Pavement Coatings Technology Council

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October 21, 2014

Associate Director
Office of Science Quality and Integrity
U.S. Geological Survey
108 National Center
Reston, VA 20192

Via E-Mail (InfoQual@usgs.gov) and Overnight Mail

Re: Request for Correction of Information Submitted Under U.S. Geological Survey Information Quality Guidelines

Publications: Van Metre PC, Mahler BJ 2010. Contribution of PAHs from coal-tar pavement sealcoat and other sources to 40 U.S. lakes. Sci Total Environ 409:334–344. [hereinafter, the "40 Lakes paper"]

Mahler, B. J., P. Van Metre, J. Crane, A. W. Watts, M. Scoggins, and E. S. Williams, 2012, Coal-tar-based pavement sealcoat and PAHs: Implications for the environment, human health, and stormwater management: Environmental Science & Technology, v. 46, p. 3039-3045. [hereinafter, the "Overview paper"]

Webpage titled "Coal Tar Sealant Largest Source of PAHs in Lakes" at http://water.usgs.gov/nawqa/home_maps/sealcoat.html and related Press Release http://www.usgs.gov/newsroom/article.asp?ID=2651

Dear Sir or Madam:

The Pavement Coatings Technology Council (PCTC), which represents numerous companies throughout the country that are part of the sealcoat industry, submits this request for correction of information disseminated by the U.S. Geological Survey (USGS). This request is made pursuant to the USGS Information Quality Guidelines and the U.S. Department of the Interior and the Office of Management and Budget Guidelines (67 F.R. 8452) in accordance with Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554).

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ACTION REQUESTED

PCTC requests that the USGS retract Van Metre and Mahler (2010) [1] [40 Lakes paper] because it fails to comply with the agency's quality requirement to provide unbiased, complete, and objective scientific information. The authors highlight results that appear to support their hypothesis while failing to include modeling results that are inconsistent with their desired outcome. As written, the 40 Lakes paper appears to purposely misinform the journal's peer reviewers, editors, and readers. Retraction is required not only because the model construct and conclusions presented in the paper are indefensible, but also because the authors and others[2] have used this paper to advocate for policy positions in legislative hearings, technical conferences, USGS websites, and the media.

In addition to ethical concerns, the paper has serious technical flaws discussed in detail in this Request for Correction of Information (RfC). Many of these irregularities render the 40 Lakes paper fatally flawed, and have been raised previously in PCTC's RfC submitted May 15, 2013, published papers[3,4] and commentaries.[5,6,7,8] USGS's failure to be unbiased, complete, and objective continues as the agency has failed to inform journal peer reviewers and readers of the technical controversy over the authors' modeling methods and related uncertainties while the authors continue to apply the biased approach developed in the 40 Lakes paper. An example is the recently published Van Metre and Mahler (2014)[9] [Lady Bird Lake paper]. Again the problem of advocacy arose as the authors held a press conference with a congressman to promote a product ban the day after the release of the Lady Bird Lake paper.[10] Additional flaws associated with the Lady Bird Lake paper will be addressed elsewhere.

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[1] Van Metre, P., and B. J. Mahler, 2010, Contribution of PAHs from coal–tar pavement sealcoat and other sources to 40 U.S. lakes: Science of the Total Environment, v. 409, p. 334 – 344 [hereinafter, the "40 Lakes paper"].
[2] Crane, J. L. Source apportionment and distribution of polycyclic aromatic hydrocarbons, risk considerations, and management implications for urban stormwater pond sediments in Minnesota, USA. Arch. Environ. Contam. Toxicol. 2014, 66, 176–200
[3] O'Reilly, K.; Pietari, J.; Boehm, P. A forensic assessment of coal tar sealants as a source of polycyclic aromatic hydrocarbons in urban sediments. Environ. Forensics 2012, 13, 185–196
[4] O'Reilly, K. T.; Pietari, J.; Boehm, P. D. Parsing pyrogenic polycyclic aromatic hydrocarbons: Forensic chemistry, receptor models, and source control policy. Integr. Environ. Assess. Manag. 2014, 10, 279–285 [O'Reilly *et al.*2014a]
[5] O'Reilly, K. T. Article title misstates the role of pavement sealers. Environ. Poll. 2014, 191, 260–261
[6] O'Reilly, K.; Pietari, J.; Boehm, P. Comment on "PAHs Underfoot: Contaminated Dust from Coal-Tar Sealcoated Pavement is Widespread in the U.S." Environ. Sci. Technol. 2011, 45, 3185–3186
[7] O'Reilly, K. T.; Pietari, J.; Boehm, P. D. Author's reply. Integr. Environ. Assess. Manag. 2014, 10, 325–326
[8] O'Reilly, K. T.; Pietari, J.; Boehm, P. D. Author's reply to Van Metre and Mahler (2014). Integr. Environ. Assess. Manag. 10, 489–491. [O'Reilly *et al.*2014b]
[9] Van Metre, P. C.; Mahler, B. J. PAH concentrations in lake sediment decline following ban on coal-tar-based pavement sealants in Austin, Texas. Environ. Sci. Technol. 2014a, 48, 7222¬-7228. [hereinafter, the "Lady Bird Lake paper"]
[10] Price, A. Researchers find carcinogen dropoff in Lady Bird Lake following ban. Austin Amer. Statesman 2014, June 24

PCTC requests that USGS retract Mahler *et al*. (2012)[11] [the Overview paper] because it is a wholly derivative article, relying on flawed science such as that presented in the 40 Lakes paper, described below, as well as on publications for which separate Requests for Correction have been or will be filed.

PCTC reiterates the request made in the May 15, 2013 RfC that the USGS take down the website entitled *Coal Tar Sealant Largest Source of PAHs in Lakes* at http://water.usgs.gov/nawqa/home_maps/sealcoat.html as well as remove the related press release at http://www.usgs.gov/newsroom/article.asp?ID=2651. This website summarizes the incomplete results published in Van Metre and Mahler (2010) and ignores uncertainties inherent in receptor modeling.

INFORMATION REQUIRING CORRECTION – OVERVIEW

On May 15, 2013 a RfC was submitted seeking correction of information disseminated on the USGS web site concerning the USGS claim that refined coal tar-based pavement sealers (RTS; called "Coal Tar Sealants" by the USGS) are the largest source of polycyclic aromatic compounds (PAHs) in lake sediments in the United States. [12] The 2013 RfC requested removal of the web page titled *Coal Tar Sealants Largest Source of PAHs in Lakes*, for removal of the related press release, and for revision of the USGS "all things sealcoat" web site to, at the least, include citations of refereed publications reaching conclusions contrary to those disseminated by the USGS. Specifically, the May 15, 2013 RfC addressed issues as then understood, concerning the Austin paper,[13] the 9 Lakes paper[14] and the 40 Lakes paper.

Following submission of the 2013 RfC, in partial response to the PCTC's 2011 Freedom of Information Act (FOIA) request, the USGS provided unpublished information on some but not all of the Chemical Mass Balance (CMB) model input parameters used as the basis of the 40 Lakes paper. Based on this information we have been able to recreate and better evaluate the four model runs described in the 40 Lakes paper. To date, the USGS has failed to provide the actual output files of these 4 and most of the other 200 model runs.

Information provided in the 2013 RfC identified a number of fatal flaws in the 40 Lake paper. This RfC includes descriptions of the results of additional evaluations made possible by the FOIA response and conducted since submission of the May 15, 2013 RfC. These additional evaluations of the model demonstrate that not only are the authors claims made in the 40 Lakes

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[11] Mahler, B. J., P. Van Metre, J. Crane, A. W. Watts, M. Scoggins, and E. S. Williams, 2012, Coal-tar-based pavement sealcoat and PAHs: Implications for the environment, human health, and stormwater management: Environmental Science & Technology, v. 46, p. 3039-3045

[12] The May 15, 2013 RfC is available on the USGS web site at http://www.usgs.gov/info_qual/coal_tar_sealants.html

[13] Mahler, B. J., P. Van Metre, T. J. Bashara, J. T. Wilson, and D. A. Johns, 2005, Parking Lot Sealcoat: An Unrecognized Source of Urban Polycyclic Aromatic Hydrocarbons: Environmental Science & Technology, v. 39, p. 5560 - 5566. [hereinafter, the "Austin paper"]

[14] Van Metre, P., B. Mahler, and J. Wilson, 2009, PAHs underfoot: contaminated dust from sealcoated pavements is widespread in the United States: Environ Sci Technol, v. 43, p. 20-25. [hereinafter, the "9 Lakes paper"]

paper not supported, the authors appear to have conspired to hide CMB results that were inconsistent with their claims concerning the role of RTS as a PAH source.

SUMMARY OF THE 40 LAKES PAPER (VAN METRE AND MAHLER, 2010)

The purported purpose of the 40 Lakes paper was to test the authors' hypothesis that RTS is a significant source of PAHs in urban sediments. EPA's CMB model was used to estimate the relative contribution of proposed sources to 120 sediment samples collected from 40 Lakes located across the United States. Most of the proposed source profiles were obtained from the literature. While others[15] have used some of these same source profiles for CMB source inputs, the profiles have not been validated as accurately representing appropriate sources.[16,17] According to Table 2 in the 40 Lakes paper, source profiles evaluated for RTS-derived PAHs included fresh product, scrapings from USGS-prepared RTS test plots, and dust collected from suspected RTS sealed parking lots from various US cities. Using various combinations of source profiles, the authors stated in the 40 Lakes paper that they ran over 200 CMB model variations.

Only 4 of the variations were included in the 40 Lakes paper - about 2 percent of the 200 models runs. The remaining 98 percent have not been made available even as part of the FOIA response. Most of the 40 Lakes paper focused on the results of these 4 runs. The inputs used for the 4 runs were essentially the same: one of two averaged RTS sealed parking lot dust was used to represent the "RTS source" and either 11 or 12 PAHs were used as fitting parameters.[18] The outputs of all other of the 200 runs were either not considered or combined into averages. This is inconsistent with the standard approach for presenting CMB output.[19,20] The authors' averaging approach is essentially meaningless as they ran multiple similar runs of some conditions thus skewing the averages to suggest support for their hypothesis.

Critically, Van Metre and Mahler did not present CMB results that used actual RTS source materials or their own data[21] on *unsealed* parking lot dust as source profiles. Without the output of such CMB runs, the 40 Lakes paper fails its purported purpose of hypothesis testing.

In summary, while the 40 Lakes paper claims to test a hypothesis, in reality the authors ran CMB under a number of conditions, found the combination of inputs that generates the

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[15] Li A, Jang J-K, Scheff PA. 2003. Application of EPA CMB8.2 model for source apportionment of sediment PAHs in Lake Calumet, Chicago. Environ Sci Technol 37:2958-2965
[16] O'Reilly *et al.*2012
[17] O'Reilly *et al.*2014a
[18] The runs using 12 PAHs included phenanthrene, whereas the 11 PAH runs excluded phenanthrene.
[19] Li *et al.*2003 This paper presented minimum, maximum, and average contributions for all 9 different combinations of sources, not a single average for all runs.
[20] Belis, CA, F. Karagulian , B.R. Larsen, P.K. Hopke. Critical review and meta-analysis of ambient particulate matter source apportionment using receptor models in Europe. Atmospheric Environment. 2013. 69:94-108
[21] Van Metre PC, Mahler BJ, Wilson JT, Burbank TL (2008) Collection and analysis of samples for polycyclic aromatic hydrocarbons in dust and other solids related to sealed and unsealed pavement from 10 cities across the United States, 2005–07. U S Geol Surv Data Ser; 361.

output they sought when applied to almost any urban sediment, and then packaged the methods as a supposedly unbiased and objective approach.

VAN METRE AND MAHLER (2010) FAILS TO MEET THE USGS REQUIREMENT OF OBJECTIVITY

The USGS's information quality guidelines[22] state that the agency's goal is to provide unbiased, objective scientific information upon which other entities may base judgments. OMB defines quality as the encompassing term, of which utility, objectivity, and integrity are the constituents. Objectivity focuses on whether the disseminated information is being presented in an accurate, clear, complete, and unbiased manner, and as a matter of substance, is accurate, reliable, and unbiased.[23] The agency should retract Van Metre and Mahler (2010) because it fails the agency's own requirement to be objective and unbiased. While the authors' apparently conducted an extensive modeling exercise, they present only results that support the desired outcome. There is little question that the authors strongly believe their hypothesis concerning the role of RTS. The resulting effort to confirm their bias is obvious throughout the 40 Lakes article.

Van Metre and Mahler state that the goal of the modeling exercise published as the 40 Lakes paper was to test the hypothesis that RTS is a major source of PAHs to urban lakes in the United States. But the results are not presented or discussed in a manner appropriate for hypothesis testing. Technical problems with their modeling approach will be described in more detail in following sections, but a critical ethical problem is the failure to present the information required for readers to evaluate the hypothesis for themselves. Most of the results described only 4 model runs that had very similar input conditions, one of either two averaged parking lot dust PAH profiles as the supposed RTS source and either 11 or 12 PAHs per sample. The 40 Lakes paper then highlights the ability of the model to fit these conditions while estimating an elevated RTS contribution. The authors ignore that this finding does little to test their hypothesis. Van Metre and Mahler purposely exclude from discussion modeling conditions that are inconsistent with the hypothesis.

To demonstrate the appropriate application of CMB for hypothesis testing, PCTC obtained Van Metre and Mahler's source profiles through a FOIA request. CMB was then run under the conditions of the 40 Lakes paper Model A with consistent results. We than reran CMB replacing the sealed parking lot dust "RTS source" profile of the 40 Lakes paper with Van Metre and Mahler's own data on either non-sealed parking lot dust,[24] scraping from an RTS test plot,[25] or fresh RTS.[26] A no-RTS or parking lot dust model run was also conducted as a negative control.[27]

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[22] USGS's information quality guidelines at www.usgs.gov/info_qual/ . Accessed September 23, 2014.
[23] 67 FR 8452
[24] Van Metre *et al.*2008
[25] Mahler *et al.*2005
[26] *Id.*
[27] O'Reilly, K. T.; Ahn, S.; Pietari, J.; Boehm, P. D. Use of receptor models to evaluate sources of PAHs in sediments. Polycyclic Aromatic Compounds 2014c, DOI:10.1080/10406638.2014.907817.

As summarized in Tables 1 and 2 of this RfC, below, the results are inconsistent with the Van Metre-Mahler hypothesis. Output from each of the model runs is included here as Exhibit A. The modeled contribution of *unsealed* parking lot dust was similar to or greater than that of RTS sealed parking lot dust. This means modeled results in which sealed parking lot dust was used as an RTS source profile provides no specific support for the hypothesis. While Van Metre and Mahler could counter by claiming the results could be interpreted to mean that the unsealed lots might have been impacted by RTS sealant, this is a circular argument which uses the hypothesis to support the hypothesis. The CMB results which indicated that known RTS materials are not sources was another critical finding that should have be included in the paper. The excellent fit between measured and modeled concentrations in the negative control further weakens the author's argument.

Table 1: Minimum, maximum, average, and median CMB modeled contributions (percent) of parking lot dust or RTS.

	Sealed Lot Dust	**Unsealed Lot Dust**	**RTS Test Plot**	**Fresh RTS**	**No RTS or Dust**
# of samples with RTS or dust contribution >0%	107	110	15	6	--
% RTS contribution					
Min	0.0	0.0	0.0	0.0	--
Max	95	100	33	23	--
Average	46	60	1.5	0.6	--
Median	49	65	0.0	0.0	--
Average Model Parameters					
R^2	0.93	0.94	0.91	0.91	0.91
X^2	0.94	0.76	1.10	1.11	1.08
%Mass	98.9	97.6	96.7	96.7	97.1

Van Metre and Mahler's failure to include unsealed lot dust, known RTS sources, and a negative control in a paper with the stated goal of hypothesis testing borders on scientific malpractice. The information in Table 2 of the 40 Lakes paper suggest that at least modeling runs with fresh RTS and RTS test plot profiles were conducted and the output met acceptability criteria, but results indicating the lack of RTS contribution were withheld by the authors.

Table 2- The average PAH contribution (percent) of five source types to 120 sediment samples as modeled by CMB. * Indicates 40 Lakes paper input parameters held constant.

RTS or Dust Source Profile	RTS/Dust	Vehicle*	Wood*	Coal*	Oil*
Sealed lot dust*	46	36	6.3	9.4	2.9
Unsealed lot dust	60	25	11	3.5	0.4
RTS Test Plot	1.5	58	29	9.3	1.6
Fresh RTS	0.6	57	30	11	1.7
None	-	60	31	8.0	0.0

There is no valid technical reason for focusing the results and discussion on just two percent of the model outputs that happen to support the authors' own hypothesis. There are a number of ways to summarize the various outputs of various model runs (Figure 1). In this day of supplementary information files associated with published articles, more information on the results of remaining 200 model runs should have been provided.

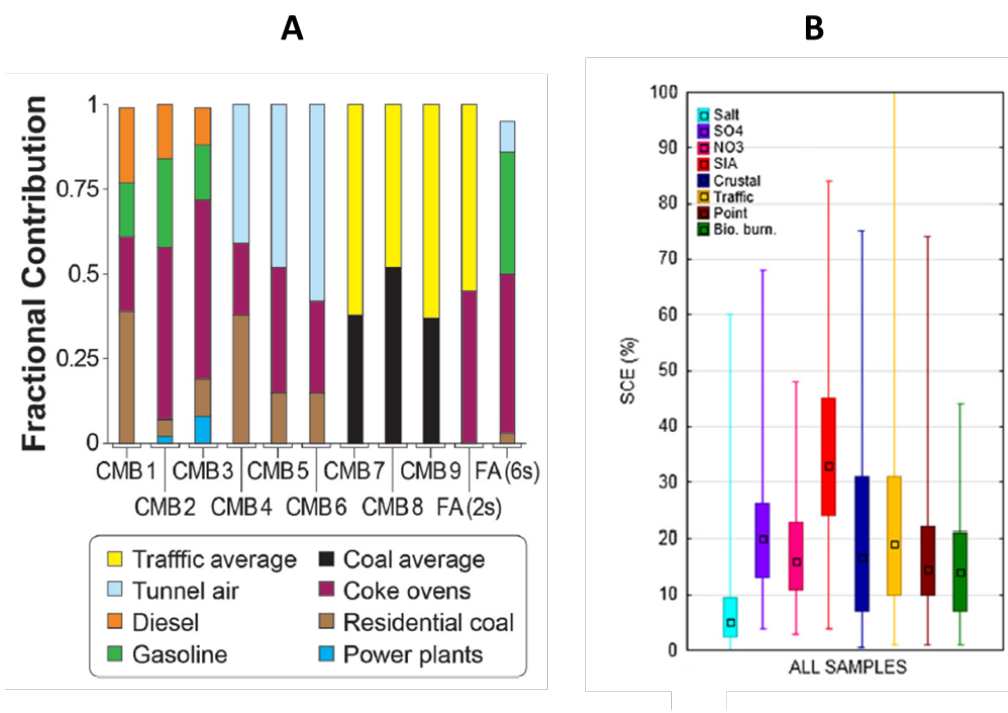

Figure 1: Examples of methods for presenting the results of multiple runs of source receptor models such as CMB. A is from O'Reilly *et al.* 2014a and B is from Belis *et al.* 2013.

In an attempt to defend including only results that appeared to support their hypothesis, Van Metre and Mahler recently wrote that "*it is common practice in modeling to try many different model runs to test various hypotheses and to determine the best-fitting model, but not all model runs can or need to be discussed in detail in a publication.*"[28] While we disagree that this is even generally true, it is especially not true in this case. It was not Van Metre and Mahler's stated goal to merely identify the best fitting model, and that is clearly not how they are explaining the results to policy makers and the public. From the abstract through the conclusion, the authors imply that source contributions estimated with their favorite model runs is fact with no uncertainty.

The authors' suppression of findings inconsistent with their hypothesis violates the ethical standards of scientific journals. As stated by the American Chemical Society author's guidelines[29] "*An author's central obligation is to present an accurate and complete account of the research performed, absolutely avoiding deception, including the data collected or used, as well as an objective discussion of the significance of the research*."

The problem is compounded as the authors have continued to withhold all but a couple of the CMB output files from their study. It is possible that some of these files are hidden within the FOIA response. If so, they have not yet been identified. The failure of the USGS to share this information without the need and expense of a FOIA request violates both the OMB quality standard of transparency and scientific ethical standards. Elsevier, publisher of the 40 Lakes paper, states that authors should be prepared to provide public access to relevant information [30] while ACS says authors should make every reasonable effort to provide relevant data to other researchers.

The USGS's lack of objectivity concerning the 40 Lakes paper continued in its response to PCTC's May 15, 2013 RfC. In defending Van Meter and Mahler's application of CMB, the RfC response claimed that the results were confirmed by independent researchers in Crane *et al*. 2010[31] and Crane 2014.[32] Crane *et al*. 2010 is a report built primarily on the opinions of Van Metre and Mahler.[33] Many of the figures are taken directly from USGS publications. To claim that this serves as independent confirmation is disingenuous. Crane 2014 is one example of why

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[28] Van Metre, P; B Mahler. In Response to O'Reilly et al. (2014). Integr. Environ. Assess. Manag., 2014b. 10:485–488

[29] American Chemical Society author's guidelines at www.acs.org. Accessed on September 22, 2014.

[30] Guide for authors at www.elsevier.com. Accessed on September 22, 2014.

[31] Crane J, K Grosenheider, CB Wilson. 2010. Contamination of Stormwater Pond Sediments by Polycyclic Aromatic Hydrocarbons (PAHs) in Minnesota. Minnesota Pollution Control Agency (MPCA), Saint Paul, MN. 133pg

[32] Crane 2014

[33] Indeed, the Crane et al. 2010 (fn 31) report seems to have been written to replace a report suppressed by the MPCA which had retained a consultant to evaluate sources of PAHs in sediments. The suppressed report, obtained via a FOIA request to MPCA, discounted the USGS Austin paper and, in the words of an MPCA staffer, ` [an MPCA staff scientist] does not think it really makes a case for coal tar-based sealants as being the source of PAHs in storm water sediments." Email included in Exhibit B.

it is important that Van Metre and Mahler 2010 be retracted. The 2010 40 Lakes paper searched for and found a combination of model conditions that could be used to suggest RTS as a source and Dr. Crane applied essentially the same approach to a new data set. Like Van Metre and Mahler, she used parking lot dust as the supposed RTS source profile but did not show CMB results that used non-sealed parking lot dust or known RTS source profiles.[34] Obtaining the same result with the same method is not confirmation that the author's interpretation is correct. Since PCTC knows that the work of Crane, Van Metre, and Mahler, is not independent, it appears that the authors of the RfC response were trying to mislead either USGS management or the public.

The failure to meet the objectivity standard cannot now be rectified by a technical argument of why the withheld information should not have changed the peer reviewers' or readers' interpretation of the results. Retraction is the only appropriate response.

Lake Ballinger- A Case Study in Failed Objectivity

Van Metre and Mahler's changing description of sources of PAHs in the sediments of Lake Ballinger (Mountlake Terrace, WA) demonstrates the lack of objectivity concerning their hypothesis. Lake Ballinger illustrates exactly how the problems derived from the 40 Lakes study have real world consequences as its publication lead to the local state representative successfully enacting a statewide RTS ban in Washington. At legislative hearings on February 8, 2011, Dr. Van Metre spoke forcefully about how his series of papers indicated that the ban was not only appropriate, but necessary. While speaking to a lay audience, he made no effort to explain the inherent uncertainties of CMB modeling but spoke as if the claims made in the 40 Lakes paper were undisputable facts. He also failed to mention that his description of the sources of PAHs in Lake Ballinger continue to change. As described in O'Reilly *et al*. 2014b:

> *Shifting claims between publications further weakens the arguments presented by Van Metre and Mahler. Van Metre et al. (2000)[35] initially identified sources associated with automobile usages as primary contributors of PAHs in Lake Ballinger, near Seattle, Washington. Ballinger was used as an example of a low-RTS Western lake[36] but a year later, Van Metre and Mahler (2010) claimed that RTS was a significant source to Lake Ballinger. Other work by Van Metre[37,38] suggests that a smelter is responsible for some contaminants found in Lake Ballinger's sediment. While these papers focused on metals, not PAHs, another study indicated a link between metals and PAHs in sediments affected*

[34] O'Reilly *et al.*2014c.
[35] Van Metre PC, Mahler BJ, Furlong ET. 2000. Urban sprawl leaves its PAH signature. Environ Sci Technol 34:4064–4070.
[36] Van Metre et al. 2009
[37] Grey JE, Pribil MJ, Van Metre PC, Borrok DM, Thapalia A. 2013. Identification of contamination in a lake sediment core using Hg and Pb isotopic compositions, Lake Ballinger, Washington, USA. Appl Geochem 29:1–12
[38] Thapalia A, Borrok DM, Van Metre PC, Musgrove M, Landa ER. 2010. Zn and Cu isotopes as tracers of anthropogenic contamination in a sediment core from an urban lake. Environ Sci Technol 44:1544–1550

by the same smelter.[39] *These inconsistencies were not brought to light, even as claims about Lake Ballinger became the catalyst for enactment of a statewide ban of RTS.*[40]

VAN METRE AND MAHLER (2010) FAILS TO MEET THE USGS REQUIREMENT OF RELIABILITY

Reliability - evaluating the inherent quality of a test report or publication relating to preferably standardized methodology and the way the experimental procedure and results are described.[41]

The inherent quality of information derived from a modeling exercise depends on having a model that has been demonstrated to be reliable for the given purpose as well as on using the correct inputs. As raised in a number of critiques[42,43] neither has been demonstrated in either Van Metre and Mahler 2010 or their subsequent work. In this section issues concerning model and source input suitability are discussed greater detail.

In defense of the 40 Lakes paper, the USGS has stated that the methods and inputs are based on published sources[44] even though the OMB's quality guidelines indicate that having been deemed sufficient by peer-review procedures does not necessarily imply acceptable quality. Quoting the guidelines:

<u>Is Journal Peer Review Always Sufficient?</u> Some comments argued that journal peer review should be adequate to demonstrate quality, even for influential information that can be expected to have major effects on public policy. OMB believes that this position overstates the effectiveness of journal peer review as a quality-control mechanism. Although journal peer review is clearly valuable, there are cases where flawed science has been published in respected journals.[45]

For important information on the limitations of using receptor models to assess sources of PAHs in the environment, we suggest review of Galarneau 2008.[46] While this suggestion has been made to Van Metre and Mahler since at least 2012,[47] they have refused to cite it in subsequent work that uses CMB.[48]

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[39] Louchouarn P, Kuo L, Brandenberger JM, Marcantonio F, Garland C, Gill GA, Cullinan V. 2012. Pyrogenic inputs of anthropogenic Pb and Hg to sediments of the Hood Canal, Washington, in the 20th century: Source evidence from stable Pb isotopes and PAH signatures. Environ Sci Technol 46:5772−5781.
[40] Van Metre and Mahler 2010
[41] Klimisch HJ, Andreae E and Tillmann U. 1997. A systematic approach for evaluating the quality of experimental and ecotoxicological data. Reg.Tox. and Pharm. 25:1-5
[42] O'Reilly *et al.*2012
[43] O'Reilly *et al.*2014a
[44] USGS response to two IQA requests for information correction. Received by PCTC on March 19, 2014. [USGS 2013 Response]
[45] 67 FR 8452 at 8455
[46] Galarneau E. 2008. Source specificity and atmospheric processing of airborne PAHs: Implications for source apportionment. Atmos Environ 42:8139-8149.
[47] O'Reilly *et al.*2012
[48] Van Metre and Mahler 2014.

The Validity of CMB Depends on how Closely the Inputs Meet the Strict Assumptions Underlying the Model.

The following summarizes the assumptions underlying CMB[49] and why the approaches used in the 40 Lakes paper fail to address them. Some points are discussed in greater detail in subsequent sections.

I. <u>The composition of each source emission profile is consistent over the period model.</u>

The USGS application of the CMB model inadequately addresses this assumption for the following reasons.

a. No site-specific emission data was used.
b. The source profiles used were averages of published data. There was no evaluation of how representative they were of actual sources.
c. The variability among the literature source profiles was not taken into consideration.
d. The composition of the emission sources used are known not be consistent and change to due to fuel, temperature, oxygen availability and other combustion process conditions.[50]

II. <u>Chemical species do not react with each other or the environment.</u>

The USGS application of the CMB model inadequately addresses this assumption for the following reasons.

a. PAH react quickly in the atmosphere so emission chemistry does not represent depositional chemistry.[51,52]
b. Sealers weather, resulting in changes in their PAH profile.[53]
c. So using unreacted emissions and weathered sealed parking lot dust as source profiles results in a greater chance of identifying the parking lot dust as a source of the weathered PAHs found in sediments.

III. <u>All sources that contribute significantly to the receptors have been identified and their profile is known.</u>

The USGS application of the CMB model inadequately addresses this assumption for the following reasons.

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[49] Coulter, C.T. 2004. EPA-CMB 8.2 users' manual. EPA 452/R-04-011. U.S. Environmental Protection Agency, Washington DC.
[50] Lima, A.L.C., J.W. Farrington, and C.M. Reddy. 2005. Combustion-derived polycyclic aromatic hydrocarbons in the environment—A review. Environ. Forensics. 6: 109-131
[51] *Id.*
[52] Galarneau 2008
[53] O'Reilly *et al.*2012

a. A limited set of sources was considered. Only five sources were used in the four model runs discussed. Evaluation of site-specific sources was not conducted.
b. As noted there is great uncertainty in whether the source profiles used as input represent actual sources.

IV. <u>The composition of each source is linearly independent or other sources.</u>

The USGS application of the CMB model inadequately addresses this assumption for the following reasons.

a. The results presented indicate a positive relationship between the mass sourced by sealers and the mass sourced by other sources (R^2=0.63). Samples with more sealer also had more other sources.
b. This is the opposite of the result expected if sealers were actually a source.

