From: Alben T. Myren Jr
To: Dec Air Comment
Subject: Fairbanks SIP
Date: Friday, July 26, 2019 7:27:13 AM
Attachments: FAIRBANKS AK SIP TESTIMONY DRAFT 7.26.19.doc

See attached.

Myren Consulting, Inc.
512 Williams Lake Road
Colville, WA 99114

Date: 23 July 2019

Ms. Cindy Heil
Division of Air Quality, ADEC
555 Cordova St.
Anchorage, AK 99501

RE: COMMENTS ON THE PROPOSED CHANGES TO THE SIP FOR FAIRBANKS, AK

Personal Information:

I have been involved in residential wood heater testing since 1983 when I submitted testimony to the State of Oregon's Department of Environmental Quality (DEQ) when the DEQ was considering adopting the rules to establish a wood heater certification program. I loaded my first fuel crib into a wood stove in 1984 when leading the successful effort to get a testing laboratory (EEMC) accredited by the DEQ. That lab was accredited by the DEQ in August 1985. In September 1986 I attended and participated in a Regulatory Negotiations (Reg Neg) meeting in Washington, D.C. as a laboratory manager. After EPA promulgated the first New Source Performance Standard (NSPS) for residential wood heaters in 1988, I managed the successful effort to get the DEQ accredited lab accredited by EPA, which happened later in 1988. Since 1988 I have been involved in residential wood heater testing as a partial owner/ manager of the EEMC lab (1988-1991), as Director of Research and Development at Aladdin Steel Products in Colville, WA (now Hearth and Home Technologies (HHT)) (1991-1994) and then as sole owner and manager of Myren Consulting, Inc. (MCI) which became an EPA accredited wood heater lab in 1996. Since I intended to retire, I did not reaccredit MCI in March of 2018. However, due to the press to get stoves certified to the 2020 standard, the lab has remained open to help clients with research and development (R&D) testing to achieve compliance and 2020 certification for their products. In addition, starting in 2008, I have participated in the process that led to the development of ASTM E3053-17, *Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters Using Cordwood Test Fuel* and in 2015-16 developed the first wood stove (the Kiwi 2.1 VcV) that was certified by EPA based upon cord wood test results.

