



University of Wisconsin – Eau Claire
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To: Town of Cook's Valley, Wisconsin

Attn: Mr. Darrel Fehr, Town Chairman
15784 40th Street
Bloomer WI 54724
715-568-4711 Phone
E-Mail cv1927@bloomer.net

Air quality monitoring results, July 2016-September 2016

6 January 2017

Dear Mr. Fehr:

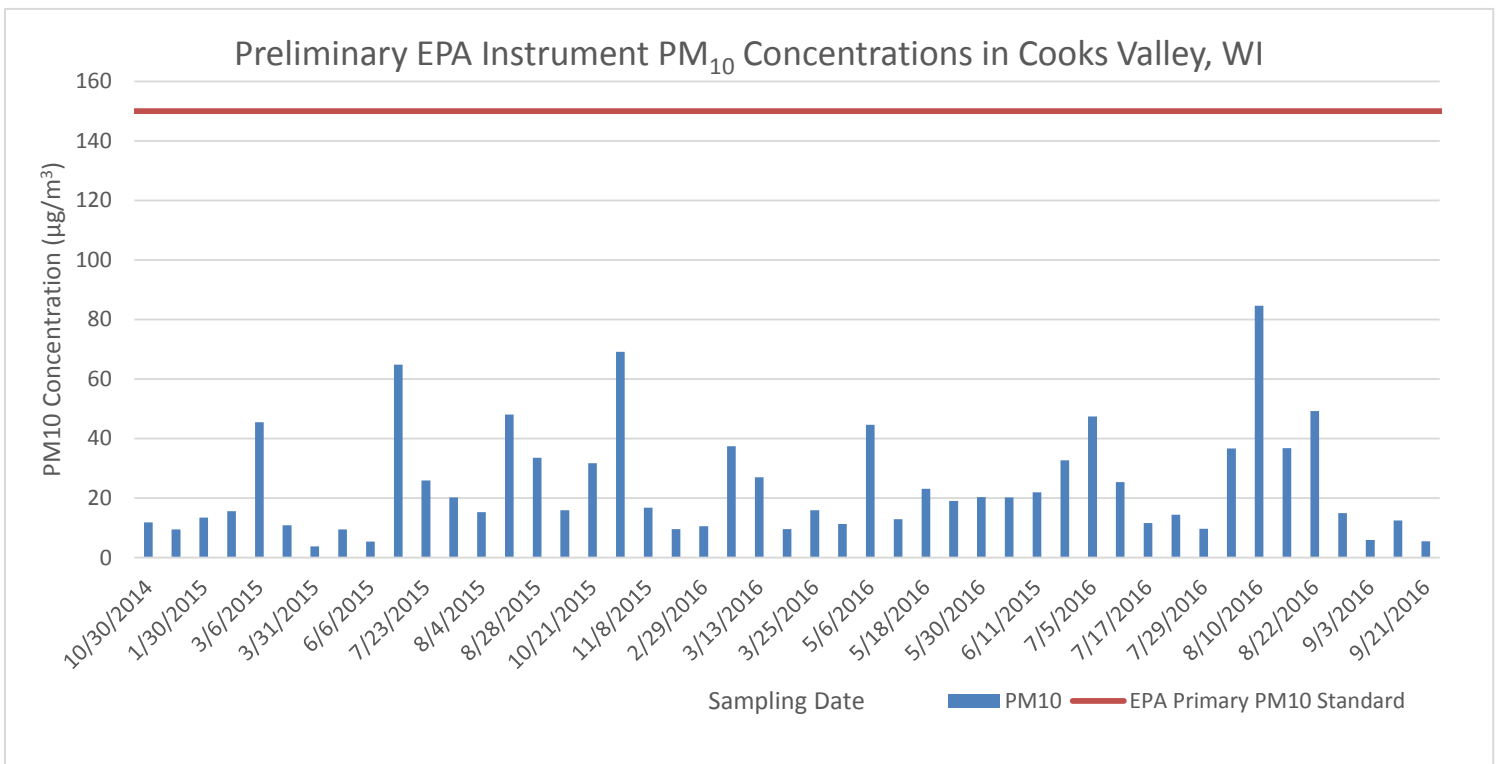
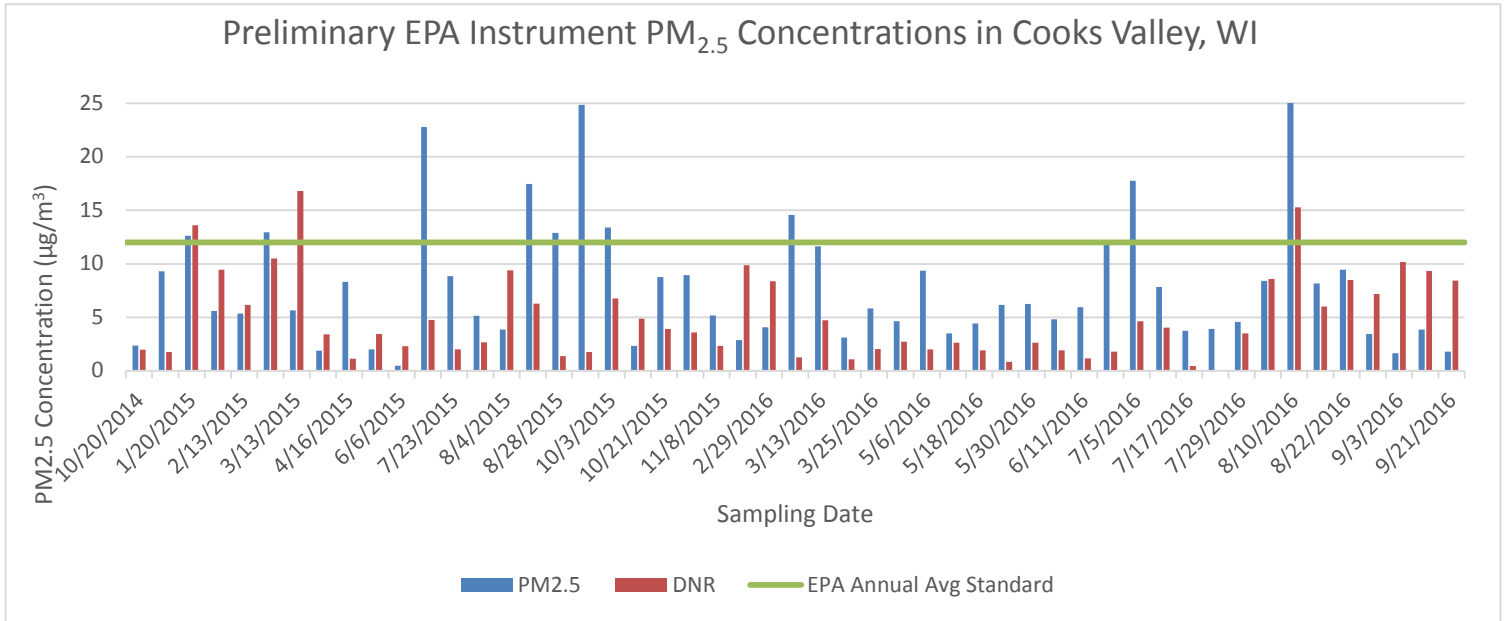
With this letter I would like to provide our preliminary results for air quality monitoring for the Town of Cook's Valley for the months of July 2016-September 2016 as well as our conclusions from the two-year study.

