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November 7, 2006

VIA FEDERAL EXPRESS AND E-MAIL TO INFOQUAL@USGS.GOV

Geographic Information Office
U.S. Geological Survey
159 National Center
Reston, VA 20192

Re: Complaint About Information Quality

Dear Sir or Madam:

Please find enclosed a complaint and request for correction pursuant to the provisions of the U.S. Geological Survey's Guidelines for Ensuring the Quality of Information Disseminated to the Public and the underlying federal statute commonly known as the Data Quality Act.

This document is submitted on behalf of a number of affected parties including E.A. Mariani Asphalt Co., Gem Seal Group, Dalton Enterprises, Tangent Rail Products, Coopers Creek Chemical Corp., Bonsal American, Surface Coatings, Inc., The Brewer Company, Vance Brothers, Inc., Star, Inc., and Velvetop Products.

Should you have any questions or need any information, please feel free to contact me as coordinating counsel for these companies in connection with this complaint and request at (512) 542-2134, at timothy.wilkins@bgllp.com, or at the above address.

Very truly yours,

Bracewell & Giuliani LLP

Timothy A. Wilkins

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Geographic Information Office
U.S. Geological Survey
159 National Center
Reston, VA 20192

Subject: **Complaint About Information Quality**

Regarding: "Concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) and Major and Trace Elements in Simulated Rainfall Runoff from Parking Lots, Austin, Texas, 2003"

Publication Date: August 5, 2005

Publication Number: Open-File Report 2004-1208, version 2

Website Location: http://pubs.usgs.gov/of/2004/1208/pdf/2004%961208ver2.pdf

Dear Sir or Madam:

This complaint and request for correction is submitted pursuant to the provisions of the U.S. Geological Survey Guidelines for Ensuring the Quality of Information Disseminated to the Public, as well as the underlying statute, Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554; HR-5658) (hereinafter, the "Data Quality Act"), and the related directives of the Office of Management and Budget, 67 Fed.Reg. 8452 (Feb.22, 2002) and the U.S. Department of the Interior.

The requesting parties, E.I. Mariani Asphalt Co., the Gem Seal Group, Dalton Enterprises, Tangent Rail Products, Coopers Creek Chemical Corp., Bonsal American, Surface Coatings Co., The Brewer Company, Vance Brothers, Inc., Star, Inc., and Velvetop Products (collectively, the "Affected Parties"), have been affected by the information errors specified below by virtue of the erroneous data and interpretations included in this report being presented and serving as a major information source considered by the City Council of the City of Austin, Texas in conjunction with the passage of a municipal ordinance banning certain products manufactured and distributed by the Affected Parties. Public presentations of the erroneous information and active promotion of media coverage of this information through agency press releases has further affected the Affected Parties by creating erroneous and exaggerated criticisms of the Affected Parties' products to the public at large and customers of the Affected Parties throughout the United States.

Basis for Complaint and Correction Request

By virtue of the nature of the information included in the subject report, the priority and attention intentionally promoted by the agency and the actions of the City Council of Austin, Texas, the Affected Parties assert that the information being challenged meets the criterion of being "influential" information, subject to the requirements of:

1) *U.S. Geological Survey Guidelines for Ensuring the Quality of Information Disseminated to the Public* **(USGS Guidelines)**;

2) *U.S. Geological Survey Manual – Section 500.9* **(USGS Manual)**;

3) *U.S. Department of the Interior Information Quality Guidelines Pursuant to Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001* **(DOI Guidelines)**; *and*

4) *Office of Management and Budget Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies* **(OMB Guidelines)**

The Data Quality Act directs that federal agencies "issue guidelines ensuring and maximizing the quality, objectivity, utility and integrity of information (including statistical information) disseminated" by those agencies and that such guidelines provide "administrative mechanisms allowing affected persons to seek and obtain correction" of such information. The USGS Guidelines implementing this directive purport to incorporate by reference the OMB Guidelines and DOI Guidelines and specify that the "information quality definitions" published in these guidelines are adopted by USGS as their definitions with respect to information quality matters. The USGS Manual provides further agency-specific details on the criteria that the USGS applies in determining the quality of information products to be disseminated.

Accordingly, we have relied upon the criteria and definitions specified in the cited guidelines and the USGS manual as the basis for identifying information meriting the challenges made in this complaint. The criteria relevant to information quality include utility, objectivity and integrity, as defined and detailed in the OMB Guidelines. 67 Fed.Reg. at 8453.

With regard to "utility," the OMB Guidelines state that "when transparency is relevant for assessing the information's usefulness from the public's perspective, the agency must take care to ensure that transparency has been addressed in its review. 67 Fed.Reg. at 8459. The degree of transparency required is also specified: "With regard to analytic results related thereto, agency guidelines shall generally require sufficient transparency about data and methods that an independent reanalysis could be undertaken by a qualified member of the public." 67 Fed.Reg. at 8460.

With regard to "objectivity," the OMB Guidelines direct that this applies specifically and separately to both the presentation and substance of the information being disseminated. Criteria for presentations include a requirement that information is "accurate, clear, complete, and unbiased," 67 Fed.Reg. at 8453, and specify that

information be presented within its proper context. The substance of the information is further required to be reliable. The guidelines state that "data should have full, accurate, transparent documentation, and error sources should be identified and disclosed to users." 67 Fed.Reg. 8459. Objectivity is further specified to require the use of sound scientific methods – "the original and supporting data shall be generated, and the analytic results shall be developed, using sound statistical and research methods." 67 Fed.Reg. 8459.

With regard to "integrity," the USGS Manual specifies that this requires that "data collected are accurate and precise and the methods of collection are documented. The interpretations are presented as honestly and straightforwardly as possible, without apparent bias." USGS Manual 500.9 §5.A.

The USGS Manual also identifies a separate criterion termed "impartiality and nonadvocacy," that amplifies upon the term unbiased included within "objectivity" by the OMB, specified as follows: "the report presents facts and interpretations impartially for others to use for their own purposes. Alternatives are evaluated rather than solutions recommended. Advocacy positions are avoided.... There is no implied adverse criticism of ... the private sector." USGS Manual 500.9 §5.C. Note the affirmative requirement to avoid advocacy means that agency staff are instructed to directly consider whether the presentation of information could reasonably be considered to be taking an advocacy position and to actively seek to prevent this. A lack of intent to promote an advocacy position is not sufficient to meet the standard specified in the USGS Manual.

Based on the various definitions, the following set of criteria and subcategories has been organized and the basis for each individual specific challenge specified correspondingly:

- Utility – transparency is sufficient for reanalysis
- Objectivity – presentation and substance must be:
    - Accurate
    - Clear
    - Complete
    - Unbiased
    - Set in proper context
    - Based on sound scientific reasoning
- Integrity – information must be:
    - Accurate
    - Precise
    - Documented as to method used
    - Presented with error sources disclosed
    - Presented straightforwardly, with no apparent bias
- Impartiality and Nonadvocacy – requires that :

- Interpretations and facts are presented impartially
- Alternatives are evaluated
- Advocacy is avoided
- There is no implied criticism of private sector

Nature of Information and Statements Being Challenged

The objections being submitted identify significant errors and/or omissions in study design, methodological limitations and incomplete analytical steps that impair the quality of the study described in the report to the extent that some interpretations drawn from this study are called into question. The objections also point out significant mischaracterizations of background information and the results of the study as presented by the narrative text of the report. The flaws in both the implementation and reporting of the study have affected the Affected Parties because they have served to either minimize or conceal uncertainties and emphasize findings and interpretations that support the position of parties with a previously acknowledged interest in banning products of the Affected Parties. Because of the link between this study and a product ban, the preparation of this report should be particularly careful and thorough and correction of identified errors and adequate disclosure of the details of the study sufficient to allow independent replication or reanalysis of the study should be made in a timely manner.

The errors and omissions detailed below fall into several categories. There were intentional study design decisions and modifications in the field that served to bias the subsequent results and constrain the analyses so that findings suggestive of PAH contributions being uniquely associated with one type of pavement sealer product (coal tar-derived products) were more likely to be obtained. Alternate explanations specifically indicated by the data of the study were not disclosed and discussed. In some instances, the analyses did not follow generally accepted conventions regarding statistical representations and excluded samples or individual results from analyses without reasonable scientific rationale. Decisions regarding the summation of numerical values, rounding, and the number of samples analyzed from different types of paved surfaces were applied in manners that served to selectively make the results from coal tar-derived sealer products appear to be of greatest potential concern. The report was also used as a platform to repeat, lend agency credibility and make a record of background information from sources not considered reliable in their own right by scientists. This strategy serves to elevate information not subjected to the rigors of scientific and agency review by creating a seemingly credible citation that can be used subsequently as a reference in conjunction with repeating the information. In light of the agency's interest in maintaining credibility and requirement that the agency's studies remain strictly scientific investigations and not set out to advocate for a policy position, clearly separating information derived from the study itself from unreliable statements in need of credibility coattails is important. Another significant category of objections relates to the omission of details of the study implementation and analysis that effectively preclude a complete independent reanalysis. Reporting studies in a manner such that other scientists can repeat the investigation to independently replicate the findings is a fundamental tenet of

scientific reporting, as recognized by the inclusion of this specification in the requirements of the OMB Guidelines.

While the Affected Parties anticipate that some of the objections detailed below can be addressed through the relatively straight-forward release of supplemental details or explanations, there are a number of serious flaws in how the study was carried out and how it was reported. Updated analyses will be required to address some objections and uncertainties due to some choices in the field may be unavoidable and require forthright disclosure. In light of the study presented in this reported being carried out with direct assistance, direction and support from the City of Austin, which subsequently used the findings to substantiate its previously stated goal of identifying coal tar-derived pavement sealer products uniquely as important urban PAH sources and banning this one type of product, the implications of the corrections released in response to these objections with regard to the use of this study in policy should be specified by the agency.

