT	40	44
CLAY GRAY SOFT	44	45
CLAY GRAY GRAVEL PTOM GRAY	45	47
SAND VF TO F GRAVEL PTOM	47	
GRAY CLAY BRN		55
GRAVEL PTOM SAND FTOC GRAY	55	
WB		56
HP CLAY BRN GRAVEL PTO	56	
L SAND FTOC ROCKS STOM GRAY		63
GRAVEL PTOL ROCKS STOL	63	
SAND MTOC GRAY + BLACK WB		66
HP CLAY BRN GRAVEL PTOL	66	—
ROCKS STOL SAND MTOC GRAY		
+ BLACK		

Work started AUG 24, 19. Completed SEPT 1, 1993

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME PENINSULA WATER WELLS, INC. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 256 W SEQUIM BAY RD. SEQUIM, WA. 9838[illegible]
(Signed) Fred Grant (WELL DRILLER) License No. 1688
Contractor's Registration No. PENINWW077NL Date Sept. 1, 1993

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329-

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. RE02496

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☒ Construction

☐ Decommission 313026

ORIGINAL INSTALLATION Notice *of Intent Number*: ______

Type of Well *("x in box)*

☒ Resource Protection

☐ Geotech Soil Boring

Property Owner Charles Bridge

Site Address 760 BEverage Street

City Sequim County Clallam

Location NE1/4-1/4 SE1/4 Sec 18 Twn 30 R 03

EWM ☐ or WWM ☒

Lat/Long (s, t, r still REQUIRED) Lat Deg ______ Min ______ Sec ______

Long Deg ______ Min ______ Sec ______

Tax Parcel No. 0330184400100000

Cased or Uncased Diameter 3 1/2" Static Level 33'

Work/Decommission Start Date 8-21-08

Work/Decommission Completed Date 8-21-08

Consulting Firm Pacific Groundwater Group

Unique Ecology Well IDTag No. BAF225

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

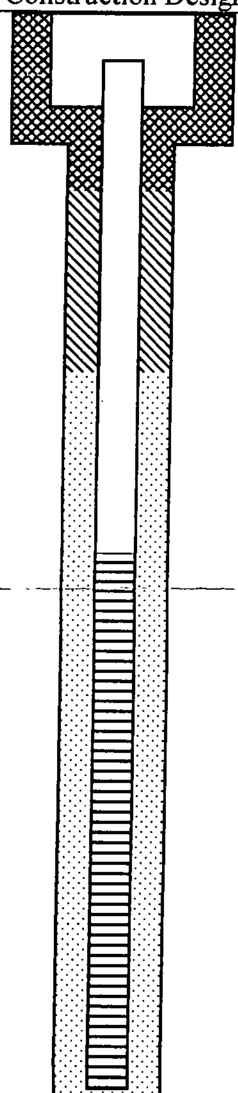
☐ Driller ☐ Engineer ☒ Trainee

Name (Print Last, First Name) Knopf Neal

Driller/Engineer /Trainee Signature [signature]

Driller or Trainee License No. T2872

If trainee, licensed driller's Signature and License Number: [signature] 2508

Construction Design	Well Data	Formation Description
	MONUMENT TYPE: 8" flush CONCRETE SURFACE SEAL: 0'-1' ANNULAR SPACE: ______ BACKFILL: 1'-26' TYPE: bentonite slurry PVC BLANK: 0'-28' SCREEN: 28'-38' SLOT SIZE: 0.010" TYPE: 1" sch 80 PVC pre-pack SAND PACK: 26'-38' MATERIAL: 10/20 silica DRILLING METHOD: D.P. WELL DEPTH: 38' BORING DIAMETER: 2"	(N/A) RECEIVED SEP 22 2008 Washington State Department of Ecology

SCALE: 1"= ____ PAGE 1 OF 1

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT BBB077

STATE OF WASHINGTON

Application No. ....
Permit No. ....

