Kuether, Molly

From: Owczarski, Jim
Sent: Tuesday, February 07, 2017 12:36 PM
To: Kuether, Molly
Subject: FW: Milwaukee Common Council File #161306
Attachments: Baldwin internal rvw draft 020117.pdf

Importance: High

And another.

Jim Owczarski, CMC
City Clerk
(414)-286-2998
@mkeclerk

From: Anne LeHuray [mailto:alehuray@pavementcouncil.org]
Sent: Tuesday, February 07, 2017 8:54 AM
To: Hamilton, Ashanti; Johnson, Cavalier; Kovac, Nik; Bauman, Robert; Bohl, James; Coggs, Milele; Rainey, Khalif; Donovan, Robert; Lewis, Chantia; Murphy, Michael (Alderman); Borkowski, Mark; Perez, Jose; Witkowski, Terry; Zielinski, Tony; Stamper II, Russell
Cc: Owczarski, Jim; 'William Werkheiser'
Subject: RE: Milwaukee Common Council File #161306
Importance: High

Honorable Aldermen and Alderwomen of the Milwaukee Common Council –

For your additional consideration, attached please find the internal review draft of a Letter to the Editor of the science journal Environmental Toxicology & Chemistry that will be submitted in the next few days. The letter concerns the recent publication authored by scientists at the USGS Wisconsin Water Science Center and the Milwaukee Metropolitan Sewage District:

> Baldwin A., S Corsi, M Lutz, C Ingersoll, R Dorman, C Magruder, M Magruder. 2016. Primary sources and toxicity of PAHs in Milwaukee-area streambed sediments. Env Tox Chem. DOI10.1002/etc.3694

The letter is a summary of a post publication peer review (PPPR) of the Baldwin et al. paper. The PPPR found that, similar to other publications on the topic of refined coal tar-based sealant authored by scientists from the USGS, the paper is an exercise in confirmation bias, using circular reasoning to identify sealcoat as an important source of PAHs in Milwaukee area sediments. Notably, the local USGS office bypassed normal USGS internal peer review practices to expedite publication. Unfortunately, on the topic of refined coal tar-based sealant, the USGS has been engaged in advocacy research and should not be relied on in making policy.

Thank you again for your attention & consideration,
Anne LeHuray

From: Anne LeHuray [mailto:alehuray@pavementcouncil.org]
Sent: Monday, February 6, 2017 5:25 PM

Subject: Milwaukee Common Council File #161306
Importance: High

Honorable Aldermen and Alderwomen of the Milwaukee Common Council –

I am the Executive Director of the Pavement Coatings Technology Council (PCTC), the national trade association representing the sealcoating industry. I write to you today concerning File #161306 *A substitute ordinance relating to the use of coal tar sealants*, which is an item on the agenda for the Common Council meeting of Tuesday, February 7, 2017.

For the reasons discussed below, PCTC asks the Milwaukee Common Council to take any one or all of the following actions:

A. Defer action on banning refined coal tar-based pavement sealant pending a thorough due diligence investigations that includes evidence from academic, industry, and government sources in addition to the activist sources of information that, based on the list of supporting documents given above, have been consulted to date.
B. Defer action on banning refined coal tar-based pavement sealant pending an opportunity for PCTC to address the Council and/or an appropriate Committee of the Council.
C. Defer action on banning refined coal tar-based pavement sealant pending the outcome of a 3rd party review, such as the one currently pending before the Alliance for Risk Assessment.

PCTC has asked the public to weigh in on the topic of whether Milwaukee should ban refined coal tar-based sealcoat via online petitions aimed at Milwaukee business and property owners via Facebook and, more generally, at change.org. The attached Excel file lists the 103 Milwaukee business and property owners who signed the Facebook petition opposing the ban. In nearby Illinois, where activists have mounted ban campaigns, a coalition has been formed to oppose a ban that includes the United Steel Workers Union, the AFL-CIO, the Laborers Union, and other workers groups. Jobs in the sealcoating industry offer good pay and safe working conditions, and are unionized in many locations.