V. <u>Measurement uncertainties are random, uncorrelated, and normally distributed.</u>

The USGS application of the CMB model inadequately addresses this assumption for the following reasons.

a. This assumption could not be met with most of the source data so a generic uncertainty factor of 40% was applied.[54]
b. This value was based typical analytical precision and ignores the variability in the chemical profiles of potential sources.
c. Profiles based on a limited set of published data are not expected to be random, uncorrelated, or normally distributed.

The Non-RTS Source Profiles used in the 40 Lakes Paper are Mathematical Constructs Based on the Geometric Mean of Averaged Values of PAH Ratios taken from 37 Articles. The Similarity of these Constructs to Real World Sources has Not been Demonstrated.

Except for the RTS profile, all source profiles used in the four CMB model runs detailed in the 40 Lakes paper were obtained from the literature. The main source cited, Li *et al.* 2003, also did not measure any actual sources but created profiles based on manipulation of published data from 37 papers. Much of the data that Li used were not actual sample results, but averages of other data. As noted in the underlying papers cited by Li, the coefficients of variation (CV) or relative standard deviations (SD) of these initial data were high as indicated by a CV>100% or SD>mean. Li did not directly apply the source profiles, but generated geometric means of the ratio between each PAH and benzo(e)pyrene. These ratios were then combined as a PAH profile. In some cases, a partitioning factor was applied to estimate particle phase concentrations. The number of samples used to generate this average of an average differed between the individual PAHs potentially further skewing the generated profile. The resulting relative standard deviations were so high that Li's initial CMB runs resulted in "inestimable" source contributions

[54] Li *et al.*2003

for many sediment samples. To resolve this problem, first Li et al. and then Van Metre and Mahler arbitrarily reduced the uncertainty factor used in CMB.

The problem with using averages of various sources, or as in this case the averages of averages, is the result may look nothing like the actual sources. This is illustrated in Figure 3.

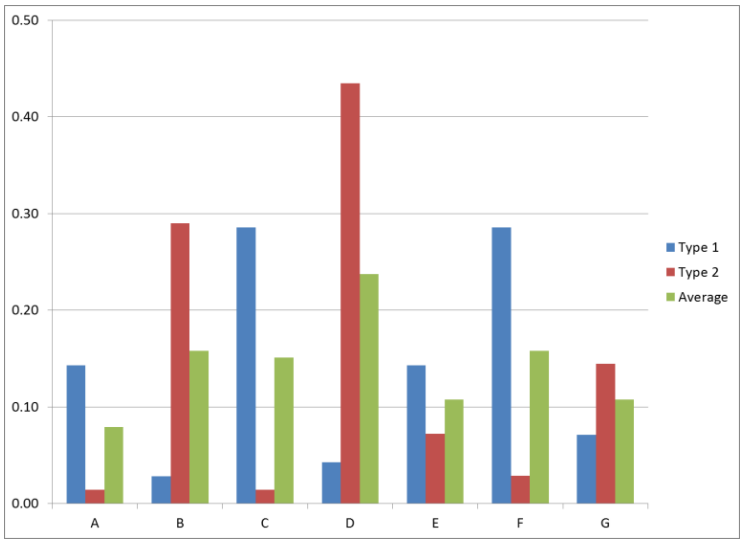

Figure 3: An example of how averaging two different source profiles results in a profile that is not similar to either one.

Another problem with the Li data set is that some of the samples were not collected from the environment, but from within emissions pipes of industrial facilities.[55] Given the reactivity of PAHs, especially under high temperature conditions (such as found in industrial emission pipes) and when exposed to oxygen and photodegradation in the atmosphere, significant changes in PAH profiles would be expected between pre-emission and when associated particles reach sediment. It is not clear whether Van Metre and Mahler did not read or did not understand the literature underlying Li's work, but in the 40 Lakes paper it is suggested that the source profiles represent non-reactive atmospheric deposition instead of emission sources that would be expected to react.

No one has conducted an evaluation of the relevance of these calculated profiles to actual sources within the air and watersheds of the lakes studied. The fact that others have used them for similar purposes is an insufficient technical justification. Critical differences between papers such as Li *et al*. (2003) and Van Metre and Mahler (2010) are that the former evaluated broad source categories without focused interested on the result of any one source type and they

[55] Yang HH, Lai SO, Hsieh LT, Hsueh HJ, Chi T. 2002. Profiles of PAH emission from steel and iron industries. Chemosphere 48:1061–1074.

presented the full range of modeling results rather than only the preferred model result. Without information on the relevancy of the model inputs, CMB results are not reliable.

Principal Component Analysis (PCA) Results indicate that the Sources used in CMB do not Properly Represent the Actual Sources of PAHs in the Sediments Studied.

PCA is a multivariate approach for evaluating potential sources. When sources and their mixtures are evaluated together, the sources typically appear as end members on a PCA plot, and the mixtures should plot within the area bounded by the sources.[56,57] To evaluate the CMB input and outputs, PCA[58] was run on the 40 Lakes data simultaneously with the proposed source inputs used in Van Metre and Mahler's Model A. Unweathered RTS was also included. As shown in Figure 4, few of the sediment samples were within the area bounded by the proposed sources. This demonstrates that the model inputs used by Van Metre and Mahler do not accurately represent the sources the sediments studies.

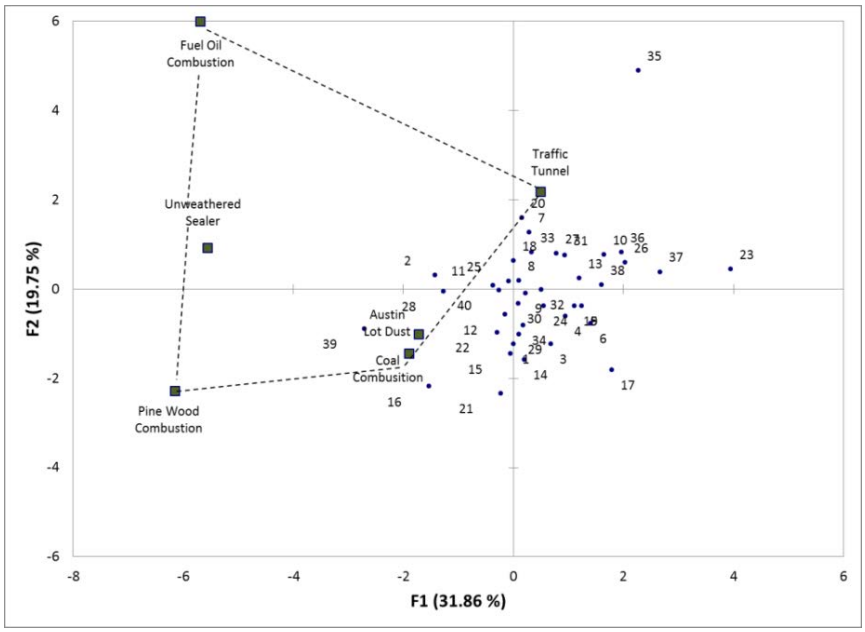

Figure 4: PCA of measured sediment profiles and proposed sources. The presence of most sediment samples outside the area bounded by the source profiles indicated that the sources used were not appropriate for CMB modeling.

[56] Johnson GW, Ehrlich R, Full W. 2004. Principal components analysis and receptor models in environmental forensics. In: Murphy BL, Morrison RD, editors. Introduction to environmental forensics. Burlington (MA): Elsevier Academic Press. 461 p
[57] Pasadakis N, E Gidarakos, G Kanellopoulou, N Spanoudakis. Identifying Sources of Oil Spills in a Refinery by Gas Chromatography and Chemometrics: A Case Study. Environmental Forensics, 2008, 9:33-39.
[58] PCA function in XLSTAT v.2013.4

The Issue of Source Collinearity was not Adequately Addressed.

One of the key assumptions of the CMB model is that source profiles are linearly independent of each other.[59] Non-independence or collinearity can be an issue with pyrogenic PAHs because of the similarity of source profiles.[60] The degree of collinearity depends on the number of source categories, the abundance and variability of fitting species, and the relative contribution of each to the source. As conditions vary from sample to sample, it is not possible to state that two or more profiles are overly collinear prior to applying them to a specific sample.

Determining whether collinearity among source profiles impacts model results is an important step in model validation.[61] CMB output files contain two performance factors that indicate the influence of collinearity. The first is the indicator of whether a source contribution is "estimable." While the model will estimate a source contribution even if a source is determined to be inestimable, it flags each source as either estimable or inestimable. A YES (estimable) indicates that the source contribution estimate combination meets the uncertainty criteria.[62] Inestimable sources are caused by excessive similarity, which is termed collinearity, among the source profiles. The standard errors associated with the estimated contribution of one or more inestimable sources are usually too large to allow an adequate separation of these source contributions to be made. As a means of dealing with inestimable sources, the model suggests estimable linear combinations of inestimable sources. While the combined source may result in a fit between sources and samples, it does not allow differentiation among the contribution estimates of the sources contained in the linear combination.

A second source estimate validation indicator is the Tstat, or ratio of the estimated source contribution to its standard error. A Tstat of greater than two is indicative of a contributing source. A Tstat of less than two suggests the source contribution is lower than the detection limit of the CMB method given the uncertainties associated with the source profile.

A summary of the collinearity indicators from Van Metre and Mahler's Model A is shown in Table 3, below. The RTS profile was not identified as an estimable source for any of the 120 sediment samples. While four or five source profiles were provided, no more than two sources were estimable for any of the sediment samples and a majority had no estimable sources. The RTS source profile used in the 40 Lakes paper met the Tstat criteria >2.0 for about a third of the samples, and the vehicle exhaust profile met the criteria with the greatest number of sediments samples. To broaden this evaluation, a summary of the collinearity indicators for three other CMB runs discussed in the 40 Lakes paper are shown in Table 3. The maximum number of samples with RTS as an estimable source was 12. The number of estimable sources identified is

[59] Coulter 2004
[60] O'Reilly et al. 2012
[61] Watson, JG. 2004. Protocol for Applying and Validating the CMB Model for PM2.5 and VOC. EPA-451/R-04-001. U.S. Environmental Protection Agency, Washington, DC
[62] Coulter 2004

consistent with the results presented in Table 2. Van Metre and Mahler's RTS source profile met the Tstat criteria >2.0 for between 44 to 73% of the sediment samples.

CMB's developer admits there are not hard rules concerning how collinearity indicators should be interpreted.[63] But the limited number of estimable sources and the few sources meeting the Tstat criteria indicate that the inputs used in the USGS assessment challenge CMB's key assumption that source profiles are linearly independent of each other. Such a finding is not surprising as the chemical similarity of different PAH sources has been identified as an issue which can limit the application of receptor models such as CMB.[64] The problem can be compounded in sediments as weathering that occurs between emission and deposition results in a residual profile of the more stable PAHs.[65] Without additional consideration of the influence of source collinearity, the results presented in Van Metre and Mahler (2010) are insufficient to support a hypothesis concerning the role of RTS as a PAH source in urban systems.

The Potential Contribution of Coal Tar from Manufactured Gas Plants (MGPs) was Not Considered.

Although MGPs have long been known to be an important source of pyrogenic PAHs in the environment[66] they have been ignored by Van Metre and Mahler in the 40 Lakes paper and in the body of work on the topic of RTS. MGP facilities were typically placed along water bodies and decades of studies have demonstrated MGPs as known sources of sediment contamination. Also, the tars from MGPs were sometimes incorporated into road base, thus spreading the material throughout a region[67,68] and potentially serving as source of sediment PAHs.[69] Failing to discuss this source is baffling as e-mails obtained in the FOIA response suggest the USGS authors were in communication with at least one researcher investigating this potential source.[70]

Review of EPA's list of MGP sites indicates that many of the cities the USGS have been studying also had gas plant operations.[71] For example, Mahler *et al*. 2005 (the Austin paper) focused on RTS compared parking lot wash off with suspended solids collected in Austin and Forth Worth, TX but failed to mention that both cities had MGPs. PAH source profiles

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[63] Coulter 2004
[64] Galarneau 2008
[65] O'Reilly et al. 2012
[66] Costa, H. J.; Sauer, T. C. Forensic approaches and consideration in identifying PAH background. Environ. Forensics. 2005, 6, 9–16
[67] Hubbard P, Draper CN. 1911. Naphthalene in road tar. Circular No. 96. Department of Agriculture, Office of Public Roads, Washington, DC.
[68] Reinke G, Glidden S. 2007. Case study of worker exposure to coal tar containing paving materials on a routine paving project in Iowa. J Occup Environ Hyg 4(S1):228–232.
[69] Ahrens, M.J. and C.J. Depree. 2010. A source mixing model to apportion PAHs from coal tar and asphalt binders in street pavement and urban aquatic sediments. Chemosphere 81:1526-1535.
[70] *Id*.
[71] EPA. 1985. Survey of town gas and by-product production and locations in the United States (1880–1950). EPA/600/7-85/004. U.S. Environmental Protection Agency, Washington, DC

associated with MGP waste were not included in Van Metre and Mahler's CMB source evaluations.

Table 3: Number of estimable sources ("Yes" indicates estimable, "No" inestimable) and Tstat results for Van Metre and Mahler's Model A. The results suggest collinearity among source profiles was not adequately addressed.

Van Metre Model A

Number of samples where source is estimable

	Yes	No
RTS	0	107
Wood	1	64
Coal	13	43
Vehicles	1	107
Fuel oil	36	4

Estimable sources per sample (n=120)

Max	2
0	71
1	47
2	2

Percent of 120 samples Tstat >2.0

	Yes	No
RTS	38%	51%
Wood	2%	52%
Coal	4%	43%
Vehicles	28%	63%
Fuel oil	0%	33%

THE USGS DID NOT RESOLVE CONCERNS ABOUT THE 40 LAKE PAPER RAISED IN PCTC'S 2013 RFC

Many of the concerns about the quality, objectivity and reliability of the 40 Lakes paper were raised in PCTC's May 15, 2013 RfC. The discussion below outlines the USGS responses[72] and how the responses failed to address PCTC's concerns. Because it focuses on the comments made in the USGS response, issues addressed earlier in this documents are repeated.

[72] USGS 2013 Reponse.

USGS Response Page 5: The USGS application of the CMB model was thoroughly documented in a peer reviewed journal.

> The results were not thoroughly documented as results of only 4 of over 200 model runs were discussed. Stating that "*These four models are in general agreement with the vast majority of the 200 models tested in terms of the relative importance of the five major source categories*" is insufficient to allow a reader to put the highlighted results in context with the entire study.
>
> The 40 Lakes paper fails the USGS's objectivity standard because only results that supported the author's hypothesis were present. Results inconsistent with the hypothesis were withheld.

USGS Response Page 6: The peer reviewers and journal editor concluded the Van Meter and Mahler was technically sound.

> According to OMB guidance, peer review is not sufficient to determine quality. The peer review process reviews material at a high level. Van Metre and Mahler write in a way that makes it seem as though the results support their claims. It often takes repeated reading to deconvolute the underlying methods.
>
> Peer reviewers typically assume that an author's interpretation of the literature is accurate. The USGS authors rely heavily on the methods of Li *et al*. (2003), but unlike Li they fail to show the sensitivity of model output to the specific source inputs[73,74] Figure 1, above, shows the range of results obtained by Li's team. Van Metre and Mahler compounded the problem by only presenting the results consistent with the desired outcome.
>
> Peer reviews typically assume that authors provide all the results required to independently evaluate the claims made.
>
> While studies on the use of atmospheric receptor models, such as CMB, to evaluate sediment sources have been published, the validity of the approach for characterizing urban background has not been confirmed. Other authors have applied the method for a single watershed using site specific sources. In contrast, Van Metre and Mahler applied the same sources to 40 lakes from across the country without consideration of whether the sources were consistent or applicable in different geographic regions or climates. Li et al. 2003 selected the proposed sources because of known industrial sources within the watershed being studied, whereas Van Metre and Mahler selected sources only because data were available.

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[73] Li *et al.*2003
[74] Bzdusek PA, Christensen ER., Li A, Zou Q-M. 2004. Source apportionment of sediment PAHs in Lake Calumet, Chicago: Application of factor analysis with nonnegative constraints. Environ Sci Technol 38:97-103

USGS Response Page 5-6: The CMB modeling builds on previous studies such as Yang *et al*, (2010).

Van Metre and Mahler co-authored Yang *et al*. 2010.[75] That article again demonstrates their lack of objectivity when presenting experimental data.

The results of Yang *et al*. (2010) do not support Van Metre and Mahler's claim that RTS is an important source of PAHs. The measured concentration of PAH in sediments was independent of the amount of RTS. Yang studied three sediment samples, one of which appeared to contain RTS and two that did not. According Figure 1 and Table S10 (included below) of Yang et al. (2010), the surface and subsurface sediments have about the same PAH concentrations, but the abstract claims the PAH contribution of sealers in one of the samples is "84% in surficial lake sediment" but the authors state "coal-tar pitch either was not detected or was detected as a very low part of total sample mass" in the other samples. The most important finding, and one that was ignored in the discussion, is that all three had similar PAH concentration of between 9.5 and 15 mg/kg.

Table S10. Comparison of estimated total PAHs with measured total PAHs. RSD, residential street dust; SPD, sealed parking lot dust; UPD, unsealed parking lot dust; RS, residential area soil; CS, commercial area soil; IBS, influent streambed sediment; LS, lake sediment at three depths (in cm).

Total PAHs (mg/kg)	RSD	SPD	UPD	RS	CS	IBS	LS 0-5	LS 10-15	LS 25-30
Estimate no. 1[a]	65±7	2,000±580	350±90	29±3	270±72	110±22	270±80	23±5	61±19
Estimate no. 2[b]	5[c]	529±179	81±29	5[c]	65±21	19±5	71±22	11±1	20±5
Measured Total PAHs (mg/kg)	0.84±0.10	1,330±160	44±5.2	0.72±0.09	16±2.0	15±1.8	9.5±1.1	11±1.3	15±1.8

[a] Calculated with literature values of PAH concentrations in coal, coke, char/charcoal, and soot, and measured values in recent OM, coal-tar pitch, and asphalt, as identified in Table S4.
[b] Calculated with literature values of PAH concentrations in all CMs except recent OM, as identified in Table S4.
[c] Standard deviation is below 0.5.

Like the 40 Lakes paper, Yang *et al*. 2010 spins the interpretation of the results to support the "RTS as source hypothesis." The section entitled "Correlations between PAHs and CMs" highlights what the authors call a positive correlation between measured PAH concentration and those based on their hypothesis even though an R^2 of only 0.52 of a log / log line indicates no real relationship. They go on to eliminate samples until they can claim an R^2 of 0.96.

While much of Yang focuses on a model the results of which, according to the authors, support their hypothesis, a plot of their results indicate no such relationship (Figure 5).

[75] Yang Y, Van Metre PC, Mahler BJ, Wilson JT, Ligouis B, Razzaque M, Schaeffer C, Werth C. 2010. The influence of coal-tar sealcoat and other carbonaceous materials on polycyclic aromatic hydrocarbon loading in an urban watershed. Environ Sci Technol 44:1217–1233

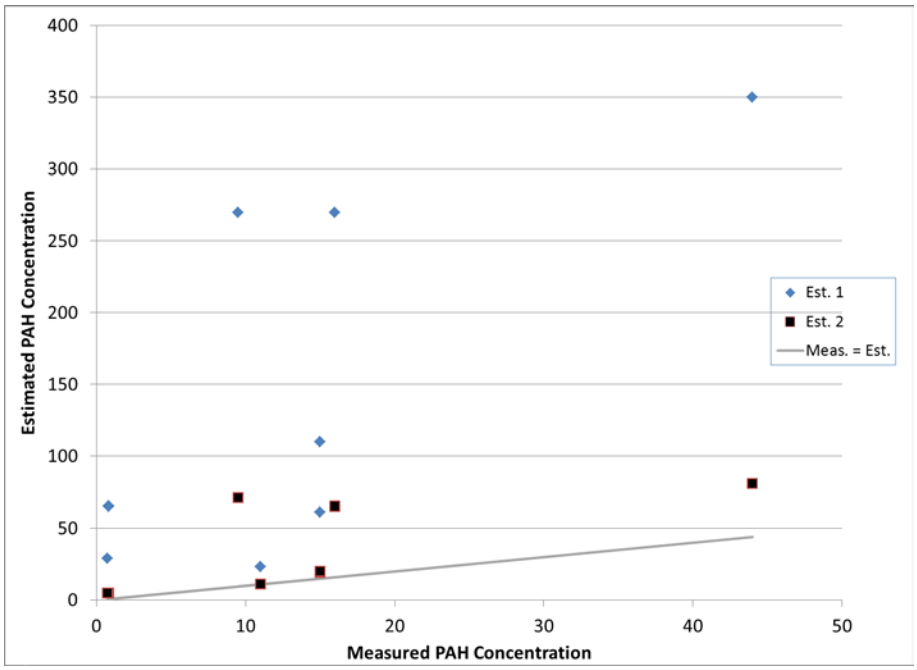

Figure 5: Measured versus estimated PAH concentration. The estimates were derived using Yang's RTS source model. Data from Table S10 of Yang *et al*. 2010.

USGS Response Page 6: These finding confirm the anecdotal evidence that asphalt based sealers are used in the west while coal tar based sealer are used in the central and eastern US.

Van Metre *et al*. (2009) included an uncited statement that RTS is the primary sealer used in the eastern US, while petroleum based sealers are more common in the west. In that paper and since that time, any observation that suggests higher PAH concentration in eastern sediments is used as supporting evidence for the role of RTS. For example, a mention of this self-cited "fact" was made in the abstract of the 40 Lakes paper.

The continued quoting of their own anecdote highlights the intellectual dishonesty of the USGS's entire body of sealer research. The industrial history and power generation system of the eastern and western US are vastly different. The central and eastern US has long been a coal driven economy whereas oil and gas power the west. To ignore such basic facts demonstrates that the goal of Mahler and Van Metre is to promote their hypothesis, not to truly understand sources of PAHs in sediments.

The use of "confirm" in the sentence suggests that the authors do not understand the concept of either evidence or proof. While it is not surprising that there are higher PAH concentrations in eastern systems, it in no ways confirms anything about either the use or contributions of RTS.

USGS Response Page 6: Other independent researchers have determined that sealer is a major cause of PAHs in Minnesota storm water ponds (Crane) and seal-coated parking lots (Watts et al). Several independent research groups have reached similar conclusions.

To claim that the work of Crane[76] and Watts[77] is independent of the work of Van Metre and Mahler is dishonest. The four of them have coauthored papers,[78] worked together to organize conference sessions focused on RTS, [79] and Crane's use of CMB is based on and almost identical to that used by the USGS. As it is known to PCTC that the work of these researchers is not independent, one wonders whether this claim was made to mislead USGS management or the public.

Since Crane made the same mistakes in applying CMB as were made in the 40 Lakes paper, she predictably got a similar answer.[80] This highlights a key reason that the 40 Lakes paper must be retracted, so these mistakes are not further propagated in the literature by authors using an apparently USGS-approved model as a "plug and play" source identification and apportionment method.

Dr. Watts has also work closely and published[81] with the USGS team. As indicated in e-mails obtained under PCTC's 2011 FOIA request, Watts, Van Metre, Mahler, and Crane were sharing data and experimental samples,[82] as well as discussing collaborative efforts[83] as far back as 2007 (see Exhibit B).

USGS Response Page 7: We are unclear of the basis of the comment that types of emission sources are known not to be consistent.

This response highlights that the authors have not made an effort to understand the science of PAH production and fate. We have pointed them to Lima *et al.* (2005)[84] as a good review. PAH profiles of emission sources depend on the fuel, oxygen concentration, and temperature of combustion. Van Metre and Mahler have presented no data on how representative the profiles they use as CMB model inputs are to actual sources.

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[76] Crane JL (2014).
[77] Watts, A. W.; Ballestero, T. P.; Roseen, R. M.; Houle, J. P. Polycyclic aromatic hydrocarbons in stormwater runoff from sealcoated pavements. Environ. Sci. Technol. 2010, 44, 8849−8854
[78] Barbara J. Mahler, Peter C. Van Metre, Judy L. Crane, Alison W. Watts, Mateo Scoggins, and E. Spencer Williams. 2012. Coal-Tar-Based Pavement Sealcoat and PAHs: Implications for the Environment, Human Health, and Stormwater Management. Environmental Science & Technology 46 (6), 3039-3045
[79] Mahler, Van Metre, Crane, and Watts have been involved in organizing and chairing a session focused on the RTS issues at annual Society of Environmental Toxicology and Chemistry national meetings since at least 2010.
[80] O'Reilly *et al.*2014c. This paper includes as a case study Crane's application of Van Metre and Mahler's biased approach for evaluating their RTS hypothesis.
[81] Mahler *et al.*2012.
[82] Document UB03001. Communication discussing sharing of samples from Dr. Watts's test plot study with Van Metre and other at the USGS. Dr Van Metre's comments suggest he participated on site at Dr. Watts field study.
[83] February 12 & 15, 2008 e-mail from Dr Watts to Van Metre and Mahler discussing collaboration on responding to a National Science Foundation request for proposal.
[84] Lima, A.L.C., J.W. Farrington, and C.M. Reddy. 2005. Combustion-derived polycyclic aromatic hydrocarbons in the environment—A review. Environ. Forensics. 6: 109-131

USGS Response Page 7: The issue of transformation in the atmosphere was explicitly discussed in Van Metre and Mahler.

The authors confuse samples collected at an emission source with those of atmospheric deposition.

While the issue of atmospheric transformation was raised, the authors essentially responded that it could be ignored. If the work of chemists [85,86,87] had been reviewed instead of just modelers the authors would know that PAHs are subject to chemical processes and photooxidation in the atmosphere and biodegradation in aqueous systems (Figure 6, below). As noted in Schauer *et al*. 2003, chemical reactions with atmospheric oxidants, such as ozone, results in substantial degradation of PAHs attached to atmospheric particles. This conflicts with the CMB assumption that source profiles are constant and not reactive.

The issue of chemical transformation is different from that of vapor / particle partitioning so is not corrected by the approach used in the 40 Lakes paper.

There is vast difference between the type of data used by Simcik *et al*. (1999)[88] and the USGS team. Simick collected actual atmospheric particles either near the ground or from a boat in the same water and air shed as the sediments samples. Such PAHs would have already been subject to reactive atmospheric processes.

As indicated in O'Reilly *et al*. 2012, the PAH profiles of Simcik's air sample were statistically similar to samples from Mahler et al's 2005 sealer test plots. The similarity in PAH profiles between the Simcik's air, water particle, and sediment samples challenges (Figure 7, below) the USGS's sealer hypothesis and so has been ignored by Van Metre and Mahler.

[85] Schauer C, R Niessner, U Poschl. Polycyclic Aromatic Hydrocarbons in Urban Air Particulate Matter: Decadal and Seasonal Trends, Chemical Degradation, and Sampling Artifacts. Environ. Sci. Technol. 2003, 37:2861-2868
[86] Marr, LC et al. Sources and transformations of particle-bound polycyclic aromatic hydrocarbons in Mexico City. Atmos. Chem. Phys., 2006. 6:1733–1745.
[87] Jariyasopit *et al*. Heterogeneous Reactions of Particulate Matter-Bound PAHs and NPAHs with NO3/N2O5, OH Radicals, and O3 under Simulated Long- Range Atmospheric Transport Conditions: Reactivity and Mutagenicity. Env Sci & Tech, 2014, 48:10155-64.
[88] Simcik, M.F., S.J. Eisenreich, and P.J. Lioy. 1999. Source apportionment and source/sink relationships of PAHs in the coastal atmosphere of Chicago and Lake Michigan. Atmos. Environ. 33: 5071-5079.

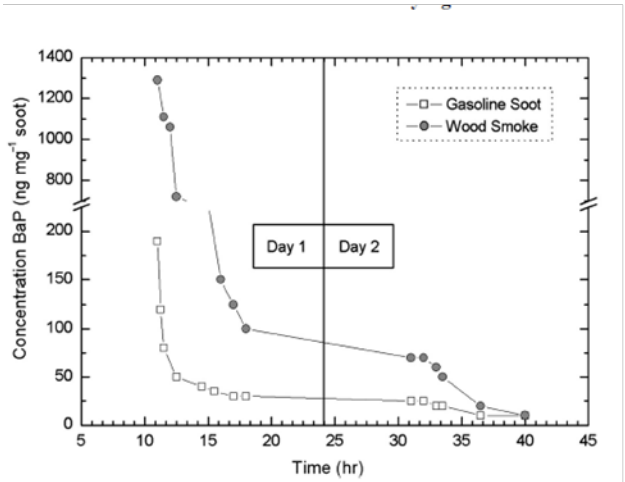


Figure 10. Degradation of BaP present in gasoline and wood soot over a 30-h period of outdoor sunlight and darkness. Experiment started at ~10 a.m. Modified from Kamens and collaborators (1988).

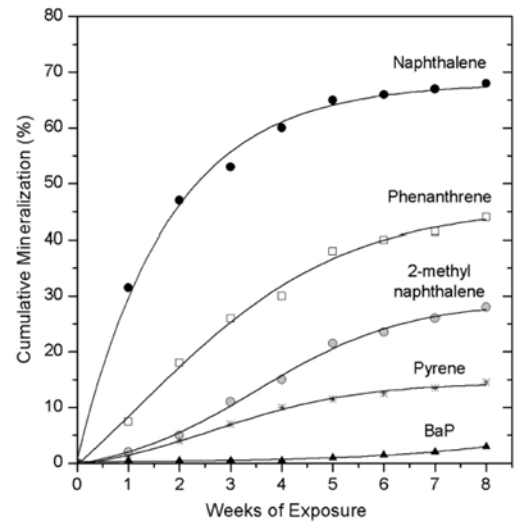


Figure 9. Rate of biodegradation of several PAHs in an estuarine system exposed to oil (Heitkamp and Cerniglia, 1987).

Figure 6: These plots indicate that PAH are subject to rapid changes in the atmosphere and steady changes in sediments thus challenging CMB assumption of source stability.