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

(1) OWNER: Name Charles Bridge Address Rt 5 Box 1187 Sequim

(2) LOCATION OF WELL: County CLALLAM — S ½ NE ¼ Sec. 18 T. 30 N., R. 3 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☑ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 30 ft. Depth of completed well 30 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 30 ft.
Threaded ☐ ....." Diam. from ..... ft. to ..... ft.
Welded ☑ ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☑
Type of perforator used.....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☐ No ☑
Manufacturer's Name.....
Type..... Model No.....
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☑ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal bentonite
Did any strata contain unusable water? Yes ☐ No ☑
Type of water?..... Depth of strata.....
Method of sealing strata off.....

(7) PUMP: Manufacturer's Name.....
Type: ..... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level.... ..... ft.
Static level 13 ft. below top of well Date Dec
Artesian pressure ..... lbs. per square inch Date.....
Artesian water is controlled by..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?.....
Yield: ..... gal./min. with ..... ft. drawdown after ..... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
			Approx.		

Date of test .....
Bailer test 20 gal./min. with 3 ft. drawdown after ..... hrs.
Artesian flow..... g.p.m. Date Dec
Temperature of water..... Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Owner in May 2009 reports well was deepened to 65' by Mel Williams.		

RECEIVED
JAN 11 1977
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started Dec 16, 1976 Completed Dec 17, 1976

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Van Ausdle Well Drilling Inc. (Person, firm, or corporation) (Type or print)

Address Rt 5 Box 1118 - Sequim WA.

[Signed] Delvin Williams (Well Driller)

License No. 0524 Date Dec 21, 1976

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

ACA661

62-20701

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

WELL LOG

Record by: Driller
Source: Well Report

Location: State of WASHINGTON
County: Clallam
Area: —
Map:
NW 1/4 NW 1/4 sec. 19 T. 30 N., R. [redacted] W. +3 W

Diagram of Section: 0, A

Drilling Co. Hood Canal
Address: Quilcene Wa.
Method of Drilling: ~~Rotary~~ Cable Date 10-11-72, 19
Owner: Dave Cameron
Address: Sequim Wa.
Land surface, datum ___ ft. above / below
SWL: 32' Date 10-11-72, 19 Dims.: 6" x 67'

CORRELATION	MATERIAL (Domestic)	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Topsoil	0	1
	Rock, brown?	1	25
	Gravel, hardpacked, w/ HP	25	34
	Gravel (w B)	34	49
	" "	49	67
	Casing:- 6" [redacted]	0	49'
	Bailer Test:- 35 gpm/15' DD @ 2 hrs		
	Temp H_2O - 51°		

Turn up   Sheet ___ of ___ sheets

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT BBB078

STATE OF WASHINGTON

Application No. 12437
Permit No. G2-00323

(1) OWNER: Name JAMES PEDLAR SR. Address P.O. Box 872 SEQUIM, WA

(2) LOCATION OF WELL: County CLALLAM NW¼ NE ¼ NW ¼ Sec 20 T. 30 N., R. 3W W.M.
Bearing and distance from section or subdivision corner 810' W. & 30' S. From the NW4 Cor. of Sec. 20

(3) PROPOSED USE: Domestic [X] Industrial [ ] Municipal [ ] Irrigation [ ] Test Well [ ] Other [ ]

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well [X] Deepened [ ] Reconditioned [ ]
Method: Dug [ ] Cable [X] Rotary [ ] Bored [ ] Driven [ ] Jetted [ ]

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 36 ft. Depth of completed well 36 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from 0 ft. to 36 ft.
Threaded [ ] ....." Diam. from ..... ft. to ..... ft.
Welded [ ] ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes [ ] No [X]
Type of perforator used .....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes [ ] No [X]
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes [ ] No [X] Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes [ ] No [X] To what depth? ..... ft.
Material used in seal .....
Did any strata contain unusable water? Yes [ ] No [ ]
Type of water? ..... Depth of strata .....
Method of sealing strata off .....