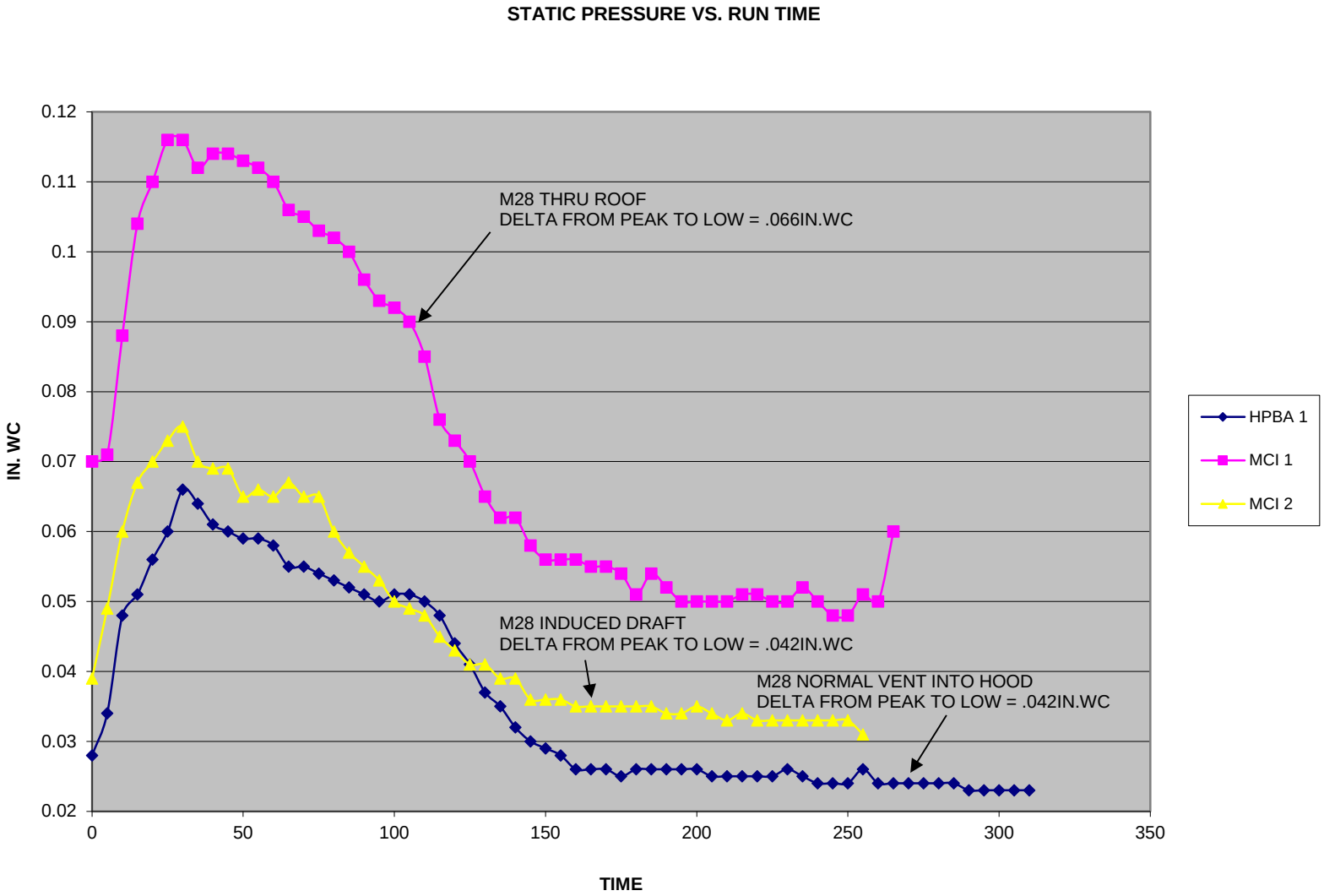
TESTIMONY:

A. USE OF TEOM DATA:

The proposed use of TEOM data to assess the performance of non catalytic (or catalytic) wood heaters is, at best, tenuous because:

1. **As far as I am aware, there is not an officially adopted TEOM test Method that has gone through any air quality regulatory agency's formal rule making process.**
2. **Nor have any assessment criteria been established for TEOM data, again through a formal rule making process, to determine whether or not a specific unit's emissions are acceptable, i.e., below some undefined number for some undefined period of time.**
3. **As far as I am aware, none of the past or present test labs have used a TEOM to determine Particulate Matter (PM) emissions and so are unfamiliar with the instrument or any draft test method. (Yes, I am aware of a proposed Draft TEOM test method in the April 2, 2019 draft of the Integrated Duty Cycle cord wood test method that was referenced in the Information presented in the SIP. The April 2 document is clearly labeled as a ''Draft'', so see # 1 above.)**
4. **When becoming an EPA accredited lab, a lab must participate in a Round Robin Test Series to demonstrate that it can perform the tests properly. How does the State of Alaska plan to make an assessment of whether or not a lab can perform TEOM tests properly?**
5. **I have seen TEOMs operated in my lab during some special testing done in October of 2017. The filter in the instrument is susceptible to plugging. This creates all sorts of issues for data continuity and completeness, especially if that data is going to be used for compliance purposes.**
6. **The TEOM data in the SIP looks to be from tests where EPA M28 cribs were used as fuel, at least the graphs are so labeled. There is plenty of data available that demonstrates that crib fuel does not burn like cord wood, so using crib fuel for any compliance purpose(s) is a waste of time, because crib fuel results are not a valid predictor of real world performance when cord wood is used as fuel. (Here see a paper written by Dr. James E. Houck, PhD. titled *Comparison of Particulate Emission Rates from the In-Home Use of Certified Wood Stove Models with U.S.EPA Certification Emission Values* dated July 18, 2011.)**
7. **Other than the switch to cord wood, none of the proposed revisions to any North American test method really addresses the laboratory versus real world performance issues because nothing is done to address the difference in the draft generated by EPA M28/ M28R freely communicated lab chimneys versus the draft generated by real world chimneys. The attached graph titled *Static Pressure vs. Run Time* shows the difference between the drafts generated by (1.) an EPA M28/ M28R chimney, (2.) an EPA M28/ M28R chimney with a constant induced draft of about -0.040 inches of water, which is similar to what the Europeans do in EN 16510 and *''beReal''* when they induce a draft of -12 Pa (-0.0482 inches of water)**