This ordinance appears to have been introduced on January 18, at which time it was referred to the Public Works Committee (PWC). The PWC deliberated for about 13 minutes at its Jan. 25, 2017, meeting. Documents in support of banning the sealants that are posted on the Council's web page consist of:

1. Fiscal impact statement – stating that there is no perceived fiscal impact on the revenues or expenditures of the City of Milwaukee.
2. A list of bans from the alarmist web site *CoalTarFreeAmerica*.
3. A newspaper story from the Dec. 25, 2016, edition of the Milwaukee Sentinel-Journal.
4. An article titled *Polycyclic Aromatic Hydrocarbons* from a web site called *Toxipedia* that is part of an organization called *Collaborative on Health and the Environment*. The CHE website (and links on *Toxipedia* itself) seem to be focused on activist "science" on such topics as fracking, bisphenol-A, and other anti-science campaigns.
5. What appears to be a blog post from another activist "science" organization called the *Environmental and Energy Study Institute*.
6. A presentation by Christopher Magruder, described on the title slide as the "SWWT Science Advisory Committee Coordinator" (SWWT = Southeastern Wisconsin Watershed Trust, Inc.). The second slide of the presentation is titled "Who have we met with," and lists a variety of organizations that do not include any representative of the private sector.
7. A press release/news article published by the US Geological Survey.
8. A letter in support of the ban ordinance from the Kevin L. Shafer, Executive Director of the Milwaukee Metropolitan Sewage District.

9. A copy of an ordinance from the tiny village of North Barrington, Illinois, similar to the proposed Milwaukee ordinance.
10. An email from the Department of Public Works stating that the ban is anticipated to pose no hardship to the DPW.

From this list, it seems clear that the Common Council is being asked to adopt the judgement of a variety of environmental alarmists and activists, who in turn take their lead from advocacy science published by the US Geological Survey (USGS). Missing from this list is the substantial body of work in the peer reviewed scientific literature and other sources that have found the USGS studies to be unscientific in that they are unreproducible and, in some cases, based on scientific misconduct. There is so much information and documentation of the issues with the USGS studies that the issues are as difficult to summarize as any scientific argument. A place to start may be the many post-publication peer review (PPPR) summaries that have been published online, that provide links to (a) original USGS and other papers, (b) PPPR reports that were commissioned by PCTC (c) published comments (summaries of PPPR reports, often) and responses, and (d) other relevant information. Links to PPPRs are given at the bottom of this email. In addition, attached here is a brief summary of the false arguments put forth by some alarmists and activists who argue in favor of banning refined coal tar-based sealants.

That said, PCTC understands that elected officials such as yourselves are, because of a lack of funding and access to scientific expertise, unequipped to sort through the arcane details of science. Often, officials feel faced with a choosing between believing scientists who work for the government and scientists who work for industry. For many years, PCTC had hoped that the USGS would join us in commissioning a 3rd party to review the evidence and bring clarity to policy makers. Since this has not happened, PCTC has petitioned the not-for-profit Alliance for Risk Assessment (ARA) to establish an independent 3rd party peer review consultation. ARA is a project overseen by federal and state scientists. Members of its current Steering Committee are:

- **Anita Meyer,** United States Army Corps of Engineers
- **Annette Dietz**, Oregon Department of Environmental Quality
- **Michael Habeck**, Indiana Department of Environmental Management
- **Edward Ohanian**, United States Federal Employee
- **Michael Dourson**, University of Cincinnati School of Medicine, Risk Science Center
- **Michael Honeycutt**, Texas Commission on Environmental Quality
- **Moiz Mumtaz**, Agency for Toxic Substance & Disease Registry
- **Ralph Perona**, Neptune & Company, Inc.

PCTC's petition to the ARA is available here. PCTC initiated the petition, but it is with the understanding that interested parties such as the City of Milwaukee or any and all the organizations listed in Mr. Magruder's presentation will be invited to participate in this review.

In the meantime, to repeat myself, PCTC asks the Milwaukee Common Council to take any one or all of the following actions:

A. Defer action on banning refined coal tar-based pavement sealant pending a thorough due diligence investigations that includes evidence from academic, industry, and government sources in addition to the activist sources of information that, based on the list of supporting documents given above, have been consulted to date.
B. Defer action on banning refined coal tar-based pavement sealant pending an opportunity for PCTC to address the Council and/or an appropriate Committee of the Council.
C. Defer action on banning refined coal tar-based pavement sealant pending the outcome of a 3rd party review, such as the one currently pending before the Alliance for Risk Assessment.

Thank you for your attention & consideration. Please contact me for additional information.