(7) PUMP: Manufacturer's Name .....
Type: ..... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 125 ft.
Static level 9½ ft. below top of well Date 5-8-71
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [X] If yes, by whom? .....
Yield: ..... gal./min. with ..... ft. drawdown after ..... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
Bailer test 60 gal./min. with 3 ft. drawdown after 2 hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water 48° Was a chemical analysis made? Yes [ ] No [X]

(10) WELL LOG:
Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
SURFACE / SOIL	0	1
BROWN Rocky cemented GRAVEL	1	25
BROWN WBL / SAND & GRAVEL	25	36

Well probably deepened; no log found.

Work started 5/2, 1971. Completed 5/8, 1971

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME STOICAN DRILLING CO. INC. (Person, firm, or corporation) (Type or print)
Address P.O BOX 161 SEQUIM, WA.
[Signed] Valer Stoican (President) (Well Driller)
DRILLER # 0473
License No. ..... Date ....., 19.....
CORP # D18300873

OK/WHM 12-13-73

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

30N/03W-20E01 (no tag)

WATER WELL REPORT

STATE OF WASHINGTON

Application No. ....

X Permit No. 055-953

(1) OWNER: Name Shirley Mork... Address P.O. Box 761 Sequim Wash 98382

(2) LOCATION OF WELL: County Clallam ... SW ¼ NW ¼ Sec. 20 T. 30 N., R. 3 W.

Bearing and distance from section or subdivision corner: In City of Sequim

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Lawn Irrigation ☒ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 71-3" ft. Depth of completed well 71'3" ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6" Diam. from 0 ft. to 65'9" ft.
Threaded ☐ 5" Diam. from 64' ft. to 66'3 ft.
Welded ☒ ..." Diam. from ... ft. to ... ft.

Perforations: Yes ☐ No ☒
Type of perforator used ....
SIZE of perforations ... in. by ... in.
... perforations from ... ft. to ... ft.
... perforations from ... ft. to ... ft.
... perforations from ... ft. to ... ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Howard Smith
Type Stainless Steel Model No. ...
Diam. 5-5/8 Slot size 20 from 66' ft. to 71'3" ft.
Diam. ... Slot size ... from ... ft. to ... ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: ...
Gravel placed from ... ft. to ... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ... Depth of strata ...
Method of sealing strata off ...

(7) PUMP: Manufacturer's Name ...
Type: ... H.P. ...

(8) WATER LEVELS: Land-surface elevation above mean sea level Approx. 225 ft.
Static level 26 ft. below top of well Date 10-11-77
Artesian pressure ... lbs. per square inch Date ...
Artesian water is controlled by ... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? ...
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ...
-12 Bailer test 60 gal./min. with ? ft. drawdown after 2 hrs.
Artesian flow ... g.p.m. Date ...
Temperature of water 49 Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Brown Surface Soil	0	4
Brown Cemented Gravel	4	26
Brown W/ Gravel	26	36
Brown Sandy Cemented Gravel	36	61
Brown W/B Gravel	61	76

RECEIVED
OCT 20 1977
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started 10-10 1977 Completed 10-11 1977

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Stoican Drilling Co. Inc. (Person, firm, or corporation) (Type or print)

Address P.O. Box 161 Sequim Wash 98382

[Signed] Ordie Stoican (President) 0473 (Well Driller)

License No. ... Date 10-13 1977

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71)
ECY-070-28

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT BBB074

STATE OF WASHINGTON

Application No. ....

Permit No. ....