Specific Statements Being Challenged

1. USGS Statement

Page 1 - Abstract; paragraph 1

"Concentrations were similar for runoff and scrapings from the test plots"

Objection

This statement falls in the category of mischaracterizations of the actual results and findings of the study in the report text. The statement is misleading and imprecise. Concentrations of PAHs reported in washoff samples from the coal-tar derived sealer test plots were many times lower than the corresponding results obtained by scraping the sealer. Only for the asphalt-based sealer test plot could the relative concentrations be reasonably characterized as similar (e.g., sum of PAHs = 96 mg/kg for washoff sample and 110 mg/kg for scraping – Table 2).

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- being inaccurate with regard to the coal-tar sealer test plot results,
- imprecise and unclear by virtue of implying similarity between the dissimilar groups – coal-tar vs. asphalt sealed test plots, and
- not being straightforward and containing an apparent bias by suggesting that the simulated rainfall runoff from the coal-tar sealed test plots was as high in PAHs as scrapings of the product itself.

Relief Requested

The sentence should be rewritten to clarify that PAH concentrations were similar for runoff and scrapings from asphalt-based sealer test plots but that concentrations in runoff from coal-tar-based sealer test plots were much lower than in the corresponding scrapings.

2. USGS Statement

Page 1 – Introduction; paragraph 2

"samples of creek bed sediment…had unusually elevated PAH concentrations (Austin American Statesman, 2003)"

Objection

This statement falls in the category of being a representation that serves or intends to elevate unreliable information by including it in an agency report. Citation of a newspaper article as the source for environmental sampling results and their characterization is not appropriate for a technical publication. Newspapers are not generally recognized by scientists as a suitable source of data. Newspapers typically report upon the work conducted by others making them a secondary source, at best. With regard to a technical report by a federal agency, relying on the characterization from a secondary source that is not subject to the data quality requirements that accrue to the agency is both inappropriate and unnecessary since the agency authors could readily identify the primary source of any results they wished to cite since their study was done in cooperation with the municipal staff involved in the sampling being characterized in this statement.

The choice to cite a newspaper article instead of the actual source of the underlying results lends the appearance of attempting to elevate the significance of the results by associating them with generalized media attention. This is a form of advocacy for the importance/significance of the study.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility and Impartiality and Nonadvocacy by virtue of:

- being inadequately transparent with regard to the actual source of the results being cited, preventing reviewers from assessing its data quality, and
- implicitly linking media attention to the significance of the topic under study instead of simply citing the primary source of results being mentioned.

Relief Requested

Properly qualified citations to primary sources of recognized scientific expertise and available to reviewers should be used throughout the report.

3. USGS Statement

Page 1 – Introduction; paragraph 2

"prompting city staff to theorize that the sealers coating the parking lots could be the cause (Austin American Statesman, 2003b)."

Objection

This statement falls in the category of being a representation that serves or intends to elevate unreliable information by including it in an agency report. Theories presented in a newspaper article are of insufficient credibility to substantiate carrying out a federal agency study and are not generally accepted by scientists as a basis for establishing research priorities or hypotheses. Citations to relevant and appropriate peer-reviewed scientific publications should be used as the basis for introducing the findings/hypotheses that led up to the current study.

This statement furthers the appearance of attempting to associate the study with media attention and concerns, advocating for its significance.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility and Impartiality and Nonadvocacy by virtue of:

- being inadequately transparent with regard to the credibility of the source being cited, and
- implicitly linking media attention to the significance of the topic under study instead of simply citing the primary source of results being mentioned.

Relief Requested

Properly qualified citations to primary sources of recognized scientific expertise and available to reviewers should be used throughout the report.

4. USGS Statement

Page 1 – Introduction; paragraph 3

The most commonly used sealers have a coal-tar-emulsion base"

Objection

The products referred to incorporate an ASTM-specified distillate refined from coal tar – RT-12; coal tar itself is not used as a base for sealer formulation. The chemistry and environmental fate characteristics of RT-12 differ from unrefined coal tar, so this is a meaningful distinction that should be made when mentioned in the report. The refining process changes the mixtures of PAHs, relevant in particular to the study, from that found in coal tar and failure to specify that the study relates to RT-12-based materials could

result in readers incorrectly presuming that the composition/characteristics of raw coal tar are applicable to interpretations of the study.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Integrity by virtue of:

- being imprecise in terminology that is meaningful with regard to the specific chemicals/characteristics involved.

Relief Requested

The term "coal-tar-emulsion" should be replaced with "RT-12 emulsion" or "coal-tar derived emulsion" throughout the report and the distinction between coal tar and RT-12 should be made clear in the Introduction.

5. USGS Statement

Page 1 – Introduction; paragraph 3

"Reapplication is recommended about every 2 to 3 years."

Objection

This statement falls in the category of being a representation that serves or intends to elevate unreliable information by including it in an agency report. No source for this specification is provided and a significant distinction between different types of sealer products is not made. This statement is not general knowledge. Accordingly, proper citation to a reliable source is necessary.

Further, authors of this study have stated publicly in presentations their understanding that a) coal-tar derived sealers are longer lasting than other products, and b) have specified a typical approximate re-sealing interval of approximately 5 years for coal tar-derived sealers versus 2-3 years for asphalt-based sealers.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity and Integrity by virtue of:

- failing to be adequately transparent with regard to the source of the information in the statement,
- failing to set the statement in proper context regarding the differences in anticipated reapplication intervals among product types and the source/basis for the recommendation, and
- being imprecise in specification with regard to which types of sealer products the specified interval relates.

Relief Requested

Relevant distinctions between anticipated longevity of different sealer products should be made clear and proper citations to the source of any specific recommendations should be provided.

6. USGS Statement

Page 1 – Introduction; paragraph 3

"City of Austin staff estimate that about 660,000 gallons (2,500 cubic meters) of coal-tar-emulsion based sealers are used annually in Austin (City of Austin, 2004)."

Objection

This statement falls in the category of being a representation that serves or intends to elevate unreliable information by including it in an agency report. The cited source is an internet URL address which does not link to the presentation indicated in the reference list or any source to substantiate the quantitative information specified. The cited value has been specified by City of Austin staff in public statements, but no scientifically based, transparent derivation of this value has been released in the media or credible scientific publication. Specifying this estimate amounts to repetition of an unsubstantiated value from a presentation that cannot be verified per the citation and results in the appearance of attempting to create credibility for the value by inserting it within an agency publication.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity and Impartiality and Nonadvocacy by virtue of:

- being inadequately transparent with regard to the potential for independent reanalysis and verification of the cited value;
- failing to establish sound scientific reasoning or basis for the statement;
- failing to remain impartial by adopting this estimate from a source presented as credible which, in fact, does not include any quantitative derivation of the specified value or appropriately reviewed publication/release; and
- advocating on behalf of the City of Austin's representation of the volume of sealer used.

Relief Requested

Since the specified value is not available from any known source that includes a technically substantiated quantitative derivation and even attribution of the value to City of Austin staff cannot be verified per the citation as presented, the sentence should be deleted in its entirety.

7. USGS Statement

Page 2 – Introduction; paragraph 4

"Coal tar is 50-percent or more PAHs by weight (U.S. Department of Health and Human Services, 2002), and coal-tar-emulsion-based sealers typically are 20-to-35 percent coal tar by weight"

Objection

This statement falls in the category of mischaracterization of information pertaining to the PAH content of pavement sealer products in the report text. The differences between coal tar, RT-12 and finished sealer products are not made clear with regard to the progression from coal tar to a refined distillate (RT-12) and then an emulsion containing RT-12, water and other additives. It is inaccurate to specify a percentage of sealer products being "coal tar" when they are formulated from the refined distillate RT-12. No source is cited with regard to the range of final fractions of PAHs in sealer products and adequate specificity as to the corresponding product type is not provided. The distinction between sealer product concentrates manufactured and distributed and the final product diluted with water for use by applicators is not made clear. The specified values are incorrect for commercial sealer products mixed and ready for application.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility and Objectivity by virtue of:

- being inadequately transparent with regard to distinctions between coal tar and sealer product formulation/composition;
- being unclear and incomplete in specifying the stated percentages in sealer products as "coal tar" and failing to differentiate between manufacturer concentrates and products diluted for application.

Relief Requested

The composition of sealer products should be stated to contain the appropriate percentage of RT-12, as opposed to unrefined coal tar, and the distinction should be clarified by describing the process of distillation and then emulsification so that the steps between the cited value for coal tar and the ultimate formulation of sealer products are clear. The other components of the sealer emulsions, i.e., water and additives, should be specified and the percentage water should be quantitatively specified so that readers can reasonably derive for themselves the differences between wet-weight and dry-weight measurements.

8. USGS Statement

Page 2 – Introduction; paragraph 4

"Analyses of commercially available coal-tar-emulsion-based sealers indicated concentrations of total PAH (sum of 16 parent PAHs) ranging from 5 to 600 times greater that those in asphalt-emulsion-based sealers (City of Austin, 2004)."

Objection

This statement falls in the category of being a representation that serves or intends to elevate unreliable information by including it in an agency report. Citing a City of Austin presentation as a source of quantitative data, which obviously must be available from some primary source that collected the corresponding samples is inappropriate attribution. Further, the URL specified in the citation does not link to the specified presentation or data.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility and Impartiality and Nonadvocacy by virtue of:

- being inadequately transparent with regard to the credibility of the source being cited and choosing to cite a secondary source when the primary source is obviously available to the authors; and
- advocating on behalf of the City of Austin's interpretation of the subject samples.

Relief Requested

Properly qualified citations to primary sources of recognized scientific expertise and available to reviewers should be used.

9. USGS Statement

Page 2 – Introduction; paragraph 5

"The purpose of this study was to determine concentrations and loads of PAHs in runoff from different types of parking lot surfaces, and to the extent possible, to determine to what degree parking lot sealers are a source of urban PAHs."