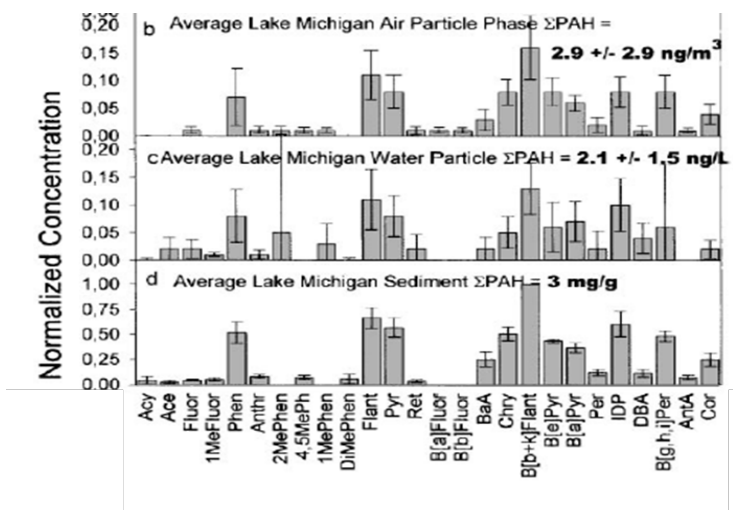


Figure 7: This figure from Simcik *et al*. 1999 demonstrate that the PAH profiles of atmospheric deposition are similar to urban sediment. While this observation is used in the 40 Lakes paper to argue that the CMB requirement of source stability was met, this atmospheric data was not used as a proposed source. Instead, profiles of emission samples taken before atmospheric reactions would have occurred were used as representative of sources.

Tracing sources used in the 40 Lakes paper back through Li to the original publications, some samples were collected from inside the stacks at industrial facilities, as illustrated in Figure 8.[89] Significant changes in the chemistry of these materials would be expected as they leave high temperature, low oxygen conditions and are exposed to atmosphere.

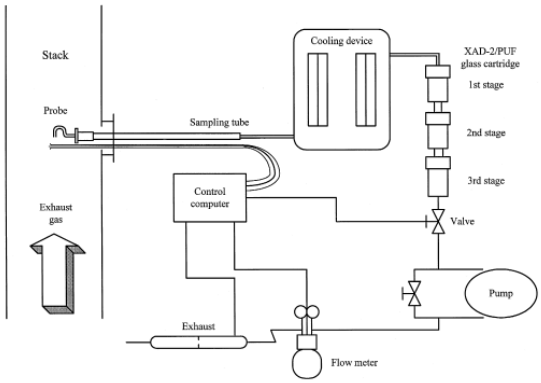


Fig. 1. PAH sampling system.

Figure 8: Within stack sample collection system used by Yang *et al*. 1998.

The issue of environmental transformation of PAH sources demonstrates a bias in the selection of results presented in the 40 Lakes paper. All the source profiles other than sealer were based on untransformed samples collected at or near the point of emission. For sealers, the USGS possessed samples representing both fresh and weathered particles from sealed parking lots, but only showed results using the weathered profiles. We reran the CMB model using the average sealer profile from the test plots described in the Austin paper as a source profile and found the median sealer contribution to PAHs in the 40 lake sediments drop from over 45% to 0%.

USGS Response Page 7: Twenty-two different PAH sources and profiles were considered.

While 22 PAH source profiles might have been considered, modeling results that were inconsistent with the author's desired outcome were withheld and continue to be unavailable.

USGS Response Page 8: The model assumption of linear independence means that the chemical composition is sufficiently different for the model to distinguish between them.

We agree with this statement which supports the contention that Van Metre and Mahler have been overstating the meaning of their CMB results.[90]

[89] Yang, Lee, Chen, and Lai. 1998. PAH emission from various industrial stacks. Journal of Hazardous Materials 60: 159–174.
[90] O'Reilly *et al.*2012, 2014a

The issue is that given the chemical similarities of pyrogenic source profiles, it has not been demonstrated by Van Metre and Mahler, or others such as Li *et al*. (2003), that CMB can accurately estimate the contributions of the many sources that make-up the PAH profile of urban background typically found in sediments.

Just because CMB comes up with a solution it does not demonstrate that the critical model assumptions have been met.

USGS Response Page 9: The null hypothesis is tested by the modeling in the sense of having concluded for some lakes that coal-tar sealers are not a major source of PAHs.

As stated by Van Metre and Mahler, they were testing the hypothesis that sealcoat is a major source of PAHs to urban lakes in the United States. The negative control for a CMB test of this hypothesis is to run the model with and without sealer as a source. Because the model can fit the sediment data without sealer as a source, CMB results provide no specific support for the hypothesis.

The observation that CMB fails to find sealer as a source of some lakes provides no support that it is correctly predicting it as source of other lakes.

VAN METRE AND MAHLER (2010) IS USED AS AN ADVOCACY TOOL

It is the policy of the USGS that communications remain neutral and not advocate, persuade, advise or recommend actions.[91] The three communications and the press release that are the subject of this request fail this test. By including only partial results, ignoring the broad uncertainties inherent in the methods, and presenting model output as factual proof, the authors present a false picture to a lay audience. This has resulted in advocacy as policy makers from localities that included some of the lakes discussed in Van Metre and Mahler (2010) have proposed or enacted product bans. In many of these cases, the authors cited their own claims when testifying in favor of the bans.[92]

The implications of incomplete information in these advocacy efforts are seen in comparing the two maps in Figure 9, below. As shown on the USGS web site, Map A is presented as "proof" that RTS is a major source of PAHs in the areas being considered for product bans. While the text accompany the map cites the article, it does not say that the map is based on partial results of an uncertain modeling procedure. The website states the authors' claim "*Coal-tar-based pavement sealant is the largest source of polycyclic aromatic hydrocarbons*" as if it was a fact.

[91] Bales, JD. Response to O'Reilly et al. (2014): Policy of the US Geological Survey on advocacy. Integr. Environ. Assess. Manag. 2014 DOI: 10.1002/ieam.1555
[92] Partial list: Van Meter -WA state legislative hearing Feb 2011, Mahler and Van Metre- Minnesota Pollution Control Agency December 2011, Van Metre – Chicago council committee hearing June 2013.

Figure 9: Two approaches for presenting CMB modeling results. The USGS's approach (Map A) provides an incomplete and biased summary of the model's output that the authors have used to advocate for RTS product bans. Focusing on areas where bans have been proposed or enacted, Map B provides a fuller range of results which indicate that CMB modeling does not support the claim that RTS is an important source of PAHs in these lakes.

A more complete and balanced presentation of results in Map B demonstrates that modeled contribution of RTS, as represented by Van Metre and Mahler own experimental test plot samples, is zero in each case. CMB calculated source contributions for unsealed parking lot is similar to or exceeds that calculated for RTS sealed lots for each of the lakes that were the basis for considering a ban. Critically, the PCTC understands testifying at legislative and regulatory hearings can be an appropriate role for USGS's technical staff, and we agree with the agency's requirement to be neutral and objective. While the line between neutrality and advocacy may be grey in some instances, this is not one of those cases. The USGS's claims of neutrality[93,94] rings hollow as Van Metre and Mahler continue to quote only partial results in a way that appears to support their position as they speak forcefully on what they consider the evil of RTS in the press[95] and in association with advocacy groups. [96]

CONCLUSION: RETRACTING VAN METRE AND MAHLER (2010) IS THE ONLY OPTION

The 40 Lake paper fails the USGS requirement for objectivity because Van Metre and Mahler described only results that supported their desired message and withheld information that was inconsistent with their hypothesis. As with their previous papers, a careful assessment of the results indicate the conclusions reached by the authors are not supported and are not defensible. Objectivity is a basic principle of the scientific method and is especially important in this case as the authors and others have used the results to advocate for policy action at the Federal, State, and Local level. The only way to prevent the continued misuse of this paper within the legislative and regulatory process is retraction of Van Metre and Mahler (2010) and other USGS products that cite its findings.

The article does not meet the requirement for reliability because the authors fail to demonstrate (1) whether CMB can accurately identify the sources of PAHs in urban sediments or (2) that the model inputs were either appropriate or met the model assumptions. The partial use of published methods does overcome this limitation. The problem is being compounded as others apply this apparently "USGS approved" approach. The only way to prevent the continued misuse of this paper within the scientific community is retraction.

Anne P. LeHuray,
Executive Director

[93] USGS IQA Response 2013
[94] Bales 2014
[95] Price 2014
[96] Mahler, B. Coal Tar Based Pavement Sealcoat: Health and Environmental Overview. Presentation to Ohio Environmental Council (OEC), September 30, 2014. According to its website the OEC is "**Ohio's leading advocate**" for environmental protection using tools such as legislative initiatives and legal action.

Exhibit A

Output of 5 Chemical Mass Balance (CMB) model runs holding the 4 USGS source input parameters (Van Metre and Mahler's Model A) for "vehicle, tunnel," "Coal," "Fuel Oil" and "Pinewood" constant and varying source input parameters representing the refined tar-base sealer (RTS) end point. The 5 RTS end point parameters are:

1. Sealed parking lot dust
2. Unsealed parking lot dust
3. RTS test plot
4. Fresh RTS
5. No RTS or parking lot dust.

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
	Site		Concentrations				Statistics			Estimated Sources										Contribution(%)				
Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT Sealed lot dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Sealed Dust	ANN	2003.6	16.53	3.47	16.55	2.24	0.95	0.36	100.15	15.78	5.73	0.06	3.36	0.00	0.00	0.00	0.00	0.72	4.09	95.3	0.3	0.0	0.0	4.3
Sealed Dust	ANN	2006.2	16.82	3.53	16.77	2.20	0.96	0.28	99.72	15.51	4.68	1.26	3.32	0.00	0.00	0.00	0.00	0.00	0.00	92.5	7.5	0.0	0.0	0.0
Sealed Dust	ANN	2008.2	17.74	3.73	17.67	2.12	0.97	0.25	99.62	14.46	4.67	3.21	3.48	0.00	0.00	0.00	0.00	0.00	0.00	81.8	18.2	0.0	0.0	0.0
Sealed Dust	BAL	2002.9	9.53	0.95	9.38	0.96	0.96	0.50	98.41	6.63	2.45	2.54	2.50	0.00	0.00	0.20	0.85	0.00	0.00	70.7	27.1	0.0	2.1	0.0
Sealed Dust	BAL	2004	23.60	2.36	23.63	2.31	0.96	0.50	100.15	14.99	5.46	8.65	4.42	0.00	0.00	0.00	0.00	0.00	0.00	63.4	36.6	0.0	0.0	0.0
Sealed Dust	BAL	2006.3	16.49	1.65	16.52	1.76	0.90	1.11	100.18	13.63	3.10	0.00	0.00	2.89	2.21	0.00	0.00	0.00	0.00	82.5	0.0	17.5	0.0	0.0
Sealed Dust	BEC	1999	1.57	0.33	1.56	0.14	0.99	0.25	99.23	0.78	0.38	0.00	0.00	0.19	0.30	0.23	0.15	0.36	0.33	49.8	0.0	12.3	15.0	22.9
Sealed Dust	BEC	2000.1	2.05	0.43	2.05	0.18	0.98	0.36	99.80	0.88	0.72	0.67	0.56	0.00	0.00	0.26	0.23	0.24	0.44	42.8	33.0	0.0	12.5	11.7
Sealed Dust	BEC	2001.5	2.48	0.52	2.48	0.23	0.96	0.57	100.16	0.96	0.95	1.21	0.75	0.00	0.00	0.22	0.31	0.10	0.57	38.6	48.7	0.0	8.7	4.0
Sealed Dust	BRK	1995.7	2.28	0.48	2.31	0.24	0.94	0.83	101.40	1.49	0.68	0.09	0.55	0.60	0.47	0.13	0.28	0.00	0.00	64.4	4.1	26.0	5.6	0.0
Sealed Dust	BRK	1997.7	3.32	0.70	3.35	0.36	0.93	0.97	100.79	2.26	1.01	0.13	0.82	0.80	0.68	0.16	0.41	0.00	0.00	67.4	4.0	23.9	4.7	0.0
Sealed Dust	BRK	1999.1	2.41	0.51	2.43	0.25	0.89	2.15	100.66	1.32	1.06	0.11	0.62	0.87	0.51	0.11	0.32	0.02	0.62	54.5	4.6	35.7	4.3	0.8
Sealed Dust	CHA	1990.2	104.20	21.88	104.91	10.19	0.92	1.20	100.69	45.40	33.69	49.30	26.72	1.10	19.62	0.00	0.00	9.12	22.01	43.3	47.0	1.0	0.0	8.7
Sealed Dust	CHA	1994.9	110.20	23.14	111.50	10.26	0.94	1.04	101.18	41.00	35.29	51.93	27.58	9.64	20.75	0.00	0.00	8.92	22.47	36.8	46.6	8.6	0.0	8.0
Sealed Dust	CHA	1999.5	87.40	18.35	89.72	8.43	0.96	0.66	102.65	18.18	34.38	52.59	27.64	0.00	0.00	2.13	11.65	16.81	21.23	20.3	58.6	0.0	2.4	18.7
Sealed Dust	CMO	1990.6	7.89	1.66	7.99	0.77	0.96	0.63	101.24	1.54	2.58	4.85	2.28	0.19	1.71	0.00	0.00	1.41	1.65	19.2	60.8	2.4	0.0	17.6
Sealed Dust	CMO	1998.7	12.71	2.67	12.48	1.28	0.92	0.90	98.20	6.40	3.06	6.08	2.72	0.00	0.00	0.00	0.00	0.00	0.00	51.3	48.7	0.0	0.0	0.0
Sealed Dust	CMO	2000.8	7.34	1.54	7.23	0.77	0.93	0.71	98.48	4.47	1.78	2.76	1.48	0.00	0.00	0.00	0.00	0.00	0.00	61.8	38.2	0.0	0.0	0.0
Sealed Dust	CYN	1995.3	0.19	0.04	0.19	0.02	0.90	1.59	100.99	0.02	0.08	0.13	0.07	0.01	0.05	0.01	0.03	0.02	0.05	10.8	69.2	6.0	5.7	8.3
Sealed Dust	CYN	1997.2	0.12	0.03	0.13	0.01	0.92	0.90	103.45	0.00	0.00	0.10	0.04	0.01	0.03	0.02	0.02	0.00	0.00	0.0	79.3	6.9	13.8	0.0
Sealed Dust	CYN	1998.6	0.12	0.02	0.12	0.01	0.91	1.31	101.79	0.00	0.00	0.09	0.03	0.02	0.03	0.00	0.02	0.01	0.02	0.0	71.5	14.9	3.9	9.7
Sealed Dust	DEK	1990	0.52	0.11	0.50	0.06	0.90	0.87	96.38	0.09	0.13	0.41	0.13	0.00	0.00	0.00	0.00	0.00	0.00	17.9	82.1	0.0	0.0	0.0
Sealed Dust	DEK	1990	0.84	0.18	0.77	0.07	0.89	1.65	92.08	0.35	0.18	0.32	0.19	0.09	0.14	0.00	0.00	0.00	0.00	45.5	42.2	12.3	0.0	0.0
Sealed Dust	DEK	1990	0.92	0.19	0.80	0.07	0.86	2.70	87.44	0.28	0.24	0.34	0.19	0.15	0.16	0.00	0.00	0.03	0.17	35.0	42.3	18.8	0.0	3.9
Sealed Dust	ECO	1996.4	4.64	0.97	4.61	0.50	0.89	1.55	99.38	2.99	1.66	0.17	0.95	1.38	0.84	0.00	0.00	0.06	1.11	64.9	3.8	30.0	0.0	1.3
Sealed Dust	ECO	1998.3	5.41	1.14	5.37	0.54	0.93	0.84	99.32	2.00	1.89	3.23	1.26	0.00	0.00	0.00	0.00	0.14	1.15	37.2	60.2	0.0	0.0	2.7
Sealed Dust	ECO	1999.7	7.55	1.59	7.58	0.78	0.93	0.72	100.44	2.52	1.92	5.06	1.85	0.00	0.00	0.00	0.00	0.00	0.00	33.3	66.7	0.0	0.0	0.0
Sealed Dust	FAR	1983.6	0.33	0.07	0.34	0.03	0.94	0.91	102.39	0.00	0.00	0.15	0.08	0.15	0.07	0.03	0.05	0.00	0.00	0.0	44.1	45.8	10.1	0.0
Sealed Dust	FAR	1991.5	0.33	0.07	0.34	0.03	0.93	1.00	104.08	0.00	0.00	0.11	0.08	0.20	0.07	0.03	0.05	0.00	0.00	0.0	33.5	57.0	9.6	0.0
Sealed Dust	FAR	1997.1	0.38	0.08	0.40	0.04	0.91	1.19	104.84	0.00	0.00	0.13	0.09	0.22	0.08	0.04	0.05	0.00	0.00	0.0	33.3	56.0	10.7	0.0
Sealed Dust	FOS	1996.2	17.69	3.71	17.12	1.68	0.95	0.64	96.76	8.81	5.26	7.06	3.53	0.00	0.00	0.00	0.00	1.25	3.51	51.5	41.3	0.0	0.0	7.3
Sealed Dust	FOS	1998.4	14.62	3.07	14.10	1.45	0.94	0.77	96.46	7.55	4.65	6.54	3.11	0.00	0.00	0.00	0.00	0.01	3.04	53.5	46.4	0.0	0.0	0.1
Sealed Dust	FOS	2000.4	9.64	2.02	9.26	0.96	0.94	0.70	96.03	5.21	2.36	4.05	2.03	0.00	0.00	0.00	0.00	0.00	0.00	56.2	43.8	0.0	0.0	0.0
Sealed Dust	HAR	1991	41.24	8.66	41.84	4.42	0.94	0.98	101.44	27.18	12.75	2.56	10.22	5.10	9.00	6.99	5.35	0.00	0.00	65.0	6.1	12.2	16.7	0.0
Sealed Dust	HAR	1999	34.35	7.21	34.97	4.00	0.94	0.84	101.80	25.57	11.48	1.00	9.19	2.03	7.96	6.37	4.75	0.00	0.00	73.1	2.8	5.8	18.2	0.0
Sealed Dust	HAR	2006	40.95	8.60	40.99	3.81	0.96	0.63	100.11	16.37	10.12	18.92	10.99	0.00	0.00	5.70	4.63	0.00	0.00	39.9	46.2	0.0	13.9	0.0
Sealed Dust	HIL	1993	1.31	0.28	1.29	0.13	0.94	0.61	98.11	0.76	0.31	0.53	0.27	0.00	0.00	0.00	0.00	0.00	0.00	58.8	41.2	0.0	0.0	0.0
Sealed Dust	HIL	1995.6	1.90	0.40	1.83	0.18	0.93	1.17	96.36	1.04	0.60	0.28	0.36	0.49	0.32	0.00	0.00	0.03	0.41	56.5	15.1	27.0	0.0	1.4
Sealed Dust	HIL	1997.7	2.09	0.44	2.03	0.20	0.93	1.01	97.33	1.04	0.52	0.26	0.37	0.74	0.38	0.00	0.00	0.00	0.00	51.0	12.7	36.2	0.0	0.0
Sealed Dust	HSP	1990.7	7.71	1.62	7.83	0.64	0.94	1.51	101.55	2.08	2.77	2.92	2.01	1.26	1.52	0.68	0.95	0.89	1.59	26.5	37.3	16.1	8.7	11.4
Sealed Dust	HSP	1995.7	7.57	1.59	7.59	0.65	0.94	1.52	100.22	2.75	2.74	2.62	1.99	0.79	1.45	0.66	0.92	0.76	1.57	36.3	34.6	10.4	8.7	10.1
Sealed Dust	HSP	2000	10.14	2.13	10.30	0.86	0.94	1.39	101.55	2.47	3.64	4.28	2.75	1.19	2.05	0.97	1.27	1.39	2.09	24.0	41.5	11.6	9.4	13.5
Sealed Dust	KIL	1994	27.32	5.74	25.62	2.97	0.85	1.54	93.77	19.22	6.57	6.40	5.09	0.00	0.00	0.00	0.00	0.00	0.00	75.0	25.0	0.0	0.0	0.0
Sealed Dust	KIL	1997	67.89	14.26	65.13	7.65	0.88	1.23	95.94	50.34	16.71	14.79	12.73	0.00	0.00	0.00	0.00	0.00	0.00	77.3	22.7	0.0	0.0	0.0
Sealed Dust	KIL	1999.1	63.98	13.43	61.77	8.16	0.87	1.08	96.56	57.13	17.14	4.64	12.23	0.00	0.00	0.00	0.00	0.00	0.00	92.5	7.5	0.0	0.0	0.0
Sealed Dust	LKH	2000.4	10.24	1.02	10.10	0.93	0.96	0.63	98.65	4.55	3.14	5.46	2.10	0.00	0.00	0.00	0.00	0.10	1.99	45.0	54.0	0.0	0.0	0.9
Sealed Dust	LKH	2003	8.13	0.81	8.09	0.89	0.97	0.31	99.51	6.98	1.55	0.00	0.00	0.70	1.58	0.42	0.79	0.00	0.00	86.2	0.0	8.6	5.2	0.0
Sealed Dust	LKH	2006.9	12.15	1.21	12.24	1.37	0.96	0.50	100.71	10.02	3.35	1.32	3.27	0.00	0.00	0.89	1.12	0.00	0.00	81.9	10.8	0.0	7.3	0.0
Sealed Dust	LKW	1991.1	13.16	2.76	13.28	1.21	0.97	0.48	100.93	5.05	4.02	5.81	3.21	0.79	2.40	0.00	0.00	1.63	2.68	38.0	43.7	6.0	0.0	12.3

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Sealed Dust	LKW	1995.3	17.28	3.63	17.46	1.51	0.96	1.01	101.03	6.78	6.34	3.09	4.07	4.71	3.17	0.26	2.06	2.62	3.85	38.8	17.7	27.0	1.5	15.0
Sealed Dust	LKW	1998.9	16.01	3.36	16.15	1.45	0.96	0.80	100.89	6.14	4.90	6.45	3.71	1.60	2.82	0.00	0.00	1.95	3.23	38.0	40.0	9.9	0.0	12.1
Sealed Dust	LVB	1992	0.09	0.02	0.09	0.01	0.86	1.36	97.88	0.00	0.00	0.07	0.02	0.00	0.00	0.02	0.01	0.00	0.00	0.0	78.0	0.0	22.0	0.0
Sealed Dust	LVB	1994.9	0.10	0.02	0.10	0.01	0.87	1.26	100.10	0.00	0.00	0.08	0.02	0.00	0.00	0.02	0.02	0.00	0.00	0.0	75.7	0.0	24.3	0.0
Sealed Dust	LVB	1998.2	0.09	0.02	0.09	0.01	0.84	1.40	95.56	0.00	0.00	0.07	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.0	85.9	0.0	14.1	0.0
Sealed Dust	MAP	1993.8	3.44	0.72	3.55	0.38	0.91	1.28	103.15	0.05	1.61	2.76	1.32	0.15	1.01	0.30	0.59	0.29	0.95	1.5	77.8	4.2	8.4	8.1
Sealed Dust	MAP	1996.5	2.86	0.60	2.96	0.31	0.92	1.15	103.47	0.04	1.31	2.22	1.06	0.29	0.81	0.21	0.48	0.21	0.77	1.3	74.9	9.8	7.0	7.0
Sealed Dust	MAP	1999.7	3.95	0.83	4.01	0.35	0.92	1.63	101.41	1.23	0.99	1.06	0.86	1.53	0.85	0.19	0.47	0.00	0.00	30.6	26.4	38.3	4.6	0.0
Sealed Dust	MYS	1996.5	67.02	14.07	67.73	7.39	0.94	0.73	101.05	49.24	16.01	0.00	0.00	7.16	9.17	0.00	0.00	11.33	16.18	72.7	0.0	10.6	0.0	16.7
Sealed Dust	MYS	2000.7	76.91	16.15	78.04	9.24	0.94	0.73	101.47	61.77	25.04	1.30	16.85	6.56	12.69	0.00	0.00	8.41	19.79	79.2	1.7	8.4	0.0	10.8
Sealed Dust	MYS	2000.7	91.28	19.17	92.18	10.62	0.93	0.97	100.98	70.10	28.70	10.33	20.08	2.95	14.70	0.00	0.00	8.80	22.50	76.1	11.2	3.2	0.0	9.5
Sealed Dust	NEW	1991.7	79.88	16.77	80.91	9.60	0.95	0.63	101.28	64.76	25.93	5.95	17.99	4.77	13.20	0.00	0.00	5.43	20.43	80.0	7.3	5.9	0.0	6.7
Sealed Dust	NEW	1993.3	57.41	12.06	54.02	5.26	0.91	1.36	94.10	27.41	16.13	18.55	10.40	0.00	0.00	0.00	0.00	8.07	10.96	50.7	34.3	0.0	0.0	14.9
Sealed Dust	NEW	1995	104.77	22.00	105.56	11.95	0.94	0.78	100.75	78.55	32.51	12.20	22.79	5.13	16.69	0.00	0.00	9.68	25.35	74.4	11.6	4.9	0.0	9.2
Sealed Dust	NJCP	1993.7	3.79	0.80	3.75	0.40	0.97	0.29	98.97	0.00	0.00	0.00	0.00	1.80	0.65	0.00	0.00	1.95	0.80	0.0	0.0	47.9	0.0	52.1
Sealed Dust	NJCP	1995.6	5.30	1.11	5.09	0.47	0.92	1.17	96.09	2.34	1.27	0.00	0.00	1.75	0.88	0.00	0.00	1.01	1.10	45.9	0.0	34.3	0.0	19.8
Sealed Dust	NJCP	1997	4.68	0.98	4.64	0.44	0.95	0.79	99.13	2.32	1.14	0.00	0.00	1.41	0.77	0.00	0.00	0.91	1.00	50.0	0.0	30.5	0.0	19.5
Sealed Dust	NJOR	1992.3	7.85	1.65	7.54	0.68	0.89	1.73	95.99	2.60	1.79	2.77	1.62	2.17	1.45	0.00	0.00	0.00	0.00	34.4	36.8	28.8	0.0	0.0
Sealed Dust	NJOR	1995.2	10.73	2.25	10.86	1.16	0.93	0.92	101.23	7.03	2.85	0.77	2.11	3.06	1.86	0.00	0.00	0.00	0.00	64.8	7.0	28.2	0.0	0.0
Sealed Dust	NJOR	1997.2	11.05	2.32	10.93	1.11	0.91	1.23	98.95	6.04	2.89	0.82	2.00	4.08	2.06	0.00	0.00	0.00	0.00	55.2	7.5	37.3	0.0	0.0
Sealed Dust	NTR	1993	46.65	9.80	43.52	5.09	0.89	1.09	93.30	33.71	11.26	9.81	8.62	0.00	0.00	0.00	0.00	0.00	0.00	77.5	22.5	0.0	0.0	0.0
Sealed Dust	NTR	1999	38.30	8.04	36.96	3.77	0.95	0.55	96.49	17.76	9.39	19.20	8.46	0.00	0.00	0.00	0.00	0.00	0.00	48.0	52.0	0.0	0.0	0.0
Sealed Dust	NTR	2004	29.98	6.30	28.75	3.01	0.96	0.45	95.91	17.06	7.21	11.69	6.11	0.00	0.00	0.00	0.00	0.00	0.00	59.3	40.7	0.0	0.0	0.0
Sealed Dust	ORL	1994.1	38.64	8.11	37.14	4.41	0.89	1.03	96.13	29.37	9.59	7.77	7.20	0.00	0.00	0.00	0.00	0.00	0.00	79.1	20.9	0.0	0.0	0.0
Sealed Dust	ORL	1996.6	38.10	8.00	36.91	4.34	0.90	0.98	96.87	28.69	9.50	8.22	7.18	0.00	0.00	0.00	0.00	0.00	0.00	77.7	22.3	0.0	0.0	0.0
Sealed Dust	ORL	1997.5	20.57	4.32	19.99	2.30	0.91	0.95	97.17	14.86	5.09	5.14	3.93	0.00	0.00	0.00	0.00	0.00	0.00	74.3	25.7	0.0	0.0	0.0
Sealed Dust	PEP	1998	1.08	0.23	1.08	0.11	0.90	1.52	100.30	0.07	0.44	0.68	0.35	0.00	0.00	0.10	0.15	0.24	0.27	6.1	62.6	0.0	9.3	22.1
Sealed Dust	PEP	2002	0.91	0.19	0.91	0.09	0.90	1.58	100.32	0.04	0.37	0.55	0.29	0.00	0.00	0.12	0.12	0.20	0.22	4.4	60.1	0.0	13.6	22.0
Sealed Dust	PEP	2006	1.24	0.26	1.26	0.13	0.88	1.35	101.83	0.00	0.00	0.94	0.25	0.00	0.00	0.21	0.19	0.11	0.20	0.0	74.3	0.0	16.8	8.9
Sealed Dust	PLM	1997	32.00	6.72	31.55	3.85	0.96	0.39	98.60	27.80	8.26	0.00	0.00	2.04	4.46	0.00	0.00	1.71	8.50	88.1	0.0	6.5	0.0	5.4
Sealed Dust	PLM	2002	34.69	7.28	34.09	3.75	0.94	0.71	98.27	25.38	8.19	0.00	0.00	2.87	4.59	0.00	0.00	5.84	8.31	74.5	0.0	8.4	0.0	17.1
Sealed Dust	PLM	2006.1	35.64	7.48	34.83	4.23	0.95	0.51	97.74	30.56	9.18	0.00	0.00	2.92	4.97	0.00	0.00	1.36	9.39	87.7	0.0	8.4	0.0	3.9
Sealed Dust	SCM	2001.7	4.35	0.91	4.44	0.43	0.95	0.86	101.84	2.13	1.88	0.10	1.12	1.69	0.91	0.32	0.55	0.19	1.09	48.1	2.3	38.1	7.3	4.3
Sealed Dust	SCM	2003	4.64	0.98	4.73	0.43	0.95	1.10	101.89	1.88	1.92	0.55	1.16	1.84	0.95	0.16	0.58	0.30	1.11	39.8	11.6	39.0	3.3	6.3
Sealed Dust	SCM	2005.2	7.22	1.52	7.46	0.68	0.91	1.79	103.36	1.54	3.19	1.03	1.85	3.97	1.74	0.40	0.97	0.53	1.79	20.6	13.8	53.1	5.3	7.1
Sealed Dust	SLN	1990.2	16.57	3.48	15.72	1.65	0.85	1.69	94.89	5.53	3.87	10.19	3.72	0.00	0.00	0.00	0.00	0.00	0.00	35.2	64.8	0.0	0.0	0.0
Sealed Dust	SLN	1994.4	16.52	3.47	15.73	1.63	0.84	1.88	95.21	7.47	3.86	8.26	3.49	0.00	0.00	0.00	0.00	0.00	0.00	47.5	52.5	0.0	0.0	0.0
Sealed Dust	SLN	1996.7	16.57	3.48	15.64	1.62	0.84	1.82	94.38	6.91	3.86	8.73	3.55	0.00	0.00	0.00	0.00	0.00	0.00	44.2	55.8	0.0	0.0	0.0
Sealed Dust	SWT	1994.3	1.18	0.25	1.19	0.12	0.96	0.50	101.49	0.22	0.33	0.54	0.29	0.44	0.30	0.00	0.00	0.00	0.00	18.3	45.2	36.5	0.0	0.0
Sealed Dust	SWT	1996.5	1.31	0.27	1.34	0.17	0.93	0.52	102.50	0.00	0.00	1.21	0.44	0.13	0.40	0.00	0.00	0.00	0.00	0.0	90.4	9.6	0.0	0.0
Sealed Dust	SWT	1998.3	1.72	0.36	1.78	0.24	0.94	0.32	103.42	0.00	0.00	1.78	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Sealed Dust	TNB	1996.4	1.38	0.29	1.33	0.14	0.90	1.16	96.31	0.79	0.33	0.54	0.28	0.00	0.00	0.00	0.00	0.00	0.00	59.6	40.4	0.0	0.0	0.0
Sealed Dust	TNB	2000.5	1.56	0.33	1.45	0.17	0.85	1.31	92.79	0.22	0.38	1.23	0.40	0.00	0.00	0.00	0.00	0.00	0.00	15.1	84.9	0.0	0.0	0.0
Sealed Dust	TNB	2003.7	1.08	0.23	1.02	0.11	0.87	1.38	94.97	0.70	0.26	0.32	0.21	0.00	0.00	0.00	0.00	0.00	0.00	68.6	31.4	0.0	0.0	0.0
Sealed Dust	TWN	1991.5	6.15	1.29	5.98	0.65	0.90	1.03	97.24	3.97	1.50	2.01	1.22	0.00	0.00	0.00	0.00	0.00	0.00	66.4	33.6	0.0	0.0	0.0
Sealed Dust	TWN	1991.5	6.83	1.43	6.70	0.74	0.93	0.90	98.08	4.80	1.98	1.03	1.21	0.00	0.00	0.00	0.00	0.87	1.41	71.6	15.4	0.0	0.0	13.0
Sealed Dust	TWN	1998.1	7.86	1.65	7.65	0.91	0.91	0.98	97.36	6.07	2.36	1.42	1.49	0.00	0.00	0.00	0.00	0.17	1.71	79.3	18.5	0.0	0.0	2.2
Sealed Dust	WAS	1991.9	0.46	0.10	0.45	0.05	0.93	0.72	98.19	0.27	0.11	0.18	0.09	0.00	0.00	0.00	0.00	0.00	0.00	59.8	40.2	0.0	0.0	0.0
Sealed Dust	WAS	1994.8	0.37	0.08	0.37	0.04	0.93	0.71	98.97	0.16	0.09	0.21	0.08	0.00	0.00	0.00	0.00	0.00	0.00	43.5	56.5	0.0	0.0	0.0
Sealed Dust	WAS	1997.5	0.36	0.08	0.36	0.04	0.92	0.84	98.09	0.19	0.09	0.17	0.08	0.00	0.00	0.00	0.00	0.00	0.00	52.5	47.5	0.0	0.0	0.0
Sealed Dust	WEE	1996	0.61	0.13	0.59	0.06	0.93	1.01	96.77	0.31	0.24	0.25	0.19	0.00	0.00	0.01	0.07	0.02	0.14	52.2	42.1	0.0	2.5	3.2
Sealed Dust	WEE	1999	0.65	0.14	0.63	0.06	0.94	0.95	96.73	0.32	0.24	0.23	0.19	0.00	0.00	0.02	0.07	0.07	0.15	50.8	36.3	0.0	2.5	10.4
Sealed Dust	WEE	2002	0.97	0.20	0.95	0.10	0.96	0.49	98.29	0.66	0.40	0.23	0.29	0.00	0.00	0.05	0.11	0.02	0.24	68.8	24.4	0.0	4.8	2.0
Sealed Dust	WES	1993.4	6.07	1.27	5.74	0.52	0.97	0.68	94.60	0.87	1.52	1.12	0.98	1.53	0.99	0.00	0.00	2.22	1.21	15.2	19.5	26.6	0.0	38.7
Sealed Dust	WES	1995.6	8.85	1.86	8.74	0.80	0.98	0.42	98.78	4.24	2.61	1.66	1.68	1.95	1.44	0.00	0.00	0.90	1.83	48.5	18.9	22.3	0.0	10.2
Sealed Dust	WES	1998	8.04	1.69	7.75	0.75	0.97	0.45	96.37	4.22	1.79	0.00	0.00	1.64	1.39	0.09	0.65	1.80	1.76	54.4	0.0	21.2	1.2	23.2

