Skip Richards

Please see attached file.

To: Annie Sawabini
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Re: **PRELIMINARY DRAFT COMMENTS** on Amendment to Chapter 173-501 WAC Instream Resources Protection Program - Nooksack Water Resource Inventory Area (WRIA) 1 Preliminary Draft for Public Comment

Date: May 8 2019

Via: online comment form submitted to: http://ws.ecology.commentinput.com/?id=GFRjc

0.0. Summary:

Ecology's uncritical application of the USGS streamflow-well interaction program STRMDEPL08 (Reeves 2008) is fatally flawed. If Ecology intends to rely on said model, it should run the model for realistic domestic permit-exempt well pumping rates and regimes to arrive at a reasonable assessment of permit-exempt well impacts on nearby streams. Doing so will likely demonstrate that actual permit-exempt well impacts on streams is roughly two orders of magnitude less than the figures cited in Reeves. Ecology should then reevaluate its quantity reductions, which are not justified by reliance on the results reported in Reeves.

1.0. Introduction and background:

The Preliminary Draft Rule appears to be based in part on its accompanying Background Document, which presents what it terms "Hydrogeologic Information and Assumptions" beginning on page 14.

Said Hydrogeologic Information and Assumptions in turn relies in part on references to work done by USGS, namely a computer program described in a report by Reeves 2008: STRMDEPL08—An Extended Version of STRMDEPL with Additional Analytical Solutions to Calculate Streamflow Depletion by Nearby Pumping Wells By Howard W. Reeves Open-File Report 2008–1166.

A cursory examination of Reeves reveals the input data to the computer program included:

Well pumping rate: **250 gallons per minute**, or roughly **0.557 cfs**.
Well distance from stream: 500 feet.
TRANSMISSIVITY: 0.116D-01 square feet per second
STORATIVITY: 0.100D+00
STREAMBED CONDUCTANCE: 0.231D-03 feet per second
Well pumping regime: **91 days** constant pumping at the above rate for the continuous pumping case.

2.0. Uncritical application of the Reeves pumping rate is incorrect and misleading:

Obviously, the Reeves input parameters are more representative of (and were likely designed to model) a commercial irrigation pumping regime.

By contrast, a single domestic permit-exempt well pumping at its (former) statutory capacity of 5,000 gallons per day is pumping at **0.0077 cfs**, or **3.47 gallons per mi**nute, which is approximately **1.4 percent** of the rate used in Reeves.

Given the nature of the equations used in Reeves, based on Darcy's Law, we should expect proportional outcomes. Thus, since the peak streamflow depletion rate in Reeves, which is **0.2437 cfs** after 30 days of continuous pumping at the rate of **0.557 cfs**, then for a permit-exempt well pumping at its statutory limit, the rate should be something like **0.0034 cfs.**

3.0. Uncritical application of the Reeves pumping regime is incorrect and misleading:

Few, if any, domestic permit-exempt wells pump continuously for 24 hours per day for 90 days. To obtain a more accurate result, run the STRMDEPL08 program with a pumping regime of something more like 8 hours per day every day. Using even that regime will err on the (far) side of caution. The results from using the 8-hours/day pumping regime for a domestic permit-exempt well pumping at its (former) statutory rate of 5,000 gallons per day are likely to be something like **0.0012 cfs**.

Note, however, that since the legislature saw fit to reduce the statutory limit to 3,000 gallons per day, the impact of that change in the daily quantity would further reduce the simulated pumping rate to 3/5 of 0.0012 cfs, which is **0.00072 cfs**.

Note, further, that the preliminary draft rule chose to accept the RH2 estimate of domestic permit-exempt consumptive use rates, which is substantially less than 3,000 gallons per day. Thus, the rough streamflow depletion estimate of **0.00072 cfs** per well set forth herein shall hereinafter be referred to as the worst case streamflow depletion rate.

4.0. The assumption that the quantity of consumptive use equals the quantity of streamflow depletion is problematic.

Based on the results in Reeves, and assuming that consumptive use is equal to roughly half the gross water quantity pumped, then the assumption that the rate of consumptive use equals the rate of streamflow depletion seems reasonable, since the rate of streamflow depletion is roughly half of the gross pumping in Reeves. The problem with that conclusion, however, is that, per **Section 3.0** above herein, Reeves' results are based on three months' worth of continuous pumping, which far overstates the likely high end of domestic permit-exempt well pumping.