and (3.) a real world chimney about 21 feet tall venting into outside air that is about 30 F.



As the data in Table 1 shows, the increased draft generated by real world chimneys also affects stove performance during ''Cold Starts'' when a fire is ignited in a stove that is at room temperature. A static pressure (Pg) of -0.100 inches of water is about the maximum Pg achieved during EPA M28/ M28R Category 4 (High burn) certification tests. Many stoves never reach -0.100 inches of water, even after burning 1-3 hours on high when connected to a lab chimney. Yet that maximum for a lab chimney (_0.100 inches of water) is typically exceeded within 10 minutes after a fire is started in a stove connected to a real world chimney.

TABLE 1
ELAPSED TIME FROM IGNITION/TEST START TO ACHIEVING A STATIC PRESSURE OF -0.100 IN H_2O IN A REAL-WORLD CHIMNEY

Run #	Fuel/ Wood	Outside Chimney Ht.(ft)	Ambient Temp (F)	Elapsed time to. -0.100 in. H_2O (min)
81	D Fir	24.5	41	12
87	D Fir	24.5	22	8
91	D Fir	24.5	10	9
94	Birch	24.5	18	3
83	D Fir	28.5	33	8
95	D Fir	28.5	20.5	4
92	D Fir	28.5	10	4

Similarly, the difference in draft also affects a stove's performance after reloads. The data plotted in the graph above starts just before a Low burn crib fuel load was added to a burning stove shows just how different the draft is. This extra draft affects stove performance in other ways as well. The dry burn rate (DBR) increases and that affects combustion and thus emissions.

The point of all this discussion about draft is that any additional testing that requires the use of an EPA M28/ M28R chimney is a waste of time, money and effort because the results have no real world value. That is even more true if M28 fuel cribs are used as the fuel during those tests.

B.INCORRECT INFORMATION:

1. **While more of a semantics concern, I take issue with the use of the words that the TEOM data ‘‘…demonstrated that there are uncontrolled emissions from non-catalytic wood-fired heating devices…’’ That is a non-sequitur, and very misleading! You can not have ‘‘uncontrolled emissions’’ from a stove that is EPA certified because that stove’s design is based upon the need to control emissions. A better choice of words would be that the emissions from that stove are higher than desired.**

2. **At present a stove must achieve a weighted average emission rate of <2.5 g/h to be certified by EPA based upon cord wood test results. That weighted average includes a Cold Start preceding the High Burn where particulate matter (PM) sampling begins simultaneously when the fire is ignited in a stove at room temperature. (See ASTM E3053-17 Section 8.5.9.2). So, if there are any ‘‘uncontrolled emissions’’ when a fire is ignited in a stove, they are captured in the PM catch for the High Burn. This is especially true since PM sampling is continuous from ignition through the entire Kindling/ Start-up fuel phase and the start of the High burn tests to the end of the High burn test. Similarly, PM sampling begins at the start of the Medium and Low burn tests, so again, any ‘‘uncontrolled emissions’’ are captured by the PM sampling process. (See ASTM E3053-17 Section 8.6.9.1). Here I would like to point out that a stove can not achieve a weighted average emission rate of <2.5 g/h and have any ‘‘uncontrolled emissions’’. It is just too difficult to get under 2.5 g/h with any ‘‘uncontrolled emissions’’.**