Anne LeHuray

Post-Publication Peer Review (PPPR) Summaries:

https://pubpeer.com/publications/62730EDFFC17A5F85CA9EB7FD04C24#fb42729 (Mahler et al. 2005)
https://pubpeer.com/publications/C3ADDD65D7FDDD9D8F3E06EC0B9A2A#fb4273 (Van Metre et al. 2009)
https://pubpeer.com/publications/DEC6835FF61E589EB95C8597944A7F#fb42759 (Van Metre & Mahler 2014)
https://pubpeer.com/publications/F7AA69C873AB96CA862322CF1929BF#fb42838 (Mahler et al. 2010)
https://pubpeer.com/publications/BEE4406AC9EF33CF9E3E6C238F0EDF (Van Metre & Mahler 2010)
https://pubpeer.com/publications/C6EE9D26B17539950DFCE21E5BBE2F (Williams et al., 2012)
https://pubpeer.com/publications/5EBEB3ACD53C7F2FF65624EC6DDA58 (Williams et al., 2013)
https://pubpeer.com/publications/D11E6D8EA68C093ACB155A821E5DFB (Watts et al., 2010)
https://pubpeer.com/publications/F886AEF6529AA9843114E710B1AC2D (Pavlowsky, 2013)
https://pubpeer.com/publications/1BC1FF805A0E9DE96ADBA73AC443AD#fb43811 (Crane, 2014)
https://pubpeer.com/publications/C95FA81213FD9D30144C36DD6D3DF9#fb44076 (Witter et al., 2014)
https://pubpeer.com/publications/747B19A6260CA08B9CA4908177268A (Scoggins et al., 2007)
https://pubpeer.com/publications/456CA525683D444D8AE75DB9E88554#fb45568 (Van Metre et al., 2012a and 2012b)
https://pubpeer.com/publications/CA5E52B5AD1819E468B800DB24D261 (Mahler et al., 2015)
https://pubpeer.com/publications/EFBBA26FDD35EBF21FC7A96538B03E#fb46601 (Kienzler et al., 2015)
https://www.ncbi.nlm.nih.gov/myncbi/kirk.o'reilly.1/comments/ (McIntyre et al., 2016)

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Letter commenting on "Primary sources and toxicity of PAHs in Milwaukee-area streambed sediments.

Editor-

Baldwin et al. (2016) [Baldwin] sought to identify sources of polycyclic aromatic hydrocarbons (PAH) in sediment samples collected from streams in Milwaukee, WI. The authors used a number of approaches that rely on comparing the PAH chemistry of sediment samples to those of proposed sources. These approaches are only valid if appropriate sources are correctly identified and sufficiently characterized. Unfortunately, Baldwin relies almost entirely on source profiles initially published by Van Metre and Mahler (2010) [Van Metre]. Van Metre and Mahler's work has focused on implicating refined tar pavement sealants (RTS) as a significant source of PAHs in urban sediments (Mahler et al., 2005; Van Metre et al., 2009; Van Metre and Mahler, 2010). The profile identified as that of RTS in Baldwin was specifically developed from parking lot dust sample data to be more consistent with urban sediment of than with actual RTS (Van Metre and Mahler, 2010). This results in a circular argument where the similarity of background with itself is used to suggest that RTS is a source.

A comparison of background urban soil (Kay et al 2003) and Baldwin's sediments indicates soils can have sufficient PAHs concentrations to account for those measured in sediments. Soil is a source of solids that become creek sediments, but soils are less likely to have been impacted by runoff from paved surfaces. Like Baldwin and Van Metre, Kay's work was conducted as a US Geological Survey (USGS) project. The goal of Kay's study was to characterize PAH concentrations resulting from atmospheric deposition. To compare Baldwin's sediment and Kay's soil PAH data, after excluding an outlier with a PAH_{16} concentration of over 4,000 mg/kg, we used ProUCL 4.1 (EPA) to calculate a 95% upper tolerance limit background for the soil samples of 120 mg/kg PAH_{16}. This is 5x greater than Baldwin's assumed background of 20 mg/kg. Six of Baldwin's 40 samples exceeded 120 mg/kg, but only two exceeded 130 mg/kg.

PAH diagnostic ratios do not support Baldwin's conclusion. While benzo[b]fluoranthene to benzo[k]fluoranthene (BdF/BkF) and fluoranthene to pyrene (Fl/Py) ratios of urban sediment may be similar to urban parking lot dusts, they are not similar to RTS. Figure 1 shows these two ratios for Baldwin's sediment samples, Van Metre's parking lot dusts (2008), fresh RTS data from Mahler et al (2005), and fresh RTS data from Scoggins et al (2009). Only one of the 18 RTS samples plotted near the

sediment samples. Baldwin noted an average BbF/BkF ratio of 2.54 for Milwaukee sediment, but the average ratio is only 1.38 for the RTS samples.

