Study Finds Elevated Ammonia Levels at Lower Yakima Valley Site Near Large CAFO Dairies

May 10, 2019

The Friends of Toppenish Creek (FOTC) share with the public the results of yearlong air testing for ammonia at a site in the Lower Yakima Valley (LYV) near a large concentrated animal feeding operation (CAFO) dairy. The study was paid for with a grant from Legends Casino and private donations.

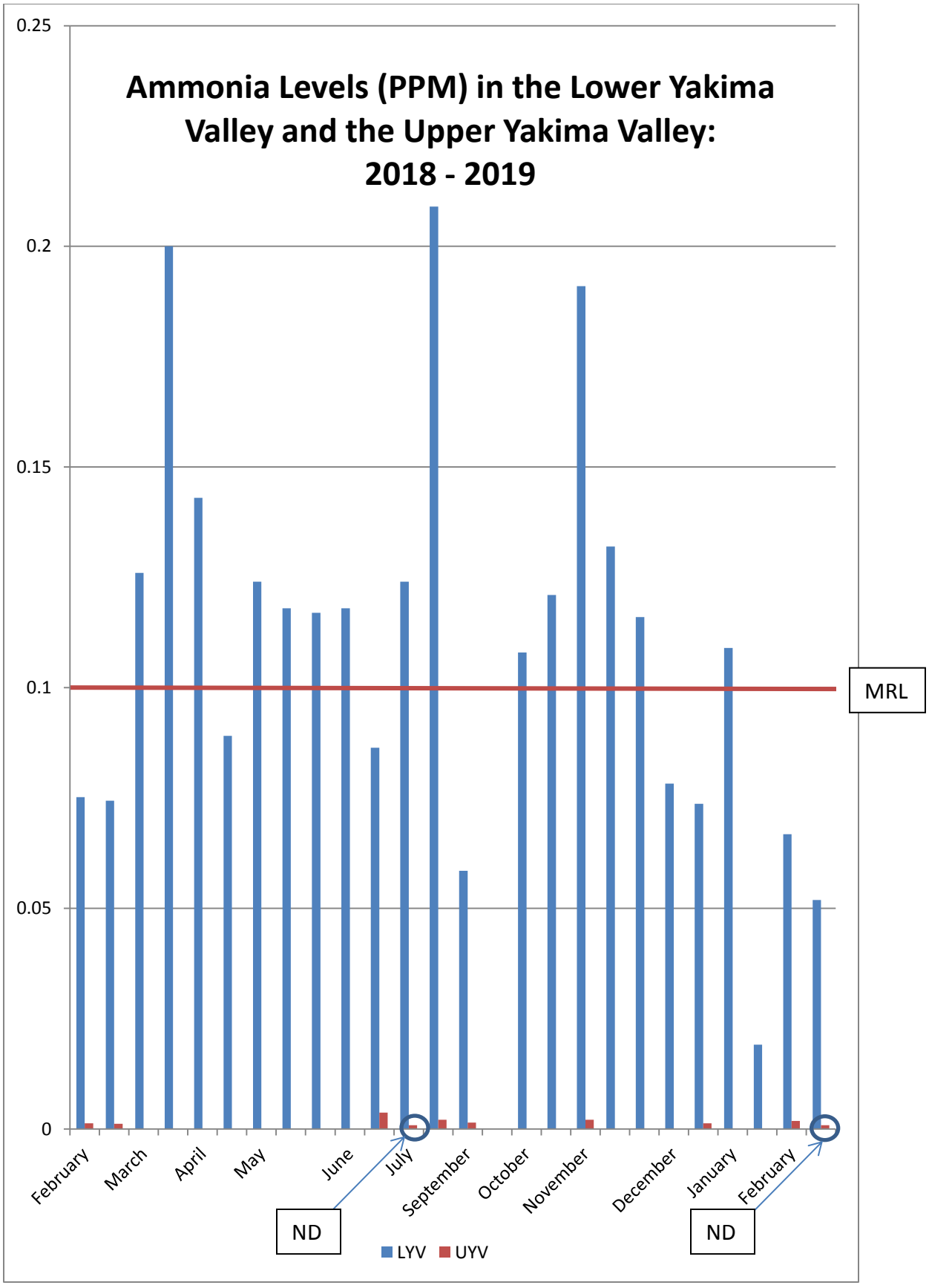
The FOTC study measured average ammonia levels for two week periods from February, 2018 to February, 2019. Due to the type of sampling we do not know the peak ammonia levels. Control samples were measured at a site in the Upper Yakima Valley, far from any CAFOs. The average of all LYV samples in the study exceeded the Minimum Risk Level (MRL) for chronic ammonia exposure.