Objection

This statement falls in the category of mischaracterizations of the actual results and findings of the study in the report text. This representation misstates the nature of the results presented in the report, correspondingly overstating the potential interpretative value of the report. As indicated by the title of the report, the purpose of this specific study was apparently limited to determining concentrations of constituents in simulated runoff. No attempt to compute or discuss load estimates nor relative contributions from various urban sources is made in the report.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- not setting the proper context in which the reported results should be interpreted, i.e., as concentration information solely; and
- not being presented in a straightforward, unbiased manner in suggesting the report could provide insights regarding PAH loading or relative source contributions.

Relief Requested

The statement of purpose should be moved down a paragraph within the section titled "Purpose and Scope" and should be constrained to the nature of the results that are actually included in the report.

10. USGS Statement

Page 2 – Purpose and Scope; paragraph 1

"Immediately before the beginning of the study, a coal-tar-emulsion sealer was applied to two of the test plots"

Objection

As specified in the "Site Selection" section of the report, it was actually two different coal tar-derived sealer products of different product types that were applied to corresponding test plots. Clearly indicating this element of the study design is significant for readers evaluating the variability in test plot results and recognizing two different types of sealers are represented.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- being incomplete with regard to not distinguishing that two separate coal-tar derived sealers were used; and
- not clearly documenting the method used in the study.

Relief Requested

Reword the sentence to clarify and make consistent with the subsequent section.

11. USGS Statement

Page 3 – Purpose and Scope; paragraph 1

"Three times during the 2-month period following applications of sealer, distilled deionized (DI) water was applied to the sites"

Objection

This objection relates to the category of omitting information critical to the interpretation and independent reanalysis of the study. This degree of specification is incomplete with regard to elements critical to the interpretation of the test plot results that are not further expanded elsewhere in the materials and methods section of the report. Most significant to interpreting the test plot data is acknowledgement and discussion of the curing time that was allowed prior to the first sampling event. This should be specified in the narrative text and put in corresponding context regarding the expected interval required for complete curing. Further, it is important to interpreting the study design for reviewers to understand the intervals between each subsequent sampling event and whether all test plots were sampled on the same days. As currently presented, readers cannot obtain the information needed to consider these factors from the text and have to derive for themselves the intervals using information from two different tables, one of which is not included within the body of the report.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- being incomplete with regard to not specifying the relevance of curing time and specific intervals prior to and between sampling events; and
- not clearly documenting the method used in the study.

Relief Requested

The details of curing time, approximate temperatures, amount of rainfall and number of rain events that occurred prior to and between sampling events and the specific intervals should be specified in text. The relevance of curing and PAH aging should be introduced. These details could be provided either in the place of the current statement or in the "Sample-Collection Methods" section.

12. USGS Statement

Page 3 – Purpose and Scope; paragraph 1

"Scrapings of the parking lot surface from most of the sites were analyzed"

Objection

This objection relates to the category of omitting information critical to the interpretation and independent reanalysis of the study. This degree of specification is incomplete with regard to elements critical to the interpretation of the test plot results that are not further

expanded elsewhere in the materials and methods section of the report. First, it is significant that scrapings of the sealer on the test plots were taken substantially before the first simulated rainfall washoff event and apparently after only 6-7 days for curing. This is significant to interpreting the relevance of the test plot scraping data to the washoff data collected after the surfaces had further cured and would be expected to have changed chemical composition. This difference in scraping vs. washoff sampling interval should be made clear in the text and the amount of rainfall and number of rainfall events intervening should be specified.

Next, the scrapings for certain of the in-use parking lots also appear to have been taken on different dates than the corresponding washoff samples. The intervals of these differences and number and extent of intervening rainfall events at each lot should be clearly specified.

Third, the basis for excluding certain lots from the sampling program for scrapings should be explicitly stated and the excluded lots should be identified specifically instead of stating the "most" were analyzed.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- being incomplete with regard to not specifying the discrepancy between sampling dates for scrapings versus washoff samples and relevant factors for the intervening time period (rain and curing time);
- not clearly documenting the method used in the study; and
- not disclosing error sources that could contribute significantly to differences between the washoff versus scraping sampling results.

Relief Requested

The difference in dates for sampling scrapings versus washoff should be specified in text and explained, the relevance of shorter curing interval and any intervening rain events should be discussed, and lots excluded from the scraping sample analysis should be identified and explained.

13. USGS Statement

Page 3 – Purpose and Scope; paragraph 1

"At a subset of sites, PAHs in the dissolved phase also were analyzed."

Objection

This objection relates to the category of omitting information critical to the interpretation and independent reanalysis of the study. The intent and rationale for excluding some sites from sampling of dissolved phase constituents should be made clear. It is not clear

whether this was an element of the study design or represents a deviation from the field sampling plan.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- being incomplete with regard to not specifying which samples were excluded from analysis; and
- not clearly documenting the method used in the study.

Relief Requested

The specific samples excluded from analysis of dissolved constituents should be identified in the text and rationale provided.

14. USGS Statement

Page 3 – Site Selection; paragraph 1

"The City of Austin arranged for a commercial pavement-sealing company to apply a coal-tar sealer (less than 34-percent coal tar by weight) to one site (TAR) and an asphalt sealer (less than 35-percent asphalt resin by weight) to one site (PAV). An off-the-shelf coal-tar sealer (33-percent coal tar by weight), of the type used for homeowner application to residential driveways, was applied to one site (MON) by City of Austin staff following the manufacturer's instructions."

Objection

This objection relates to the category of omitting information critical to the interpretation and independent reanalysis of the study. This description of the methodology is deficient in numerous details that would be required for another research team to duplicate the study and does not mention required elements such as the Standard Operating Procedures, Quality Assurance Plan specifications and Data Quality Objectives and compliance with data quality control requirements imposed by federal regulations and guidance.

First, the relationship between the City of Austin and the pavement sealing company should be clarified. The term "arranged" does not differentiate whether this company was a contractor to the city or provided the work on a volunteer basis. This is significant to the interpretations because the motivation and interests of a commercial vendor that provided services voluntarily could be pertinent to potential conflict of interest and readers may consider this in evaluating the data and nature of the job done to apply the sealer.

The identity/affiliations and qualifications of the applicators should be disclosed along with the source and revision date of the SOPs that were followed. Again, these details

could be obviously relevant to interpreting data quality. Citations should be provided to the relevant SOPs and, if these are not available to reviewers through standard industry governance bodies (e.g., ASTM), they should be included as appendices to the report.

The specific products and sources should be identified along with all handling and/or modifications made to the formulated sealers and the time interval between the preparation of the batches of each sealer product and its corresponding use. Identification of chemicals used, purity grade and sources in experiments is required in standard scientific publications and these appear in the materials and methods sections of publications precisely because experienced researchers are able to interpret the relevant quality implications of using specific grades of supplies from specific vendors.

The specific materials are particularly relevant for the commercially applied sealers because these materials are typically diluted, mixed and adulterated with additives by a supplier on a batch-by-batch basis. The specific formulation from the sealer concentrate volume, the amount of water, the nature and extent of mixing and the identity and purpose of any additives should be disclosed. Any difference between grit/friction additives between the coal-tar derived product and the asphalt-based product should be disclosed and discussed as to their potential relevance for differential adherence and/or washoff properties. Any differences between the applications used for the test plots compared to standard applications should be disclosed and discussed as to their potential relevance to interpretations – e.g., if friction/grit additives typically used in commercial uses were excluded from the text plots. Also, any steps used to prepare or pre-treat the test plots prior to applying the sealer products should be disclosed so that their potential relevance to adherence can be considered by readers.

Another factor critical to interpreting the results is the relative thicknesses of the sealer layers applied, as this will affect significantly adherence, curing and washoff characteristics. The rate of application by area should be specified and the evenness of the application and the thickness of the sealer layer should be described. The type of application device and operating parameters for sprayers or other such equipment should be disclosed for each product applied.

Finally, given the failure to disclose the specific materials used on the test plots, it is impossible for readers to interpret the application details underlying the statement that the product was applied "following the manufacturer's instructions." The specific methods and approaches should be disclosed.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity and Integrity by virtue of:

- being inadequately transparent with regard to materials and methods used for applying the sealer products to permit replication of the study;
- being incomplete in specifying relevant details of the experimental design and implementation; and
- not documenting the methods used in the study.

Relief Requested

The materials and methods should be expanded to incorporate the specific details mentioned above and to clearly disclose other significant aspects of the study methods.

15. USGS Statement

Page 4 – Site Selection; paragraph 2

"The parking lots for the synoptic sampling were chosen by City of Austin and USGS personnel to represent a range of surface types and sealer ages (Table 1)."

Objection

This statement provides insufficient detail regarding the inclusion/exclusion criteria, does not specify the universe of lots from which the sample was obtained and is contradicted by the specifications noted in Table 1 of the report.

According to Table 1, 6 out of the 9 sealed lots had been resealed within 1-2 months before the study began in August, 2003. All but 2 of the lots had been resealed within 6 months prior to the start of the study. Considering that authors of the study have stated publicly their understanding that typical resealing intervals are on the order of years, not a few months, it is not accurate to characterize this set of lots as a representative "range of ...sealer ages." In fact, the lots chosen for inclusion were heavily overrepresented by very recently sealed lots with minimal curing time. This anomaly of so many recently sealed lots suggests that some type of exclusion criteria were applied starting from a universe of government agency, municipal, school, and commercial lots as specified in the report. Accordingly, this element of the study design should be disclosed.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity , Integrity and Impartiality and Nonadvocacy by virtue of:

- being inadequately transparent with regard to selection criteria for including parking lots;
- failing to be complete and unbiased in implementing the study design per the stated goal of sampling lots representative of a range of sealer ages;
- not adequately documenting the methods used; and
- not presenting the facts regarding the representativeness of the ages of sealer reflected in the sampled lots impartially since the results from what are predominantly newly sealed lots with limited curing time – from which washoff could be expected to be higher -- are construed to be representative of sealed lots overall.

Relief Requested

Details of the identification of the universe of lots from which the sample was chosen, whether lots were inspected prior to their selection, inclusion/exclusion criteria and other relevant details to properly characterize the sample of lots should be clearly disclosed. The sentence should be reworded to clearly state in the text the number of lots that were newly resealed and the expected increase in PAH levels in washoff from freshly sealed lots.