Whereas Baldwin used principal component analysis (PCA) to compare the similarity of sediment and proposed source profiles through quantification of Euclidean distances, another common application is to evaluate the graphical distribution of different sample types in PCA plots (Johnson et al 2007) as the distance between samples is an indicator of their similarity. We ran PCA using as inputs Baldwin's sediment parking lot samples, parking lot and fresh RTS samples, and both Baldwin and Van Metre's CMB RTS source profiles. Figure 2 demonstrates the fundamental problem with both Baldwin's and Van Metre's approach for source characterization. Although the profile identified as RTS appears consistent with sediment samples, it does not appear to accurately represent RTS. Figure 2 shows that *only* sealed parking lot dust samples with PAH profiles most like urban background were used to generate the profile. Dust samples with more varied profiles were excluded, as were scrapings of sealants from parking lots, and profiles of actual RTS. The latter two would better represent actual RTS chemistry. The PCA plot also shows the similarity in PAH profiles between sealed and unsealed parking lot dust.

Using Baldwin's approach for comparing PAH profiles, Figure 3 compares the average sediment profile to the source profile used to represent RTS, the average profiles for Van Metre's sealed lot scrapings, fresh RTS product, and Kay's Chicago soil samples. Using χ^2 as an indicator, the order of similarity with sediment is Chicago soil, selected sealed parking dust, unsealed parking lot dust, sealed lot scrapping, and RTS product. Baldwin's Figure 5 demonstrates the high similarity between the source profiles. This is a problem because the uncertainty associated with most of these average based profiles is unknown and the range of profiles for the different source type may overlap. We assessed the uncertainty of the profile based on the average of Van Metre's sealed lot dust samples and found that the standard deviations as a percent of the mean (SD/mean) range from 32 to 102 for the individual PAHs, with an average SD/mean of 60%. Because the uncertainty associated with most of the source inputs was unknown, Baldwin used a default value of 40%. As highlighted in Figure 3-F, this exceeds the difference among some source profiles reducing the ability of CMB to distinguish among them.

A fatal flaw in Baldwin's application of CMB is highlighted in Van Metre and Mahler (2010) stated goal of developing a source profile with the greatest statistical similarity to the sediment profile. The source profile identified as RTS dust was generated specifically to have the highest R^2 and lowest X^2 possible when compared to the sediment profiles. Setting-up the circular argument, differences in the R^2 and X^2 between modeled and measured sediment concentrations were then used to rank the output of various

CMB runs. Baldwin added comparisons of Euclidean distances, but this is just another indicator of statistical similarity. It is the mathematics of the CMB model that the better the fit between a source input and the receptor samples, the better the fit will be between the modeled and measured concentrations. A slightly better fit does not, as Baldwin claims, demonstrate that the mix of source profiles used as inputs were correct. What Van Metre and Baldwin have failed to do is demonstrate that the profile accurately represents RTS. As shown in Figure 1 it does not represent either fresh RTS or sealer actually scraped off parking lots. The profile is based on averaging a subset of results of samples from parking lots that the authors' admit they only assume are sealed with RTS. Baldwin averaged the Milwaukee lot samples with six of Van Metre's samples so the resulting profile would be essentially the same as the profile that had already been demonstrated to give the desired modeling results.

Even with specifically generating a profile to maximize the apparent RTS contribution, the fit between measured and modeled sediment concentrations were similar whether or not an RTS source profile was included as an input. As stated by Baldwin, the R^2, X^2, and percent mass differed by only 0.06, 0.67, and 3.6% respectively and each was well within the criteria of R^2 ≥0.8, X^2≤2.0, and percent mass +/- 20%. Given the uncertainty as to whether the non-RTS source profiles accurately represented local sources, the similarities among all profiles, the 40% modeling uncertainty, and the effort to generate an RTS source input that more closely represented typical sediment than actual RTS, these slight differences provide no support for the author's hypothesis concerning the role of sealants.

