



*Friends of Toppenish Creek*

April 8, 2019

To: Columbia River Keepers (CRK)

From: Jean Mendoza  
Executive Director  
Friends of Toppenish Creek (FOTC)  
3142 Signal Peak Road  
White Swan, WA 98952

RE: Water analysis of the lower Yakima Valley

Friends of Toppenish Creek received a \$50,000 grant from CRK in 2017 to study water quality in the lower Yakima Valley in Washington State. This is a report on our study design and findings.

We hired Richard Honour, Ph.D., Precautionary Group to guide us in the design, implementation and analysis of the findings. Dr. Honour also guided us in the correct collection of water and sediment samples, chain of evidence, shipping, and choice of accredited labs to do the analysis. Below is a narrative of the history of the study. Also included are charts of the data results, analysis of the results by Dr. Honour, and a sample of the correspondence we provided to home owners of domestic drinking water wells that were tested.

At this point we need to explain the concept of TEQ and TEF for dioxins/furans. There are many dioxin/furan compounds. An international scientific community has agreed to a mechanism to give numerical values to the toxicity of these compounds. The two most toxic compounds as regards human health are 2,3,7,8-TCDD and 1,2,3,7,8-

PeCDD. All the other compounds or congeners have a numerical value less than one. This number is their TEF or Toxic Equivalency Factor. One usually finds more than one dioxin/furan in water at a time. To achieve a numerical value for the mixture of compounds, each compound's concentration in water is multiplied by its TEF and then the total is added up to get a TEQ or Toxic Equivalency. The higher the TEQ the more worrisome the water source is for human health. There is one problem with this system. It assumes that the accumulative effect on human health of these different compounds is linear or additive. This may not be accurate. It is possible that exposure to many different dioxins may be multiplicative. The toxicities of chronic exposure to multiple dioxins/furans may enhance the overall toxicity of the toxic "soup".

At the beginning of the study during the summer of 2017, we chose to measure pesticide levels and dioxins/furans in surface waters and sediments in the lower Yakima Valley. The surface waters included rivers, creeks and irrigation ditches. At the same time toxic sewage sludge (biosolids) from King County was also collected and analyzed. We added this component because sewage sludge from King County is trucked to eastern Washington forests lands and Yakima County for application to cropland. The types of pesticides that were tested were chosen because of their toxicity and potential harm for human health. Of course, dioxins/furans are known to affect human health. The results of the findings are shown on tables 1 and 2. We did not include the results of the sediment analysis in the tables because the results were like the water samples taken at the same location. You can see the results for the sediment results in Dr. Honour's report. As you can see, none of the surface waters, sediment, or biosolids had detectable pesticide residuals. However, many of the water and sediment samples had measurable levels of dioxins/furans. Three of seven water samples had detectable levels of the most toxic dioxin/furan compounds. The biosolids from King County had elevated levels of dioxins/furans and the most toxic compounds as well.

Stage two of our study was accomplished during the spring of 2018. We changed the study design at this time. We resampled the surface waters but eliminated the testing of sediments. We added one more surface water site. FOTC has some members who are

involved in the health fields and we agreed on the importance of looking at impact on humans. We decided to include some domestic well water near a few of the surface water sites. We found three homeowners who would let us test their domestic wells. These wells were analyzed for dioxins/furans, nitrate, arsenic, and lead. None of the three wells had elevated nitrates, lead or arsenic. One of the wells had a nitrate level of 7. The results of the dioxin/furan analysis are seen in Table 2. As you can see the results for the surface waters were quite different than in the summer of 2017. In general, many of the dioxin/furan levels were lower than they were during the summer of 2017.

FOTC is actively involved in ground water issues in the Yakima Valley related to nitrate contamination. We have observed that nitrate levels from the same wells vary by month or season of the year. We suspect that this relates to rain levels, snow melt, and irrigation. Therefore, it doesn't surprise us that the levels of these toxins would vary by season of the year. This time two of the 8 surface waters had elevated TEQs and one had the most toxic dioxin/furan compounds. As we suspected the King County biosolids continued to have elevated dioxins/furans and the most toxic dioxins/furans were present

What was most surprising and to this point unexplained is that two of the three domestic wells had higher dioxins/furans than the surface waters. The Prosser domestic well which was 120 feet deep and within feet of the Yakima River had a TEQ of 57.6. A second well in Granger with a depth of about 10 feet had a TEQ of 30.6. Both had the most toxic dioxins/furans in their water. The only risk factor we see for these two wells is that the Prosser well is near several ponds that have been used as a dumping ground over the years for municipalities. We encouraged the homeowners to use bottled water or charcoal filters until we could do further testing.

We once again changed our sampling plan for the next phase of our study. During the fall of 2018 we decided to analyze more domestic drinking wells, municipal water systems, and commercial bottled water. The sampling sites for domestic well water were spread across our valley and included wells in Yakima and Benton counties. There was not an attempt to select wells near our previous surface water sampling sites, but we did

try to get homeowners near the previous Prosser and Granger sites to volunteer. Because of our dwindling budget we had to limit the number of wells to test. The results are found in tables 2, 3, 4, and 5.