16. USGS Statement

Page 4 – Site Selection; paragraph 2

"The type of sealer used and date of sealer application were determined on the basis of information provided by the property owner or manager or from the company that sealed the parking lot."

Objection

This statement falls in the category of being a representation that serves or intends to elevate unreliable information by including it in an agency report. Obtaining this information by eliciting responses from individuals with unspecified and varying degrees of confidence regarding actual surfaces adds substantial uncertainty to the study design that should be acknowledged and discussed. Some of the respondents may have referred to documentation and others may have provided answers from memory. Many non-specialists construe the term "tar" to pertain to the color and consistency of sealer and would associate it with both asphalt and coal tar-derived sealer types. Accordingly, the potential for misclassification of sealer types due to the use of the term "coal-tar" is significant. Also, even experienced technicians cannot easily distinguish between coal tar-derived and asphalt-based sealer under varying conditions after application. Color-related indicators are unreliable because some asphalt products contain additives intended to mimic the color associated with coal tar-derived products. This makes it unlikely that misclassification errors could have been reliably caught during field inspections. Potential date and surface type uncertainties should be identified and discussed.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- not providing appropriate context for readers to understand potential uncertainties in classification of the sample groups; and
- not adequately disclosing error sources in the presentation.

Relief Requested

The potential uncertainties associated with classifying the sample groups by elicitation of presumed reliable information should be identified in the materials and methods section of the report and discussed subsequently.

17. USGS Statement

Page 4 – Sample-Collection Methods; paragraph 1

"Parking lots were sprinkled with simulated rainfall following a minimum of 5 dry days."

Objection

This objection relates to the category of omitting information critical to the interpretation and independent reanalysis of the study. The specification of 5 dry days preceding sample collection is inadequate as a study design criterion due to the presence of other confounding factors that should have been addressed. For the test plots, critical factors include the number of rainfall events and amount of rainfall in each event that occurred between the application of sealer and each sampling event. The dramatic decreases observed between sampling rounds are substantially a function of curing and washoff of the removable material in earlier sampling events. However, intervening rain events would clearly confound these factors and should have been recorded and disclosed so that reviewers can consider the corresponding effects and uncertainties. It even appears the individual test plots were subjected to different numbers/extent of rainfall events between sampling rounds (See comment 19, below) within a given sampling round, further illustrating the need to specify this information for each test plot and each sampling round.

For the in-use lots, the number of rain events and amount of rain since the sealer was applied should be specified for at least those lots that had been sealed within 6 months of the start of the study and an explanation should note that for the 2 lots with sealer older than this, the loss related to curing and washoff would be expected to have been complete prior to the sampling event.

Also, since the in-use lots were sampled on different days and some rainfall events could have taken place over only parts of the city, it is necessary to specify not only that a minimum number of dry days for vehicle particulate to accumulate had passed, but to disclose how many days worth of accumulation had, in fact, collected on each of the lots prior to sampling. This is an obviously relevant factor to consider in interpreting the differences in results between lots. For example, lots that had received 5 days of vehicle traffic since the last flushing event would be expected to have different accumulation than lots that had not been flushed off by rain for 2 months. Accordingly, the interval between sample collection and the last locally relevant rainfall event should have been specified for each lot and not listed simply as a minimum number of days.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity and Integrity by virtue of:

- being inadequately transparent with regard to obvious confounding factors that would be of interest for re-analysis;
- not being based on sound scientific reasoning with regard to setting the inclusion criterion as a minimum number of dry days instead of either a similar, or recorded number of dry days; and
- not disclosing information on differences in accumulation time that could be a source of errors in interpreting the factors controlling particulate characteristics.

Relief Requested

The details identified above as obvious confounding factors should be addressed by specifically tabulating the rainfall events, intervals and other relevant differences from lot to lot. These factors should be specifically evaluated in the quantitative analysis of the study to determine to what extent they control/explain the results obtained.

18. USGS Statement

Page 4 – Sample-Collection Methods; paragraph 1

"The only exception was the sampling of the test plots on August 12, 2003, when 25 liters of water on a 2.5- by 5-meter area was used on all the test plots except TAR, the test plot with a commercially applied coal-tar sealer (the smaller volume of water was used because it was immediately obvious that insufficient particulates were available for analysis so samples for analysis of dissolved PAH only were collected)"

Objection

This objection falls in the category of information related to methods not being disclosed and serving to conceal study design choices that promote bias in the results. This explanation of the specified deviation from the study design is confusing, unclear and its implications with regard to the effect of curing time and the inability to wash off particulate using the first sampling strategy are never discussed.

It is apparent from this statement that the first planned washoff sampling event for the test plots was on August 12, 2003 – after only 6-7 days of curing – and that the initial intent was to collect particulate samples during this event. Apparently, after determining that the amount of material that could be collected from the commercially applied coal tar-derived sealer test plot (TAR) was insufficient for analysis, the sampling design was modified to apply less water on a smaller area for the sampling of the other types of sealer test plots. The specified rationale is that it was obvious that insufficient particulate was available. Even if only small amounts of particulate had been washed from the TAR plot, it is not readily apparent why the amount of particulate on the other plots could be presumed to be inadequate for analysis. There is no reason, *a priori*, to exclude the

possibility that the particulate levels would have been higher on the other plots on August 12th. It is not clear that such a determination could have been reliably made by simple visual observation of the test plots. Had the same amount of water and area been sampled from these plots as was used on the TAR plot, sufficient material could have been collected on the filters to permit analysis for the other three plots. In such a case, it would have been particularly relevant to report the concentrations from the other plots and to discuss the fact that recovery was substantially different, i.e., lower, from the TAR plot. Curing differences and the differing tackiness/adhesiveness of the between the sealed surfaces at this early time point could have been relevant factors affecting particulate washoff.

The decision to limit the sampling event for the non-TAR plots to less water and a smaller area served to reduce the amount of particulate that could possibly be collected from these plots. This prevented the possibility that measurements could have been detectable for the non-TAR plots and the circumstance where numerical results would have been reported for the other lots, but would have been reported as too low to measure from the TAR plot. Facing concerns about getting too little material for analysis, it would seem that a more obvious deviation in the field would have been to wash larger areas with more water to try to ultimately collect more particulate on the filters for analysis. More detail regarding the rationale and motivation for reducing the sample that could be collected from certain test plots should be provided since this modification could be perceived to have been made to ensure that higher particulate levels were not obtained for non-coal tar-based plots compared to the TAR plot.

The possibility that measurable amounts of particulate could have been obtained from other lots had the volume not been reduced is even supported directly by data reported in Table 5 of the report. The suspended sediment concentration reported in Table 5 for the MON test plot for August 12th is similar to that reported for September 9th and actually higher than that reported for September 26th from the same test plot. At these suspended sediment concentrations, sufficient material was obviously obtained for analysis of particulate on August 26th and September 9th – as presented in Table 2. Accordingly, filtering water from the August 12th sampling event with the same or higher concentrations of particulate could very well have yielded as much or more particulate and been sufficient for analysis. This indicates the potential that, had the deviation not been made, results might have been obtained and reported for particulate from at least some of the test plots on August 12th.

Based on the description of the method provided and the deviation made, it is not clear how a determination was made to exclude analyses of particulate from August 12th from the study. Since a suspended sediment concentration was measured, at least for the MON test plot, suspensions containing the washoff water and the resultant particulate were obviously collected such that they could be analyzed. Also, since dissolved PAH concentrations are reported in Table 3 for all test plots on August 12, the suspension from each test plot was obviously filtered to remove the particulate from the water submitted for analysis of dissolved constituents. This means that filters containing the filtered particulate must have actually been obtained for each test plot. The MON suspended

sediment concentration suggests that similar amounts of particulate should have been collected on this filter as were collected in subsequent sampling events where the particulate was submitted for analysis. In these circumstances, what basis was used to decide that the particulate on the filter should not be analyzed for any of the August 12th samples? Were these filters submitted to the analytical laboratory where such a determination was made? Did the laboratory try to analyze these filters or obtain preliminary analytical results from these filters that have not been released? Did a researcher in the field decide that insufficient material would be recovered in the lab and not even process the filters for analysis and, if so, upon what basis? All these questions remain open due to the limited detail provided regarding how the event on August 12th was handled differently than the subsequent events and lead to uncertainties that should be discussed.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity, Integrity and Impartiality and Nonadvocacy by virtue of:

- being inadequately transparent with regard to the rationale and specific course of events that led to the exclusion of certain samples from the report;
- being incomplete and potentially biased with regard to reducing the sample collection amount from test plots other than the commercially applied coal tar-derived sealer test plot;
- failing to adequately document the methods used and present possible sources of error; and
- failing to evaluate the alternative circumstance that there might actually have been higher levels of particulate obtained from the test plots other than the one of the coal tar-derived plots first sampled on August 12.

Relief Requested

The sequence of events that occurred in the field on August 12 should be clearly and completely described and the basis and rationale for including scraping sample results, dissolved sample results and a suspended sediment concentration from one test plot, but not reporting analytical results for particulate should be made reasonable and clear. If attempts were made to analyze particulate from any of the filters obtained on this date, they should be described and any preliminary testing that was attempted should be disclosed.

19. USGS Statement

Page 4 – Sample-Collection Methods; paragraph 1

"In one instance it rained during the sampling, and actual rainfall runoff was collected instead of the simulated rainfall (TAR test plot, August 26, 2003)."

Objection

This statement falls in the category of mischaracterizations of the actual study in the report text. No results were reported for a sampling event on August 26, 2003. This description of the study design deviation does not make clear whether the samples from the other three test plots were collected before or after the rain event mentioned, preventing reviewers from understanding whether the sample results reflect different rainfall/flushing histories for the different test plots.