To broaden the evaluation so it includes alternative RTS or parking lot dust input profiles, we have run CMB starting with the mixture of sources identified as Model Run A in Van Metre and Mahler (2010) with a number of sediment data sets (). We then replace the Van Metre's RTS sealed lot profile, with the average profile of unsealed parking lot dust, samples from RTS test plots, or fresh RTS product. All the profiles were based on USGS data. For the Baldwin data set, we also included Baldwin's CTD7 as a profile. Table 1 presents the average results for the 32 sediment samples that met modeling output criteria. CMB results using either a sealed lot dust profile or an unsealed lot profile are similar. Sealed profile inputs gave a higher average contribution than unsealed lot dust with the Baldwin sediment data set, but lower with the Van Metre sediment data set. Actual RTS profiles generated using either fresh product or USGS test plots data have modeled contributions of 2% or less. The average R^2 and χ^2 for all runs were higher than the model runs highlighted in Van Metre and Mahler (2010). Zou et al (2015) applied a Bayesian based CMB analysis of PAH concentrations in Illinois River sediments and also found the most probable RTS contribution of PAHs was likely just a few percent

Technical issues concerning the non-RTS source profiles used by Baldwin are described in detail elsewhere (O'Reilly et al 2012, 2014, 2015). Many of the profiles were derived from the work of Li et al (2003) [Li] who had combined data from at least 22 different papers dating as far back as 1976. Some of the papers Li used had compiled data from other sources. Li did not provide sufficient detail be able to recreate the underlying profiles, so it is impossible to ade□uately evaluate their validity or variability. A comparison between the traffic tunnel profile used by Baldwin and data from of one of Li's source documents, Venkataraman et al (1994), shows a poor relationship with R^2 of 0.17 to 0.38 (Figure 3), indicating the model input does not represent the stated source. We agree with Li's caveat concerning the use of published source profiles□

> [illegible]

The combined issues of variability within source types and similarity of different source types can result in the failure of receptor models, such as CMB, to accurately estimate source contributions (□ou et al 2015). While the same source profiles have been used in other papers since 2010 (Crane 2013; Baldwin et al 2016), Van Metre has presented no information that suggests any effort has been made to confirm their validity with new data. Without such validation, Baldwin's statistical comparisons do not provide support for the paper's conclusions.

In Van Metre and Mahler (2010), the authors state that they ran CMB more than 200 times but focused their discussion on just four specific model runs that were said to be in general agreement with most of the other runs. Although the American Chemical Society's □Ethical Obligations of Authors□ states that authors should make every reasonable effort to provide data and methods to other researchers, Van Metre and USGS have actively resisted all re□uests for details concerning the 200 runs. Specific □uestions as to use of negative controls and whether unsealed lot dust profiles were tested have not been answered. In an affidavit defending the withholding of this information, Van Metre admitted that the full release of their CMB results □would make it appear we overstated the contribution of that source□ and would □discredit our work□ (Van Metre 2016).

In conclusion, the data presented by Baldwin does not support the paper's conclusions. The evaluation is based on the circular logic of creating a source profile identified as representing RTS to be similar to

urban background and then using statistical measurements of that similarity as evidence of causation. As a mentor often told me, in chemistry the method defines the result. By relying on the approach and source profiles of Van Metre, Baldwin obtained the preordained and desired outcome. Our evaluation demonstrates that urban soils have sufficient PAHs to account for those measured in urban sediments and that additional validation of all potential source profiles is necessary if they are to be used to assess local contributions.

We have received support from the Pavement Coatings Technology Council. The opinions are those of the authors.

Kirk O'Reilly and Sungwoo Ahn, Exponent.

eferences

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Table 1Summary of average CMB source contributions and output criteria based on different RTS or parking lot samples. The remaining source inputs are from Model A in Van Metre and Mahler (2010). The averages are for either Baldwin or Van Metre's sediment data sets.

aldwin ediment	**ontribution**	^{2}	^{2}	**mass**
CTD6	59%	0.99	0.12	97%
CTD7	67%	0.99	0.11	98%
VM-USD	49%	0.99	0.22	96%
VM-Test Plot	0%	0.95	0.64	93%
Fresh Product	1%	0.95	0.64	93%
o RTS or dust	0%	0.95	0.64	93%
an Metre Lakes				
CTD6	46%	0.93	0.94	99%
VM-USD	63%	0.94	0.76	98%
Fresh Product	1%	0.91	1.11	97%
o RTS or dust	0%	0.94	0.71	92%

Figure 1 Fl/Py and BbF/BkF ratios of Baldwin's sediments samples, dust from RTS sealed parking lots (Van Metre et al 2008), and fresh RTS (Mahler et al 2005; Scoggins et al 2009).