As you know, we are using EPA-certified federal reference method monitors to measure the levels of PM₁₀ and PM_{2.5} particulate matter. The monitoring site was chosen based upon EPA siting criteria, the Andersen dichotomous samplers were calibrated before and after each sample using a Tetracal calibrator, and pre- and post-weight filter weights were recorded. Results from these 24-hour samples were compared to EPA standards, the State of California/World Health Organization standard, and the concurrent 24-hour averaged hourly PM_{2.5} values reported by the Eau Claire DNR regional monitor.

Date/Time	PM10 ($\mu\text{g}/\text{m}^3$)	State of CA/WHO PM10 Standard ($\mu\text{g}/\text{m}^3$)	EPA PM10 Standard ($\mu\text{g}/\text{m}^3$)*	PM2.5 ($\mu\text{g}/\text{m}^3$)	DNR PM2.5 Average ($\mu\text{g}/\text{m}^3$)	EPA PM2.5 Standard ($\mu\text{g}/\text{m}^3$)**
0:00-23:59 7/17/2016	7.8820	20	150	3.7371	0.458333	12
0:00-23:59 7/23/2016	10.5513	20	150	3.9227	n/a	12
0:00-23:59 7/29/2016	5.1842	20	150	4.5664	3.5	12
0:00-23:59 8/4/2016	28.2979	20	150	8.4075	8.583333	12
0:00-23:59 8/10/2016	57.8901	20	150	26.7214	15.29166	12
0:00-23:59 8/16/2016	28.6177	20	150	8.1706	6	12
0:00-23:59 8/22/2016	39.8296	20	150	9.4534	8.5	12
0:00-23:59 8/28/2016	11.5500	20	150	3.4273	7.166666	12
0:00-23:59 9/3/2016	4.3004	20	150	1.6268	10.16666	12
0:00-23:59 9/15/2016	8.6545	20	150	3.8451	9.333333	12
0:00-23:59 9/21/2016	3.7197	20	150	1.8033	8.416666	12

*EPA PM10 standard is "Not to be exceeded more than once per year on average over 3 years." **PM2.5 NAAQS average annual standard.