The substitution of rainwater for deionized, distilled water represents a major difference in the solvent applied to the test plots. The relative acidity and ionic content anticipated for rain water, first of all, is more reflective of what actually affects sealed surfaces. Further, pH and ionic characteristics of solvents are relevant to the function of filter systems and it is not made clear whether they cited filtration method has been validated and/or is robust with regard to this change in solvent. These factors increase the uncertainty associate with the reported results.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility and Integrity by virtue of:

- being inadequately transparent with regard to the actual dates on which samples were collected; and
- not making clear the potential errors and differences associate with changing the collection solvent.

Relief Requested

If samples were taken on August 26, 2003, the results should be disclosed. If the specified date is incorrect, it should be identified properly.

The applicability/reliability of the collection and filtration methods used should be discussed with regard to the change from deionized, distilled water to rainwater.

20. USGS Statement

Page 4 – Sample-Collection Methods; paragraph 2

"Samples were filtered through 0.45-micron pore size, polytetrafluoroethylene (PTFE) filters following the methods of Mahler and Van Metre (2003)."

Objection

This objection relates to the category of omitting information critical to the interpretation and independent reanalysis of the study. The description provided is insufficient to allow

reviewers to determine specifically how the samples were processed and the rationale for choosing among the options presented in the cited source.

The cited paper (Mahler and Van Metre, 2003) includes a multi-stage filtration option that removes larger particulate matter prior to trapping the material for analysis. The description provided does not mention whether this option was employed and the decision of whether or not to employ this step is relevant to interpreting the results from the in-use parking lots in particular.

The cited source (Mahler and Van Metre, 2003) also incorporates methods using two different types of filters – glass-fiber filters (GFF) and PTFE filters. Comparing results between the types of filters, the paper reported that higher PAH concentrations were found when choosing PTFE filters, stating, "the difference in PAH concentrations was more striking, with concentrations on sediments from the PTFE filter two to three times higher than those from the GFF filter" (Mahler, B.J. & Van Metre, P.C., *Arch. Environ. Contam. Toxicol.* (2003) 44: p. 290). One possible explanation for higher levels of PAHs using the PTFE filters is that the filters are less efficient at trapping certain particulate and tend to selectively concentrate PAH-associated particulate, allowing other particulate to pass through by virtue of size or chemical characteristics. This would result in the subsequent analytical measurements appearing higher than the actual sediment concentrations as an artifact of the filtering method. Because PAH results from the same washoff sample would be expected to 2-3 times higher using the PTFE filters, the rationale for this choice should be made clear.

In conjunction with the use of PTFE filters, the cited source (Mahler and Van Metre 2003) specifies that the filters can either be used one time and then sent for analysis or processed and re-used. The description provided does not make clear which of these options was used.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity, and Integrity by virtue of:

- being inadequately transparent with regard to the selections made among the choices included in the cited method;
- being unclear and incomplete regard methodological choices that could have led to sample results being biased high; and
- not documenting adequately the method used.

Relief Requested

Additional methodological details should be provided addressing the options within the cited method. Specific rationale for the selection of PTFE filters should be provided and it should be disclosed that, among the methods provided in the cited source, this choice would be expected to yield 2 to 3 times higher measurements of PAHs.

21. USGS Statement

Page 4 – Sample-Collection Methods; paragraph 2

"Samples for analysis of suspended sediment concentration were collected periodically from the churn prior to filtering to allow quantification of the mass of sediment recovered in the sample."

Objection

This objection relates to the category of omitting information critical to the interpretation and independent reanalysis of the study. Insufficient details are provided regarding the method used for analysis of suspended sediment concentrations to allow reviewers to understand the associated error rates. There are several methods available for determination of suspended sediment concentration – the two most common being evaporation and filtration. The nature and magnitude of associated uncertainties differ between methods. Proper method selection is particularly critical at the very low suspended sediment concentrations measured for the test plots. Without knowing which method was used, it is impossible to evaluate the uncertainty in the measurements presented. Because the suspended sediment concentration data are subsequently used to calculate the mass of sediment recovered in the runoff samples, knowledge of the methodology for determining suspended sediment concentration is critical for evaluating the accuracy of the computed amounts of sediment.

In addition to the specific type of methodology used, there is no indication of the size of the sub-sample collected from the churn, the number of samples taken from the churn, nor the critical detail of whether multiple sample containers from the field were combined into the churn. The effect of sample size on representativeness will depend upon the effectiveness of the churn at homogenizing the sample. The less effective the churn is, the greater the uncertainty that smaller sub-samples accurately reflect bulk water properties.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility and Integrity by virtue of:

- being inadequately transparent with regard to the method used to determine suspended sediment concentrations;
- not documenting the methods used in the study; and
- not disclosing factors critical to the error rates for suspended sediment concentration estimates.

Relief Requested

The method and procedures used to determine suspended sediment concentrations should be specified along with the appropriate citations, including specific details on how individual sample containers and samples from the churn were handled and obtained with

regard to reflecting the overall characteristics for the entire collected water volume. Data validating the accuracy and reproducibility of sub-sampling churn contents to represent bulk water properties should be presented. Differences between results from the first part of each sample collection versus the last portion of the water collected should be disclosed.

22. USGS Statement

Page 4 – Sample-Collection Methods; paragraph 2

"The filters were massaged inside of locking bags to remove retained particles, and the recovered particles were shipped as chilled slurries."

Objection

Insufficient detail is provided regarding these steps of the method to allow reviewers to adequately evaluate methodological uncertainties. The solvent and volume used in conjunction with removing particulate from the filters for analysis is not specified. The basis for determining when this removal step was complete and quality control approaches are not described. Steps taken to ensure that particulate from the varying surface types was removed with similar efficiency in light of the possible differences in size and composition should be described.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility and Integrity by virtue of:

- being inadequately transparent with regard to the handling and processing of the filtered material; and
- not documenting adequately the method used.

Relief Requested

Additional methodological and quality control details should be provided addressing the aspects described above.

23. USGS Statement

Page 4 – Analytical Methods (PAHs in the Particulate Phase); paragraph 1

"Surrogate compounds were added to the sample prior to extraction to verify method recoveries."

Objection

Insufficient detail is provided regarding this step of the method to allow reviewers to adequately evaluate methodological and quality control uncertainties. The specific

chemicals added to the samples should be identified and, in the "Quality Control Samples" section later in the report, surrogate recovery for the individual chemicals added should be specified.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility and Integrity by virtue of:

- being inadequately transparent with regard to the processing of the extracts; and
- not documenting adequately the method used.

Relief Requested

Additional methodological and quality control details should be provided addressing the aspects described above.

24. USGS Statement

Page 5 – Analytical Methods (PAHs in the Particulate Phase); paragraph 3

"If less than 25 grams was extracted, the MRL was raised accordingly. In some cases, MRLs were raised because of background interferences."

Objection

Insufficient detail is provided regarding this step in the quantification and qualification of results allow reviewers to adequately evaluate uncertainties. This statement implies that dilutions were used in conjunction with background interference. If this is the case, it should be specified clearly that samples were diluted, and the relevant dilution factor listed. Specific samples in which reporting limits had to be increased due to either interference or insufficient extraction material should be identified or tabulated, specifying which of the reasons for MRL uncertainty was pertinent to each sample.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility and Integrity by virtue of:

- being inadequately transparent with regard to the assignment of reporting and detection limits; and
- not documenting adequately the method used.

Relief Requested

Additional methodological and quantification details should be provided addressing the aspects described above.

25. USGS Statement

Page5 – Analytical Methods (Quality-Control Samples); paragraph 1

"two duplicate samples for analysis of particulate PAH were collected, one from a site with extremely elevated particulate PAH concentrations"

Objection

This objection falls in the category of information related to methods not being disclosed and serving to conceal study design choices that promote bias in the results. The basis for determining where duplicate samples would be collected and exactly what steps of the methodology are reflected in the duplicated analyses is not specified clearly. Duplicate samples for quality control purposes can be assigned randomly to ensure against bias, or they can be assigned to attempt to intentionally capture a range of the possible characteristics and concentrations anticipated in the study. In this case, it is not clear whether two samples were intentionally collected from a lot with particularly high particulate concentrations or whether the lot had been chosen in some other manner. If the researchers had some type of prior knowledge about the PAH concentrations expected from the lots, this should be disclosed along with explaining what information served as the basis for selecting the lost from which duplicates were collected.

The sample collection, processing and extraction methods involved multiple steps and it appears that multiple containers of washoff water were collected in the field from individual lots. Accordingly, to interpret the implications of the duplicate results, it is significant to understand whether they were taken from two separate containers, two separate filtration steps, or from two separate extractions in the analytical lab. Because specified duplicate analyses ended up yielding results that varied by more than 2-fold, it is important to characterize the variability in the laboratory versus the sampling and sample processing methods.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility and Integrity by virtue of:

- being inadequately transparent with regard to selection of lots for taking duplicate samples and the specific handling of the duplicate samples; and
- not documenting adequately the method used.

Relief Requested

Additional methodological details should be provided addressing the aspects described above.

26. USGS Statement

Page 5 – Analytical Methods (Quality-Control Samples); paragraph 1

"ΣPAH_{part} is defined here as the sum of concentrations of 12 parent PAHs (naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benz(a)anthracene, chrysene, benzo(a)pyrene, and dibenzo(a,h)anthracene) and 2-methylnaphthalene"

Objection

This statement falls in the category of mischaracterizations of the actual methods of the study. Results are not provided in the text nor Table 2 of the report for one of the specific compounds specified to be added together to represent ΣPAH_{part} – 2-methylnaphthalene. Further, the analytical method apparently used (USGS Water-Resources Investigations Report 03-4318) does not specify 2-methylnaphthalene to even be one of the specific compounds that can be identified via this method. Either the definition and/or computation of ΣPAH_{part} should be updated and clarified to match the compounds and sets of isomers actually identified by the analytical laboratory. The numerical values for ΣPAH_{part} should be updated accordingly throughout the report based on the approach taken to correct the definition or computation of ΣPAH_{part}.