(1) OWNER: Name Carl Revard Address Rt I Sequim Wash

(2) LOCATION OF WELL: County Clallam SW¼ NW¼ NW¼ - NW¼ ¼ NW ¼ Sec. 30 T. 30 N., R. 3 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 99 ft. Depth of completed well 100 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 0 ft. to 92'3" ft.
Threaded ☐ ....." Diam. from ..... ft. to ..... ft.
Welded ☒ ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☒
Type of perforator used .....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Smith
Type Stainless steel Model No. .....
Diam. 5 5/8 Slot size 25 from 92'3 ft. to ~~100~~ 99'6 ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ..... Depth of strata .....
Method of sealing strata off .....

(7) PUMP: Manufacturer's Name .....
Type: ..... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 260 ft.
Static level 47 ft. below top of well Date 4/2/76
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? .....
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test 4/2/76
Bailer test 8 gal./min. with 33 ft. drawdown after 1½ hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water 50° Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Surface soil	0	1
Brown gravely clay with small boulders	1	15
Brown gravely clay	15	29
Brown rocky gravel	29	47
Brown gravely clay firm	47	68
Brown sandstone / clay	68	79
Brown sandstone, some water	79	90
Brown fine & med. sand W.B.	90	98
Brown firm sandy clay	98	100
Screen dim. as follows		
Lead pipe 5" - 1'-11"		
Screen 5" - 5'-3"		
Tail pipe 5" - 2'-6"		
Over all Length 9'-8"		

RECEIVED
DEPARTMENT OF ECOLOGY

Work started 3/26, 1976. Completed 4/2, 1976.

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Stoican Drilling Co INC
(Person, firm, or corporation) (Type or print)

Address P.O. Box 161 Sequim Wash - 98382

[Signed] Valier Stoican (President 0473
William Weber (Well Driller)

License No. 0535 Date 4/26, 1976
Charlie Shenk - 0458

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71)
ECY-070-28

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. R73653

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☒ Construction

☐ Decommission

298945

ORIGINAL INSTALLATION Notice *of Intent Number*: ______

Consulting Firm Pacific Groundwater Group

Unique Ecology Well IDTag No. APJ133

WELL CONSTRUCTION CERTIFICATION I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards Materials used and the information reported above are true to my best knowledge and belief

☒ Driller ☐ Engineer ☒ Trainee

Name (Print Last, First Name) Gogan, Scott

Driller/Engineer /Trainee Signature [signature]

Driller or Trainee License No. 2877T

If trainee, licensed driller's Signature and License Number: [signature] 2508

Type of Well *("x in box)*

☒ Resource Protection

☐ Geotech Soil Boring

Property Owner Christy Mitchell

Site Address 343 McComb Rd

City Sequim County Clallam

Location SE1/4-1/4 SW1/4 Sec 12 Twn 30N R 04

EWM ☐ or WWM ☒

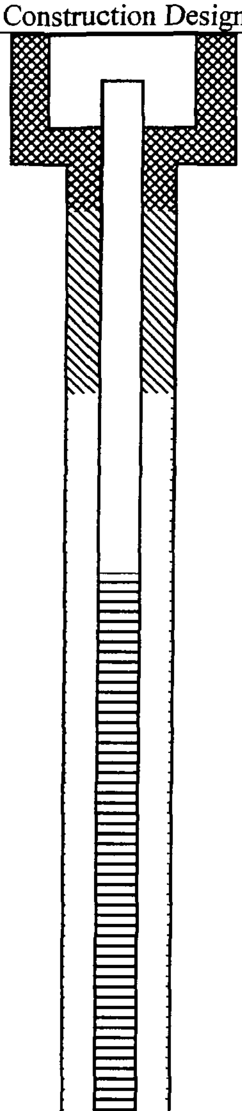
Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____ Long Deg ____ Min ____ Sec ____

Tax Parcel No. 043013210000200l

Cased or Uncased Diameter 1" Static Level 17.5'