The average of all samples at the LYV site was 0.1092 parts per million (ppm) with a range of 0.0191 ppm to 0.209 ppm. The average of all samples at the UYV site was 0.0016 ppm. Ammonia levels in the lower valley averaged sixty eight times higher than those in the upper valley.

The Agency for Toxic Substances and Disease Registry (ATSDR) at the Center for Disease Control (CDC) has determined that the Minimum Risk Level (MRL) for long term (≥ 1 year) exposure to ammonia is 0.10 ppm. According to the CDC, "An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure."

The FOTC data agrees with findings from a University of Washington study of asthmatic LYV children that found 24 hour ammonia levels ranging from .00027 ppm to .3175 ppm. That study concluded (page 84), "Ammonia may serve as a marker for the complex airborne emissions from CAFOs, and the observed decreases in lung function may have resulted from exposure to one or more co-pollutants with established respiratory system toxicity, such as endotoxin, particulate matter or hydrogen sulfide."

The FOTC data agrees with the results of a Yakima Air Winter Nitrate Study by Ecology that found high levels of ammonia lead to high levels of fine particulate matter in Yakima County. That study stated (page 111), "Given the backdrop of excess gaseous ammonia, there is usually sufficient reactive nitrogen in the valley to produce elevated levels of particulate nitrate if the right meteorological conditions take hold."


Ammonia Levels (PPM) in the Lower Yakima Valley and the Upper Yakima Valley: 2018 - 2019
0.25
0.2
0.15
0.1
0.05
0
MRL
February
March
April
May
June
July
September
October
November
December
January
February
ND
ND
LYV
UYV

Date	LYV µg/m³	LYV ppm	UYV µg/m³	UYV ppm
2/8/2018	56.4	0.0752	1.0	0.00133
2/22/2018	55.8	0.0744	0.9	0.00120
3/8/2018	94.6	0.126		
3/22/2018	150	0.200		
4/5/2018	107	0.143		
4/19/2018	66.8	0.0891		
5/3/2018	92.8	0.124		
5/17/2018	88.5	0.118		
5/31/2018	87.6	0.117		
6/14/2018	88.3	0.118		
6/28/2018	64.8	0.0864	2.8	0.00373
7/12/2018	93.2	0.124	ND	0.0009
7/26/2018	157	0.209	1.6	0.00213
9/20/2018	43.9	0.0585	1.1	0.00147
10/4/2018	81.1	0.108		
10/18/2018	90.4	0.121		
11/1/2018	143	0.191	1.6	0.00213
11/15/2018	99.1	0.132		
11/29/2018	86.8	0.116		
12/13/2018	58.7	0.0783		
12/27/2018	55.3	0.0737	1.0	0.00133
1/10/2019	82	0.109		
1/24/2019	14.3	0.0191		
2/6/2019	50.1	0.0668	1.4	0.00187
2/20/2019	38.9	0.0519	ND	0.0009

This bar graph depicts ammonia levels gathered by the Friends of Toppenish Creek from a home in the Lower Yakima Valley and a control home in the Upper Yakima Valley in 2018 and 2019. The red horizontal line is the ATSDR Minimum Risk Level of 0.1 ppm.

Data was reported in micrograms per cubic meter. Conversion to parts per million – PPM was performed using the Lenntech Calculator at https://www.lenntech.com/calculators/ppm/converter-parts-per-million.htm

* For graphing purposes we entered values of .0009 ppm for non-detect (ND) readings in the Upper Yakima Valley on 7/12/2018 and 2/20/2019. The Inter-Mountain Labs reporting limit for ammonia is .0008 micrograms per cubic meter or .00107 parts per million.

Quality Assurance:

The FOTC study used a low-cost, passive, radiello diffusion sampler that was developed by the National Atmospheric Deposition Program (NADP) for their Ammonia Monitoring Network (AMoN). Product data is available at https://www.sigmaaldrich.com/technical-documents/articles/analytical/environmental/air-sampling-ammoniaradiello.html

FOTC followed a modified EPA Method 325 sampling protocol. (There was only one site and one control site in our study, while the EPA Method 325 recommends multiple sites.) Temperatures were recorded using WA State Dept. of Ecology web-based data.

Samples were sent in batches to Inter-Mountain Labs in Sheridan Wyoming and analyzed under standard lab protocols. All Quality Control parameters met the acceptance criteria defined by EPA and Inter-Mountain Laboratories.

One sample, collected on September 6, 2018, showed no readings and was rejected for summary data analysis since this made no sense in this study setting.

References:

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