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Sealed Dust	WP55	1997.4	2.30	0.48	2.30	0.23	0.93	0.88	99.96	0.74	0.83	1.44	0.55	0.00	0.00	0.00	0.00	0.12	0.51	32.2	62.5	0.0	0.0	5.4
Sealed Dust	WP55	2000.6	1.94	0.41	1.93	0.21	0.90	1.08	99.39	0.46	0.76	1.45	0.51	0.00	0.00	0.00	0.00	0.02	0.46	24.1	75.0	0.0	0.0	0.9
Sealed Dust	WP55	2003	2.05	0.43	2.05	0.22	0.92	0.78	100.05	0.47	0.53	1.58	0.53	0.00	0.00	0.00	0.00	0.00	0.00	22.9	77.1	0.0	0.0	0.0
Sealed Dust	WRL	1999.9	1.75	0.37	1.66	0.17	0.89	1.55	95.01	0.85	0.53	0.70	0.35	0.00	0.00	0.00	0.00	0.12	0.35	50.9	41.9	0.0	0.0	7.2
Sealed Dust	WRL	2002.1	1.50	0.32	1.45	0.14	0.93	0.99	96.34	0.72	0.43	0.49	0.28	0.00	0.00	0.00	0.00	0.23	0.29	49.9	34.1	0.0	0.0	16.0
Sealed Dust	WRL	2003.2	2.80	0.59	2.63	0.27	0.89	1.44	94.06	1.19	0.91	1.38	0.61	0.00	0.00	0.00	0.00	0.07	0.57	45.1	52.4	0.0	0.0	2.5
Sealed Dust	WST	1995	12.43	2.61	12.19	1.20	0.96	0.51	98.10	6.10	3.84	5.38	2.51	0.00	0.00	0.00	0.00	0.71	2.55	50.0	44.2	0.0	0.0	5.8
Sealed Dust	WST	1996.8	11.83	2.48	11.73	1.08	0.98	0.39	99.13	4.29	3.47	5.18	2.86	0.27	2.12	0.00	0.00	1.99	2.40	36.6	44.2	2.3	0.0	17.0
Sealed Dust	WST	1998.3	7.72	1.62	7.64	0.74	0.96	0.53	98.97	2.40	2.52	4.51	1.70	0.00	0.00	0.00	0.00	0.73	1.60	31.4	59.0	0.0	0.0	9.5
Sealed Dust	WTN	1993	1.42	0.30	1.46	0.15	0.94	0.74	102.63	0.00	0.00	0.76	0.26	0.00	0.00	0.12	0.17	0.58	0.25	0.0	52.3	0.0	8.2	39.5
Sealed Dust	WTN	2000	3.17	0.67	3.14	0.29	0.96	0.67	99.09	0.83	0.91	1.23	0.63	0.00	0.00	0.00	0.00	1.08	0.64	26.5	39.0	0.0	0.0	34.5
Sealed Dust	WTN	2004	4.12	0.87	4.04	0.37	0.97	0.47	97.96	1.23	1.19	1.76	0.82	0.00	0.00	0.00	0.00	1.04	0.80	30.6	43.6	0.0	0.0	25.8
Sealed Dust	WTY	2001.1	48.72	10.23	49.46	4.98	0.98	0.31	101.51	26.12	16.19	21.07	12.81	0.82	9.20	0.00	0.00	1.45	10.86	52.8	42.6	1.7	0.0	2.9
Sealed Dust	WTY	2004	48.95	10.28	49.80	5.17	0.98	0.16	101.74	29.02	12.35	20.78	10.43	0.00	0.00	0.00	0.00	0.00	0.00	58.3	41.7	0.0	0.0	0.0
Sealed Dust	WTY	2005.3	50.47	10.60	49.63	5.48	0.96	0.49	98.35	37.49	13.00	0.00	0.00	9.92	7.55	0.00	0.00	2.22	12.34	75.5	0.0	20.0	0.0	4.5

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)
	Sample Info		Concentrations				Statistics			Estimated Sources									
Test Source	SiteID	DATE	Measured concn. (ug/kg)	Uncertainty (40%)	Calculated concn. (ug/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	Unsealed lot dust (ug/kg)	Std. error (ULD)	Vehicle, tunnel (ug/kg)	Std. error (Veh/tunnel)	Coal, avg. (ug/kg)	Std. error (Coal, avg.)	Fuel oil (ug/kg)	Std. error (Fuel oil)	Pinewood (ug/kg)	Std. error (pinewood)
Unsealed Dust	ANN	2003.6	15.21	6.08	14.93	1.93	0.94	0.58	98.18	12.49	4.23	0.00	0.00	0.00	0.00	0.00	0.00	2.44	4.09
Unsealed Dust	ANN	2006.2	15.48	6.19	15.31	2.07	0.95	0.46	98.91	13.73	4.54	0.00	0.00	0.00	0.00	0.00	0.00	1.58	4.33
Unsealed Dust	ANN	2008.2	16.32	6.53	16.19	2.17	0.96	0.37	99.22	14.36	10.42	1.09	6.86	0.00	0.00	0.00	0.00	0.74	4.98
Unsealed Dust	BAL	2002.9	8.76	3.50	8.70	0.94	0.96	0.89	99.36	5.71	4.15	1.83	2.92	0.00	0.00	0.63	1.60	0.54	2.08
Unsealed Dust	BAL	2004	21.60	8.64	21.31	2.32	0.96	0.61	98.65	15.39	11.02	4.90	7.42	0.00	0.00	0.00	0.00	1.02	5.30
Unsealed Dust	BAL	2006.3	14.89	5.96	14.88	2.00	0.92	0.67	99.96	14.42	4.38	0.00	0.00	0.00	0.00	0.00	0.00	0.47	4.18
Unsealed Dust	BEC	1999	1.50	0.60	1.49	0.16	0.99	0.26	99.12	0.78	0.52	0.00	0.00	0.15	0.38	0.20	0.27	0.36	0.33
Unsealed Dust	BEC	2000.1	1.93	0.77	1.89	0.24	0.99	0.16	97.84	1.46	1.06	0.20	0.74	0.00	0.00	0.07	0.41	0.17	0.53
Unsealed Dust	BEC	2001.5	2.34	0.94	2.31	0.30	0.98	0.19	98.52	1.99	0.95	0.32	0.86	0.00	0.00	0.00	0.00	0.00	0.00
Unsealed Dust	BRK	1995.7	2.07	0.83	2.05	0.27	0.97	0.32	99.04	1.80	0.99	0.00	0.00	0.14	0.68	0.00	0.00	0.11	0.56
Unsealed Dust	BRK	1997.7	3.02	1.21	3.01	0.43	0.95	0.42	99.47	2.90	1.58	0.00	0.00	0.07	1.07	0.00	0.00	0.03	0.89
Unsealed Dust	BRK	1999.1	2.17	0.87	2.12	0.30	0.92	0.65	97.67	1.97	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.60
Unsealed Dust	CHA	1990.2	95.18	38.07	96.75	13.59	0.93	0.69	101.65	90.28	61.81	3.53	40.02	0.00	0.00	0.00	0.00	2.95	30.20
Unsealed Dust	CHA	1994.9	100.87	40.35	102.81	14.46	0.95	0.48	101.93	96.42	66.00	3.74	42.70	0.00	0.00	0.00	0.00	2.65	32.28
Unsealed Dust	CHA	1999.5	80.53	32.21	79.34	9.20	0.98	0.31	98.53	55.89	42.30	11.98	28.20	0.00	0.00	0.00	0.00	11.47	20.79
Unsealed Dust	CMO	1990.6	7.36	2.95	7.41	0.74	0.95	1.09	100.64	2.69	3.50	3.07	2.51	0.32	1.94	0.00	0.00	1.33	1.53
Unsealed Dust	CMO	1998.7	11.76	4.70	11.60	1.34	0.93	0.84	98.71	7.16	4.32	4.45	4.17	0.00	0.00	0.00	0.00	0.00	0.00
Unsealed Dust	CMO	2000.8	6.78	2.71	6.66	0.85	0.94	0.62	98.25	5.39	2.63	1.26	2.40	0.00	0.00	0.00	0.00	0.00	0.00
Unsealed Dust	CYN	1995.3	0.17	0.07	0.17	0.02	0.95	0.87	95.87	0.07	0.08	0.08	0.06	0.00	0.00	0.00	0.00	0.02	0.04
Unsealed Dust	CYN	1997.2	0.11	0.04	0.11	0.01	0.97	0.29	96.13	0.01	0.06	0.08	0.05	0.00	0.00	0.00	0.00	0.01	0.03
Unsealed Dust	CYN	1998.6	0.11	0.04	0.10	0.01	0.97	0.41	97.71	0.01	0.05	0.07	0.04	0.00	0.00	0.00	0.00	0.02	0.03
Unsealed Dust	DEK	1990	0.46	0.18	0.44	0.05	0.94	0.54	96.53	0.00	0.00	0.39	0.14	0.01	0.13	0.00	0.00	0.05	0.08
Unsealed Dust	DEK	1990	0.73	0.29	0.71	0.09	0.92	1.21	97.16	0.00	0.41	0.54	0.33	0.06	0.26	0.00	0.00	0.11	0.18
Unsealed Dust	DEK	1990	0.83	0.33	0.72	0.07	0.87	1.98	86.57	0.00	0.00	0.39	0.16	0.14	0.16	0.00	0.00	0.19	0.13
Unsealed Dust	ECO	1996.4	4.27	1.71	4.44	0.54	0.93	0.84	104.10	3.29	2.52	1.01	1.73	0.00	0.00	0.00	0.00	0.14	1.18
Unsealed Dust	ECO	1998.3	4.99	2.00	4.77	0.56	0.92	1.15	95.49	3.28	2.59	1.24	1.80	0.00	0.00	0.00	0.00	0.25	1.21
Unsealed Dust	ECO	1999.7	6.91	2.77	6.61	0.79	0.92	1.08	95.68	4.60	3.74	1.99	2.62	0.00	0.00	0.00	0.00	0.03	1.72
Unsealed Dust	FAR	1983.6	0.30	0.12	0.31	0.03	0.94	0.86	102.14	0.00	0.00	0.13	0.07	0.14	0.07	0.04	0.04	0.00	0.00
Unsealed Dust	FAR	1991.5	0.30	0.12	0.29	0.03	0.98	0.33	96.52	0.02	0.15	0.19	0.12	0.08	0.10	0.00	0.00	0.01	0.06
Unsealed Dust	FAR	1997.1	0.35	0.14	0.36	0.04	0.90	1.14	104.97	0.00	0.00	0.15	0.08	0.21	0.08	0.00	0.00	0.00	0.00
Unsealed Dust	FOS	1996.2	16.51	6.61	15.73	1.64	0.97	0.48	95.25	8.47	7.53	4.10	5.32	0.00	0.00	0.00	0.00	3.16	3.69
Unsealed Dust	FOS	1998.4	13.59	5.44	12.80	1.39	0.96	0.67	94.14	7.72	6.63	3.48	4.69	0.00	0.00	0.00	0.00	1.60	3.10
Unsealed Dust	FOS	2000.4	8.97	3.59	8.36	1.13	0.95	0.39	93.24	7.41	3.62	0.95	3.29	0.00	0.00	0.00	0.00	0.00	0.00
Unsealed Dust	HAR	1991	38.39	15.36	36.68	5.33	0.98	0.14	95.55	36.68	5.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unsealed Dust	HAR	1999	31.91	12.76	30.16	4.36	0.97	0.19	94.51	29.76	9.59	0.00	0.00	0.00	0.00	0.00	0.00	0.39	9.06
Unsealed Dust	HAR	2006	38.25	15.30	36.20	4.73	0.98	0.16	94.65	30.87	15.16	5.34	13.82	0.00	0.00	0.00	0.00	0.00	0.00
Unsealed Dust	HIL	1993	1.19	0.47	1.17	0.12	0.96	0.74	98.28	0.38	0.55	0.59	0.42	0.00	0.00	0.00	0.00	0.20	0.26
Unsealed Dust	HIL	1995.6	1.72	0.69	1.67	0.16	0.94	1.55	97.15	0.40	0.75	0.60	0.51	0.36	0.44	0.00	0.00	0.31	0.34
Unsealed Dust	HIL	1997.7	1.87	0.75	1.81	0.17	0.94	1.46	96.81	0.46	0.85	0.61	0.55	0.47	0.48	0.00	0.00	0.28	0.37
Unsealed Dust	HSP	1990.7	7.17	2.87	7.14	0.99	0.97	0.30	99.58	6.65	4.56	0.24	2.96	0.00	0.00	0.00	0.00	0.24	2.24
Unsealed Dust	HSP	1995.7	7.05	2.82	7.01	1.02	0.95	0.34	99.50	6.93	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.09	2.09
Unsealed Dust	HSP	2000	9.43	3.77	9.32	1.21	0.97	0.35	98.84	7.90	5.53	0.78	3.62	0.00	0.00	0.00	0.00	0.64	2.71
Unsealed Dust	KIL	1994	24.44	9.78	22.98	2.79	0.90	1.07	94.01	16.64	9.42	6.34	8.91	0.00	0.00	0.00	0.00	0.00	0.00
Unsealed Dust	KIL	1997	60.59	24.24	57.81	6.47	0.92	1.21	95.41	35.33	31.42	18.90	22.50	0.00	0.00	0.00	0.00	3.58	14.32
Unsealed Dust	KIL	1999.1	57.61	23.04	54.67	7.32	0.90	1.01	94.91	47.22	34.24	0.67	22.41	0.00	0.00	0.00	0.00	6.78	16.68
Unsealed Dust	LKH	2000.4	9.62	3.85	9.33	0.98	0.97	0.57	96.99	6.22	4.59	2.87	3.21	0.00	0.00	0.00	0.00	0.25	2.17
Unsealed Dust	LKH	2003	7.52	3.01	7.37	1.05	0.97	0.26	98.09	7.22	1.73	0.00	0.00	0.00	0.00	0.15	1.75	0.00	0.00
Unsealed Dust	LKH	2006.9	11.16	4.46	10.88	1.50	0.96	0.26	97.49	10.88	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unsealed Dust	LKW	1991.1	12.04	4.82	12.07	1.32	0.98	0.24	100.27	7.52	6.01	2.61	4.07	0.00	0.00	0.00	0.00	1.95	2.98
Unsealed Dust	LKW	1995.3	15.69	6.28	15.80	1.82	0.98	0.26	100.73	10.79	6.39	0.00	0.00	2.00	4.43	0.00	0.00	3.01	3.81

RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Contribution (%)				
Unsealed lot dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
83.6	0.0	0.0	0.0	16.4
89.7	0.0	0.0	0.0	10.3
88.7	6.8	0.0	0.0	4.6
65.6	21.0	0.0	7.2	6.2
72.2	23.0	0.0	0.0	4.8
96.9	0.0	0.0	0.0	3.1
52.6	0.0	9.8	13.6	24.0
77.5	10.3	0.0	3.5	8.7
86.3	13.7	0.0	0.0	0.0
88.1	0.0	6.6	0.0	5.3
96.5	0.0	2.4	0.0	1.1
93.0	0.0	0.0	0.0	7.0
93.3	3.6	0.0	0.0	3.0
93.8	3.6	0.0	0.0	2.6
70.4	15.1	0.0	0.0	14.5
36.2	41.5	4.4	0.0	17.9
61.7	38.3	0.0	0.0	0.0
81.0	19.0	0.0	0.0	0.0
42.8	45.2	0.0	0.0	12.0
10.5	80.0	0.0	0.0	9.5
7.8	71.8	0.0	0.0	20.4
0.0	87.8	1.8	0.0	10.4
0.6	76.1	8.2	0.0	15.1
0.0	54.8	19.3	0.0	25.9
74.2	22.7	0.0	0.0	3.2
68.8	26.1	0.0	0.0	5.2
69.6	30.0	0.0	0.0	0.4
0.0	41.5	44.4	14.1	0.0
5.2	65.7	27.3	0.0	1.7
0.0	42.4	57.6	0.0	0.0
53.8	26.1	0.0	0.0	20.1
60.3	27.2	0.0	0.0	12.5
88.7	11.3	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0
98.7	0.0	0.0	0.0	1.3
85.3	14.7	0.0	0.0	0.0
32.3	50.9	0.0	0.0	16.8
23.9	36.1	21.5	0.0	18.5
25.1	33.6	25.7	0.0	15.6
93.2	3.4	0.0	0.0	3.4
98.7	0.0	0.0	0.0	1.3
84.8	8.4	0.0	0.0	6.8
72.4	27.6	0.0	0.0	0.0
61.1	32.7	0.0	0.0	6.2
86.4	1.2	0.0	0.0	12.4
66.6	30.7	0.0	0.0	2.7
97.9	0.0	0.0	2.1	0.0
100.0	0.0	0.0	0.0	0.0
62.2	21.6	0.0	0.0	16.1
68.3	0.0	12.7	0.0	19.1

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Unsealed Dust	LKW	1998.9	14.59	5.84	14.65	1.85	0.97	0.29	100.46	11.86	8.44	1.03	5.46	0.00	0.00	0.00	0.00	1.77	4.21	80.9	7.0	0.0	0.0	12.1
Unsealed Dust	LVB	1992	0.08	0.03	0.08	0.01	0.81	1.31	102.92	0.00	0.00	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Unsealed Dust	LVB	1994.9	0.09	0.04	0.09	0.01	0.82	1.27	105.57	0.00	0.00	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Unsealed Dust	LVB	1998.2	0.08	0.03	0.08	0.01	0.83	1.16	101.32	0.00	0.00	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Unsealed Dust	MAP	1993.8	3.15	1.26	2.97	0.33	0.95	0.78	94.27	1.73	1.59	1.09	1.14	0.00	0.00	0.00	0.00	0.15	0.72	58.2	36.8	0.0	0.0	5.0
Unsealed Dust	MAP	1996.5	2.63	1.05	2.55	0.30	0.96	0.57	97.13	1.71	1.42	0.83	0.99	0.00	0.00	0.00	0.00	0.01	0.66	66.9	32.7	0.0	0.0	0.4
Unsealed Dust	MAP	1999.7	3.54	1.42	3.52	0.51	0.96	0.33	99.28	3.45	1.42	0.00	0.00	0.07	1.25	0.00	0.00	0.00	0.00	97.9	0.0	2.1	0.0	0.0
Unsealed Dust	MYS	1996.5	61.64	24.66	62.21	7.71	0.94	0.57	100.92	47.18	16.21	0.00	0.00	0.00	0.00	0.00	0.00	15.02	16.12	75.9	0.0	0.0	0.0	24.1
Unsealed Dust	MYS	2000.7	70.69	28.28	71.30	9.17	0.95	0.48	100.87	58.76	19.57	0.00	0.00	0.00	0.00	0.00	0.00	12.55	18.98	82.4	0.0	0.0	0.0	17.6
Unsealed Dust	MYS	2000.7	83.55	33.42	83.99	11.24	0.93	0.57	100.52	73.78	24.10	0.00	0.00	0.00	0.00	0.00	0.00	10.21	22.99	87.8	0.0	0.0	0.0	12.2
Unsealed Dust	NEW	1991.7	74.29	29.72	75.95	10.47	0.95	0.44	102.24	69.91	22.55	0.00	0.00	0.00	0.00	0.00	0.00	6.04	21.37	92.1	0.0	0.0	0.0	7.9
Unsealed Dust	NEW	1993.3	53.05	21.22	47.38	5.00	0.86	3.18	89.31	6.66	22.69	15.69	15.88	5.10	11.07	0.00	0.00	19.94	11.44	14.0	33.1	10.8	0.0	42.1
Unsealed Dust	NEW	1995	97.43	38.97	99.47	13.68	0.94	0.53	102.09	91.09	29.39	0.00	0.00	0.00	0.00	0.00	0.00	8.38	27.83	91.6	0.0	0.0	0.0	8.4
Unsealed Dust	NJCP	1993.7	3.59	1.44	3.55	0.40	0.97	0.31	98.97	0.00	0.00	0.00	0.00	1.60	0.63	0.00	0.00	1.95	0.79	0.0	0.0	45.0	0.0	55.0
Unsealed Dust	NJCP	1995.6	4.91	1.96	4.76	0.52	0.92	1.25	97.03	2.68	1.72	0.00	0.00	0.78	1.22	0.00	0.00	1.30	1.09	56.3	0.0	16.5	0.0	27.2
Unsealed Dust	NJCP	1997	4.34	1.73	4.31	0.48	0.95	0.72	99.39	2.68	1.63	0.00	0.00	0.53	1.14	0.00	0.00	1.11	1.02	62.1	0.0	12.2	0.0	25.7
Unsealed Dust	NJOR	1992.3	7.23	2.89	7.23	1.07	0.89	0.73	99.99	7.23	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.0	0.0	0.0	0.0	0.0
Unsealed Dust	NJOR	1995.2	9.90	3.96	10.18	1.50	0.94	0.47	102.83	10.14	4.17	0.00	0.00	0.04	3.65	0.00	0.00	0.00	0.00	99.6	0.0	0.4	0.0	0.0
Unsealed Dust	NJOR	1997.2	10.32	4.13	10.34	1.42	0.90	0.90	100.18	9.30	3.92	0.00	0.00	1.04	3.46	0.00	0.00	0.00	0.00	89.9	0.0	10.1	0.0	0.0
Unsealed Dust	NTR	1993	43.49	17.39	39.83	4.16	0.88	2.15	91.59	12.47	17.54	11.93	13.20	0.00	0.00	0.00	0.00	15.43	9.23	31.3	29.9	0.0	0.0	38.7
Unsealed Dust	NTR	1999	35.62	14.25	33.55	3.56	0.94	0.93	94.19	17.07	17.13	13.19	12.84	0.00	0.00	0.00	0.00	3.29	7.66	50.9	39.3	0.0	0.0	9.8
Unsealed Dust	NTR	2004	27.98	11.19	26.77	2.80	0.95	0.77	95.70	12.88	13.12	10.71	9.90	0.00	0.00	0.00	0.00	3.19	5.98	48.1	40.0	0.0	0.0	11.9
Unsealed Dust	ORL	1994.1	34.98	13.99	32.95	3.45	0.89	2.00	94.21	14.57	15.36	7.64	10.82	0.00	0.00	0.00	0.00	10.74	7.89	44.2	23.2	0.0	0.0	32.6
Unsealed Dust	ORL	1996.6	34.44	13.78	32.68	3.51	0.89	1.73	94.88	18.25	16.68	7.18	11.51	0.00	0.00	0.00	0.00	7.26	8.08	55.8	22.0	0.0	0.0	22.2
Unsealed Dust	ORL	1997.5	18.58	7.43	17.84	1.95	0.91	1.42	96.00	10.71	9.43	4.46	6.58	0.00	0.00	0.00	0.00	2.68	4.41	60.0	25.0	0.0	0.0	15.0
Unsealed Dust	PEP	1998	1.01	0.40	0.92	0.10	0.91	1.38	91.69	0.56	0.52	0.19	0.36	0.00	0.00	0.00	0.00	0.17	0.24	61.1	21.0	0.0	0.0	17.9
Unsealed Dust	PEP	2002	0.85	0.34	0.77	0.08	0.91	1.53	90.03	0.43	0.42	0.18	0.30	0.00	0.00	0.00	0.00	0.16	0.20	56.2	23.1	0.0	0.0	20.7
Unsealed Dust	PEP	2006	1.17	0.47	1.03	0.11	0.89	1.74	88.19	0.61	0.59	0.33	0.43	0.00	0.00	0.00	0.00	0.09	0.26	59.3	32.0	0.0	0.0	8.6
Unsealed Dust	PLM	1997	29.38	11.75	29.26	3.80	0.95	0.44	99.61	24.72	8.24	0.00	0.00	0.00	0.00	0.00	0.00	4.54	7.95	84.5	0.0	0.0	0.0	15.5
Unsealed Dust	PLM	2002	31.84	12.74	31.54	3.89	0.94	0.65	99.07	23.64	8.26	0.00	0.00	0.00	0.00	0.00	0.00	7.90	8.24	75.0	0.0	0.0	0.0	25.0
Unsealed Dust	PLM	2006.1	32.54	13.02	32.63	4.27	0.95	0.47	100.28	27.96	9.28	0.00	0.00	0.00	0.00	0.00	0.00	4.68	8.92	85.7	0.0	0.0	0.0	14.3
Unsealed Dust	SCM	2001.7	4.07	1.63	4.06	0.58	0.99	0.06	99.70	3.98	1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.08	1.21	98.1	0.0	0.0	0.0	1.9
Unsealed Dust	SCM	2003	4.33	1.73	4.37	0.64	0.99	0.08	100.91	4.37	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.0	0.0	0.0	0.0	0.0
Unsealed Dust	SCM	2005.2	6.72	2.69	6.72	0.99	0.97	0.23	100.00	6.71	2.15	0.00	0.00	0.00	0.00	0.00	0.00	0.01	2.03	99.8	0.0	0.0	0.0	0.2
Unsealed Dust	SLN	1990.2	14.84	5.93	14.06	1.66	0.87	1.59	94.78	9.08	5.25	4.99	5.00	0.00	0.00	0.00	0.00	0.00	0.00	64.5	35.5	0.0	0.0	0.0
Unsealed Dust	SLN	1994.4	15.09	6.04	14.56	1.80	0.87	1.47	96.52	10.89	5.65	3.67	5.23	0.00	0.00	0.00	0.00	0.00	0.00	74.8	25.2	0.0	0.0	0.0
Unsealed Dust	SLN	1996.7	15.20	6.08	14.49	1.71	0.87	1.57	95.32	9.58	5.55	4.91	5.27	0.00	0.00	0.00	0.00	0.00	0.00	66.1	33.9	0.0	0.0	0.0
Unsealed Dust	SWT	1994.3	1.08	0.43	1.10	0.13	0.98	0.27	101.81	0.64	0.49	0.44	0.41	0.03	0.35	0.00	0.00	0.00	0.00	57.9	39.9	2.3	0.0	0.0
Unsealed Dust	SWT	1996.5	1.19	0.48	1.21	0.18	0.96	0.29	102.28	0.09	0.52	1.13	0.57	0.00	0.00	0.00	0.00	0.00	0.00	7.3	92.7	0.0	0.0	0.0
Unsealed Dust	SWT	1998.3	1.58	0.63	1.59	0.23	0.95	0.39	100.13	0.13	0.68	1.46	0.74	0.00	0.00	0.00	0.00	0.00	0.00	8.2	91.8	0.0	0.0	0.0
Unsealed Dust	TNB	1996.4	1.24	0.49	1.22	0.14	0.93	1.00	98.64	0.45	0.64	0.75	0.50	0.00	0.00	0.00	0.00	0.03	0.28	36.5	61.4	0.0	0.0	2.1
Unsealed Dust	TNB	2000.5	1.39	0.55	1.28	0.17	0.87	0.82	92.58	0.00	0.00	1.28	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Unsealed Dust	TNB	2003.7	0.97	0.39	0.93	0.10	0.89	1.84	95.13	0.38	0.47	0.45	0.36	0.00	0.00	0.00	0.00	0.09	0.21	41.4	48.6	0.0	0.0	9.9
Unsealed Dust	TWN	1991.5	5.59	2.24	5.39	0.65	0.92	1.07	96.31	4.07	3.07	0.71	2.06	0.00	0.00	0.00	0.00	0.61	1.47	75.5	13.2	0.0	0.0	11.3
Unsealed Dust	TWN	1991.5	6.32	2.53	6.14	0.77	0.93	0.68	97.15	4.70	1.64	0.00	0.00	0.00	0.00	0.00	0.00	1.44	1.62	76.6	0.0	0.0	0.0	23.4
Unsealed Dust	TWN	1998.1	7.43	2.97	7.25	0.82	0.93	1.08	97.53	4.68	3.75	0.94	2.50	0.00	0.00	0.00	0.00	1.64	1.87	64.5	12.9	0.0	0.0	22.6
Unsealed Dust	WAS	1991.9	0.41	0.16	0.40	0.05	0.95	0.61	97.79	0.29	0.23	0.10	0.15	0.00	0.00	0.00	0.00	0.02	0.11	71.6	23.7	0.0	0.0	4.7
Unsealed Dust	WAS	1994.8	0.33	0.13	0.32	0.04	0.95	0.48	97.41	0.24	0.13	0.09	0.12	0.00	0.00	0.00	0.00	0.00	0.00	73.1	26.9	0.0	0.0	0.0
Unsealed Dust	WAS	1997.5	0.33	0.13	0.32	0.04	0.94	0.56	97.77	0.26	0.13	0.06	0.12	0.00	0.00	0.00	0.00	0.00	0.00	80.6	19.4	0.0	0.0	0.0
Unsealed Dust	WEE	1996	0.56	0.23	0.53	0.07	0.94	0.66	93.75	0.43	0.32	0.06	0.21	0.00	0.00	0.00	0.00	0.04	0.15	81.4	10.8	0.0	0.0	7.8
Unsealed Dust	WEE	1999	0.60	0.24	0.57	0.07	0.95	0.62	96.01	0.46	0.34	0.04	0.22	0.00	0.00	0.00	0.00	0.07	0.16	79.9	7.5	0.0	0.0	12.6
Unsealed Dust	WEE	2002	0.91	0.36	0.88	0.12	0.97	0.32	96.67	0.80	0.57	0.01	0.37	0.00	0.00	0.00	0.00	0.07	0.28	91.0	1.6	0.0	0.0	7.4
Unsealed Dust	WES	1993.4	5.70	2.28	5.36	0.56	0.97	0.52	93.98	0.00	0.00	1.26	0.81	1.47	0.96	0.00	0.00	2.63	1.12	0.0	23.6	27.4	0.0	49.0
Unsealed Dust	WES	1995.6	8.15	3.26	8.09	0.81	0.98	0.68	99.27	1.99	3.51	2.22	2.37	1.71	2.05	0.14	1.51	2.02	1.72	24.6	27.5	21.2	1.7	25.0
Unsealed Dust	WES	1998	7.48	2.99	7.34	0.82	0.97	0.86	98.09	1.58	3.10	0.20	1.82	2.01	1.85	0.63	1.44	2.91	1.72	21.6	2.8	27.3	8.6	39.7
Unsealed Dust	WP55	1997.4	2.12	0.85	2.04	0.26	0.93	0.79	96.39	1.65	1.25	0.34	0.83	0.00	0.00	0.00	0.00	0.05	0.59	80.9	16.5	0.0	0.0	2.6