The definition of ΣPAH_{part} is also incomplete and insufficiently clear regarding whether individual results that were either qualified due to quality control failures or were below the reporting and detection limits for the analyses were added into estimates of overall PAH levels. Representing PAH concentrations by adding together the results obtained from various chemicals introduces uncertainties in quantification and the inclusion or exclusion of qualified analytical results and levels below reliable reporting limits is well recognized to be a relevant factor for understanding the overall characterization. The definition and computation of ΣPAH_{part} should be expanded so that it is apparent how these issues were dealt with and the associated uncertainties should be disclosed and discussed.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity and Integrity by virtue of:

- being inadequately transparent with regard to the computation of the combined measurement ΣPAH_{part};
- being inaccurate by including a specific PAH compound in the stated definition that does not appear to be detected nor reported; and
- not documenting adequately the method used.

Relief Requested

Additional methodological details should be provided addressing the aspects described above. If additional data are available specifically for the 2-methylnapthalene isomer, they should be included in the report. If data are available for other isomers or groups of isomers, these should be identified clearly. The inclusion or exclusion of qualified results and results below reporting and detection limits in computing the ΣPAH_{part} values should be made clear.

27. USGS Statement

Page 5 – Analytical Methods (Quality-Control Samples); paragraph 1

"For one of the duplicate sample, ΣPAH_{part} differed by 8 percent (relative percent difference); for the second duplicate (sample with elevated concentrations), ΣPAH_{part} differed by 54 percent."

Objection

This disclosure of error rates found in analyzing duplicate samples is incomplete with regard to an element critical to interpreting the significance of the finding. The large discrepancy between the repeatability of results from the two duplicates means that the degree of uncertainty in PAH measurements appears to be dependent upon the concentration level in the sample. The implications of a concentration-dependent analytical error rate are significant to interpreting the results presented in the report because this would mean that there is much greater uncertainty about one subset of the samples compared to others. The 54% relative percent difference obtained with the duplicates containing high concentrations of PAHs means that any individual result for samples with higher PAH levels could be off by a factor of about two-fold. Conversely, there is a lot less uncertainty for samples with lower PAH concentrations. Functionally, this means that the uncertainty associated with results from the scrapings and some of the coal tar-derived sealer would be expected to be relatively high (e.g., a factor of two), while this uncertainty would be much lower for other samples. Substantial differences in the nature of variance between groups of samples also invalidate many routine statistical comparisons and the apparent 2-fold analytical error rate for samples with the higher reported results makes clear presentation of differential variance among sample types necessary for the statistical relevance of the reported differences to be interpreted.

Due to the correlation between certain groups of samples and the high analytical uncertainties and the subsequent complications for statistical evaluations, the concentration dependent nature of the error rate reflected in analysis of duplicate samples should be explicitly discussed. Further, after the results have been presented in the report, it should be acknowledged in the discussion and interpretation of these results that the apparently elevated error rates affect samples from coal tar-derived sealer lots and scraping samples disproportionately.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity and Integrity by virtue of:

- being inadequately transparent with regard to the implication of the different error rates for the duplicate samples reflecting a concentration-dependent uncertainty;
- being incomplete in describing a source of uncertainty discovered by the quality control analyses included in the study; and
- failing to disclose that this error source selectively affected certain sample groups.

Relief Requested

In the materials and methods section of the study where the duplicate sample error rates are presented, a further statement regarding the concentration-dependent nature of the error rates should be added. When the results from different groups of samples are discussed later in the report, the discussion should include mention of the uncertainty in comparisons between groups because of the approximately 2-fold error rate in measurements that affects certain groups of samples (i.e., coal tar-derived sealer lots) selectively.

28. USGS Statement

Page 5 – Analytical Methods (Quality-Control Samples); paragraph 2

"Recovery of the six spiked samples ranged from 6 to 107 percent with a median of 76 percent."

Objection

The range of recovery for spiked samples suggests substantially differential recovery efficiency for the different samples used and/or surrogate chemicals used as spikes. In order for a reviewer to appropriately interpret this large range, disclosure of which chemicals/samples corresponded to very poor recovery and the distribution of compound/sample-specific recoveries is significant.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility by virtue of:

- being inadequately transparent with regard to the specific spiked chemicals and samples reflected in the wide range of recovery efficiency.

Relief Requested

To clarify the implications of the range of recovery for spiked samples, the details by sample and surrogate chemical should be further described and presented in a table.

29. USGS Statement

Page 5 – Analytical Methods (Quality-Control Samples); paragraph 2

"For the six laboratory blanks, an analyte was detected to 85 of 336 possible cases, but only 22 detected concentrations were greater than the MRL."

Objection

This disclosure that more than 25% of sample results could reflect contamination in the laboratory increasing the actual reported values for the samples warrants more detailed presentation and has an obvious and critical implication was not addressed. First, the specific PAHs that appeared in samples due to lab or equipment contamination should be identified. Further, those which appeared in a blank above the corresponding MRL should be distinguished.

In addition to these clarifications, the fact that laboratory or equipment contamination was obviously relevant to interpretation of the sample results should have been addressed by 1) marking or flagging the relevant analytes in the data tables – the conventional qualifier flag for blank contamination is "B", 2) describing the use of the corresponding qualifier in text, and 3) discussing specifically whether analytes containing blank contamination were included in adding together the compound-specific results to obtain the presented values for summed PAHs present (ΣPAH_{part} and ΣPAH_{diss}).

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- being incomplete with regard to carrying over the quality control finding of substantial laboratory/equipment contamination into the presentation of the sample results; and
- not adequately disclosing sources of error to the specific summation values used to characterize the PAH levels in the samples.

Relief Requested

Additional detail on the specific PAHs found due to laboratory or equipment contamination should be provided as outlined above. A corresponding qualifier should be added to the data and presented in summary tables provided. The implications of including data qualified due to laboratory/equipment contamination in the summations of PAHs for each sample should be discussed.

30. USGS Statement

Page 5 – PAHs and Major and Trace Elements in Simulated Rainfall Runoff; paragraph 1

"The "E" qualifier also precedes a concentration when it is less than the MRL, when the analyte failed the lab-spike criteria, and for all of the alkyl-homologue groups for which authentic standards are unavailable."

Objection

This objection relates to the category of omitting information critical to the interpretation and independent reanalysis of the study. The use of a single data qualifier to reflect three

separate issues related to being below reliable measurement levels or quality control failures precludes reviewers from determining which of these distinct concerns affects individual reported results. While values obtained under all three circumstances could reasonably be characterized as "estimated," the different basis for this qualification is relevant and should be made clear through the use of separate qualifiers that identify specific data quality or validation concerns. Data validation guidance and conventions are maintained by federal agencies and this report should follow generally understood and accepted data qualifier terminology.

In addition to flagging data for which the analyte failed the lab spike criterion or the result was below the reliable quantification limit, relevant results affected by laboratory or equipment contamination in blank quality control samples should be flagged and the qualifiers used in the report should be described in this section. See Comment 29, above regarding blank contamination that was not properly flagged.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- not being complete with regard to establishing distinct data qualifiers to address the separate issues identified and defining/using all relevant qualifiers; and
- not presenting adequately sources of error by not providing any means for reviewers to determine which quantification limit or quality control issue applied to each reported result.

Relief Requested

Distinct and unique data qualifier flags should be defined and shown on the relevant tabulations of data consistent with federal agency requirements and guidance. In connection with the corrected handling of blank contamination, the qualifier corresponding to this quality control limitation should be included and described along with those relating to estimated values.

31. USGS Statement

Page 6 – PAHs (Runoff From Test Plot); paragraph 1

"The probable effect concentration (PEC), the concentration above which adverse effects on benthic biota are expected to occur more often than not (MacDonald and others, 2000), is 22,800 µg/kg for ΣPAH_{part}."

Objection

This statement falls in the category of mischaracterizations of the actual results and findings of the study in the report text. This statement incorrectly specifies that the cited source provides a probable effects concentration derived for ΣPAH_{part}. The screening concentrations developed in the cited source were calculated for application to streambed

sediments suitable as habitat for organisms. ΣPAH_{part} as defined earlier in this report corresponds to material washed directly off of paved surfaces that was separated by filtration steps to yield particulate matter slurries that were analyzed. This is not equivalent to streambed sediment and no previous publication has described or validated a "probable effects concentration" or other similar criterion applicable for comparisons to residue removed from a filtering device.

Specifying streambed sediment screening criteria to be applicable for characterizing ΣPAH_{part} is invalid because there are obvious differences between sediments and the filter residue that are relevant to differential effects on organisms. There is no basis to assume that the particle size distribution of the filter residue is equivalent to streambed sediments. Particle size is a critical factor affecting exposure of organisms to chemicals because it controls the surface area relevant for direct contact with organisms and the extent to which particles are ingested. There is also no basis to assume that the overall organic carbon and the nature of that fraction is equivalent between streambed sediment and the residue collected from the filters. Organic carbon relationships control the bioavailability (ability of organisms to extract) of chemicals within sediment and streambed sediment would be expected to have dramatically different bioavailability than the material collected directly from paved surfaces.

No attempt is made within the report to characterize the proportionate relationship of ΣPAH_{part} as a fraction of overall streambed sediment content. There is no means for a reviewer to apply a relevant conversion factor and determine the correct concentration that would be analogous to sediments for which screening criteria have been developed and to make corresponding comparisons.

Adopting streambed sediment screening concentrations for comparisons to the parking lot filtered residue as done in this report implies that comparisons can be meaningfully made without correcting for the differences in the particulate material. Further, directly stating that there is an established probable effects concentration for ΣPAH_{part} implies that this type of material has been specifically evaluated. The failure to point out the significantly different basis in the derivation of the cited PEC value and adopting its use in comparisons to the residue collected in this study improperly advocates for the relevance of this value. The failure to reasonably characterize the differences between the residue analyzed and streambed sediment is an omission which further suggests that direct comparisons using filter residue from paved surfaces are environmentally relevant.