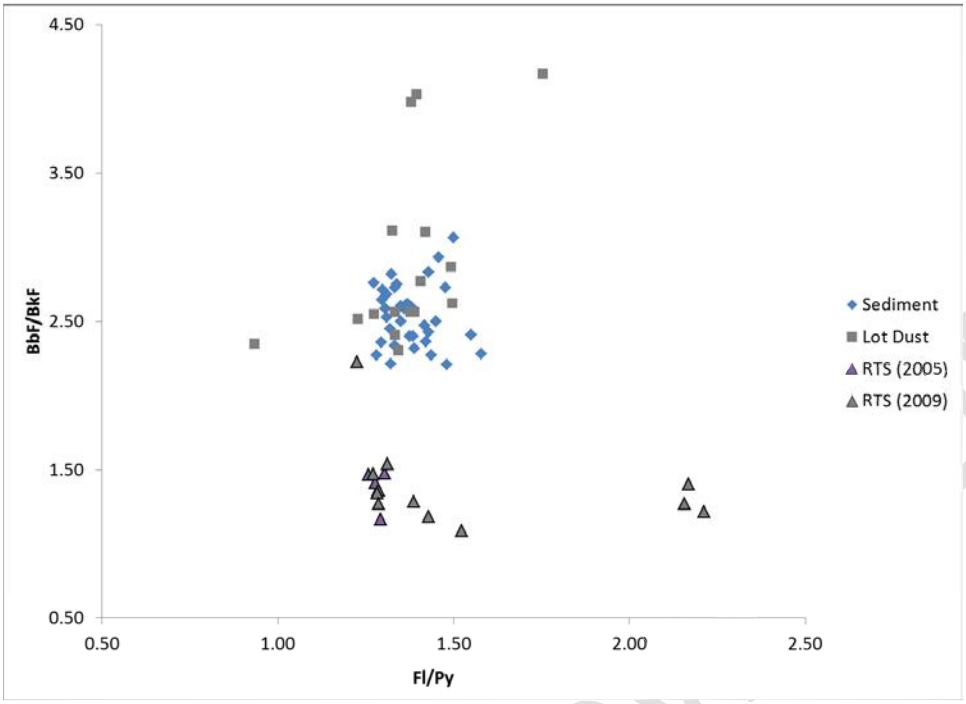

Figure 2 This PCA plots shows that while the two profiles used by Baldwin to represent RTS sealed lot dust (SLD) are similar to Baldwin's sediment samples, they do not represent the range of actual RTS profiles. The CMD sources are the Baldwin's source profiles CTD6 and CTD7. Parking lot dust data (SLD-A, SLD-B, SLS, and USD) are from Van Metre et al (2008). SLD-A samples were used by Van Metre to generate the source profiles CTD6, while SLD-B samples were not. SLS are solids scraped from sealed lots, and USD are samples from unsealed parking lots. RTS are samples of RTS products (Mahler et al 2005).