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Unsealed Dust	WP55	2000.6	1.78	0.71	1.67	0.21	0.89	1.21	93.82	1.28	0.67	0.40	0.62	0.00	0.00	0.00	0.00	0.00	0.00	76.3	23.7	0.0	0.0	0.0
Unsealed Dust	WP55	2003	1.87	0.75	1.75	0.21	0.91	1.06	93.66	1.16	0.67	0.59	0.64	0.00	0.00	0.00	0.00	0.00	0.00	66.5	33.5	0.0	0.0	0.0
Unsealed Dust	WRL	1999.9	1.63	0.65	1.53	0.19	0.91	1.06	93.75	1.20	0.91	0.15	0.61	0.00	0.00	0.00	0.00	0.17	0.43	79.0	9.8	0.0	0.0	11.3
Unsealed Dust	WRL	2002.1	1.40	0.56	1.33	0.15	0.94	0.93	95.13	0.83	0.69	0.18	0.47	0.00	0.00	0.00	0.00	0.32	0.35	62.0	13.7	0.0	0.0	24.3
Unsealed Dust	WRL	2003.2	2.60	1.04	2.35	0.28	0.90	1.39	90.32	1.70	1.39	0.46	0.96	0.00	0.00	0.00	0.00	0.20	0.64	72.3	19.4	0.0	0.0	8.3
Unsealed Dust	WST	1995	11.28	4.51	11.27	1.29	0.98	0.34	99.95	0.77	5.52	7.21	4.45	0.00	0.00	0.00	0.00	3.30	2.67	6.8	63.9	0.0	0.0	29.3
Unsealed Dust	WST	1996.8	10.86	4.35	10.81	1.17	0.98	0.34	99.52	0.86	5.11	5.81	4.09	0.53	3.06	0.00	0.00	3.61	2.46	7.9	53.7	4.9	0.0	33.4
Unsealed Dust	WST	1998.3	7.00	2.80	7.11	0.87	0.97	0.31	101.59	0.01	3.73	5.30	3.03	0.00	0.00	0.00	0.00	1.80	1.76	0.2	74.5	0.0	0.0	25.3
Unsealed Dust	WTN	1993	1.33	0.53	1.27	0.13	0.96	0.66	94.94	0.41	0.53	0.37	0.39	0.00	0.00	0.00	0.00	0.48	0.29	32.4	29.5	0.0	0.0	38.1
Unsealed Dust	WTN	2000	2.97	1.19	2.83	0.30	0.95	0.76	95.32	1.32	1.27	0.47	0.87	0.00	0.00	0.00	0.00	1.04	0.70	46.5	16.6	0.0	0.0	36.9
Unsealed Dust	WTN	2004	3.87	1.55	3.70	0.38	0.96	0.70	95.56	1.46	1.63	1.09	1.18	0.00	0.00	0.00	0.00	1.15	0.84	39.5	29.3	0.0	0.0	31.1
Unsealed Dust	WTY	2001.1	44.96	17.99	45.15	5.49	0.98	0.22	100.41	34.56	26.06	8.77	17.63	0.00	0.00	0.00	0.00	1.81	12.32	76.6	19.4	0.0	0.0	4.0
Unsealed Dust	WTY	2004	45.18	18.07	45.67	5.50	0.99	0.16	101.09	34.17	26.17	10.39	17.87	0.00	0.00	0.00	0.00	1.11	12.30	74.8	22.7	0.0	0.0	2.4
Unsealed Dust	WTY	2005.3	46.66	18.66	47.04	6.40	0.96	0.37	100.83	42.34	23.25	0.00	0.00	0.68	15.65	0.00	0.00	4.03	13.34	90.0	0.0	1.4	0.0	8.6

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)
	Site		Concentrations				Statistics			Estimated Sources									
Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	TestPlot RTS (mg/kg)	Std. error (TestPlot RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)
Test Plot RTS	ANN	2003.6	15.21	6.08	13.75	1.64	0.85	1.77	90.41	0.00	0.00	5.02	2.07	0.00	0.00	0.00	0.00	8.73	2.91
Test Plot RTS	ANN	2006.2	15.48	6.19	14.02	1.58	0.87	1.50	90.54	0.00	0.00	6.76	2.26	0.00	0.00	0.00	0.00	7.26	2.81
Test Plot RTS	ANN	2008.2	16.32	6.53	15.08	1.66	0.90	1.05	92.42	0.00	0.00	8.81	2.55	0.00	0.00	0.00	0.00	6.27	2.87
Test Plot RTS	BAL	2002.9	8.76	3.50	8.28	0.84	0.91	1.12	94.47	0.00	0.00	5.39	1.34	0.00	0.00	0.00	0.00	2.89	1.43
Test Plot RTS	BAL	2004	21.60	8.64	20.84	2.13	0.92	1.00	96.47	0.00	0.00	14.72	3.47	0.00	0.00	0.00	0.00	6.12	3.48
Test Plot RTS	BAL	2006.3	14.89	5.96	14.45	1.40	0.82	3.90	97.02	0.00	0.00	1.76	1.58	6.16	2.53	0.00	0.00	6.53	2.75
Test Plot RTS	BEC	1999	1.50	0.60	1.45	0.14	0.97	0.62	96.53	0.20	0.31	0.40	0.23	0.19	0.40	0.00	0.00	0.66	0.28
Test Plot RTS	BEC	2000.1	1.93	0.77	1.91	0.20	0.97	0.46	98.86	0.11	0.53	1.15	0.39	0.00	0.00	0.03	0.40	0.62	0.36
Test Plot RTS	BEC	2001.5	2.34	0.94	2.34	0.26	0.95	0.51	99.96	0.09	0.42	1.73	0.54	0.00	0.00	0.00	0.00	0.52	0.42
Test Plot RTS	BRK	1995.7	2.07	0.83	2.02	0.19	0.94	0.96	97.85	0.00	0.00	0.75	0.36	0.65	0.39	0.00	0.00	0.62	0.34
Test Plot RTS	BRK	1997.7	3.02	1.21	2.91	0.28	0.92	1.25	96.15	0.00	0.00	1.15	0.53	0.85	0.56	0.00	0.00	0.91	0.49
Test Plot RTS	BRK	1999.1	2.17	0.87	2.14	0.21	0.89	1.85	98.69	0.00	0.00	0.67	0.35	0.82	0.42	0.00	0.00	0.65	0.36
Test Plot RTS	CHA	1990.2	95.18	38.07	95.13	10.51	0.92	0.83	99.95	0.00	0.00	65.30	16.65	0.00	0.00	0.00	0.00	29.83	16.76
Test Plot RTS	CHA	1994.9	100.87	40.35	101.54	10.80	0.94	0.78	100.66	0.00	0.00	65.74	25.55	7.43	22.89	0.00	0.00	28.37	17.67
Test Plot RTS	CHA	1999.5	80.53	32.21	82.67	9.11	0.96	0.46	102.65	1.01	13.92	54.76	17.96	0.00	0.00	0.00	0.00	26.89	15.39
Test Plot RTS	CMO	1990.6	7.36	2.94	7.45	0.82	0.95	0.54	101.25	0.00	0.00	5.08	1.98	0.18	1.75	0.00	0.00	2.20	1.35
Test Plot RTS	CMO	1998.7	11.76	4.70	11.30	1.34	0.90	0.84	96.15	0.00	0.00	9.50	2.23	0.00	0.00	0.00	0.00	1.80	1.96
Test Plot RTS	CMO	2000.8	6.78	2.71	6.44	0.73	0.91	0.86	95.11	0.00	0.00	4.97	1.21	0.00	0.00	0.00	0.00	1.48	1.12
Test Plot RTS	CYN	1995.3	0.17	0.07	0.18	0.02	0.92	1.14	101.34	0.01	0.05	0.12	0.04	0.00	0.00	0.01	0.04	0.03	0.03
Test Plot RTS	CYN	1997.2	0.11	0.04	0.11	0.01	0.92	1.00	103.32	0.00	0.00	0.09	0.03	0.01	0.03	0.02	0.02	0.00	0.02
Test Plot RTS	DEK	1990	0.46	0.18	0.44	0.05	0.94	0.54	96.53	0.00	0.00	0.39	0.14	0.01	0.13	0.00	0.00	0.05	0.08
Test Plot RTS	DEK	1990	0.73	0.29	0.67	0.07	0.92	1.07	91.43	0.00	0.00	0.43	0.17	0.10	0.15	0.00	0.00	0.13	0.11
Test Plot RTS	DEK	1990	0.83	0.33	0.72	0.07	0.87	1.98	86.57	0.00	0.00	0.39	0.16	0.14	0.16	0.00	0.00	0.19	0.13
Test Plot RTS	ECO	1996.4	4.27	1.71	4.04	0.40	0.86	2.30	94.71	0.00	0.00	1.09	0.63	1.38	0.73	0.00	0.00	1.57	0.74
Test Plot RTS	ECO	1998.3	4.99	2.00	4.91	0.56	0.92	0.72	98.37	0.00	0.00	3.81	0.92	0.00	0.00	0.00	0.00	1.10	0.85
Test Plot RTS	ECO	1999.7	6.91	2.76	6.88	0.80	0.93	0.65	99.47	0.00	0.00	5.68	1.33	0.00	0.00	0.00	0.00	1.20	1.19
Test Plot RTS	FAR	1983.6	0.30	0.12	0.30	0.03	0.94	1.12	101.45	0.05	0.20	0.14	0.10	0.09	0.18	0.02	0.11	0.00	0.00
Test Plot RTS	FAR	1991.5	0.30	0.12	0.31	0.03	0.94	1.04	102.68	0.10	0.08	0.13	0.06	0.08	0.09	0.00	0.00	0.00	0.00
Test Plot RTS	FAR	1997.1	0.35	0.14	0.36	0.03	0.92	1.28	103.91	0.12	0.09	0.15	0.07	0.09	0.11	0.00	0.00	0.00	0.00
Test Plot RTS	FOS	1996.2	16.51	6.60	15.67	1.72	0.94	0.64	94.91	0.00	0.00	10.27	2.79	0.00	0.00	0.00	0.00	5.40	2.91
Test Plot RTS	FOS	1998.4	13.59	5.44	12.86	1.43	0.92	0.77	94.60	0.00	0.00	9.21	2.37	0.00	0.00	0.00	0.00	3.65	2.33
Test Plot RTS	FOS	2000.4	8.97	3.59	8.33	0.94	0.90	0.97	92.86	0.00	0.00	6.27	1.57	0.00	0.00	0.00	0.00	2.06	1.49
Test Plot RTS	HAR	1991	38.39	15.36	37.50	3.59	0.92	1.49	97.69	0.00	0.00	18.80	8.31	6.89	7.98	1.59	4.69	10.24	6.14
Test Plot RTS	HAR	1999	31.91	12.76	30.88	3.05	0.91	1.53	96.79	0.00	0.00	16.24	7.02	3.86	6.68	1.24	3.88	9.54	5.28
Test Plot RTS	HAR	2006	38.25	15.30	37.81	4.09	0.94	0.83	98.86	0.00	0.00	27.39	10.82	0.56	9.98	3.46	5.50	6.40	6.49
Test Plot RTS	HIL	1993	1.18	0.47	1.13	0.12	0.94	0.55	95.17	0.00	0.00	0.79	0.20	0.00	0.00	0.00	0.00	0.34	0.20
Test Plot RTS	HIL	1995.6	1.72	0.69	1.60	0.15	0.93	1.11	93.20	0.00	0.00	0.63	0.29	0.49	0.31	0.00	0.00	0.49	0.28
Test Plot RTS	HIL	1997.7	1.87	0.75	1.77	0.17	0.94	0.91	94.57	0.00	0.00	0.58	0.30	0.75	0.37	0.00	0.00	0.44	0.30
Test Plot RTS	HSP	1990.7	7.17	2.87	7.30	0.70	0.93	1.36	101.78	0.72	5.32	3.94	2.42	0.75	4.53	0.08	2.75	1.80	1.20
Test Plot RTS	HSP	1995.7	7.05	2.82	7.09	0.72	0.93	1.10	100.64	0.53	1.77	4.23	1.70	0.42	2.39	0.00	0.00	1.91	1.21
Test Plot RTS	HSP	2000	9.43	3.77	9.61	0.95	0.94	0.99	101.93	1.43	2.41	5.51	2.24	0.25	3.15	0.00	0.00	2.42	1.62
Test Plot RTS	KIL	1994	24.44	9.78	21.79	2.48	0.85	1.54	89.15	0.00	0.00	16.21	4.15	0.00	0.00	0.00	0.00	5.58	3.95
Test Plot RTS	KIL	1997	60.59	24.24	55.10	6.20	0.87	1.29	90.94	0.00	0.00	39.87	10.26	0.00	0.00	0.00	0.00	15.23	9.97
Test Plot RTS	KIL	1999.1	57.61	23.04	50.11	5.60	0.82	2.06	86.99	0.00	0.00	28.09	8.59	0.00	0.00	0.00	0.00	22.02	9.81
Test Plot RTS	LKH	2000.4	9.62	3.85	9.39	0.97	0.94	0.66	97.56	0.00	0.00	7.00	1.61	0.00	0.00	0.00	0.00	2.38	1.56
Test Plot RTS	LKH	2003	7.52	3.01	6.98	0.62	0.88	2.49	92.87	0.00	0.00	2.96	1.19	1.51	1.21	0.00	0.00	2.50	1.17
Test Plot RTS	LKH	2006.9	11.16	4.46	10.58	1.05	0.87	1.98	94.81	0.00	0.00	6.76	2.43	0.43	2.22	0.00	0.00	3.39	1.84
Test Plot RTS	LKW	1991.1	12.04	4.82	12.03	1.28	0.98	0.31	99.92	0.00	0.00	7.27	2.90	0.65	2.62	0.00	0.00	4.11	2.22
Test Plot RTS	LKW	1995.3	15.69	6.28	15.86	1.55	0.97	0.50	101.10	0.00	0.00	5.46	2.71	4.30	2.93	0.00	0.00	6.11	2.88
Test Plot RTS	LKW	1998.9	14.59	5.83	14.63	1.53	0.96	0.52	100.32	0.00	0.00	8.41	3.39	1.27	3.09	0.00	0.00	4.95	2.64

RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Contribution (%)				
TestPlot RTS	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
0.0	36.5	0.0	0.0	63.5
0.0	48.2	0.0	0.0	51.8
0.0	58.4	0.0	0.0	41.6
0.0	65.1	0.0	0.0	34.9
0.0	70.6	0.0	0.0	29.4
0.0	12.2	42.6	0.0	45.2
13.7	27.6	13.3	0.0	45.3
5.6	60.2	0.0	1.7	32.6
3.9	73.9	0.0	0.0	22.3
0.0	37.0	32.3	0.0	30.8
0.0	39.7	29.2	0.0	31.1
0.0	31.2	38.4	0.0	30.4
0.0	68.6	0.0	0.0	31.4
0.0	64.7	7.3	0.0	27.9
1.2	66.2	0.0	0.0	32.5
0.0	68.2	2.3	0.0	29.5
0.0	84.1	0.0	0.0	15.9
0.0	77.1	0.0	0.0	22.9
8.5	69.8	0.0	3.5	18.2
0.0	75.3	4.8	16.8	3.1
0.0	87.9	1.8	0.0	10.4
0.0	64.4	15.5	0.0	20.1
0.0	54.8	19.4	0.0	25.9
0.0	27.0	34.2	0.0	38.8
0.0	77.5	0.0	0.0	22.5
0.0	82.6	0.0	0.0	17.4
17.8	46.9	28.8	6.6	0.0
32.6	41.8	25.6	0.0	0.0
32.6	41.7	25.7	0.0	0.0
0.0	65.5	0.0	0.0	34.5
0.0	71.6	0.0	0.0	28.4
0.0	75.3	0.0	0.0	24.7
0.0	50.1	18.4	4.2	27.3
0.0	52.6	12.5	4.0	30.9
0.0	72.4	1.5	9.2	16.9
0.0	69.8	0.0	0.0	30.2
0.0	39.0	30.3	0.0	30.7
0.0	32.5	42.4	0.0	25.1
9.8	54.0	10.3	1.1	24.7
7.5	59.6	5.9	0.0	27.0
14.9	57.4	2.6	0.0	25.2
0.0	74.4	0.0	0.0	25.6
0.0	72.4	0.0	0.0	27.6
0.0	56.1	0.0	0.0	43.9
0.0	74.6	0.0	0.0	25.4
0.0	42.4	21.7	0.0	35.9
0.0	63.9	4.0	0.0	32.0
0.0	60.4	5.4	0.0	34.2
0.0	34.4	27.1	0.0	38.5
0.0	57.5	8.6	0.0	33.9

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Test Plot RTS	LVB	1992	0.08	0.03	0.08	0.01	0.86	1.39	100.24	0.00	0.00	0.06	0.01	0.00	0.00	0.02	0.01	0.00	0.00	0.0	73.9	0.0	26.1	0.0
Test Plot RTS	LVB	1994.9	0.09	0.03	0.09	0.01	0.88	1.23	103.39	0.00	0.00	0.06	0.02	0.00	0.00	0.03	0.01	0.00	0.00	0.0	71.3	0.0	28.7	0.0
Test Plot RTS	LVB	1998.2	0.08	0.03	0.08	0.01	0.85	1.43	98.50	0.00	0.00	0.06	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.0	81.3	0.0	18.7	0.0
Test Plot RTS	MAP	1993.8	3.15	1.26	3.24	0.35	0.91	1.23	102.84	0.00	0.00	2.41	0.96	0.08	0.86	0.34	0.49	0.41	0.55	0.0	74.3	2.5	10.6	12.6
Test Plot RTS	MAP	1996.5	2.63	1.05	2.71	0.29	0.92	1.33	103.40	0.01	2.31	1.96	1.10	0.22	1.97	0.24	1.22	0.29	0.46	0.3	72.2	8.2	8.7	10.6
Test Plot RTS	MAP	1999.7	3.54	1.42	3.61	0.34	0.93	1.24	101.92	0.00	0.00	1.59	0.79	1.42	0.80	0.07	0.49	0.53	0.56	0.0	44.1	39.2	2.0	14.7
Test Plot RTS	MYS	1996.5	61.64	24.66	60.96	7.32	0.90	1.43	98.90	0.00	0.00	13.67	8.91	7.35	9.45	0.00	0.00	39.95	13.65	0.0	22.4	12.1	0.0	65.5
Test Plot RTS	MYS	2000.7	70.69	28.28	68.59	7.92	0.90	1.45	97.04	0.00	0.00	23.73	11.84	5.04	11.49	0.00	0.00	39.82	14.73	0.0	34.6	7.4	0.0	58.1
Test Plot RTS	MYS	2000.7	83.55	33.42	80.89	9.10	0.89	1.23	96.82	0.00	0.00	40.19	12.76	0.00	0.00	0.00	0.00	40.71	15.76	0.0	49.7	0.0	0.0	50.3
Test Plot RTS	NEW	1991.7	74.29	29.71	71.02	7.92	0.89	1.41	95.60	0.00	0.00	34.37	14.67	2.62	13.44	0.00	0.00	34.03	14.34	0.0	48.4	3.7	0.0	47.9
Test Plot RTS	NEW	1993.3	53.05	21.22	48.45	5.39	0.88	1.35	91.33	0.00	0.00	27.01	8.19	0.00	0.00	0.00	0.00	21.44	9.43	0.0	55.7	0.0	0.0	44.3
Test Plot RTS	NEW	1995	97.43	38.97	93.69	10.52	0.89	1.36	96.16	0.00	0.00	47.96	20.12	1.78	18.26	0.00	0.00	43.95	18.90	0.0	51.2	1.9	0.0	46.9
Test Plot RTS	NJCP	1993.7	3.59	1.44	3.55	0.39	0.97	0.31	98.97	0.00	0.00	0.00	0.00	1.60	0.63	0.00	0.00	1.95	0.79	0.0	0.0	45.0	0.0	55.0
Test Plot RTS	NJCP	1995.6	4.91	1.96	4.79	0.53	0.90	1.19	97.53	0.00	0.00	0.00	0.00	2.35	0.86	0.00	0.00	2.44	1.04	0.0	0.0	49.1	0.0	50.9
Test Plot RTS	NJOR	1992.3	7.23	2.89	6.80	0.69	0.88	1.70	94.01	0.00	0.00	3.91	1.60	2.41	1.61	0.00	0.00	0.47	1.05	0.0	57.6	35.5	0.0	6.9
Test Plot RTS	NJOR	1995.2	9.90	3.96	9.33	0.89	0.89	1.68	94.27	0.00	0.00	3.71	1.71	3.68	1.94	0.00	0.00	1.94	1.48	0.0	39.8	39.4	0.0	20.8
Test Plot RTS	NJOR	1997.2	10.32	4.13	9.81	0.96	0.89	1.67	95.02	0.00	0.00	2.91	1.62	5.00	2.13	0.00	0.00	1.90	1.60	0.0	29.7	51.0	0.0	19.4
Test Plot RTS	NTR	1993	43.49	17.39	38.77	4.32	0.86	1.57	89.15	0.00	0.00	21.41	6.66	0.00	0.00	0.00	0.00	17.36	7.69	0.0	55.2	0.0	0.0	44.8
Test Plot RTS	NTR	1999	35.62	14.25	33.77	3.79	0.93	0.66	94.80	0.00	0.00	25.01	6.31	0.00	0.00	0.00	0.00	8.76	6.08	0.0	74.1	0.0	0.0	25.9
Test Plot RTS	NTR	2004	27.98	11.19	26.08	2.89	0.93	0.70	93.23	0.00	0.00	18.22	4.76	0.00	0.00	0.00	0.00	7.86	4.79	0.0	69.9	0.0	0.0	30.1
Test Plot RTS	ORL	1994.1	34.98	13.99	31.85	3.57	0.87	1.49	91.05	0.00	0.00	16.64	5.27	0.00	0.00	0.00	0.00	15.20	6.29	0.0	52.3	0.0	0.0	47.7
Test Plot RTS	ORL	1996.6	34.44	13.78	31.37	3.48	0.87	1.48	91.09	0.00	0.00	18.27	5.35	0.00	0.00	0.00	0.00	13.10	5.99	0.0	58.2	0.0	0.0	41.8
Test Plot RTS	ORL	1997.5	18.58	7.43	17.09	1.89	0.88	1.30	91.96	0.00	0.00	10.85	2.99	0.00	0.00	0.00	0.00	6.24	3.17	0.0	63.5	0.0	0.0	36.5
Test Plot RTS	PEP	1998	1.00	0.40	1.01	0.10	0.89	1.48	100.31	0.00	0.00	0.62	0.20	0.00	0.00	0.10	0.13	0.28	0.17	0.0	61.9	0.0	10.0	28.2
Test Plot RTS	PEP	2002	0.85	0.34	0.85	0.09	0.89	1.57	100.15	0.00	0.00	0.50	0.17	0.00	0.00	0.12	0.11	0.23	0.14	0.0	59.0	0.0	14.4	26.6
Test Plot RTS	PEP	2006	1.17	0.47	1.19	0.13	0.88	1.54	101.50	0.00	0.00	0.86	0.25	0.00	0.00	0.21	0.18	0.12	0.20	0.0	72.9	0.0	17.4	9.7
Test Plot RTS	PLM	1997	29.38	11.75	27.60	3.43	0.86	1.94	93.96	0.00	0.00	5.82	4.04	2.54	4.18	0.00	0.00	19.24	6.38	0.0	21.1	9.2	0.0	69.7
Test Plot RTS	PLM	2002	31.84	12.74	31.45	4.25	0.86	1.71	98.79	0.00	0.00	3.39	4.21	3.04	4.65	0.00	0.00	25.03	7.78	0.0	10.8	9.7	0.0	79.6
Test Plot RTS	PLM	2006.1	32.54	13.02	30.55	3.83	0.85	2.12	93.87	0.00	0.00	4.36	4.09	4.55	4.61	0.00	0.00	21.63	7.13	0.0	14.3	14.9	0.0	70.8
Test Plot RTS	SCM	2001.7	4.07	1.63	4.06	0.39	0.94	1.07	99.71	0.01	1.09	1.01	0.63	1.91	1.24	0.00	0.00	1.12	0.72	0.3	24.8	47.1	0.0	27.7
Test Plot RTS	SCM	2003	4.33	1.73	4.35	0.42	0.93	1.01	100.47	0.00	0.00	1.26	0.70	1.96	0.90	0.00	0.00	1.13	0.74	0.0	29.1	45.0	0.0	26.0
Test Plot RTS	SCM	2005.2	6.72	2.69	6.76	0.59	0.89	2.37	100.53	1.08	1.67	1.93	1.07	2.25	1.85	0.00	0.00	1.50	1.07	15.9	28.6	33.3	0.0	22.2
Test Plot RTS	SLN	1990.2	14.84	5.93	14.10	1.88	0.85	0.99	95.04	0.00	0.00	14.10	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Test Plot RTS	SLN	1994.4	15.09	6.03	14.30	1.90	0.83	1.15	94.76	0.00	0.00	14.30	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Test Plot RTS	SLN	1996.7	15.20	6.08	14.25	1.90	0.83	1.14	93.76	0.00	0.00	14.25	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Test Plot RTS	SWT	1994.3	1.08	0.43	1.09	0.12	0.96	0.46	101.25	0.00	0.00	0.56	0.25	0.43	0.28	0.00	0.00	0.10	0.19	0.0	51.1	39.8	0.0	9.1
Test Plot RTS	SWT	1996.5	1.19	0.47	1.22	0.16	0.93	0.51	102.48	0.09	0.27	1.13	0.33	0.00	0.00	0.00	0.00	0.00	0.00	7.3	92.7	0.0	0.0	0.0
Test Plot RTS	SWT	1998.3	1.58	0.63	1.64	0.23	0.94	0.35	103.35	0.00	0.00	1.64	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Test Plot RTS	TNB	1996.4	1.24	0.49	1.16	0.14	0.90	0.88	93.54	0.00	0.00	0.96	0.23	0.00	0.00	0.00	0.00	0.19	0.20	0.0	83.4	0.0	0.0	16.6
Test Plot RTS	TNB	2000.5	1.39	0.55	1.28	0.17	0.87	0.82	92.58	0.00	0.00	1.28	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Test Plot RTS	TNB	2003.7	0.97	0.39	0.88	0.10	0.86	1.38	91.01	0.00	0.00	0.66	0.16	0.00	0.00	0.00	0.00	0.23	0.16	0.0	74.3	0.0	0.0	25.7
Test Plot RTS	TWN	1991.5	5.59	2.24	5.24	0.58	0.88	1.24	93.77	0.00	0.00	3.32	0.92	0.00	0.00	0.00	0.00	1.92	0.97	0.0	63.3	0.0	0.0	36.7
Test Plot RTS	TWN	1991.5	6.32	2.53	5.90	0.68	0.87	1.45	93.45	0.00	0.00	2.63	0.93	0.00	0.00	0.00	0.00	3.27	1.20	0.0	44.5	0.0	0.0	55.5
Test Plot RTS	TWN	1998.1	7.43	2.97	6.92	0.77	0.87	1.42	93.16	0.00	0.00	3.91	1.17	0.00	0.00	0.00	0.00	3.01	1.33	0.0	56.4	0.0	0.0	43.6
Test Plot RTS	WAS	1991.9	0.41	0.16	0.39	0.04	0.93	0.70	95.03	0.00	0.00	0.29	0.07	0.00	0.00	0.00	0.00	0.10	0.07	0.0	73.3	0.0	0.0	26.7
Test Plot RTS	WAS	1994.8	0.33	0.13	0.32	0.04	0.94	0.54	97.43	0.00	0.00	0.26	0.06	0.00	0.00	0.00	0.00	0.07	0.06	0.0	79.5	0.0	0.0	20.5
Test Plot RTS	WAS	1997.5	0.33	0.13	0.31	0.04	0.92	0.76	95.53	0.00	0.00	0.25	0.06	0.00	0.00	0.00	0.00	0.07	0.05	0.0	78.9	0.0	0.0	21.1
Test Plot RTS	WEE	1996	0.56	0.22	0.53	0.06	0.91	0.87	94.87	0.00	0.00	0.36	0.10	0.00	0.00	0.00	0.00	0.17	0.10	0.0	67.4	0.0	0.0	32.6
Test Plot RTS	WEE	1999	0.60	0.24	0.57	0.06	0.93	0.78	95.99	0.00	0.00	0.35	0.10	0.00	0.00	0.00	0.00	0.22	0.11	0.0	61.3	0.0	0.0	38.7
Test Plot RTS	WEE	2002	0.91	0.36	0.86	0.09	0.93	0.76	94.23	0.00	0.00	0.53	0.15	0.00	0.00	0.00	0.00	0.33	0.16	0.0	62.0	0.0	0.0	38.0
Test Plot RTS	WES	1993.4	5.70	2.28	5.36	0.56	0.97	0.52	93.98	0.00	0.00	1.26	0.81	1.47	0.96	0.00	0.00	2.63	1.12	0.0	23.6	27.4	0.0	49.0
Test Plot RTS	WES	1995.6	8.15	3.26	7.84	0.76	0.97	0.41	96.27	0.00	0.00	2.98	1.41	1.99	1.49	0.00	0.00	2.87	1.43	0.0	38.0	25.4	0.0	36.6
Test Plot RTS	WES	1998	7.48	2.99	6.97	0.76	0.96	0.54	93.20	0.00	0.00	1.16	0.95	2.12	1.24	0.00	0.00	3.69	1.52	0.0	16.6	30.4	0.0	53.0
Test Plot RTS	WP55	1997.4	2.12	0.85	2.10	0.24	0.92	0.74	98.96	0.00	0.00	1.62	0.39	0.00	0.00	0.00	0.00	0.48	0.36	0.0	77.1	0.0	0.0	22.9
Test Plot RTS	WP55	2000.6	1.78	0.71	1.76	0.21	0.89	0.93	98.72	0.00	0.00	1.50	0.35	0.00	0.00	0.00	0.00	0.26	0.30	0.0	85.3	0.0	0.0	14.7
Test Plot RTS	WP55	2003	1.87	0.75	1.85	0.22	0.92	0.67	99.06	0.00	0.00	1.63	0.38	0.00	0.00	0.00	0.00	0.21	0.32	0.0	88.4	0.0	0.0	11.6