Work/Decommission Start Date 6/4/08

Work/Decommission Completed Date 6/4/08

Construction Design	Well Data	Formation Description
	MONUMENT TYPE: 8" Flush CONCRETE SURFACE SEAL: 0-2 ANNULAR SPACE: ___ BACKFILL: 2-14' TYPE: #8 Bentonite PVC BLANK: 0-15' SCREEN: 15-25' SLOT SIZE: .020 TYPE: Sched 80 1" PVC SAND PACK: 14-25' MATERIAL: 10/20 Silica DRILLING METHOD: DP WELL DEPTH: 25' BORING DIAMETER: 2.5"	no soil observed

RECEIVED
JUN 2 9 2008
Washington State Department of Ecology

SCALE: 1"= ____ PAGE 1 OF 1

ECY 050-12 (Rev. 7/06)

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Third Copy — Driller's Copy

WATER WELL REPORT

30N/04W-13J04 (no tag)

Application No.

STATE OF WASHINGTON

Permit No.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

(1) OWNER: Name Mayfield Address Rt 4 Box 105, Sequim, WN

(2) LOCATION OF WELL: County CLALLAM NE ¼ SE ¼ Sec. 13 T. 30 N., R. 4 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 45 ft. Depth of completed well 45 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from 0 ft. to 41 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Van Ausdle
Type Stainless mesh Model No.
Diam. 6 Slot size from 41 ft. to 45 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal cement bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level.... ft.
Static level 6'6" ft. below top of well Date July 25 74
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 18-20 gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date July 25, 1974
Temperature of water Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
clay Brown - cobbles	0'	10'
Clay Brown - sand gravel	10'	22'
Clay Brown - fine sand	22'	41'
Course sand	41'	45'

RECEIVED
OCT 7 1974
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started July 24 1974 Completed July 25, 1974

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Van Ausdle Well Drilling, Inc. (Person, firm, or corporation) (Type or print)

Address 1430 E. 3rd, Pt. Angeles, WN.

[Signed] Melvin Williams (Well Driller)

License No. 0524 Date July 26, 1974

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT BBB079

STATE OF WASHINGTON

Application No.
Permit No.

(1) OWNER: Name Clay Philbrick Address Rt5 Box 1000- Sequim, WN.

(2) LOCATION OF WELL: County Challam — ¼ NW¼ Sec 24 T 30 N., R 4 W.M.
Bearing and distance from section or subdivision corner Durant Sub. Div. Lot #3

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☑ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 54 ft. Depth of completed well 54 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6" Diam. from 0 ft. to 54 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☑ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☑
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level.... ft.
Static level 22 ft. below top of well Date Feb 28
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 15 gal./min. with 23 ft. drawdown after Approx. hrs.
Artesian flow g.p.m. Date Feb 28
Temperature of water Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
topsoil	0'	2'
clay Brown sand gravel	2	32
clay tan cemented gravel	32	50
gravel	50	54

RECEIVED
MAY 18 1977
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started Feb 24, 1977 Completed Feb 28, 1977

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Van Ausdle Well Drilling (Person, firm, or corporation) (Type or print)
Address Rt 5 Box 1118 - Sequim WN.
[Signed] Melvin Williams (Well Driller)
License No. 0524 Date Mar 4, 1977

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT ACA651

STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) OWNER: Name BRUCE CRAMER Address R4, BOX 555B SEQUIM WA 98382

(2) LOCATION OF WELL: County CLALLAM — ¼ ¼ Sec. 24 T. 30 N., R. 4W W.M.

Bearing and distance from section or subdivision corner LOT #31 PALO VERDA VISTA

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 79 ft. Depth of completed well 79 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from 0 ft. to 78' 8½" ft.
Threaded ☐ ....." Diam. from ..... ft. to ..... ft.
Welded ☒ ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☒
Type of perforator used.....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☐ No ☒
Manufacturer's Name open BOTTOM
Type..... Model No.....
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite + puddle Clay
Did any strata contain unusable water? Yes ☐ No ☒
Type of water?..... Depth of strata.....
Method of sealing strata off.....