3. **Similarly, the three graphs showing the TEOM data for High, Medium and Low burns presumably start when the EPA M28 tests start, i.e., just before the door is open to load the fuel. The emissions shown are typical of any batch fed appliance that burns solid fuel. Emissions are highest just after loading and then decrease over time as the fire establishes itself and the emission control system starts working. It is no surprise that different appliances have different ‘‘start-up emissions. And remember (1.) that these emissions that occur just after reloading are part of the PM catch that is used to determine compliance with the 2020 standard of 2.0 g/h and (2.) this data was generated with an EPA M28/ M28R chimney. The data would certainly be very different if a real world chimney had been used.**

4. **Also worth noting is, that if the claim made in the first paragraph of Lisa Rector’s May 6, 2019 memo to Ms. Cindy Heil of the ADEC that the testing protocol used to generate the data described in the second paragraph was indeed the**

Integrated Duty Cycle (IDC), then the description of the IDC protocol in the third paragraph in that memo is incorrect where it states:

1. ''…Load 1 is the Start-up load, kindling, start-up fuel and smaller fuel pieces loaded at a density of 7 pounds per cubic foot…''

Comment:
Load 1 is the Start-up Phase and only includes Kindling and Start-up fuel. The loading density for the kindling is 1.0 pound per cubic foot (See Section 8.13.1.4.1. in the IDC 4/2/19 draft (IDC)) and 3.0 lbs. per cubic foot ±5% for the Start-up fuel. (See IDC Section 8.13.1.4.2.)

As described in the memo, the Start-up phase would seem to include the smaller fuel pieces associated with the High burn fuel load. That is incorrect! Based upon the language in the April 2 draft of the IDC, the Start-up phase ends as per IDC Section 8.13.1.8. Then the High burn fuel load (Load 2) is added to the stove, followed by Load 3 and then Load 4. The Kindling, Start-up fuel and High burn fuel are not mixed together in Load 1 as is indicated in the memo.

2. ''…Load 2 represents fire maintenance mode, which loads two large pieces on (*in)* the stove at a loading density of 5 pounds per cubic foot…'' Word in italics and parenthesis indicates what a consumer would actually do. Putting wood ''on'' a burning stove would create safety and indoor air quality issues.

Comment:
That is correct for Load 3 which is the fire maintenance phase, but incorrect for Load 2 which is the High burn fuel load which has a loading density of seven pounds per cubic foot. (See IDC Sections 8.13.2.5. and 8.13.3.5.)

Conclusions:

1. **Proposing to use a TEOM to assess the PM emissions from ''Cold Starts'' and/ or ''Reloads'' when the stove is connected to a lab chimney is a huge waste of time and money because the data generated will not be representative of real world**

performance due to the difference in draft. In fact, due to the extra draft, non-catalytic stoves might do just fine. Thus, basing regulatory decisions upon a test method - still to be defined - that knowingly does not reflect real world conditions is just not good science or regulatory policy.

2. **If the goal is to have lab test results be a better predictor of real-world stove performance, and I would hope that is the case, then the continued use of a M28/ M28R chimney and/ or M28 fuel cribs are no longer viable options.**

3. **How a lay person could sort through the information presented in the SIP and reach an accurate and informed conclusion about what is being proposed is beyond me due to the number of obvious poorly written and/or incorrect statements made. Even as a knowledgeable person I had to go back and forth looking at the IDC draft and the information that was presented in the SIP and memo to sort things out and understand what is actually being proposed.**

I thank you and the ADEC for the opportunity to present this testimony. If you have any questions about the information presented in this testimony, feel free to contact me anytime.

Sincerely,

Ben Myren, President
Myren Consulting, Inc.
509 684 1154 (Office)
%09 685 9458 (Lab)
myren.ben@gmail.com

CC: Steffan Johnson, EPA
Adam Baumgart-Getz, EPA
Mike Toney, EPA
Amanda Aldridge, EPA
John Crouch, HPBA