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Test Plot RTS	WRL	1999.9	1.63	0.65	1.52	0.17	0.87	1.38	93.65	0.00	0.00	1.03	0.27	0.00	0.00	0.00	0.00	0.50	0.28	0.0	67.3	0.0	0.0	32.7
Test Plot RTS	WRL	2002.1	1.40	0.56	1.32	0.15	0.91	0.99	94.28	0.00	0.00	0.75	0.22	0.00	0.00	0.00	0.00	0.57	0.25	0.0	57.0	0.0	0.0	43.0
Test Plot RTS	WRL	2003.2	2.60	1.04	2.42	0.27	0.87	1.28	92.86	0.00	0.00	1.79	0.46	0.00	0.00	0.00	0.00	0.62	0.43	0.0	74.2	0.0	0.0	25.8
Test Plot RTS	WST	1995	11.28	4.51	10.84	1.18	0.97	0.34	96.11	0.00	0.00	7.11	1.89	0.00	0.00	0.00	0.00	3.73	1.99	0.0	65.6	0.0	0.0	34.4
Test Plot RTS	WST	1996.8	10.86	4.34	10.61	1.15	0.98	0.23	97.71	0.00	0.00	6.19	2.52	0.33	2.28	0.00	0.00	4.09	2.06	0.0	58.4	3.1	0.0	38.5
Test Plot RTS	WST	1998.3	7.00	2.80	6.88	0.76	0.97	0.28	98.25	0.00	0.00	4.86	1.23	0.00	0.00	0.00	0.00	2.01	1.22	0.0	70.7	0.0	0.0	29.3
Test Plot RTS	WTN	1993	1.33	0.53	1.37	0.14	0.94	0.85	102.93	0.00	0.00	0.66	0.26	0.00	0.00	0.13	0.17	0.59	0.25	0.0	48.0	0.0	9.1	42.8
Test Plot RTS	WTN	2000	2.97	1.19	2.93	0.33	0.95	0.53	98.69	0.00	0.00	1.45	0.47	0.00	0.00	0.00	0.00	1.48	0.58	0.0	49.5	0.0	0.0	50.5
Test Plot RTS	WTN	2004	3.87	1.55	3.76	0.41	0.96	0.43	97.15	0.00	0.00	2.16	0.63	0.00	0.00	0.00	0.00	1.60	0.72	0.0	57.5	0.0	0.0	42.5
Test Plot RTS	WTY	2001.1	44.96	17.99	44.39	4.91	0.96	0.46	98.73	0.00	0.00	30.52	11.78	0.54	10.45	0.00	0.00	13.33	8.20	0.0	68.8	1.2	0.0	30.0
Test Plot RTS	WTY	2004	45.18	18.07	44.45	4.90	0.96	0.39	98.39	0.00	0.00	31.58	7.97	0.00	0.00	0.00	0.00	12.87	7.89	0.0	71.0	0.0	0.0	29.0
Test Plot RTS	WTY	2005.3	46.66	18.66	44.01	4.89	0.89	1.66	94.33	0.00	0.00	4.24	5.38	16.81	8.06	0.00	0.00	22.96	9.40	0.0	9.6	38.2	0.0	52.2

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)
	Site		Concentrations				Statistics			Estimated Sources									
Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	Fresh RTS (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)
Fresh RTS	ANN	2003.6	15.21	6.08	13.75	1.64	0.85	1.77	90.41	0.00	0.00	5.02	2.07	0.00	0.00	0.00	0.00	8.73	2.91
Fresh RTS	ANN	2006.2	15.48	6.19	14.02	1.58	0.87	1.50	90.54	0.00	0.00	6.76	2.26	0.00	0.00	0.00	0.00	7.26	2.81
Fresh RTS	ANN	2008.2	16.32	6.53	15.08	1.66	0.90	1.05	92.42	0.00	0.00	8.81	2.55	0.00	0.00	0.00	0.00	6.27	2.87
Fresh RTS	BAL	2002.9	8.76	3.50	8.28	0.84	0.91	1.12	94.47	0.00	0.00	5.39	1.34	0.00	0.00	0.00	0.00	2.89	1.43
Fresh RTS	BAL	2004	21.60	8.64	20.84	2.13	0.92	1.00	96.47	0.00	0.00	14.72	3.47	0.00	0.00	0.00	0.00	6.12	3.48
Fresh RTS	BAL	2006.3	14.89	5.96	14.45	1.40	0.82	3.90	97.02	0.00	0.00	1.76	1.58	6.16	2.53	0.00	0.00	6.53	2.75
Fresh RTS	BEC	1999	1.50	0.60	1.45	0.15	0.97	0.61	96.85	0.00	0.00	0.33	0.24	0.36	0.26	0.09	0.16	0.67	0.29
Fresh RTS	BEC	2000.1	1.93	0.77	1.91	0.20	0.97	0.46	99.15	0.00	0.00	1.15	0.48	0.03	0.45	0.09	0.25	0.64	0.36
Fresh RTS	BEC	2001.5	2.34	0.94	2.35	0.27	0.95	0.57	100.31	0.00	0.00	1.76	0.69	0.02	0.63	0.02	0.34	0.54	0.43
Fresh RTS	BRK	1995.7	2.07	0.83	2.02	0.19	0.94	0.96	97.85	0.00	0.00	0.75	0.36	0.65	0.39	0.00	0.00	0.62	0.34
Fresh RTS	BRK	1997.7	3.02	1.21	2.91	0.28	0.92	1.25	96.15	0.00	0.00	1.15	0.53	0.85	0.56	0.00	0.00	0.91	0.49
Fresh RTS	BRK	1999.1	2.17	0.87	2.14	0.21	0.89	1.85	98.69	0.00	0.00	0.67	0.35	0.82	0.42	0.00	0.00	0.65	0.36
Fresh RTS	CHA	1990.2	95.18	38.07	95.13	10.51	0.92	0.83	99.95	0.00	0.00	65.30	16.65	0.00	0.00	0.00	0.00	29.83	16.76
Fresh RTS	CHA	1994.9	100.87	40.35	101.54	10.80	0.94	0.78	100.66	0.00	0.00	65.74	25.55	7.43	22.89	0.00	0.00	28.37	17.67
Fresh RTS	CHA	1999.5	80.53	32.21	82.67	9.10	0.96	0.53	102.66	0.00	0.00	54.42	22.02	0.86	20.22	0.41	11.34	26.99	15.39
Fresh RTS	CMO	1990.6	7.36	2.94	7.45	0.82	0.95	0.54	101.25	0.00	0.00	5.08	1.98	0.18	1.75	0.00	0.00	2.20	1.35
Fresh RTS	CMO	1998.7	11.76	4.70	11.30	1.34	0.90	0.84	96.15	0.00	0.00	9.50	2.23	0.00	0.00	0.00	0.00	1.80	1.96
Fresh RTS	CMO	2000.8	6.78	2.71	6.44	0.73	0.91	0.86	95.11	0.00	0.00	4.97	1.21	0.00	0.00	0.00	0.00	1.48	1.12
Fresh RTS	CYN	1995.3	0.17	0.07	0.17	0.02	0.92	1.20	101.32	0.00	0.00	0.12	0.05	0.01	0.04	0.01	0.02	0.03	0.03
Fresh RTS	DEK	1990	0.46	0.18	0.44	0.05	0.94	0.54	96.53	0.00	0.00	0.39	0.14	0.01	0.13	0.00	0.00	0.05	0.08
Fresh RTS	DEK	1990	0.73	0.29	0.67	0.07	0.92	1.07	91.43	0.00	0.00	0.43	0.17	0.10	0.15	0.00	0.00	0.13	0.11
Fresh RTS	DEK	1990	0.83	0.33	0.72	0.07	0.87	2.25	86.57	0.01	0.13	0.40	0.17	0.13	0.24	0.00	0.00	0.18	0.13
Fresh RTS	ECO	1996.4	4.27	1.71	4.04	0.40	0.86	2.30	94.71	0.00	0.00	1.09	0.63	1.38	0.73	0.00	0.00	1.57	0.74
Fresh RTS	ECO	1998.3	4.99	2.00	4.91	0.56	0.92	0.72	98.37	0.00	0.00	3.81	0.92	0.00	0.00	0.00	0.00	1.10	0.85
Fresh RTS	ECO	1999.7	6.91	2.76	6.88	0.80	0.93	0.65	99.47	0.00	0.00	5.68	1.33	0.00	0.00	0.00	0.00	1.20	1.19
Fresh RTS	FAR	1983.6	0.30	0.12	0.31	0.03	0.94	1.08	101.72	0.05	0.12	0.16	0.11	0.09	0.14	0.02	0.09	0.00	0.00
Fresh RTS	FAR	1991.5	0.30	0.12	0.31	0.03	0.93	1.22	102.90	0.07	0.12	0.14	0.11	0.09	0.14	0.01	0.08	0.00	0.00
Fresh RTS	FAR	1997.1	0.35	0.14	0.36	0.03	0.92	1.48	104.05	0.08	0.14	0.17	0.13	0.10	0.16	0.00	0.10	0.00	0.00
Fresh RTS	FOS	1996.2	16.51	6.60	15.67	1.72	0.94	0.64	94.91	0.00	0.00	10.27	2.79	0.00	0.00	0.00	0.00	5.40	2.91
Fresh RTS	FOS	1998.4	13.59	5.44	12.86	1.43	0.92	0.77	94.60	0.00	0.00	9.21	2.37	0.00	0.00	0.00	0.00	3.65	2.33
Fresh RTS	FOS	2000.4	8.97	3.59	8.33	0.94	0.90	0.97	92.86	0.00	0.00	6.27	1.57	0.00	0.00	0.00	0.00	2.06	1.49
Fresh RTS	HAR	1991	38.39	15.36	37.50	3.59	0.92	1.49	97.69	0.00	0.00	18.80	8.31	6.89	7.98	1.59	4.69	10.24	6.14
Fresh RTS	HAR	1999	31.91	12.76	30.88	3.05	0.91	1.53	96.79	0.00	0.00	16.24	7.02	3.86	6.68	1.24	3.88	9.54	5.28
Fresh RTS	HAR	2006	38.25	15.30	37.81	4.09	0.94	0.83	98.86	0.00	0.00	27.39	10.82	0.56	9.98	3.46	5.50	6.40	6.49
Fresh RTS	HIL	1993	1.18	0.47	1.13	0.12	0.94	0.55	95.17	0.00	0.00	0.79	0.20	0.00	0.00	0.00	0.00	0.34	0.20
Fresh RTS	HIL	1995.6	1.72	0.69	1.60	0.15	0.93	1.11	93.20	0.00	0.00	0.63	0.29	0.49	0.31	0.00	0.00	0.49	0.28
Fresh RTS	HIL	1997.7	1.87	0.75	1.77	0.17	0.94	0.91	94.57	0.00	0.00	0.58	0.30	0.75	0.37	0.00	0.00	0.44	0.30
Fresh RTS	HSP	1990.7	7.17	2.87	7.30	0.69	0.93	1.21	101.82	0.00	0.00	3.63	1.63	1.40	1.52	0.41	0.91	1.86	1.17
Fresh RTS	HSP	1995.7	7.05	2.82	7.10	0.71	0.93	1.15	100.65	0.00	0.00	4.05	1.70	0.93	1.56	0.16	0.90	1.96	1.20
Fresh RTS	HSP	2000	9.43	3.77	9.60	0.92	0.94	1.11	101.88	0.00	0.00	4.98	2.20	1.38	2.03	0.66	1.20	2.59	1.57
Fresh RTS	KIL	1994	24.44	9.78	21.79	2.48	0.85	1.54	89.15	0.00	0.00	16.21	4.15	0.00	0.00	0.00	0.00	5.58	3.95
Fresh RTS	KIL	1997	60.59	24.24	55.10	6.20	0.87	1.29	90.94	0.00	0.00	39.87	10.26	0.00	0.00	0.00	0.00	15.23	9.97
Fresh RTS	KIL	1999.1	57.61	23.04	50.11	5.60	0.82	2.06	86.99	0.00	0.00	28.09	8.59	0.00	0.00	0.00	0.00	22.02	9.81
Fresh RTS	LKH	2000.4	9.62	3.85	9.39	0.97	0.94	0.66	97.56	0.00	0.00	7.00	1.61	0.00	0.00	0.00	0.00	2.38	1.56
Fresh RTS	LKH	2003	7.52	3.01	6.98	0.62	0.88	2.49	92.87	0.00	0.00	2.96	1.19	1.51	1.21	0.00	0.00	2.50	1.17
Fresh RTS	LKH	2006.9	11.16	4.46	10.58	1.05	0.87	1.98	94.81	0.00	0.00	6.76	2.43	0.43	2.22	0.00	0.00	3.39	1.84
Fresh RTS	LKW	1991.1	12.04	4.82	12.03	1.28	0.98	0.31	99.92	0.00	0.00	7.27	2.90	0.65	2.62	0.00	0.00	4.11	2.22
Fresh RTS	LKW	1995.3	15.69	6.28	15.86	1.55	0.97	0.50	101.10	0.00	0.00	5.46	2.71	4.30	2.93	0.00	0.00	6.11	2.88
Fresh RTS	LKW	1998.9	14.59	5.83	14.63	1.53	0.96	0.52	100.32	0.00	0.00	8.41	3.39	1.27	3.09	0.00	0.00	4.95	2.64
Fresh RTS	LVB	1992	0.08	0.03	0.08	0.01	0.86	1.39	100.24	0.00	0.00	0.06	0.01	0.00	0.00	0.02	0.01	0.00	0.00

RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Contribution				
Fresh RTS	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
0.0	36.5	0.0	0.0	63.5
0.0	48.2	0.0	0.0	51.8
0.0	58.4	0.0	0.0	41.6
0.0	65.1	0.0	0.0	34.9
0.0	70.6	0.0	0.0	29.4
0.0	12.2	42.6	0.0	45.2
0.0	22.6	25.0	5.9	46.5
0.0	60.1	1.6	4.8	33.4
0.0	75.0	1.0	1.0	23.0
0.0	37.0	32.3	0.0	30.8
0.0	39.7	29.2	0.0	31.1
0.0	31.2	38.4	0.0	30.4
0.0	68.6	0.0	0.0	31.4
0.0	64.7	7.3	0.0	27.9
0.0	65.8	1.0	0.5	32.6
0.0	68.2	2.3	0.0	29.5
0.0	84.1	0.0	0.0	15.9
0.0	77.1	0.0	0.0	22.9
0.0	67.6	5.6	7.6	19.2
0.0	87.9	1.8	0.0	10.4
0.0	64.4	15.5	0.0	20.1
0.9	55.4	17.9	0.0	25.8
0.0	27.0	34.2	0.0	38.8
0.0	77.5	0.0	0.0	22.5
0.0	82.6	0.0	0.0	17.4
14.9	51.0	27.9	6.2	0.0
22.4	46.4	29.1	2.0	0.0
23.4	47.1	28.2	1.3	0.0
0.0	65.5	0.0	0.0	34.5
0.0	71.6	0.0	0.0	28.4
0.0	75.3	0.0	0.0	24.7
0.0	50.1	18.4	4.2	27.3
0.0	52.6	12.5	4.0	30.9
0.0	72.4	1.5	9.2	16.9
0.0	69.8	0.0	0.0	30.2
0.0	39.0	30.3	0.0	30.7
0.0	32.5	42.4	0.0	25.1
0.0	49.8	19.1	5.7	25.4
0.0	57.0	13.1	2.2	27.7
0.0	51.8	14.4	6.8	27.0
0.0	74.4	0.0	0.0	25.6
0.0	72.4	0.0	0.0	27.6
0.0	56.1	0.0	0.0	43.9
0.0	74.6	0.0	0.0	25.4
0.0	42.4	21.7	0.0	35.9
0.0	63.9	4.0	0.0	32.0
0.0	60.4	5.4	0.0	34.2
0.0	34.4	27.1	0.0	38.5
0.0	57.5	8.6	0.0	33.9
0.0	73.9	0.0	26.1	0.0

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Fresh RTS	LVB	1994.9	0.09	0.03	0.09	0.01	0.88	1.23	103.39	0.00	0.00	0.06	0.02	0.00	0.00	0.03	0.01	0.00	0.00	0.0	71.3	0.0	28.7	0.0
Fresh RTS	LVB	1998.2	0.08	0.03	0.08	0.01	0.85	1.43	98.50	0.00	0.00	0.06	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.0	81.3	0.0	18.7	0.0
Fresh RTS	MAP	1996.5	2.63	1.05	2.71	0.29	0.92	1.14	103.40	0.00	0.00	1.96	0.78	0.23	0.70	0.24	0.40	0.29	0.44	0.0	72.1	8.4	8.8	10.6
Fresh RTS	MAP	1999.7	3.54	1.42	3.61	0.34	0.93	1.24	101.92	0.00	0.00	1.59	0.79	1.42	0.80	0.07	0.49	0.53	0.56	0.0	44.1	39.2	2.0	14.7
Fresh RTS	MYS	1996.5	61.64	24.66	60.96	7.32	0.90	1.43	98.90	0.00	0.00	13.67	8.91	7.35	9.45	0.00	0.00	39.95	13.65	0.0	22.4	12.1	0.0	65.5
Fresh RTS	MYS	2000.7	70.69	28.28	68.59	7.92	0.90	1.45	97.04	0.00	0.00	23.73	11.84	5.04	11.49	0.00	0.00	39.82	14.73	0.0	34.6	7.4	0.0	58.1
Fresh RTS	MYS	2000.7	83.55	33.42	80.89	9.10	0.89	1.23	96.82	0.00	0.00	40.19	12.76	0.00	0.00	0.00	0.00	40.71	15.76	0.0	49.7	0.0	0.0	50.3
Fresh RTS	NEW	1991.7	74.29	29.71	71.02	7.92	0.89	1.41	95.60	0.00	0.00	34.37	14.67	2.62	13.44	0.00	0.00	34.03	14.34	0.0	48.4	3.7	0.0	47.9
Fresh RTS	NEW	1993.3	53.05	21.22	48.45	5.39	0.88	1.35	91.33	0.00	0.00	27.01	8.19	0.00	0.00	0.00	0.00	21.44	9.43	0.0	55.7	0.0	0.0	44.3
Fresh RTS	NEW	1995	97.43	38.97	93.69	10.52	0.89	1.36	96.16	0.00	0.00	47.96	20.12	1.78	18.26	0.00	0.00	43.95	18.90	0.0	51.2	1.9	0.0	46.9
Fresh RTS	NJCP	1993.7	3.59	1.44	3.55	0.39	0.97	0.31	98.97	0.00	0.00	0.00	0.00	1.60	0.63	0.00	0.00	1.95	0.79	0.0	0.0	45.0	0.0	55.0
Fresh RTS	NJCP	1995.6	4.91	1.96	4.79	0.53	0.90	1.19	97.53	0.00	0.00	0.00	0.00	2.35	0.86	0.00	0.00	2.44	1.04	0.0	0.0	49.1	0.0	50.9
Fresh RTS	NJCP	1997	4.34	1.73	4.31	0.49	0.92	1.05	99.31	0.00	0.00	0.27	0.52	1.78	0.81	0.00	0.00	2.26	0.94	0.0	6.2	41.3	0.0	52.5
Fresh RTS	NJOR	1992.3	7.23	2.89	6.80	0.69	0.88	1.70	94.01	0.00	0.00	3.91	1.60	2.41	1.61	0.00	0.00	0.47	1.05	0.0	57.6	35.5	0.0	6.9
Fresh RTS	NJOR	1995.2	9.90	3.96	9.33	0.89	0.89	1.68	94.27	0.00	0.00	3.71	1.71	3.68	1.94	0.00	0.00	1.94	1.48	0.0	39.8	39.4	0.0	20.8
Fresh RTS	NJOR	1997.2	10.32	4.13	9.81	0.96	0.89	1.67	95.02	0.00	0.00	2.91	1.62	5.00	2.13	0.00	0.00	1.90	1.60	0.0	29.7	51.0	0.0	19.4
Fresh RTS	NTR	1993	43.49	17.39	38.77	4.32	0.86	1.57	89.15	0.00	0.00	21.41	6.66	0.00	0.00	0.00	0.00	17.36	7.69	0.0	55.2	0.0	0.0	44.8
Fresh RTS	NTR	1999	35.62	14.25	33.77	3.79	0.93	0.66	94.80	0.00	0.00	25.01	6.31	0.00	0.00	0.00	0.00	8.76	6.08	0.0	74.1	0.0	0.0	25.9
Fresh RTS	NTR	2004	27.98	11.19	26.08	2.89	0.93	0.70	93.23	0.00	0.00	18.22	4.76	0.00	0.00	0.00	0.00	7.86	4.79	0.0	69.9	0.0	0.0	30.1
Fresh RTS	ORL	1994.1	34.98	13.99	31.85	3.57	0.87	1.49	91.05	0.00	0.00	16.64	5.27	0.00	0.00	0.00	0.00	15.20	6.29	0.0	52.3	0.0	0.0	47.7
Fresh RTS	ORL	1996.6	34.44	13.78	31.37	3.48	0.87	1.48	91.09	0.00	0.00	18.27	5.35	0.00	0.00	0.00	0.00	13.10	5.99	0.0	58.2	0.0	0.0	41.8
Fresh RTS	ORL	1997.5	18.58	7.43	17.09	1.89	0.88	1.30	91.96	0.00	0.00	10.85	2.99	0.00	0.00	0.00	0.00	6.24	3.17	0.0	63.5	0.0	0.0	36.5
Fresh RTS	PEP	1998	1.00	0.40	1.01	0.10	0.89	1.48	100.31	0.00	0.00	0.62	0.20	0.00	0.00	0.10	0.13	0.28	0.17	0.0	61.9	0.0	10.0	28.2
Fresh RTS	PEP	2002	0.85	0.34	0.85	0.09	0.89	1.57	100.15	0.00	0.00	0.50	0.17	0.00	0.00	0.12	0.11	0.23	0.14	0.0	59.0	0.0	14.4	26.6
Fresh RTS	PEP	2006	1.17	0.47	1.19	0.13	0.88	1.54	101.50	0.00	0.00	0.86	0.25	0.00	0.00	0.21	0.18	0.12	0.20	0.0	72.9	0.0	17.4	9.7
Fresh RTS	PLM	1997	29.38	11.75	27.60	3.43	0.86	1.94	93.96	0.00	0.00	5.82	4.04	2.54	4.18	0.00	0.00	19.24	6.38	0.0	21.1	9.2	0.0	69.7
Fresh RTS	PLM	2002	31.84	12.74	31.45	4.25	0.86	1.71	98.79	0.00	0.00	3.39	4.21	3.04	4.65	0.00	0.00	25.03	7.78	0.0	10.8	9.7	0.0	79.6
Fresh RTS	PLM	2006.1	32.54	13.02	30.55	3.83	0.85	2.12	93.87	0.00	0.00	4.36	4.09	4.55	4.61	0.00	0.00	21.63	7.13	0.0	14.3	14.9	0.0	70.8
Fresh RTS	SCM	2001.7	4.07	1.63	4.06	0.39	0.94	0.94	99.71	0.00	0.00	1.01	0.62	1.92	0.84	0.00	0.00	1.13	0.71	0.0	24.9	47.3	0.0	27.8
Fresh RTS	SCM	2003	4.33	1.73	4.35	0.42	0.93	1.01	100.47	0.00	0.00	1.26	0.70	1.96	0.90	0.00	0.00	1.13	0.74	0.0	29.1	45.0	0.0	26.0
Fresh RTS	SCM	2005.2	6.72	2.69	6.86	0.63	0.90	2.38	101.99	0.41	2.15	1.85	1.83	3.06	2.78	0.12	1.39	1.42	1.11	5.9	27.0	44.6	1.7	20.7
Fresh RTS	SLN	1990.2	14.84	5.93	14.10	1.88	0.85	0.99	95.04	0.00	0.00	14.10	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Fresh RTS	SLN	1994.4	15.09	6.03	14.30	1.90	0.83	1.15	94.76	0.00	0.00	14.30	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Fresh RTS	SLN	1996.7	15.20	6.08	14.25	1.90	0.83	1.14	93.76	0.00	0.00	14.25	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Fresh RTS	SWT	1994.3	1.08	0.43	1.09	0.12	0.96	0.46	101.25	0.00	0.00	0.56	0.25	0.43	0.28	0.00	0.00	0.10	0.19	0.0	51.1	39.8	0.0	9.1
Fresh RTS	SWT	1996.5	1.19	0.47	1.21	0.16	0.93	0.59	102.29	0.03	0.30	1.10	0.42	0.09	0.55	0.00	0.00	0.00	0.00	2.4	90.2	7.4	0.0	0.0
Fresh RTS	SWT	1998.3	1.58	0.63	1.64	0.23	0.94	0.35	103.35	0.00	0.00	1.64	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Fresh RTS	TNB	1996.4	1.24	0.49	1.16	0.14	0.90	0.88	93.54	0.00	0.00	0.96	0.23	0.00	0.00	0.00	0.00	0.19	0.20	0.0	83.4	0.0	0.0	16.6
Fresh RTS	TNB	2000.5	1.39	0.55	1.28	0.17	0.87	0.82	92.58	0.00	0.00	1.28	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
Fresh RTS	TNB	2003.7	0.97	0.39	0.88	0.10	0.86	1.38	91.01	0.00	0.00	0.66	0.16	0.00	0.00	0.00	0.00	0.23	0.16	0.0	74.3	0.0	0.0	25.7
Fresh RTS	TWN	1991.5	5.59	2.24	5.24	0.58	0.88	1.24	93.77	0.00	0.00	3.32	0.92	0.00	0.00	0.00	0.00	1.92	0.97	0.0	63.3	0.0	0.0	36.7
Fresh RTS	TWN	1991.5	6.32	2.53	5.90	0.68	0.87	1.45	93.45	0.00	0.00	2.63	0.93	0.00	0.00	0.00	0.00	3.27	1.20	0.0	44.5	0.0	0.0	55.5
Fresh RTS	TWN	1998.1	7.43	2.97	6.92	0.77	0.87	1.42	93.16	0.00	0.00	3.91	1.17	0.00	0.00	0.00	0.00	3.01	1.33	0.0	56.4	0.0	0.0	43.6
Fresh RTS	WAS	1991.9	0.41	0.16	0.39	0.04	0.93	0.70	95.03	0.00	0.00	0.29	0.07	0.00	0.00	0.00	0.00	0.10	0.07	0.0	73.3	0.0	0.0	26.7
Fresh RTS	WAS	1994.8	0.33	0.13	0.32	0.04	0.94	0.54	97.43	0.00	0.00	0.26	0.06	0.00	0.00	0.00	0.00	0.07	0.06	0.0	79.5	0.0	0.0	20.5
Fresh RTS	WAS	1997.5	0.33	0.13	0.31	0.04	0.92	0.76	95.53	0.00	0.00	0.25	0.06	0.00	0.00	0.00	0.00	0.07	0.05	0.0	78.9	0.0	0.0	21.1
Fresh RTS	WEE	1996	0.56	0.22	0.53	0.06	0.91	0.87	94.87	0.00	0.00	0.36	0.10	0.00	0.00	0.00	0.00	0.17	0.10	0.0	67.4	0.0	0.0	32.6
Fresh RTS	WEE	1999	0.60	0.24	0.57	0.06	0.93	0.78	95.99	0.00	0.00	0.35	0.10	0.00	0.00	0.00	0.00	0.22	0.11	0.0	61.3	0.0	0.0	38.7
Fresh RTS	WEE	2002	0.91	0.36	0.86	0.09	0.93	0.76	94.23	0.00	0.00	0.53	0.15	0.00	0.00	0.00	0.00	0.33	0.16	0.0	62.0	0.0	0.0	38.0
Fresh RTS	WES	1993.4	5.70	2.28	5.36	0.56	0.97	0.52	93.98	0.00	0.00	1.26	0.81	1.47	0.96	0.00	0.00	2.63	1.12	0.0	23.6	27.4	0.0	49.0
Fresh RTS	WES	1995.6	8.15	3.26	7.84	0.76	0.97	0.41	96.27	0.00	0.00	2.98	1.41	1.99	1.49	0.00	0.00	2.87	1.43	0.0	38.0	25.4	0.0	36.6
Fresh RTS	WES	1998	7.48	2.99	6.97	0.76	0.96	0.54	93.20	0.00	0.00	1.16	0.95	2.12	1.24	0.00	0.00	3.69	1.52	0.0	16.6	30.4	0.0	53.0
Fresh RTS	WP55	1997.4	2.12	0.85	2.10	0.24	0.92	0.74	98.96	0.00	0.00	1.62	0.39	0.00	0.00	0.00	0.00	0.48	0.36	0.0	77.1	0.0	0.0	22.9
Fresh RTS	WP55	2000.6	1.78	0.71	1.76	0.21	0.89	0.93	98.72	0.00	0.00	1.50	0.35	0.00	0.00	0.00	0.00	0.26	0.30	0.0	85.3	0.0	0.0	14.7
Fresh RTS	WP55	2003	1.87	0.75	1.85	0.22	0.92	0.67	99.06	0.00	0.00	1.63	0.38	0.00	0.00	0.00	0.00	0.21	0.32	0.0	88.4	0.0	0.0	11.6
Fresh RTS	WRL	1999.9	1.63	0.65	1.52	0.17	0.87	1.38	93.65	0.00	0.00	1.03	0.27	0.00	0.00	0.00	0.00	0.50	0.28	0.0	67.3	0.0	0.0	32.7