Basis for Our Objection

This statement falls in the category of mischaracterizations of the actual results and findings of the study in the report text. This objection is based on failure of the presented statement to meet the criteria of Utility Objectivity, Integrity and Impartiality and Nonadvocacy by virtue of:

- being inadequately transparent with regard to applicability of streambed sediment screening criteria to results from the residue samples analyzed in the study;
- being inaccurate in specifying that there is an established PEC for ΣPAH_{part};

- failing to present the relevant differences between the study's samples and streambed sediment in a straightforward, unbiased manner;
- improperly advocating that filtered residue from paved surfaces be considered environmentally equivalent to streambed sediment; and
- failing to interpret the concentration results from the residue samples impartially.

Relief Requested

Comparisons of ΣPAH_{part} concentrations from the samples collected in this study to streambed sediment screening criteria should be eliminated since they are not analogous materials. No statement that there is a PEC established for ΣPAH_{part} should be made or implied.

32. USGS Statement

Page 6 – PAHs (Runoff From Test Plot); paragraph 1

"Concentration of ΣPAH_{part} exceeded the PEC in all samples except the final sample collected at the control site."

Objection

This comparison of ΣPAH_{part} results to the improperly cited PEC value does not serve to inform readers about the distribution of concentrations found in the study among types of samples. The fact that sample concentrations from all the sites exceeded the PEC points out that this is not a useful metric for differentiating among them. This statement serves to suggest that ΣPAH_{part} is somehow environmentally relevant, though the relationship of this filtered particulate to streambed sediment is not mentioned and, correspondingly, not established in a quantitative manner. The lack of relevance of the cited PEC to the filter residue analyzed in this study is detailed in Comment 31, above.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity, Integrity and Impartiality and Nonadvocacy by virtue of:

- failing to interpret results from the study in an unbiased manner;
- failing to present the relationship between the samples collected in the study and the streambed sediment for which the cited screening criteria was developed in a straightforward, unbiased manner; and
- failing to interpret the concentration results from the residue samples impartially.

Relief Requested

The statement should be eliminated from the report in conjunction with applying the requested relief regarding Comment 31, above.

33. USGS Statement

Page 6 – PAHs (Runoff From Parking Lots in Use); paragraph 1

"The average ΣPAH_{part} concentrations in runoff from parking lots in use were 3,500,000 µg/kg (coal-tar-sealed lots), 620,000 µg/kg (asphalt-sealed lots), and 54,000 µg/kg (unsealed asphalt and concrete lots combined)."

Objection

This objection falls in the category of identifying a failure to follow generally accepted conventions regarding statistical representations and the exclusion of results such that bias could be introduced. The characterization in this statement is imprecise from a statistical perspective and the selection of the awkward units of measure attempts to imply that the largeness of the numbers is relevant to the significance of the findings.

Further specificity should be provided regarding the type of average presented as the difference between means, medians and modes is significant to understanding representations of the central tendency. Further, whether the computation was made based on the assumption of a normal distribution of the data should be specified (e.g., arithmetic vs. geometric mean).

Whenever a central tendency value for a group is presented, a representation of the variance within that data should be calculated via an appropriate computation and included. A standard convention for scientific publication is to present a mean with the associated standard deviation. Reasonable scientific interpretations cannot be made from a mean value without understanding the variability within the values being averaged. For example, presenting the results for the coal tar-derived sealer lot group as an "average" of 3,500,000 µg/kg conveys substantially different information than disclosing the uncertainty in the estimate and stating that the value was "3500 plus or minus 3300 mg/kg" as reflected by the corresponding standard deviation.

Selecting micrograms per kilogram as the units in which to present results leads to confusing rounding conventions, makes the numbers, particularly in Table 2, unwieldy and serves to suggest that the largeness of the number is relevant beyond being dictated by the units that the researchers chose to use. Notably, when these same results were released in a separate publication intended specifically for a scientific journal audience (Mahler, B.J. et al., 2005, *Environ. Sci Technol.* 39:5560), they were presented in units of milligrams per kilogram, making the numbers easier to differentiate and evaluate. Results in the USGS report version should be presented in the same, milligram per kilogram units for solid phase (particulate and scraping) samples.

The rounding convention applied in conjunction with choosing to use the large, microgram per kilogram values is confusing and serves to confound replication of the analyses by independent reviewers. Specifically, it appears that a rounding convention was applied to the computation of ΣPAH_{part} for each individual sample prior to the calculation of an "average" as an arithmetic mean. This resulted in ΣPAH_{part} for sample LBJ, a coal tar-derived sealer lot being rounded up to the nearest 100,000 – listed as

9,000,000 µg/kg vs. actual sum of 8,917,000 per Table 2 – while other lots were rounded within the nearest 100 – sample ZLK, an unsealed lot, was rounded down from 7215 µg/kg to 7200. The average was apparently then computed from the already rounded values, which serves to compound the introduced imprecision. This results in the final presentation of an "average" value of 3,500,000 vs. an actual value of 3,435,000, which should have rounded down to 3,400,000 using the same convention applied by the authors for the coal tar-derived sealer lot LBJ.

The form of presentation also suggests that there is differential analytical precision for the results from different groups, which does not appear to be the case. For example, showing precision down to the nearest thousand for unsealed lots (54,000 µg/kg), while rounding off to the nearest hundred thousand for coal tar-derived sealer lots (3,500,000 µg/kg), suggests more precise estimation for the unsealed lots. However, this is due to rounding convention, not analytical precision. Expressing units for these samples in milligrams per kilogram will allow clearer numerical presentations. Rigorous consistency and convention in rounding should also be applied and individual values should not be rounded prior to computing derived values such as sums or averages.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- not being inadequately transparent regarding summarization and statistical characterization of laboratory results; and
- not being precise with regard to rounding conventions and the computation of values from previously rounded numbers.

Relief Requested

Characterizations of group results should specify the type of average computed and appear with the corresponding standard deviation, or other relevant characterization of the variance.

Throughout the report, results for particulate and scraping samples should be presented in units of milligrams per kilogram to match the scientific journal publication of the same data and to improve the clarity of the tables and interpretations. Rounding conventions should be applied uniformly across groups and only after computations are made.

34. USGS Statement

Page 6 – PAHs (Runoff From Parking Lots in Use); paragraph 1

"Differences between types of surface were compared using the nonparametric Kruskal-Wallis test; the hypothesis (no difference between groups) was rejected for $p < .1$."

Objection

This objection falls in the category of identifying a failure to follow generally accepted conventions regarding statistical representations and the exclusion of results such that bias could be introduced. The specified threshold for acceptable Type I error in hypothesis testing ($p < 0.1$) is less stringent than that typically applied in conjunction with establishing significant differences between groups in scientific publications ($p < 0.05$). This choice serves to make it "easier" to declare differences between groups to be statistically significant when there is a high degree of varianceamong the results from each group. The rationale for choosing the less stringent statistical threshold should be specified.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity and Integrity by virtue of:

- failing to present sound scientific reasoning for choosing a statistical significance threshold that is less stringent than the norm in scientific publications; and
- failing to provide rationale and straightforward explanation for a relaxed statistical testing choice that could reflect a biased interpretation of the results.

Relief Requested

Description of the basis for accepting a Type I error threshold of $p < 0.1$ as adequate for declaring differences to be statistically significant should be provided along with a description of the reason for not using more quantitatively powerful parametric statistical tests.

35. USGS Statement

Page 6 – PAHs (Runoff From Parking Lots in Use); paragraph 1

"Differences between concentrations from other groups were not significant in Kruskal-Wallis tests."

Objection

This objection falls in the category of identifying a failure to follow generally accepted conventions regarding statistical representations and the exclusion of results such that bias could be introduced. Failing to identify a statistically significant difference when the average for the asphalt-sealed lots was more than 10-fold higher than that for unsealed lots 620,000 µg/kg vs. 54,000 µg/kg, respectively) warrants additional clarification, particularly since the coefficient of variation is much lower (~50%) for the asphalt-sealed lots compared to the other groups. The relative consistency of the results from the asphalt lots and the fact that the lowest result for this group was more than 3-fold higher than the highest value from the unsealed group suggests that the inability to detect a difference was likely a reflection of the statistical power of the test used, influenced

primarily by sample size limitations. The failure to detect a difference between the asphalt group and unsealed lots, in contrast to the coal tar-derived sealer lots, relates directly to choosing to sample only three asphalt-sealed lots compared to six coal tar-derived sealer lots. Since the sample size is likely the determinant factor in not detecting a difference between the asphalt-sealed lots and unsealed lots, it should be made clear that the test results were dependent upon this choice in study design.

It is important to provide appropriate context and explanation for the observable distributions of data produced in this study because the results have been used by other agencies to specify controls on the use of coal tar-derived sealers that specifically exempt asphalt-based sealers. Accordingly, findings that can be portrayed to indicate that asphalt-based sealer samples were not different from unsealed lot samples, while PAH levels were statistically higher in samples from coal tar-derived sealer lots serve to substantiate differentiation between types of sealer products. Failing to point out that the statistical findings in the study are likely the product of limitations of the statistical tests used and choosing to sample different numbers of lots of each type is an omission that allows other interested parties to promote advocacy positions regarding coal tar-derived versus asphalt-based sealer products. Since the study was undertaken collaboratively with the City of Austin and city officials had previously made public statements relevant to imposing controls on coal tar-derived sealers selectively, the USGS directive to proactively avoid advocacy requires that clarification should have been provided to limit the potential for the stated inability to detect a statistical difference with asphalt-based sealers to be portrayed as indicating that elevated PAH levels in washoff samples were unique to coal tar-derived products.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Integrity and Impartiality and Nonadvocacy by virtue of:

- not presenting an unbiased, straightforward explanation for factors likely explaining the pattern of statistical findings reported;
- failing to evaluate alternative explanations for the statistical findings that identified the possible effects of sample size and study design in controlling the statistical power of the evaluation;
- failing to appropriately avoid an advocacy position with regard to the results being portrayed to reflect conditions unique to coal tar-derived products; and
- containing implied criticism for coal tar-derived sealer products selectively in comparison to other sealers and sources of PAHs.