Additionally, I have included graphs of all PM_{2.5} and PM₁₀ values for each sampling date over the entire sampling period, as well as the descriptive statistics (means, standard deviations, and ranges) of these data below:



Annual Averages (PM _{2.5} , µg/m ³)		Annual Standard Deviations (PM _{2.5} , µg/m ³)		Annual Ranges (PM _{2.5} , µg/m ³)	
Cooks Valley - 2015*	8.8625	Cooks Valley - 2015	7.5986	Cooks Valley - 2015	24.3774
DNR - 2015	5.5678	DNR - 2015	4.5834	DNR - 2015	15.67
Cooks Valley - 2016**	7.0474	Cooks Valley - 2016	5.1851	Cooks Valley - 2016	25.0946
DNR - 2016	4.8283	DNR - 2016	3.5867	DNR - 2016	14.8333

*Signifies a period of 30 October, 2014 to 3 October, 2015 over which 18 samples were collected. **Signifies a period of 15 October, 2015 to 21 September, 2016 over which 32 samples were collected.

PM _{2.5} , Monitor Sample Volume and Filter Mass Increase											
Site	n	Concentration (µg/m ³)				Sample Volume (m ³)			Mass Increase (mg)		
		\bar{x}	σ	Range	98 th %ile	\bar{x}	σ	Range	\bar{x}	σ	Range
Cooks Valley	50	7.70	6.15	26.25	24.88	21.06	2.90	14.87	0.192	0.252	0.52849
DNR - Cooks Valley Dates	50	5.11	3.949	16.342	15.352	-	-	-	-	-	-

PM ₁₀ , Monitor Sample Volume and Filter Mass Increase												
Site	n	Concentration (µg/m ³)					Sample Volume (m ³)			Mass Increase (mg)		
		\bar{x}	σ	Range	Second-Highest 2015*	Second-Highest 2016**	\bar{x}	σ	Range	\bar{x}	σ	Range
Cooks Valley	47	24.23	18.05	80.79	45.5269	69.1387	23.66	2.699	15.41	0.477	0.519	1.4304

*Signifies a period of 30 October, 2014 to 28 August, 2015 over which 15 samples were collected. ** Signifies a period of 15 October, 2015 to 21 September, 2016 over which 32 samples were collected.

To compare our PM_{2.5} data and concurrent DNR regional PM_{2.5} data, we used a paired t-test with a significance level of 0.05. Because the “p-value” in the table below was less than 0.05, the measured values in Cooks Valley were found to be higher than the background regional DNR values.

	PM _{2.5}
<i>Comparison</i>	Cooks Valley-DNR
<i>p-value</i>	0.001647523
<i>paired?</i>	<i>yes</i>

Our conclusions from this study are the following:

- 1) The PM_{2.5} levels at the Cook's Valley site were consistently and significantly higher (average of 7.70 µg/m³) than concurrent PM_{2.5} levels measured at the Department of Natural Resources regional monitoring site in Eau Claire (average of 5.11 µg/m³);
- 2) The average PM_{2.5} levels over the Oct. 2014-Sept. 2015 period (8.8625 µg/m³), Oct, 2015-Sept. 2016 period (7.0474 µg/m³), and over the entire two-year period (7.70 µg/m³), were below the EPA annual average standard (12 µg/m³);
- 3) The 98th percentile PM_{2.5} levels over the Oct. 2014-Sept. 2015 period (24.15 µg/m³), Oct, 2015-Sept. 2016 period (21.17 µg/m³) and over the entire two-year period (24.88 µg/m³) were below the EPA standard of 35 µg/m³;
- 4) The second-highest PM₁₀ levels ("not to be exceeded more than once per year") over the Oct. 2014-Sept. 2015 period (45.53 µg/m³) and over the Oct, 2015-Sept. 2016 period (69.14 µg/m³) period were below the EPA standard of 150 µg/m³.
- 5) The PM₁₀ levels over the Oct. 2014-Sept. 2015 period (22.24 µg/m³), Oct, 2015-Sept. 2016 period (25.16 µg/m³) and over the entire two-year period (24.23 µg/m³) were above the State of California/WHO annual average standard of 20 µg/m³.

I would be glad to discuss the interpretation of our findings with you at your convenience.

Sincerely, 

Crispin H. Pierce, Ph.D., Professor / ENPH Program Director

Our measure, our motto, our goal

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