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
Fresh RTS	WRL	2002.1	1.40	0.56	1.32	0.15	0.91	0.99	94.28	0.00	0.00	0.75	0.22	0.00	0.00	0.00	0.00	0.57	0.25	0.0	57.0	0.0	0.0	43.0
Fresh RTS	WRL	2003.2	2.60	1.04	2.42	0.27	0.87	1.28	92.86	0.00	0.00	1.79	0.46	0.00	0.00	0.00	0.00	0.62	0.43	0.0	74.2	0.0	0.0	25.8
Fresh RTS	WST	1995	11.28	4.51	10.84	1.18	0.97	0.34	96.11	0.00	0.00	7.11	1.89	0.00	0.00	0.00	0.00	3.73	1.99	0.0	65.6	0.0	0.0	34.4
Fresh RTS	WST	1996.8	10.86	4.34	10.61	1.15	0.98	0.23	97.71	0.00	0.00	6.19	2.52	0.33	2.28	0.00	0.00	4.09	2.06	0.0	58.4	3.1	0.0	38.5
Fresh RTS	WST	1998.3	7.00	2.80	6.88	0.76	0.97	0.28	98.25	0.00	0.00	4.86	1.23	0.00	0.00	0.00	0.00	2.01	1.22	0.0	70.7	0.0	0.0	29.3
Fresh RTS	WTN	1993	1.33	0.53	1.37	0.14	0.94	0.85	102.93	0.00	0.00	0.66	0.26	0.00	0.00	0.13	0.17	0.59	0.25	0.0	48.0	0.0	9.1	42.8
Fresh RTS	WTN	2000	2.97	1.19	2.93	0.33	0.95	0.53	98.69	0.00	0.00	1.45	0.47	0.00	0.00	0.00	0.00	1.48	0.58	0.0	49.5	0.0	0.0	50.5
Fresh RTS	WTN	2004	3.87	1.55	3.76	0.41	0.96	0.43	97.15	0.00	0.00	2.16	0.63	0.00	0.00	0.00	0.00	1.60	0.72	0.0	57.5	0.0	0.0	42.5
Fresh RTS	WTY	2001.1	44.96	17.99	44.39	4.91	0.96	0.46	98.73	0.00	0.00	30.52	11.78	0.54	10.45	0.00	0.00	13.33	8.20	0.0	68.8	1.2	0.0	30.0
Fresh RTS	WTY	2004	45.18	18.07	44.45	4.90	0.96	0.39	98.39	0.00	0.00	31.58	7.97	0.00	0.00	0.00	0.00	12.87	7.89	0.0	71.0	0.0	0.0	29.0
Fresh RTS	WTY	2005.3	46.66	18.66	44.01	4.89	0.89	1.66	94.33	0.00	0.00	4.24	5.38	16.81	8.06	0.00	0.00	22.96	9.40	0.0	9.6	38.2	0.0	52.2

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)
No RTS or Dust	ANN	2008.2	17.74	3.73	16.53	1.75	0.90	1.08	93.18	0.00	0.00	10.80	2.78	0.00	0.00	0.00	0.00	5.73	2.94
No RTS or Dust	ANN	2006.2	16.82	3.53	15.36	1.63	0.86	1.53	91.31	0.00	0.00	8.74	2.48	0.00	0.00	0.00	0.00	6.62	2.86
No RTS or Dust	ANN	2003.6	16.53	3.47	14.95	1.64	0.84	1.91	90.43	0.00	0.00	7.00	2.30	0.00	0.00	0.00	0.00	7.95	2.94
No RTS or Dust	BEC	2001.5	2.48	0.52	2.49	0.27	0.96	0.50	100.25	0.00	0.00	1.87	0.71	0.02	0.66	0.03	0.34	0.56	0.43
No RTS or Dust	BEC	2000.1	2.05	0.43	2.03	0.21	0.97	0.40	99.25	0.00	0.00	1.27	0.51	0.04	0.48	0.08	0.25	0.65	0.36
No RTS or Dust	BEC	1999	1.57	0.33	1.53	0.15	0.97	0.54	97.15	0.00	0.00	0.36	0.25	0.39	0.27	0.08	0.16	0.69	0.29
No RTS or Dust	BRK	1999.1	2.41	0.51	2.37	0.22	0.88	1.72	98.52	0.00	0.00	0.73	0.40	1.21	0.51	0.00	0.00	0.43	0.37
No RTS or Dust	BRK	1997.7	3.32	0.70	3.19	0.29	0.91	1.36	96.14	0.00	0.00	1.45	0.62	0.99	0.65	0.00	0.00	0.75	0.50
No RTS or Dust	BRK	1995.7	2.28	0.48	2.22	0.20	0.92	1.16	97.25	0.00	0.00	0.90	0.41	0.81	0.45	0.00	0.00	0.51	0.35
No RTS or Dust	CHA	1999.5	87.40	18.35	89.65	9.56	0.95	0.49	102.57	0.00	0.00	63.42	23.93	1.59	21.68	0.00	0.00	24.64	15.74
No RTS or Dust	CHA	1994.9	110.20	23.14	110.96	11.52	0.93	0.78	100.69	0.00	0.00	78.34	28.98	8.37	26.33	0.00	0.00	24.25	18.20
No RTS or Dust	CHA	1990.2	104.20	21.88	104.30	11.30	0.91	0.81	100.10	0.00	0.00	78.90	18.23	0.00	0.00	0.00	0.00	25.41	17.30
No RTS or Dust	CMO	2000.8	7.34	1.54	7.06	0.79	0.91	0.79	96.13	0.00	0.00	5.75	1.29	0.00	0.00	0.00	0.00	1.31	1.17
No RTS or Dust	CMO	1998.7	12.71	2.67	12.33	1.43	0.91	0.74	97.02	0.00	0.00	10.77	2.36	0.00	0.00	0.00	0.00	1.57	2.05
No RTS or Dust	CMO	1990.6	7.89	1.66	7.98	0.85	0.96	0.49	101.20	0.00	0.00	5.65	2.13	0.22	1.92	0.00	0.00	2.12	1.37
No RTS or Dust	ECO	1999.7	7.55	1.59	7.55	0.87	0.93	0.62	100.00	0.00	0.00	6.56	1.43	0.00	0.00	0.00	0.00	0.99	1.25
No RTS or Dust	ECO	1998.3	5.41	1.14	5.35	0.60	0.92	0.66	98.98	0.00	0.00	4.37	0.98	0.00	0.00	0.00	0.00	0.99	0.89
No RTS or Dust	ECO	1996.4	4.64	0.97	4.45	0.43	0.87	1.81	95.88	0.00	0.00	0.90	0.67	2.61	0.96	0.00	0.00	0.94	0.75
No RTS or Dust	FOS	2000.4	9.64	2.02	9.05	0.99	0.91	0.86	93.90	0.00	0.00	7.13	1.65	0.00	0.00	0.00	0.00	1.92	1.54
No RTS or Dust	FOS	1998.4	14.62	3.07	13.96	1.51	0.92	0.70	95.51	0.00	0.00	10.52	2.50	0.00	0.00	0.00	0.00	3.44	2.40
No RTS or Dust	FOS	1996.2	17.69	3.71	16.92	1.79	0.94	0.60	95.65	0.00	0.00	11.69	2.92	0.00	0.00	0.00	0.00	5.23	2.99
No RTS or Dust	HAR	2006	40.95	8.60	40.65	4.27	0.94	0.72	99.27	0.00	0.00	30.46	11.57	0.96	10.90	3.15	5.72	6.08	6.71
No RTS or Dust	HAR	1999	34.35	7.21	33.49	3.22	0.92	1.31	97.50	0.00	0.00	19.53	7.89	4.91	7.60	0.47	4.15	8.58	5.42
No RTS or Dust	HAR	1991	41.24	8.66	40.54	3.76	0.92	1.26	98.31	0.00	0.00	22.11	9.18	8.30	8.94	0.82	4.96	9.31	6.32
No RTS or Dust	HSP	2000	10.14	2.13	10.34	0.96	0.94	0.97	101.99	0.00	0.00	5.77	2.40	1.65	2.26	0.52	1.26	2.40	1.61
No RTS or Dust	HSP	1995.7	7.57	1.59	7.65	0.75	0.93	0.97	101.01	0.00	0.00	4.67	1.87	1.07	1.75	0.04	0.96	1.86	1.24
No RTS or Dust	HSP	1990.7	7.71	1.62	7.86	0.72	0.94	1.04	101.99	0.00	0.00	4.20	1.78	1.64	1.69	0.31	0.95	1.71	1.20
No RTS or Dust	KIL	1999.1	63.98	13.43	56.51	6.05	0.81	2.11	88.33	0.00	0.00	36.94	9.73	0.00	0.00	0.00	0.00	19.57	10.21
No RTS or Dust	KIL	1997	67.89	14.26	62.44	6.96	0.85	1.39	91.97	0.00	0.00	49.99	11.60	0.00	0.00	0.00	0.00	12.45	10.63
No RTS or Dust	KIL	1994	27.32	5.74	24.84	2.80	0.84	1.55	90.90	0.00	0.00	20.39	4.71	0.00	0.00	0.00	0.00	4.45	4.24
No RTS or Dust	LKH	2006.9	12.15	1.21	11.64	1.12	0.87	1.83	95.85	0.00	0.00	8.07	2.79	0.52	2.57	0.00	0.00	3.05	1.90
No RTS or Dust	LKH	2003	8.13	0.81	7.63	0.64	0.88	2.36	93.81	0.00	0.00	3.60	1.37	1.76	1.39	0.00	0.00	2.27	1.17
No RTS or Dust	LKH	2000.4	10.24	1.02	10.02	1.00	0.94	0.59	97.86	0.00	0.00	7.63	1.65	0.00	0.00	0.00	0.00	2.40	1.60
No RTS or Dust	LKW	1998.9	16.01	3.36	16.00	1.62	0.95	0.66	99.92	0.00	0.00	10.30	3.90	1.40	3.58	0.00	0.00	4.30	2.69
No RTS or Dust	LKW	1995.3	17.28	3.63	17.23	1.57	0.95	0.82	99.73	0.00	0.00	6.78	3.11	5.23	3.33	0.00	0.00	5.23	2.84
No RTS or Dust	LKW	1991.1	13.16	2.76	13.13	1.36	0.96	0.45	99.74	0.00	0.00	8.73	3.30	0.71	3.01	0.00	0.00	3.69	2.28
No RTS or Dust	MAP	1999.7	3.95	0.83	4.01	0.38	0.92	1.13	101.59	0.00	0.00	1.95	0.85	1.71	0.93	0.00	0.00	0.35	0.59
No RTS or Dust	MAP	1996.5	2.86	0.60	2.96	0.31	0.92	0.99	103.49	0.00	0.00	2.23	0.85	0.30	0.79	0.20	0.43	0.22	0.47
No RTS or Dust	MAP	1993.8	3.44	0.72	3.55	0.38	0.91	1.10	103.17	0.00	0.00	2.79	1.05	0.16	0.98	0.29	0.53	0.31	0.58
No RTS or Dust	MYS	2000.7	91.28	19.17	88.09	9.35	0.88	1.24	96.50	0.00	0.00	53.41	14.24	0.00	0.00	0.00	0.00	34.68	15.78
No RTS or Dust	MYS	2000.7	76.91	16.15	73.89	7.79	0.89	1.52	96.07	0.00	0.00	34.74	14.65	4.70	13.74	0.00	0.00	34.45	14.39
No RTS or Dust	MYS	1996.5	67.02	14.07	64.92	6.97	0.88	1.73	96.87	0.00	0.00	20.37	10.40	8.95	10.61	0.00	0.00	35.61	13.23
No RTS or Dust	NEW	1995	104.77	22.00	100.95	10.72	0.90	1.24	96.36	0.00	0.00	59.16	23.08	2.24	21.08	0.00	0.00	39.55	18.85
No RTS or Dust	NEW	1993.3	57.41	12.06	53.17	5.66	0.88	1.28	92.62	0.00	0.00	33.14	8.88	0.00	0.00	0.00	0.00	20.03	9.66
No RTS or Dust	NEW	1991.7	79.88	16.77	76.54	8.04	0.90	1.29	95.82	0.00	0.00	42.91	16.94	2.98	15.56	0.00	0.00	30.65	14.28
No RTS or Dust	NJCP	1997	4.68	0.98	4.63	0.49	0.92	1.10	98.89	0.00	0.00	0.30	0.57	2.35	0.92	0.00	0.00	1.98	0.94
No RTS or Dust	NJCP	1995.6	5.30	1.11	5.17	0.55	0.89	1.15	97.64	0.00	0.00	0.00	0.00	3.08	0.95	0.00	0.00	2.09	1.05
No RTS or Dust	NJCP	1993.7	3.79	0.80	3.75	0.40	0.97	0.29	98.97	0.00	0.00	0.00	0.00	1.80	0.65	0.00	0.00	1.95	0.80
No RTS or Dust	NJOR	1997.2	11.05	2.32	10.59	1.00	0.90	1.45	95.85	0.00	0.00	3.15	1.77	5.78	2.32	0.00	0.00	1.66	1.65
No RTS or Dust	NJOR	1995.2	10.73	2.25	10.21	0.94	0.90	1.51	95.20	0.00	0.00	4.21	1.92	4.50	2.19	0.00	0.00	1.51	1.52
No RTS or Dust	NJOR	1992.3	7.85	1.65	7.48	0.74	0.88	1.50	95.32	0.00	0.00	4.52	1.79	2.72	1.81	0.00	0.00	0.25	1.11

RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	No RTS (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)
No RTS or Dust	ANN	2008.2	17.74	3.73	16.53	1.75	0.90	1.08	93.18	0.00	0.00	10.80	2.78	0.00	0.00	0.00	0.00	5.73	2.94
No RTS or Dust	ANN	2006.2	16.82	3.53	15.36	1.63	0.86	1.53	91.31	0.00	0.00	8.74	2.48	0.00	0.00	0.00	0.00	6.62	2.86
No RTS or Dust	ANN	2003.6	16.53	3.47	14.95	1.64	0.84	1.91	90.43	0.00	0.00	7.00	2.30	0.00	0.00	0.00	0.00	7.95	2.94
No RTS or Dust	BEC	2001.5	2.48	0.52	2.49	0.27	0.96	0.50	100.25	0.00	0.00	1.87	0.71	0.02	0.66	0.03	0.34	0.56	0.43
No RTS or Dust	BEC	2000.1	2.05	0.43	2.03	0.21	0.97	0.40	99.25	0.00	0.00	1.27	0.51	0.04	0.48	0.08	0.25	0.65	0.36
No RTS or Dust	BEC	1999	1.57	0.33	1.53	0.15	0.97	0.54	97.15	0.00	0.00	0.36	0.25	0.39	0.27	0.08	0.16	0.69	0.29
No RTS or Dust	BRK	1999.1	2.41	0.51	2.37	0.22	0.88	1.72	98.52	0.00	0.00	0.73	0.40	1.21	0.51	0.00	0.00	0.43	0.37
No RTS or Dust	BRK	1997.7	3.32	0.70	3.19	0.29	0.91	1.36	96.14	0.00	0.00	1.45	0.62	0.99	0.65	0.00	0.00	0.75	0.50
No RTS or Dust	BRK	1995.7	2.28	0.48	2.22	0.20	0.92	1.16	97.25	0.00	0.00	0.90	0.41	0.81	0.45	0.00	0.00	0.51	0.35
No RTS or Dust	CHA	1999.5	87.40	18.35	89.65	9.56	0.95	0.49	102.57	0.00	0.00	63.42	23.93	1.59	21.68	0.00	0.00	24.64	15.74
No RTS or Dust	CHA	1994.9	110.20	23.14	110.96	11.52	0.93	0.78	100.69	0.00	0.00	78.34	28.98	8.37	26.33	0.00	0.00	24.25	18.20
No RTS or Dust	CHA	1990.2	104.20	21.88	104.30	11.30	0.91	0.81	100.10	0.00	0.00	78.90	18.23	0.00	0.00	0.00	0.00	25.41	17.30
No RTS or Dust	CMO	2000.8	7.34	1.54	7.06	0.79	0.91	0.79	96.13	0.00	0.00	5.75	1.29	0.00	0.00	0.00	0.00	1.31	1.17
No RTS or Dust	CMO	1998.7	12.71	2.67	12.33	1.43	0.91	0.74	97.02	0.00	0.00	10.77	2.36	0.00	0.00	0.00	0.00	1.57	2.05
No RTS or Dust	CMO	1990.6	7.89	1.66	7.98	0.85	0.96	0.49	101.20	0.00	0.00	5.65	2.13	0.22	1.92	0.00	0.00	2.12	1.37
No RTS or Dust	ECO	1999.7	7.55	1.59	7.55	0.87	0.93	0.62	100.00	0.00	0.00	6.56	1.43	0.00	0.00	0.00	0.00	0.99	1.25
No RTS or Dust	ECO	1998.3	5.41	1.14	5.35	0.60	0.92	0.66	98.98	0.00	0.00	4.37	0.98	0.00	0.00	0.00	0.00	0.99	0.89
No RTS or Dust	ECO	1996.4	4.64	0.97	4.45	0.43	0.87	1.81	95.88	0.00	0.00	0.90	0.67	2.61	0.96	0.00	0.00	0.94	0.75
No RTS or Dust	FOS	2000.4	9.64	2.02	9.05	0.99	0.91	0.86	93.90	0.00	0.00	7.13	1.65	0.00	0.00	0.00	0.00	1.92	1.54
No RTS or Dust	FOS	1998.4	14.62	3.07	13.96	1.51	0.92	0.70	95.51	0.00	0.00	10.52	2.50	0.00	0.00	0.00	0.00	3.44	2.40
No RTS or Dust	FOS	1996.2	17.69	3.71	16.92	1.79	0.94	0.60	95.65	0.00	0.00	11.69	2.92	0.00	0.00	0.00	0.00	5.23	2.99
No RTS or Dust	HAR	2006	40.95	8.60	40.65	4.27	0.94	0.72	99.27	0.00	0.00	30.46	11.57	0.96	10.90	3.15	5.72	6.08	6.71
No RTS or Dust	HAR	1999	34.35	7.21	33.49	3.22	0.92	1.31	97.50	0.00	0.00	19.53	7.89	4.91	7.60	0.47	4.15	8.58	5.42
No RTS or Dust	HAR	1991	41.24	8.66	40.54	3.76	0.92	1.26	98.31	0.00	0.00	22.11	9.18	8.30	8.94	0.82	4.96	9.31	6.32
No RTS or Dust	HSP	2000	10.14	2.13	10.34	0.96	0.94	0.97	101.99	0.00	0.00	5.77	2.40	1.65	2.26	0.52	1.26	2.40	1.61
No RTS or Dust	HSP	1995.7	7.57	1.59	7.65	0.75	0.93	0.97	101.01	0.00	0.00	4.67	1.87	1.07	1.75	0.04	0.96	1.86	1.24
No RTS or Dust	HSP	1990.7	7.71	1.62	7.86	0.72	0.94	1.04	101.99	0.00	0.00	4.20	1.78	1.64	1.69	0.31	0.95	1.71	1.20
No RTS or Dust	KIL	1999.1	63.98	13.43	56.51	6.05	0.81	2.11	88.33	0.00	0.00	36.94	9.73	0.00	0.00	0.00	0.00	19.57	10.21
No RTS or Dust	KIL	1997	67.89	14.26	62.44	6.96	0.85	1.39	91.97	0.00	0.00	49.99	11.60	0.00	0.00	0.00	0.00	12.45	10.63
No RTS or Dust	KIL	1994	27.32	5.74	24.84	2.80	0.84	1.55	90.90	0.00	0.00	20.39	4.71	0.00	0.00	0.00	0.00	4.45	4.24
No RTS or Dust	LKH	2006.9	12.15	1.21	11.64	1.12	0.87	1.83	95.85	0.00	0.00	8.07	2.79	0.52	2.57	0.00	0.00	3.05	1.90
No RTS or Dust	LKH	2003	8.13	0.81	7.63	0.64	0.88	2.36	93.81	0.00	0.00	3.60	1.37	1.76	1.39	0.00	0.00	2.27	1.17
No RTS or Dust	LKH	2000.4	10.24	1.02	10.02	1.00	0.94	0.59	97.86	0.00	0.00	7.63	1.65	0.00	0.00	0.00	0.00	2.40	1.60
No RTS or Dust	LKW	1998.9	16.01	3.36	16.00	1.62	0.95	0.66	99.92	0.00	0.00	10.30	3.90	1.40	3.58	0.00	0.00	4.30	2.69
No RTS or Dust	LKW	1995.3	17.28	3.63	17.23	1.57	0.95	0.82	99.73	0.00	0.00	6.78	3.11	5.23	3.33	0.00	0.00	5.23	2.84
No RTS or Dust	LKW	1991.1	13.16	2.76	13.13	1.36	0.96	0.45	99.74	0.00	0.00	8.73	3.30	0.71	3.01	0.00	0.00	3.69	2.28
No RTS or Dust	MAP	1999.7	3.95	0.83	4.01	0.38	0.92	1.13	101.59	0.00	0.00	1.95	0.85	1.71	0.93	0.00	0.00	0.35	0.59
No RTS or Dust	MAP	1996.5	2.86	0.60	2.96	0.31	0.92	0.99	103.49	0.00	0.00	2.23	0.85	0.30	0.79	0.20	0.43	0.22	0.47
No RTS or Dust	MAP	1993.8	3.44	0.72	3.55	0.38	0.91	1.10	103.17	0.00	0.00	2.79	1.05	0.16	0.98	0.29	0.53	0.31	0.58
No RTS or Dust	MYS	2000.7	91.28	19.17	88.09	9.35	0.88	1.24	96.50	0.00	0.00	53.41	14.24	0.00	0.00	0.00	0.00	34.68	15.78
No RTS or Dust	MYS	2000.7	76.91	16.15	73.89	7.79	0.89	1.52	96.07	0.00	0.00	34.74	14.65	4.70	13.74	0.00	0.00	34.45	14.39
No RTS or Dust	MYS	1996.5	67.02	14.07	64.92	6.97	0.88	1.73	96.87	0.00	0.00	20.37	10.40	8.95	10.61	0.00	0.00	35.61	13.23
No RTS or Dust	NEW	1995	104.77	22.00	100.95	10.72	0.90	1.24	96.36	0.00	0.00	59.16	23.08	2.24	21.08	0.00	0.00	39.55	18.85
No RTS or Dust	NEW	1993.3	57.41	12.06	53.17	5.66	0.88	1.28	92.62	0.00	0.00	33.14	8.88	0.00	0.00	0.00	0.00	20.03	9.66
No RTS or Dust	NEW	1991.7	79.88	16.77	76.54	8.04	0.90	1.29	95.82	0.00	0.00	42.91	16.94	2.98	15.56	0.00	0.00	30.65	14.28
No RTS or Dust	NJCP	1997	4.68	0.98	4.63	0.49	0.92	1.10	98.89	0.00	0.00	0.30	0.57	2.35	0.92	0.00	0.00	1.98	0.94
No RTS or Dust	NJCP	1995.6	5.30	1.11	5.17	0.55	0.89	1.15	97.64	0.00	0.00	0.00	0.00	3.08	0.95	0.00	0.00	2.09	1.05
No RTS or Dust	NJCP	1993.7	3.79	0.80	3.75	0.40	0.97	0.29	98.97	0.00	0.00	0.00	0.00	1.80	0.65	0.00	0.00	1.95	0.80
No RTS or Dust	NJOR	1997.2	11.05	2.32	10.59	1.00	0.90	1.45	95.85	0.00	0.00	3.15	1.77	5.78	2.32	0.00	0.00	1.66	1.65
No RTS or Dust	NJOR	1995.2	10.73	2.25	10.21	0.94	0.90	1.51	95.20	0.00	0.00	4.21	1.92	4.50	2.19	0.00	0.00	1.51	1.52
No RTS or Dust	NJOR	1992.3	7.85	1.65	7.48	0.74	0.88	1.50	95.32	0.00	0.00	4.52	1.79	2.72	1.81	0.00	0.00	0.25	1.11