Of the three domestic wells that were tested in the spring of 2018 and had very high dioxin/furan levels, the Prosser and Granger wells during the fall of 2018 had TEQs less than one and none of the most toxic dioxin/furan compounds. The third Toppenish well now had an elevated TEQ with the presence of the most toxic compounds. There is no explanation for the marked change in these levels except the factors mentioned above.

When we looked at the data from the 13 new domestic wells that were tested in the fall of 2018, we see that three had elevated TEQ levels. One well, that did not have an elevated TEQ level, did have one of the most toxic dioxin/furans in the water. Three of the 16 wells had elevated nitrate levels. None of the wells had elevated lead levels. One of the sixteen wells had elevated arsenic levels.

We are including copies of the analysis of the three phases of our study by Dr. Honour. We are also including the raw data and quality assurance information from ALS, the certified lab that received the samples.

## CONCLUSIONS:

### Contamination of surface waters

The surface waters in the Yakima Valley are generally not used for human consumption. One exception is that the city of Yakima uses the Naches River for domestic water consumption. The Yakima River and other surface waters are generally used for crop irrigation. The fact that the toxic pesticides were not found in surface water is reassuring. However, the breakdown products of these pesticides were not evaluated and there is some question whether the breakdown products might also be harmful.

Dioxins and furans are ubiquitous in the environment. However, because these compounds are persistent and can enter the human body and trigger health problems, the EPA recommends limiting exposure to these chemicals as much as possible. Dioxins/furans have been linked to cancer, endocrine abnormalities and developmental problems in children. The presence of dioxins/furans in the surface waters should be of some concern, even though the water is not used for human consumption. Dioxins/furans do accumulate in fish species and could then enter the food chain for humans. Since dioxins/furans are fat soluble and have persistence in the human body, one could question whether using these ground waters for irrigation could cause the dioxins/furans to enter crops or animal products like milk and cheese. We hoped to analyze milk and cheese products from animals grown in the Yakima Valley but the two sources we knew about had gone out of business. Milk products from our local dairy industry, Darigold, would have had milk from mixed sources in Washington and Oregon and not just from the Yakima Valley. We chose not to analyze their products.

Where are the dioxins/furans in surface waters coming from? A sampling site in the Yakima River at Cle Elum upstream from major cities was tested and dioxins/furans were present but at a lower level than found downstream in the Yakima River. Science says that they come from forest fires, back yard burning, the production of certain chemicals and pesticides, the burning of waste from Asia, and as you can see from our data, it is present in biosolids that are applied to agricultural fields and forests on the east and west side of Washington State. Certainly, eastern Washington has had it's share of forest fires in the past 5 years. We are certainly putting biosolids on agricultural land in the Yakima Valley. These biosolids are not required to be tested for dioxins/furans or other organic compounds. The EPA and state only require testing for heavy metals.

This was only a pilot study. We believe additional study needs to be undertaken to find the real extent of the water contamination and hopefully discover the main sources of the contamination.

## Contamination of domestic well water

The contamination of domestic well water with nitrates and arsenic was not unexpected. It has been well known that agricultural lands are used in such a way that groundwater gets contaminated with nitrates. In our valley we see the production of many kinds of crops including a large fruit industry and we have the largest number of dairy cows and Confined Animal Feeding Operations (CAFO) of any county in the state. Studies have shown that 15-20% of lower Yakima Valley domestic wells have greater than 10gm/L of nitrates. 60% of domestic wells for homes one mile downgradient from a cluster of dairies north of Outlook, WA have nitrate levels above this standard of safety. FOTC's opinion is that no government agency on the county, state or federal level is doing enough to protect the population of the lower Yakima Valley from nitrate pollution.

The surprising finding was the contamination of domestic wells with dioxins/furans. We are not surprised that the levels of these toxic chemicals varied based on the time of the year. What is surprising is how much dioxins/furans were found in some wells. To have the affected home owners have someone in county or state government provide them advice, we have shared the data with these agencies. Maybe the data will encourage the county, state or federal government to do some more extensive testing of private domestic wells? Maybe Columbia River Keepers will be interested in funding some additional water studies in the Yakima Valley?

Finally, FOTC wants to thank CRK for funding this project. Our main mission is to provide a healthy environment for the community members of the Yakima Valley. Many if not most of the families that are affected by contaminated water are relatively poor, racial minorities. These groups have little money and little political power.

### REQUEST:

As you can see by the attached budget, FOTC has \$2,508.92 left in our budget. We did not budget for administrative costs because we desired to use the money for expanding the number of samples we could test. As a non-profit we have very little in

savings and have no regular source of funds accept from the occasional grant we procure. Would the CRK organization allow us to keep this balance to cover some of the administrative costs we incurred including gas, food, postage and the cost of our PhD consultant? If the answer is no, we will cut CRK a check for this balance.

Sincerely,

*Jean Mendoza*

Jean Mendoza RN, MSN  
Executive Director  
Friends of Toppenish Creek