(7) PUMP: Manufacturer's Name.....
Type: ..... H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level APPROX 195 ft.
Static level 55 ft. below top of well Date 12/5/75
Artesian pressure ..... lbs. per square inch Date.....
Artesian water is controlled by..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?.....
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
Bailer test 25 gal./min. with ..... ft. drawdown after ..... hrs.
Artesian flow ..... g.p.m. Date 12/5/75
Temperature of water 49° Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
SURFACE SOIL	0	1
BROWN CONSOLIDATED MATERIAL & BOULDERS	1	59
BROWN GRAVEL WATER BEAR	59	72
BROWN GRAVELY CLAY	72	73C
BROWN GRAVEL, W.B.	73	79

RECEIVED FEB 17 1976 DEPARTMENT OF ECOLOGY

Work started 12/4, 1975 Completed 12/5, 1975

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME STOICAN DRILLING CO INC. (Person, firm, or corporation) (Type or print)

Address P.O BOX 161 SEQUIM WA 98382
DRILLER; JOE PIKE - LIC # 0391

[Signed] Walter Stoican (Well Driller)

License No. 0473 Date Jan 5, 1976

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71)
ECY-070-28

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT BBB080

STATE OF WASHINGTON

Application No. ....

Permit No. ....

(1) OWNER: Name Cl- Benson Rt 1 Box 50 Address Sequim Wash-98382

(2) LOCATION OF WELL: County Clallam — SE ¼ SW ¼ Sec. 24 T. 30 N., R. 4 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 102 ft. Depth of completed well 102' ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from 0 ft. to 97' ft.
Threaded ☐ 5" Diam. from 95 ft. to 97 ft.
Welded ☒ ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☒
Type of perforator used.....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Howard Smith
Type Stainless Steel Model No.....
Diam. 5-5/8 Slot size 30 from 97 ft. to 102 ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☒ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water?..... Depth of strata.....
Method of sealing strata off.....

(7) PUMP: Manufacturer's Name.....
Type: ..... H.P.....

(8) WATER LEVELS: Land-surface elevation above mean sea level. APPROX 212
Static level 47 ft. below top of well Date 10-27-76
Artesian pressure ..... lbs. per square inch Date.....
Artesian water is controlled by..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?.....
Yield: ..... gal./min. with ..... ft. drawdown after ..... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
Bailer test 23 gal./min. with 23 ft. drawdown after 2 hrs.
Artesian flow ..... g.p.m. Date.....
Temperature of water 49 Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Surface Soil	0	1
Brown Cemented Gravel	1	12
Brown Cemented Sandy Gravel	12	45
Brown Sandy Clay	45	47
Brown Cemented Gravel	47	48
Brown Water Bear Sand & Gravel	48	49
Brown Sandy Clay	49	69
Brown Sandy Gravel Water Bearing	69	71
Brown Cemented Gravel Water Bear.	71	77
Brown Water Bear Sand Gravel	77	79
Brown Cemented Gravel	79	82
Brown Water Bear Sand Gravely Clay	82	91
Brown Water Bear Sand	91	102

RECEIVED
NOV 9 1976
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started 10/14, 1976. Completed 10-27, 1976

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Storeon Drilling Co Inc (Person, firm, or corporation) (Type or print)

Address PO Box 161 Sequim Wash-98382

[Signed] Walter Storeon President 0473 (Well Driller)
Myrle Hancock

License No. 0204 Date 11-4, 1976

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

Appendix C

Stormwater Treatment Facility Analysis

Within the study's focus area, three recent commercial developments have been monitoring stormwater and/or groundwater quality and reporting to City of Sequim Dept. of Public Works. The County obtained copies of all reports available at City offices this spring and forwarded to Charles Pitz (Ecology's Environmental Assessment Program) for technical review as a cooperator on Clallam County's concurrent EPA grant. Pitz' response is found in Pitz 2009a (and personal communication).