No RTS	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
0.0	65.3	0.0	0.0	34.7
0.0	56.9	0.0	0.0	43.1
0.0	46.8	0.0	0.0	53.2
0.0	75.3	0.9	1.2	22.6
0.0	62.2	2.0	4.0	31.7
0.0	23.4	25.7	5.6	45.4
0.0	30.8	50.9	0.0	18.3
0.0	45.4	31.1	0.0	23.5
0.0	40.6	36.5	0.0	22.9
0.0	70.7	1.8	0.0	27.5
0.0	70.6	7.5	0.0	21.9
0.0	75.6	0.0	0.0	24.4
0.0	81.4	0.0	0.0	18.6
0.0	87.3	0.0	0.0	12.7
0.0	70.8	2.7	0.0	26.5
0.0	86.8	0.0	0.0	13.2
0.0	81.6	0.0	0.0	18.4
0.0	20.2	58.6	0.0	21.1
0.0	78.8	0.0	0.0	21.2
0.0	75.3	0.0	0.0	24.7
0.0	69.1	0.0	0.0	30.9
0.0	74.9	2.4	7.8	15.0
0.0	58.3	14.7	1.4	25.6
0.0	54.5	20.5	2.0	23.0
0.0	55.8	16.0	5.0	23.2
0.0	61.1	14.0	0.6	24.3
0.0	53.5	20.8	3.9	21.8
0.0	65.4	0.0	0.0	34.6
0.0	80.1	0.0	0.0	19.9
0.0	82.1	0.0	0.0	17.9
0.0	69.3	4.5	0.0	26.2
0.0	47.2	23.1	0.0	29.7
0.0	76.1	0.0	0.0	23.9
0.0	64.4	8.7	0.0	26.9
0.0	39.3	30.3	0.0	30.3
0.0	66.5	5.4	0.0	28.1
0.0	48.7	42.7	0.0	8.6
0.0	75.5	10.1	6.8	7.6
0.0	78.5	4.6	8.2	8.7
0.0	60.6	0.0	0.0	39.4
0.0	47.0	6.4	0.0	46.6
0.0	31.4	13.8	0.0	54.8
0.0	58.6	2.2	0.0	39.2
0.0	62.3	0.0	0.0	37.7
0.0	56.1	3.9	0.0	40.0
0.0	6.4	50.8	0.0	42.8
0.0	0.0	59.5	0.0	40.5
0.0	0.0	47.9	0.0	52.1
0.0	29.8	54.6	0.0	15.7
0.0	41.2	44.0	0.0	14.8
0.0	60.3	36.3	0.0	3.3

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
No RTS or Dust	NTR	2004	29.98	6.30	28.20	3.03	0.93	0.65	94.09	0.00	0.00	20.58	4.99	0.00	0.00	0.00	0.00	7.62	4.92	0.0	73.0	0.0	0.0	27.0
No RTS or Dust	NTR	1999	38.30	8.04	36.62	3.99	0.93	0.61	95.62	0.00	0.00	28.31	6.63	0.00	0.00	0.00	0.00	8.31	6.26	0.0	77.3	0.0	0.0	22.7
No RTS or Dust	NTR	1993	46.65	9.80	42.27	4.50	0.87	1.41	90.61	0.00	0.00	25.66	7.12	0.00	0.00	0.00	0.00	16.60	7.89	0.0	60.7	0.0	0.0	39.3
No RTS or Dust	ORL	1997.5	20.57	4.32	19.12	2.06	0.87	1.35	92.93	0.00	0.00	13.75	3.35	0.00	0.00	0.00	0.00	5.37	3.30	0.0	71.9	0.0	0.0	28.1
No RTS or Dust	ORL	1996.6	38.10	8.00	35.06	3.74	0.85	1.53	92.01	0.00	0.00	23.65	6.00	0.00	0.00	0.00	0.00	11.41	6.17	0.0	67.5	0.0	0.0	32.5
No RTS or Dust	ORL	1994.1	38.64	8.11	35.40	3.77	0.85	1.61	91.62	0.00	0.00	21.87	5.90	0.00	0.00	0.00	0.00	13.53	6.44	0.0	61.8	0.0	0.0	38.2
No RTS or Dust	PEP	2006	1.24	0.26	1.26	0.13	0.88	1.35	101.83	0.00	0.00	0.94	0.25	0.00	0.00	0.21	0.19	0.11	0.20	0.0	74.3	0.0	16.8	8.9
No RTS or Dust	PEP	2002	0.91	0.19	0.91	0.09	0.90	1.33	100.53	0.00	0.00	0.58	0.17	0.00	0.00	0.12	0.12	0.22	0.15	0.0	63.0	0.0	13.3	23.8
No RTS or Dust	PEP	1998	1.08	0.23	1.09	0.11	0.90	1.24	100.57	0.00	0.00	0.72	0.21	0.00	0.00	0.09	0.14	0.27	0.18	0.0	66.7	0.0	8.7	24.6
No RTS or Dust	PLM	2006.1	35.64	7.48	32.59	3.58	0.83	2.69	91.43	0.00	0.00	5.62	4.33	7.87	5.20	0.00	0.00	19.10	6.89	0.0	17.2	24.2	0.0	58.6
No RTS or Dust	PLM	2002	34.69	7.28	33.39	4.02	0.84	2.30	96.26	0.00	0.00	4.84	4.45	5.20	5.02	0.00	0.00	23.35	7.61	0.0	14.5	15.6	0.0	69.9
No RTS or Dust	PLM	1997	32.00	6.72	29.46	3.26	0.84	2.39	92.06	0.00	0.00	8.34	4.57	3.63	4.65	0.00	0.00	17.49	6.21	0.0	28.3	12.3	0.0	59.4
No RTS or Dust	SCM	2005.2	7.22	1.52	7.49	0.72	0.91	1.37	103.72	0.00	0.00	1.70	1.49	4.48	1.70	0.18	0.97	1.13	1.25	0.0	22.6	59.9	2.4	15.1
No RTS or Dust	SCM	2003	4.64	0.98	4.68	0.43	0.94	0.89	100.76	0.00	0.00	1.37	0.77	2.27	0.98	0.00	0.00	1.03	0.75	0.0	29.3	48.6	0.0	22.1
No RTS or Dust	SCM	2001.7	4.35	0.91	4.36	0.41	0.94	0.82	100.08	0.00	0.00	1.08	0.68	2.22	0.91	0.00	0.00	1.05	0.73	0.0	24.9	51.1	0.0	24.1
No RTS or Dust	SLN	1996.7	16.57	3.48	15.75	2.01	0.84	1.04	95.03	0.00	0.00	15.75	2.01	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
No RTS or Dust	SLN	1994.4	16.52	3.47	15.85	2.02	0.84	1.05	95.97	0.00	0.00	15.85	2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
No RTS or Dust	SLN	1990.2	16.57	3.48	15.93	2.03	0.85	1.01	96.17	0.00	0.00	15.93	2.03	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
No RTS or Dust	TWN	1998.1	7.86	1.65	7.38	0.78	0.88	1.24	93.92	0.00	0.00	4.39	1.21	0.00	0.00	0.00	0.00	2.99	1.35	0.0	59.5	0.0	0.0	40.5
No RTS or Dust	TWN	1991.5	6.15	1.29	5.83	0.63	0.88	1.24	94.78	0.00	0.00	4.14	1.02	0.00	0.00	0.00	0.00	1.69	1.01	0.0	71.1	0.0	0.0	28.9
No RTS or Dust	TWN	1991.5	6.83	1.43	6.42	0.69	0.87	1.40	94.01	0.00	0.00	3.43	1.02	0.00	0.00	0.00	0.00	2.99	1.22	0.0	53.4	0.0	0.0	46.6
No RTS or Dust	WEE	2002	0.97	0.20	0.93	0.10	0.93	0.72	95.45	0.00	0.00	0.61	0.16	0.00	0.00	0.00	0.00	0.31	0.16	0.0	66.2	0.0	0.0	33.8
No RTS or Dust	WEE	1999	0.65	0.14	0.62	0.07	0.92	0.79	95.86	0.00	0.00	0.42	0.11	0.00	0.00	0.00	0.00	0.21	0.11	0.0	66.9	0.0	0.0	33.1
No RTS or Dust	WEE	1996	0.61	0.13	0.58	0.06	0.91	0.85	95.71	0.00	0.00	0.42	0.10	0.00	0.00	0.00	0.00	0.16	0.10	0.0	72.7	0.0	0.0	27.3
No RTS or Dust	WP55	2003	2.05	0.43	2.05	0.25	0.91	0.65	99.99	0.00	0.00	1.91	0.41	0.00	0.00	0.00	0.00	0.14	0.35	0.0	93.1	0.0	0.0	6.9
No RTS or Dust	WP55	2000.6	1.94	0.41	1.93	0.23	0.90	0.82	99.51	0.00	0.00	1.72	0.37	0.00	0.00	0.00	0.00	0.21	0.32	0.0	89.2	0.0	0.0	10.8
No RTS or Dust	WP55	1997.4	2.30	0.48	2.29	0.25	0.92	0.67	99.59	0.00	0.00	1.87	0.42	0.00	0.00	0.00	0.00	0.43	0.38	0.0	81.4	0.0	0.0	18.6
No RTS or Dust	WRL	2003.2	2.80	0.59	2.64	0.29	0.88	1.11	94.16	0.00	0.00	2.07	0.48	0.00	0.00	0.00	0.00	0.57	0.45	0.0	78.4	0.0	0.0	21.6
No RTS or Dust	WRL	2002.1	1.50	0.32	1.43	0.15	0.91	0.90	95.35	0.00	0.00	0.89	0.24	0.00	0.00	0.00	0.00	0.54	0.26	0.0	62.1	0.0	0.0	37.9
No RTS or Dust	WRL	1999.9	1.75	0.37	1.66	0.18	0.88	1.18	94.85	0.00	0.00	1.20	0.29	0.00	0.00	0.00	0.00	0.46	0.29	0.0	72.4	0.0	0.0	27.6
No RTS or Dust	WTN	2004	4.12	0.87	4.01	0.42	0.96	0.40	97.45	0.00	0.00	2.43	0.66	0.00	0.00	0.00	0.00	1.59	0.73	0.0	60.5	0.0	0.0	39.5
No RTS or Dust	WTN	2000	3.17	0.67	3.13	0.33	0.95	0.51	98.80	0.00	0.00	1.70	0.50	0.00	0.00	0.00	0.00	1.44	0.59	0.0	54.2	0.0	0.0	45.8
No RTS or Dust	WTN	1993	1.42	0.30	1.46	0.15	0.94	0.74	102.63	0.00	0.00	0.76	0.26	0.00	0.00	0.12	0.17	0.58	0.25	0.0	52.3	0.0	8.2	39.5
No RTS or Dust	WTY	2005.3	50.47	10.60	47.85	4.94	0.89	1.49	94.83	0.00	0.00	3.90	6.03	26.14	9.83	0.00	0.00	17.81	9.27	0.0	8.2	54.6	0.0	37.2
No RTS or Dust	WTY	2004	48.95	10.28	48.31	5.20	0.96	0.41	98.70	0.00	0.00	36.49	8.48	0.00	0.00	0.00	0.00	11.83	8.13	0.0	75.5	0.0	0.0	24.5
No RTS or Dust	WTY	2001.1	48.72	10.23	48.20	5.16	0.95	0.49	98.92	0.00	0.00	35.13	13.01	0.91	11.74	0.00	0.00	12.16	8.40	0.0	72.9	1.9	0.0	25.2
No RTS or Dust	BAL	2006.3	16.49	1.65	16.34	1.58	0.83	2.72	99.11	0.00	0.00	1.21	1.96	11.08	3.50	0.00	0.00	4.06	2.86	0.0	7.4	67.8	0.0	24.8
No RTS or Dust	BAL	2004	23.60	2.36	22.97	2.31	0.91	0.99	97.34	0.00	0.00	17.59	3.79	0.00	0.00	0.00	0.00	5.38	3.63	0.0	76.6	0.0	0.0	23.4
No RTS or Dust	BAL	2002.9	9.53	0.95	9.10	0.89	0.90	1.12	95.51	0.00	0.00	6.44	1.45	0.00	0.00	0.00	0.00	2.67	1.48	0.0	70.7	0.0	0.0	29.3
No RTS or Dust	CYN	1998.6	0.12	0.02	0.12	0.01	0.91	1.31	101.79	0.00	0.00	0.09	0.03	0.02	0.03	0.00	0.02	0.01	0.02	0.0	71.5	14.9	3.9	9.7
No RTS or Dust	CYN	1997.2	0.12	0.03	0.13	0.01	0.92	0.90	103.45	0.00	0.00	0.10	0.04	0.01	0.03	0.02	0.02	0.00	0.00	0.0	79.3	6.9	13.8	0.0
No RTS or Dust	CYN	1995.3	0.19	0.04	0.20	0.02	0.90	1.26	101.26	0.00	0.00	0.15	0.06	0.02	0.05	0.01	0.03	0.03	0.03	0.0	74.8	8.6	3.8	12.9
No RTS or Dust	DEK	1990	0.92	0.19	0.80	0.08	0.85	2.08	87.55	0.00	0.00	0.50	0.19	0.15	0.19	0.00	0.00	0.15	0.13	0.0	62.1	19.0	0.0	19.0
No RTS or Dust	DEK	1990	0.84	0.18	0.75	0.08	0.87	1.64	90.16	0.00	0.00	0.54	0.20	0.12	0.19	0.00	0.00	0.09	0.12	0.0	71.9	15.6	0.0	12.5
No RTS or Dust	DEK	1990	0.52	0.11	0.50	0.06	0.90	0.86	96.17	0.00	0.00	0.48	0.17	0.01	0.15	0.00	0.00	0.02	0.09	0.0	94.6	1.9	0.0	3.5
No RTS or Dust	FAR	1997.1	0.38	0.08	0.40	0.04	0.91	1.19	104.84	0.00	0.00	0.13	0.09	0.22	0.08	0.04	0.05	0.00	0.00	0.0	33.3	56.0	10.7	0.0
No RTS or Dust	FAR	1991.5	0.33	0.07	0.34	0.03	0.93	1.00	104.08	0.00	0.00	0.11	0.08	0.20	0.07	0.03	0.05	0.00	0.00	0.0	33.5	57.0	9.6	0.0
No RTS or Dust	FAR	1983.6	0.33	0.07	0.34	0.03	0.94	0.91	102.39	0.00	0.00	0.15	0.08	0.15	0.07	0.03	0.05	0.00	0.00	0.0	44.1	45.8	10.1	0.0
No RTS or Dust	HIL	1997.7	2.09	0.44	1.97	0.18	0.91	1.28	94.04	0.00	0.00	0.65	0.34	0.98	0.43	0.00	0.00	0.34	0.31	0.0	33.1	49.6	0.0	17.2
No RTS or Dust	HIL	1995.6	1.90	0.40	1.77	0.16	0.91	1.37	92.91	0.00	0.00	0.77	0.33	0.58	0.36	0.00	0.00	0.42	0.28	0.0	43.6	32.7	0.0	23.7
No RTS or Dust	HIL	1993	1.31	0.28	1.25	0.14	0.92	0.74	95.65	0.00	0.00	0.96	0.22	0.00	0.00	0.00	0.00	0.29	0.21	0.0	76.5	0.0	0.0	23.5
No RTS or Dust	LVB	1998.2	0.09	0.02	0.09	0.01	0.84	1.40	95.56	0.00	0.00	0.07	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.0	85.9	0.0	14.1	0.0
No RTS or Dust	LVB	1994.9	0.10	0.02	0.10	0.01	0.87	1.26	100.10	0.00	0.00	0.08	0.02	0.00	0.00	0.02	0.02	0.00	0.00	0.0	75.7	0.0	24.3	0.0
No RTS or Dust	LVB	1992	0.09	0.02	0.09	0.01	0.86	1.36	97.88	0.00	0.00	0.07	0.02	0.00	0.00	0.02	0.01	0.00	0.00	0.0	78.0	0.0	22.0	0.0
No RTS or Dust	SWT	1998.3	1.72	0.36	1.78	0.24	0.94	0.32	103.42	0.00	0.00	1.78	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
No RTS or Dust	SWT	1996.5	1.31	0.27	1.34	0.17	0.93	0.52	102.50	0.00	0.00	1.21	0.44	0.13	0.40	0.00	0.00	0.00	0.00	0.0	90.4	9.6	0.0	0.0

Test Source	Site ID	Date	Measured concn. (mg/kg)	Uncertainty (40%)	Calculated concn. (mg/kg)	Uncertainty	Rsquare	CHIsquare	%MASS	CT dust (mg/kg)	Std. error (Fresh RTS)	Vehicle, tunnel (mg/kg)	Std. error (Veh/tunnel)	Coal, avg. (mg/kg)	Std. error (Coal, avg.)	Fuel oil (mg/kg)	Std. error (Fuel oil)	Pinewood (mg/kg)	Std. error (pinewood)	RT or Dust	Vehicle, tunnel	Coal, average	Fuel oil	Pinewood
No RTS or Dust	SWT	1994.3	1.18	0.25	1.19	0.12	0.96	0.46	101.31	0.00	0.00	0.62	0.27	0.50	0.30	0.00	0.00	0.07	0.19	0.0	52.0	42.1	0.0	5.9
No RTS or Dust	TNB	2003.7	1.08	0.23	1.00	0.11	0.86	1.32	92.60	0.00	0.00	0.81	0.19	0.00	0.00	0.00	0.00	0.18	0.17	0.0	81.8	0.0	0.0	18.2
No RTS or Dust	TNB	2000.5	1.56	0.33	1.46	0.19	0.85	0.96	93.59	0.00	0.00	1.46	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.0	100.0	0.0	0.0	0.0
No RTS or Dust	TNB	1996.4	1.38	0.29	1.30	0.15	0.88	0.94	94.52	0.00	0.00	1.18	0.26	0.00	0.00	0.00	0.00	0.13	0.22	0.0	90.1	0.0	0.0	9.9
No RTS or Dust	WAS	1997.5	0.36	0.08	0.35	0.04	0.90	0.87	96.27	0.00	0.00	0.30	0.07	0.00	0.00	0.00	0.00	0.05	0.06	0.0	85.9	0.0	0.0	14.1
No RTS or Dust	WAS	1994.8	0.37	0.08	0.36	0.04	0.92	0.70	97.78	0.00	0.00	0.31	0.07	0.00	0.00	0.00	0.00	0.05	0.06	0.0	86.2	0.0	0.0	13.8
No RTS or Dust	WAS	1991.9	0.46	0.10	0.44	0.05	0.91	0.86	95.58	0.00	0.00	0.35	0.08	0.00	0.00	0.00	0.00	0.08	0.07	0.0	80.6	0.0	0.0	19.4
No RTS or Dust	WES	1998	8.04	1.69	7.50	0.76	0.95	0.75	93.33	0.00	0.00	1.33	1.03	2.65	1.36	0.00	0.00	3.53	1.54	0.0	17.7	35.3	0.0	47.1
No RTS or Dust	WES	1995.6	8.85	1.86	8.51	0.78	0.96	0.61	96.17	0.00	0.00	3.55	1.59	2.32	1.66	0.00	0.00	2.64	1.44	0.0	41.7	27.3	0.0	31.1
No RTS or Dust	WES	1993.4	6.07	1.27	5.72	0.56	0.96	0.56	94.24	0.00	0.00	1.44	0.88	1.71	1.04	0.00	0.00	2.57	1.12	0.0	25.1	29.9	0.0	44.9
No RTS or Dust	WST	1998.3	7.72	1.62	7.58	0.82	0.95	0.45	98.23	0.00	0.00	5.84	1.35	0.00	0.00	0.00	0.00	1.74	1.27	0.0	77.1	0.0	0.0	22.9
No RTS or Dust	WST	1996.8	11.83	2.48	11.55	1.20	0.96	0.41	97.61	0.00	0.00	7.39	2.84	0.38	2.60	0.00	0.00	3.78	2.10	0.0	64.0	3.3	0.0	32.7
No RTS or Dust	WST	1995	12.43	2.61	11.95	1.27	0.94	0.55	96.16	0.00	0.00	8.64	2.08	0.00	0.00	0.00	0.00	3.31	2.05	0.0	72.3	0.0	0.0	27.7

Exhibit B

Document UB03001. Communication discussing sharing of samples from Dr. Watts's test plot study with VanMetre and other at the USGS. Dr VanMetre's comments suggest he participated on site at Dr. Watts field study.

February 12 & 15, 2008 e-mail from Dr Watts to VanMetre and Mahler discussing collaboration on responding to a National Science Foundation request for proposal.

July 8, 2008 emails between Minnesota Pollution Control Agency staff scientists concerning failure of EarthTech's report to make the case that RTS is the source of PAHs in storm water sediments.

Doc. No. UB03001

USGS FOIA
Box-03
lab batch PAH R07298-b

Peter C VanMetre/WRD/USGS/DOI
03/19/2008 03:17 PM

To Teresa L Burbank/WRD/USGS/DOI@USGS
cc Jennifer T Wilson/WRD/USGS/DOI@USGS
bcc
Subject Re: Samples IDs'

Terry,

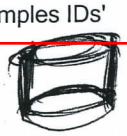
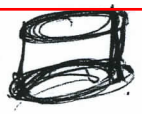
Can you send me back the jars, including any material still in the third one that looked like soil? They should have whatever I wrote on them in the field plus the typed labels that Jennifer put on them and I'd like to compare them with my field notes.

Thanks!
Pete

Peter Van Metre
USGS
8027 Exchange Drive
Austin, TX 78754
512-927-3506
Teresa L Burbank/WRD/USGS/DOI

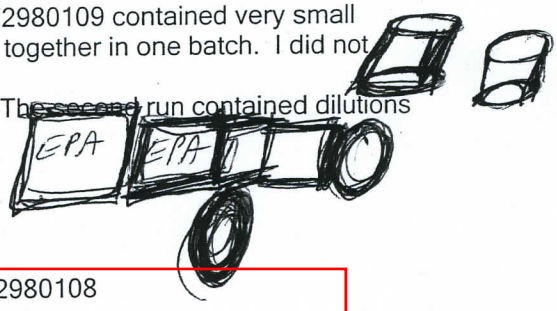
Teresa L Burbank/WRD/USGS/DOI
03/18/2008 02:54 PM

To Jennifer T Wilson/WRD/USGS/DOI@USGS, Peter C VanMetre/WRD/USGS/DOI@USGS
cc Michael P Schroeder/WRD/USGS/DOI@USGS, Duane S Wydoski/WRD/USGS/DOI@USGS
Subject Samples IDs'

Peter and Jennifer,

The data matches the information on the jars with the ASR. Samples, 20072980107 and 20072980108, contained mainly water with very little sediment material. Sample 20072980109 contained very small amount of water with sediment material. The three samples were prep together in one batch. I did not prep the samples with any other samples.
The samples were analyzed by GCMS in two different analytical runs. The second run contained dilutions for sample 20072980109 at 20 x and 100x. (EPA - Halogen PCB)



The information on the jars are as follows:

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20072980109		
Station ID:	430832070571701	430827070570901
430831070571501		
Description:	UNH Stormwater CNTR	UNH Stormwater CNTR
UNH Stormwater CNTR		
	Coal tar Sealed lot,	asphalt Sealed lot,
unsealed lot 2,		
	Durham, NH	Durham, NH

512-927-3506

Durham, NH

Date and Time	10/18/2007 @1415	10/18/2007 @ 1150
10/18/2007 @1030		
Field ID	UNH -C washoff	UNH- A washoff
UNH-U washoff		

Thanks,

Terry Burbank

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From: "Watts, Alison" <Alison.Watts@unh.edu>
SendTo: "Barbara J Mahler" <bjmahler@usgs.gov>
CopyTo: "Peter C VanMetre" <pcvanmet@usgs.gov>
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$TUA: 5E1A9FBF6EE608C08725771F005B51BD
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$PaperColor: 1

Barbara - That's fine, I'm not quite sure how these collaborations work with NSF anyways. And don't worry, we can still spring you an umbrella...

I'm proposing to do this study at the same parking lot we're doing the stormwater on, in which case I'd like to be able to use the soil and sweeping samples I collected for you in the fall to record the pre-sealant condition. Can I say that that data will be shared with us? For future samples, I'll collect splits to be analyzed for the separate studies, which provides some good replications for the labs anyways.

Also, I think the figure Pete sent showing the soil concentrations around the country really identifies the need for further research. Can I include some reference to that data in the proposal? I could either use the figure (marked draft, and referenced to you), or some much vaguer wording such as "preliminary data collected by USGS researchers found that PAH concentrations near 6 sealed lots in the eastern US and Texas were 1 to 2 orders of magnitude higher than concentrations found near unsealed lots".

Thanks, enjoy your paper writing.

- Alison

Received: from gscodens03.cr.usgs.gov ([136.177.7.24]) by gscodenh01.cr.usgs.gov (Lotus Domino Release 7.0.2FP1) with ESMTP id 2008021220214940-214770 ; Tue, 12 Feb 2008 20:21:49 -0700
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$UpdatedBy: ,CN=gscodenh01/OU=SERVER/OU=USGS/O=DOI,CN=gscodenh02/OU=SERVER/OU=USGS/O=DOI,CN=Barbara J Mahler/OU=WRD/OU=USGS/O=DOI
Categories:
DeliveredDate: 02/12/2008 09:21:50 PM
$Abstract: Thanks Pete -
$TUA: F478B096D0E029A78725771F005B51BA
$RespondedTo: 1
$PaperColor: 1

Thanks Pete -

On a related note, I think the research we are proposing here, and the sampling you have/are planning to do are very closely related, and could complement each other nicely. We are submitting this proposal to NSFs general Environmental Engineering RFP (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=501029). Would either/both of you have an interest in joining as official collaborators? You already have sweeping samples and baseline offsite sediment samples at our site, we have the stormwater component, and this proposal would add the wind/tracking component. All of the pieces together will make a fairly complete, if site-specific, study of transport paths.

... And if you come back out here we'll give you a Stormwater Center Umbrella!

- Alison

From: Peter C VanMetre [mailto:pcvanmet@usgs.gov]
Sent: Tue 2/12/2008 5:27 PM
To: Watts, Alison; mateo.scoggins@ci.austin.tx.us; nancy.mcclintock@ci.austin.tx.us; tom.bashara@ci.austin.tx.us
Cc: Barbara J Mahler
Subject: Fw: PAH research urged in EPA Science budget report

Folks,

The article on the EPA Science budget with mention of sealcoat is attached below. It's under the "Clean Air Research Emphasized" heading.

Pete

Peter Van Metre
USGS
8027 Exchange Drive
Austin, TX 78754
512-927-3506

----- Forwarded by Peter C VanMetre/WRD/USGS/DOI on 02/12/2008 04:25 PM -----

(b) (6) [redacted]

12/28/2007 04:06 PM

To
tlmiller@usgs.gov, dnmyers@usgs.gov, wgwilber@usgs.gov, pahamilt@usgs.gov, pcvanmet@usgs.gov, bjmahler@usgs.gov
cc

Subject
PAH research urged in EPA Science budget report

EPA Will Receive Nearly $40 Million More
For Science, Technology Work in FY 2008

The Environmental Protection Agency will get nearly $40 million more in

fiscal year 2008 for its science and technology activities than it got in fiscal year 2007, according to details on the consolidated budget recently posted by the House.

Congress passed the appropriations bill (H.R. 2764) Dec. 19, incorporating a Senate provision to fund military operations in Afghanistan and Iraq that was needed for final passage. President Bush signed the bill Dec. 26. The bill provides $7.5 billion for the Environmental Protection Agency (244 DEN A-10, 12/20/07).

Of that $7.5 billion total, EPA will receive $772.1 million for the Science and Technology portion of its budget. That compares with $733.4 million that it received in fiscal year 2007 and $754.5 million the president requested.

The bulk of the science and technology budget, $233.2 million, is directed at research on human health and ecosystems. EPA received $229.3 million for such research in fiscal year 2007.

Activities funded within the Human Health and Ecosystems account include basic human health research; EPA's Environmental Monitoring and Assessment Program (EMAP), through which the agency develops tools to monitor and assess the status and trends of national ecological resources; computational toxicology; and risk assessments.

Congress Tells EPA to Complete Risk Assessment

In a report that accompanies the budget bill, Congress urged EPA to expedite completion of its risk assessment for trichloroethylene, a pollutant believed to be present in more than one-third of the nation's drinking water supply.

A final assessment of the risks posed by trichloroethylene has not been issued by EPA since 1985. EPA tried to update its evaluation in 1987, but due to disagreements over whether the solvent was a probable or possible human carcinogen, the draft assessment was never completed, and EPA removed information about trichloroethylene, also called TCE, from a key database in 1989.

In a report issued in July 2006, the National Academies said the scientific evidence that trichloroethylene causes cancer and other health problems has grown since 2001 when EPA issued its most recent draft risk assessment. To help states and other parties make decisions about the chemical, the academies urged EPA to promptly complete its risk assessment

(145 DEN A-1, 07/28/06).

Clean Air Research Emphasized

The budget report also urged EPA to study the human health effects and ecosystem impacts of polycyclic aromatic hydrocarbons (PAHs) that can be released from parking lot seal-coatings and to study the health and environmental impacts of using a chemical called Trona to control sulfur dioxide emissions from coal-fired power plants.

Clean air research was the second-largest category of research funding through the science and technology account. EPA received $99.4 million for such research in fiscal year 2008. That compares with $94.3 million the agency received in fiscal year 2007.

Of the $99.4 million, Congress directed $20 million to fund research that would support a future rulemaking on greenhouse gases. The agency received $16 million for such research in fiscal year 2007.

EPA was given $95.8 million for research on air toxics. That compares with an allocation of $95 million in fiscal year 2007.

The $95.8 million includes nearly $4 million for EPA's Clean Air Status and Trends Network (CASTNet) and $1.4 million to complete the Central California Ozone Study.

From a separate part of the science and technology budget, EPA will receive $18.6 million for its Clean Automotive Technology Program, through which the agency is striving to develop cost-effective air pollution control technologies for vehicles.

Details on EPA's budget are available at http://www.rules.house.gov/110/text/omni/jes/jesdivf.pdf.

Judy Campbell Bird
4831 Langdrum Lane
Chevy Chase, MD 20815
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Fax: 301-652-4958

See AOL's top rated recipes and easy ways to stay in shape for winter.

Crane, Judy

From: Crane, Judy
Sent: Tuesday, July 08, 2008 9:59 AM
To: Cherryholmes, Keith
Cc: Kohlasch, Frank
Subject: RE: PAH Report on Stormwater Pond Sediments

Keith--

Yes, that would be fine. I can either look at it later on this afternoon or tomorrow.

Judy

-----Original Message-----
From: Cherryholmes, Keith
Sent: Tuesday, July 08, 2008 9:56 AM
To: Crane, Judy
Subject: PAH Report on Stormwater Pond Sediments

Judy,

Would you have a little time to look at the re-write of the first PAH report you reviewed for us. Bruce Wilson does not think it really makes a case for coal tar-based sealants as being the source of PAHs in stormwater sediments. Dale Thompson sent Frank an e-mail requesting some of your time and we have not heard back from him

Keith

Keith Cherryholmes, PhD
Stormwater Management Unit
Municipal Division
(651) 296-6945
keith.cherryholmes@pca.state.mn.us

Exhibit C

Alphabetized list of footnoted references

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