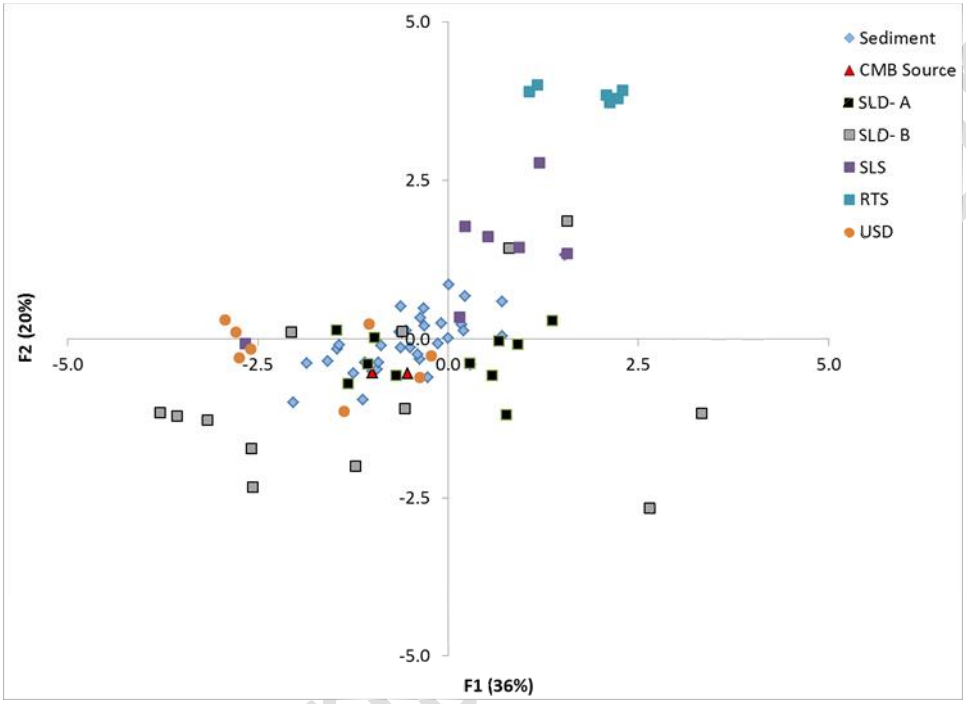

Figure 3 Comparison of the average PAH profile of Baldwin sediments with A Baldwin's RTS source profile CTD7 (0.05); B Average of Van Metre's unsealed dust samples (0.11); C Average of Van Metre's RTS scraping samples (0.12); D Average of Van Metre's fresh RTS product (0.71); E Average of Kay's soil samples (0.04); F Average of Van Metre's unsealed dust samples showing the boundaries of CMB's 40% uncertainty range. The values in parenthesis are the X^2 between the two samples.

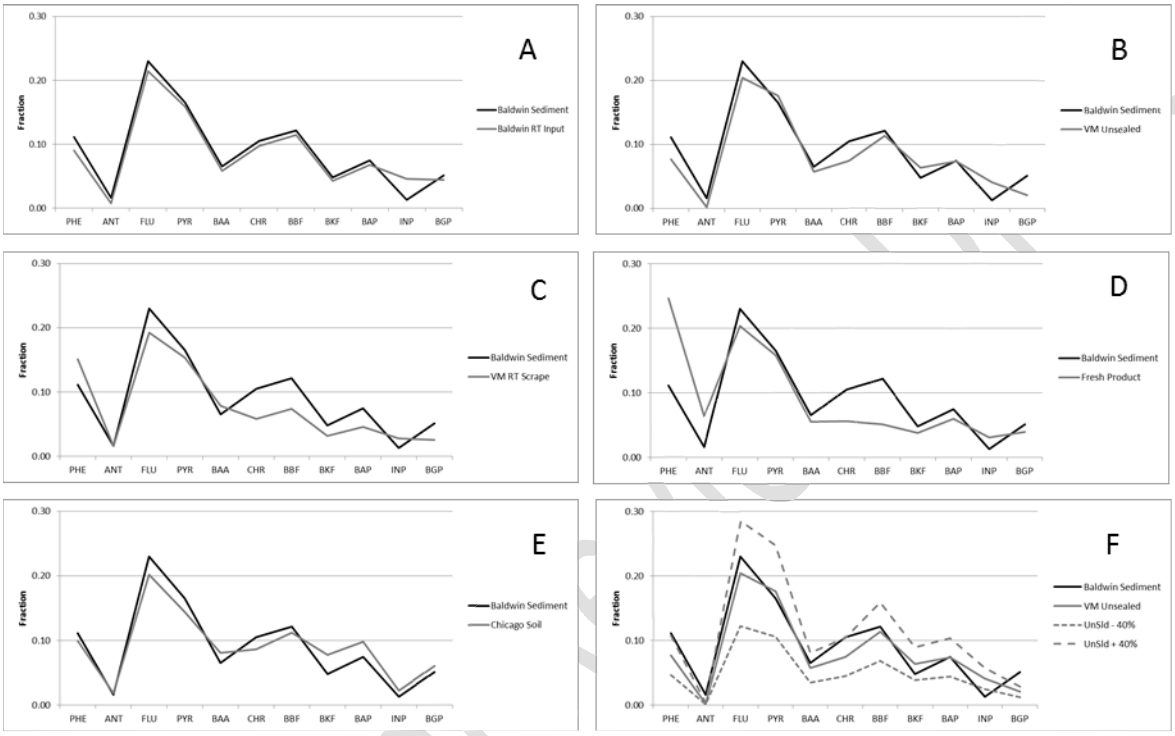

Figure 4 Baldwin PAH source profile identified as Traffic Tunnel, and average profile of traffic tunnel data from Venkataraman et al (1994). The error bars are one standard deviation.