Pitz, a hydrogeologist, emphasized the importance of monitoring groundwater quality from shallow wells downgradient of infiltration sites:

> "Monitoring wells screened across the water table below or immediately downgradient of an infiltration facility provide a much more direct and representative way to determine the impact of a site on local groundwater quality (shallow wells also incorporate the net effect of vadose zone changes on water quality not captured by lysimeters or effluent samples). Direct groundwater sampling can provide an indication of unrecognized contaminant buildup in the soil column (eventually the filtering capacity of nearly all soils will be exhausted)."

Only one of the three developers use(d) monitoring wells; the other two tested ponded water prior to infiltration and in one case attempted to obtain water from lysimeters. Tables summarizing the reported data were prepared by Pitz and updated by Soule (see below).

Without groundwater quality data from wells it can't be certain, but Pitz concludes the following:

> "…Stormwater infiltration at these locations has probably not posed a significant risk to groundwater quality to date. The majority of the parameters of interest have either been non-detect, or are well below state groundwater quality criteria. A few constituents have been measured in effluent above the state standards, but the reported concentrations are comparatively low, and the mobility characteristics of these parameters are likely to attenuate transport in the subsurface.
>
> The data are consistent with what I would expect, particularly considering the age of the facilities. Nonetheless, in light of the transmissive nature of local sediments, and the high value of the groundwater resource to your county residents, I think it's prudent to continue to *directly* monitor the unconfined aquifer for water quality status and trends over time. In my opinion, the facility effluent monitoring programs should *augment*, rather than replace, groundwater monitoring."

After further discussion with Pitz, it was agreed that monitoring plans, methods, and reporting will be more effective if they are consistent. The following suggestions further the objective of achieving effective and consistent monitoring of stormwater treatment facilities:

- Use at least 1 well completed in the water table, down-gradient by 30-50 feet (an upgradient well is also expected, and at least 3 wells are needed to determine groundwater flow direction);
- Sample in both wet and dry seasons for at least 5 years;
- Sample for contaminants related to land uses (or spills if suspected) – for light industrial development areas include: zinc, lead, chromium, iron; TPH (diesel and gas); nitrates, specific conductance, dissolved oxygen, and pH;
- Set action levels at 50% of state groundwater quality standards when possible, otherwise reasonably lower than the standard;
- Report complete lab and field results in a legible, well-organized data table each year; and
- Use a consistent address and central file for archiving reports.

Table C1 - Wal-Mart Stormwater Performance Data (infiltration pond samples)

Parameter	WA GW Qual. Criteria	Corrective Action Trigger Level(*b*)	Jan-06	Apr-06	Jul-06	Jan-07	Oct-07
Turbidity (NTU)	NSC	25	16.41	7.56	4.13	15.67	5.56
Gasoline Hydrocarbons (mg/L)	NSC	-	<50	<50	<50	<50	<50
Oil and Grease (mg/L)	NSC	15	<4.72	<4.81	<4.81	<4.81	<4.85
TPH (mg/L)	NSC	15	<4.72	<4.81	<4.81	<4.81	<4.85
Zinc (mg/L)	5 *(a)*	0.117	0.0105	0.091	<0.01	0.0681	<0.02
pH (SU)	6.5-8.5	6-9	7.66	7.99	7.66	8.9	5.56

NSC - no state criteria

Shaded cells indicate concentration fails to meet state groundwater quality criteria

(a) aesthetic criteria

(b) DEA, 2004

Table C2 - Home Depot Stormwater Performance Data (pond and lysimeter samples)