5.0. Multiple wells in each sub-basin:

Table 3 of the RH2 memo, reproduced below, indicates how many new permit-exempt wells are estimated to be in place by 2038, by sub-basin:

Table 3
Options for Total Projected New Housing Units (outside UGAs) by Aggregated Sub-Basin, 2018 through 2038, Served by DGWPE Wells

Aggregated Sub-Basin	Option 1 All Growth outside UGAs	Option 2 Considering Public Water System Service Areas	Option 3 Historic Ratio*	Option 4 Highest of Options 2 and 3	Option 5 Option 3 Plus 15 Percent
1 - Coastal North	1,017	594	563	594	647
2 - Coastal South	351	241	177	241	204
3 - Coastal West	328	290	276	290	317
4 - Lake Whatcom	205	13	145	145	167
5 - Lower Nooksack	915	495	561	561	645
6 - Middle Fork Nooksack	9	9	9	9	9
7 - North Fork Nooksack	212	126	78	126	90
8 - South Fork Nooksack	27	20	22	22	25
9 - Sumas	196	162	129	162	148
Total	**3,260**	**1,950**	**1,960**	**2,150**	**2,252**

* Historic ratio of non-UGA growth served by DGWPE wells vs. water systems.

Given the estimated streamflow impact given in **Section 3.0** above herein, for the entire 2,150 new permit-exempt wells by 2038, the total worst case streamflow impact in that year would be **1.538 cfs**.

For the Lower Nooksack Sub-basin, estimated to have the second-highest number of new permit-exempt wells by 2038, the maximum upper limit of streamflow impact will be the product of 561 wells by the maximum per-well streamflow depletion rate of **0.00072 cfs** noted in **Section 3.0** above herein, for a total of **0.404 cfs**.

To distribute this maximum streamflow impact quantity throughout the 15 drainages of the Lower Nooksack, assume only half of them have new domestic permit-exempt wells by 2038; then the total streamflow impact of **0.404 cfs** would be divided by **7.5** to arrive at the worst case streamflow depletion rate per drainage of **0.054 cfs**.

Note the median streamflow outfall in the drainages of the Lower Nooksack is **8.3 cfs**. Thus by 2038 the maximum possible streamflow depletion will amount to **0.65 percent** of median streamflow, in the worst case.

6.0. Parametric values should be confirmed:

The Reeves transmissivity, storativity, and streambed conductance parameters should be checked to see how well they conform to values for those parameters being used by Associated Earth Sciences, which has contracted to create a numerical ground water model of a significant portion of WRIA 1. The parameters used in Reeves appear to have come from some place in Michigan, where the parameters might be significantly different.

7.0 Sensitivity analyses should be performed:

In WRIA 1, the wide range of well distances from streams, parametric values, pumping regimes and rates create a wide range of potential streamflow depletion estimates. Such a situation cries out for a detailed sensitivity analysis of the full set of permutations of the inputs.

8.0. Conclusion:

Ecology's reliance on an uncritical application of a study that appears to assess the streamflow depletion rate of a single commercial irrigation well to base its proposed regulation of domestic permit-exempt wells is incorrect and misleading. If Ecology intends to reply on such work as Reeves, it should perform, to the level of commonly accepted professional standards, a thorough analysis of streamflow depletion of domestic permit-exempt wells. Certainly far more attention should be paid to the technical underpinnings of a rule amendment that likely will have a substantial adverse impact on the value of the properties to which it will apply.

Failure of Ecology to take the corrective measures suggested above to bring the technical basis of their proposed rule amendment into conformance with commonly accepted professional standards will undermine the credibility and validity of the rule amendment and further support the contention that this rulemaking process is being driven by a predetermined outcome based on a political agenda.

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9.0 Sources consulted:

December 3, 2014 Department of Ecology Presentation on Instream Flows to WRIA 1 Planning Unit

https://wria1project.whatcomcounty.org/resources/other-resources/december-3-2014-instream-flow-presentation

which includes:

Ann Wessel: How was the current Nooksack Instream Flow Rule set and how does it work?

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video of both presentations: https://www.youtube.com/watch?v=lUVAm6wsXGs

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https://fortress.wa.gov/ecy/wrdocs/WaterRights/wrwebpdf/WRIA1-PreliminaryDraftRuleSupportingDocument-04082019.pdf

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https://pubs.usgs.gov/circ/1376/pdf/circ1376_barlow_report_508.pdf

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