Parameter	WA GW Quality Criteria	Facility Corrective Action Trigger Levels*(a)*	Jun-04 (baseline gw) *(b)*	Jan-06 (sw prior to infiltration)	Nov-06 (sw prior to infiltration	Nov-06 (lysimeters)	Oct-07 (sw prior to infiltration)	Oct-07 (lysimeters)	Nov-08 (sw prior to infiltration)	Nov-08 (lysimeters)
Cadmium (mg/L)	0.01	0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002
Chromium (mg/L)	0.05	0.05	<0.007	0.003	0.002	0.001	0.003	0.001	<0.005	<0.005
Lead (mg/L)	0.05	0.015	<0.003	0.003	0.002	<0.001	0.002	<0.001	<0.001	<0.001
Nitrate-N (mg/L)	10	10	1.9	0.51	0.239	1.54	0.18	-	0.1	1.69
Copper (mg/L)	1 *(c)*	1.3	<0.005	0.007	0.007	0.006	0.005	0.005	0.006	0.004
Zinc (mg/L)	5 *(c)*	5	<0.01	0.04	0.04	0.256	0.031	0.02	0.04	0.03
Phosphorus (mg/L)	NSC	5	<0.05	0.117	0.093	0.048	0.064	-	0.112	0.112
Diesel range Hydrocarbons (mg/L)	NSC	0.5	ND	0.256	1.82	ND	0.464	ND	<0.25	<0.25
Gasoline range Hydrocarbons(mg/L)	NSC	1	ND	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.25
Benzene (µg/L)	1	5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1
Toluene (mg/L)	NSC	1	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001
Ethylbenzene (mg/L)	NSC	0.7	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001
Total Xylenes (mg/L)	NSC	1	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Pesticide scan (mg/L)	NSC	-	ND	ND	ND	ND	ND	-	ND	-
Total Suspended Solids (mg/L)	500 *(c,e)*	500	<5	4	5	0.05	5.5	-	21.2	-
Fecal coliform (CFU/100ml)	1 *(d)*	1	-	130	120	1	17	22	16	<1
Specific conductance (umhos/cm)	NSC	700	-	75	49	291	170	-	54	294
PAH sum (µg/L)	0.01	0.1	-	ND	0.015	ND	0.032	-	>0.14	-
Arsenic (µg/L)	0.05	5	-	<0.001	0.001	<1	<1	<1	0.5	0.7
Iron (mg/L)	0.3 *(c)*	0.3	-	2.56	0.84	<0.15	0.49	<0.15	0.19	0.11

NSC - no state criteria
Dash indicates parameter not measured
(a) – PACLAND, 2004
(b) - location and collection method of this baseline groundwater sample is unknown
(c) - aesthetic criteria
(d) - criteria as total coliform bacteria
(e) - criteria as total dissolved solids
Shaded cells indicate concentration above state groundwater quality criteria
ND - no detections in scan

Table C3 - Jennie's Meadow Monitoring Well Data

Parameter	WA GW Quality Criteria	Dec-06 MW1 (upgradient)	Dec-06 MW2 (downgradient)	Jan-07 MW1 (upgradient)	Jan-07 MW2 (downgradient)
Diesel range hydrocarbons (mg/L)	NSC	ND	ND	-	-
Gasoline range hydrocarbons (mg/L)	NSC	ND	ND	-	-
Pesticide scan (mg/L)	NSC	ND	ND	ND	ND
Herbicide scan (mg/L)	NSC	ND	ND	-	-
Specific conductance	NSC	147	190	-	-
Chromium (mg/L)	0.05	0.045	0.016	0.086	0.1
Cadmium (mg/L)	0.01	ND	ND	<0.005	<0.005
Lead (mg/L)	0.05	ND	ND	0.016	0.02
Arsenic (µg/L)	0.05	ND	ND	<50	<50
Nitrate-N (mg/L)	10	0.081	0.59	0.12	0.74
Barium (mg/L)	1	0.13	0.44	-	-
Mercury (mg/L)	0.002	ND	ND	ND	0.00032
Selenium (mg/L)	0.01	ND	ND	-	-
Silver (mg/L)	0.05	ND	ND	-	-

NSC - no state criteria
ND - no detections in scan
Dash indicates parameter not measured
Shading indicates concentration above state groundwater quality criteria