Relief Requested

A thorough discussion of the statistical power of the tests used, the relative variances (e.g., coefficients of variation), and obvious factors such as sample size that control the power of statistical tests should be provided. The fact that the difference between the asphalt-based sealer lots and unsealed lots is approximately a factor of 10, but still not determined to be statistically significant should be specified.

36. USGS Statement

Page 6 – PAHs (Runoff From Parking Lots in Use); paragraph 1

"The concentrations of ΣPAH_{part} in runoff samples from parking lots in use are similar to concentrations in samples from test plots with the same type of surface (fig 4)."

Objection

This statement falls in the category of mischaracterizations of the actual results and findings of the study in the report text. Specifying the results from the test plots being "similar" to the corresponding types of in-use parking lots is not an appropriate characterization given the differences observed and the differing degrees of purported similarity among the surface types. The average result reported for the asphalt-based sealer lots was 620,000 µg/kg. The arithmetic mean of the samples from the asphalt-sealed test plots was 54,600 µg/kg. This 11-fold higher concentration for in-use parking lots contrasts with only a 2.5-fold increase between the average for the coal tar-derived sealer lots and the coal tar-derived sealer test plots. More significantly, the results from the unsealed surfaces differed in the opposite direction, with an average concentration for the in-use unsealed asphalt lots that is 4-fold lower than the average concentration obtained from the unsealed asphalt test plots. Dismissing these differences simply as all "similar" is an overly simplistic analysis that serves to deflect consideration from alternative explanations for the results obtained.

Suggesting the results to be "similar" by surface type serves to imply that the type of sealer product is the only relevant determinant. Conversely, acknowledging the extent of the differences would tend to suggest that factors such as vehicle use and the time interval since a previous washoff process (i.e., rain events) could explain a significant portion of the variability that was observed. The large increase in concentration between what is apparently directly due to asphalt-based sealer particulate (asphalt-sealer test plot results) and what is washed off in-use asphalt-sealed lots document clearly that vehicular or atmospheric sources of PAHs deposit higher concentration particulate or that there is some process or phenomenon that serves to concentrate PAHs on the particulate residue that is captured using the filtration system of this study.

The graphic developed to substantiate the statement that the results were similar by surface type – Figure 4 – only appears to illustrate this similarity by virtue of the scale chosen for the y-axis and the size of the symbols used. The 11-fold and 4-fold differences in opposing directions identified between test plots versus in-use parking lots for asphalt sealed and unsealed surfaces, respectively, would actually appear substantially different if they were presented in numerical, tabular form instead of the type of graphic selected.

The significance of promoting the similarity of test plot results to parking lot results in the interpretation relates to the use of this study by other interested parties to promote advocacy positions regarding the primacy of coal tar-derived sealer products as the explanation for PAH content associated with parking lot runoff. Since the study was

undertaken collaboratively with the City of Austin and city officials had previously made public statements relevant to imposing controls on coal tar-derived sealers selectively, the USGS directive to proactively avoid advocacy requires that alternative interpretations should have been clearly acknowledged. Also, choosing to characterize the differing results between test plots and in-use lots as "similar" when the relative difference for asphalt-sealer was actually greater (11-fold) than the difference observed between coal tar derived versus asphalt-based sealer in-use lots (<6-fold) is an active interpretative characterization that serves to advance one conclusion (the primacy of sealer product type for explaining parking lot washoff material) and deflect attention from the alternatives actually suggested by the data.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity, Integrity and Impartiality and Nonadvocacy by virtue of:

- not setting the reported results in appropriate context with regard to the differences between test plots and in-use lots versus the differences in surface type;
- specifying the reported results as "similar" without a sound scientific basis for this characterization;
- not presenting an unbiased, straightforward interpretation of the data reported;
- failing to evaluate alternative explanations for the pattern of results obtained between test plots versus in-use lots;
- failing to appropriately avoid an advocacy position with regard to the results being portrayed to reflect the primacy of coal tar-derived product as the explanation for the results reported; and
- containing implied criticism for coal tar-derived sealer products selectively in comparison to other sources of PAHs.

Relief Requested

A thorough discussion of the differences observed between in-use lots and test plots surfaced with the same types of products should be provided. The degree or relative extent of the differences observed should be compared and contrasted between in-use versus test plots of the same material and relevant factors that could reasonably explain these results should be identified and discussed. The fact that increased PAH concentrations were observed when the impacts of traffic were added to lots sealed with either sealer type and the corresponding requirement for either a more concentrated source to have contributed or a concentrating process or phenomenon to have occurred should be discussed. The relevant distinction that concentrations on filtered particulate matter, which can only increase due to the influence of a more concentrated source and not due simply to the accumulation of material, should be made clear.

37. USGS Statement

Page 6 – 8– PAHs (Runoff From Parking Lots in Use); paragraph 1

"ΣPAH_{part} concentrations in all runoff samples from parking lots exceeded the PEC (22,800 µg/kg)…."

Objection

Comparison of ΣPAH_{part} concentrations from the filter residue to screening values derived for streambed sediment is irrelevant and inappropriately implies that the parking lot residue is environmentally equivalent to streambed sediment. See Comments 31 and 32, above.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity, Integrity and Impartiality and Nonadvocacy by virtue of:

- failing to interpret results from the study in an unbiased manner;
- failing to present the relationship between the samples collected in the study and the streambed sediment for which the cited screening criteria was developed in a straightforward, unbiased manner; and
- failing to interpret the concentration results from the residue samples impartially.

Relief Requested

The statement should be eliminated from the report in conjunction with applying the requested relief regarding Comments 31 and 32, above.

38. USGS Statement

Page8 – PAHs (Runoff From Parking Lots in Use); paragraph 2

"Only one sample from an asphalt-sealed lot was analyzed, so the difference between sealer types could not be compared statistically. The average ΣPAH_{diss} concentration in filtered water from parking lots in use was 8.6 micrograms per liter (µg/L) for coal-tar-sealed lots"

Objection

This objection falls in the category of identifying a failure to follow generally accepted conventions regarding statistical representations and the exclusion of results such that bias could be introduced. The reason for choosing to present analytical results for only one sample from an asphalt-sealed lot when additional samples were available should be disclosed and discussed as an uncertainty related to study design. Particulate matter results were presented for every lot sampled. Because of the method used in the sampling and necessity to filter the washoff water from each lot in order to obtain the particulate, it would appear that filtrate water must have been obtained from every lot. This suggests that the water samples were obtained from each lot, but not analyzed, or the results were not presented. Since results from water samples from all but one of the coal tar-derived sealer lots were presented, but only one of the asphalt-sealed and unsealed

lots, the manner in which certain samples were excluded from analysis of the water should be explained.

The unspecified type of "average" value is presented for coal tar-derived sealer lots without a corresponding characterization of variance such as the standard deviation. See Comment 33, above. Presenting a purported average for the coal tar group alone serves to imply that the results for this type of surface are the most definitive and reliable among the groups. This circumstance is an outcome due to intentionally choosing to exclude all but one lot from the other groups from the water analysis, precluding the computation of any type of central tendency, or variance estimate. Presenting an average for just one group, the coal tar-derived sealer lots, also implies that this group alone warranted more thorough consideration through the analysis of multiple samples. Making it appear that filtrate from coal tar-derived sealer lots specifically was most significant to analyze and present implies that these lots were somehow more relevant with regard to PAH washoff, creating an implied criticism of this product subtype without actually analyzing effectively differences among surface types.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity, Integrity and Impartiality and Nonadvocacy by virtue of:

- not being complete with regard to presenting results from all of the lots that were sampled;
- not documenting the method used to selectively analyze certain water samples; and
- implying criticism for one of the surface types by singling it out for specialized analysis and presentation.

Relief Requested

The basis, method and rationale for including results from a subset of the water samples collected should be made clear.

The representation of the results from coal tar-derived lots should include the range, specify the type of central tendency estimate computed, and include the standard deviation or other appropriate variance measure. It should be stated explicitly that the study design and exclusion of all but one sample from each of the other groups precludes presenting analogous information for other surface types.

39. USGS Statement

Page 8 – PAHs (Runoff From Parking Lots in Use); paragraph 2

"Concentrations of ΣPAH_{diss} in runoff samples from parking lots in use were similar to those from test plots with the same type of sealer, except the ΣPAH_{diss} concentration in the runoff sample from the asphalt-sealed parking lot, which was about four times greater than the average concentrations at the asphalt-sealed test plot (fig 5)."

Objection

This statement falls in the category of mischaracterizations of the actual results and findings of the study in the report text. This characterization of the pattern of results fails to mention a further obvious consistency that is relevant to interpreting the study results overall. The only difference specified to be notable between test plot versus in-use lot results for the same surface type is for asphalt-sealed surfaces (~4-fold increase for in-use lots). It was this same type of surface for which the largest difference was found between test plots and in-use lots for the particulate samples (~11-fold increase for the in-use lots). This consistency between the increases in water and particulate sample results for asphalt-sealed surfaces should have been pointed out because it further strengthens the observation that either a PAH source or concentrating process related to the vehicle use or other characteristics of the in-use lots dominates the PAH concentration pattern. As discussed in Comment 36, above, deflecting attention away from increased PAH concentrations associated with in-use lots versus test plots serves to promote the sealer type as the primary factor controlling the study results when the data actually demonstrates that, at least for asphalt-sealed lots, an obvious alternative factor – use/history characteristics of the in-use lots – likely explains the pattern of results found.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Integrity and Impartiality and Nonadvocacy by virtue of:

- not presenting an unbiased, straightforward interpretation of the data reported;
- failing to evaluate alternative explanations for the pattern of results obtained between test plots versus in-use lots; and
- failing to appropriately avoid an advocacy position with regard to the results being portrayed to reflect the primacy of coal tar-derived product as the explanation for the results reported.

Relief Requested

A thorough discussion of the implication of the approximate 4-fold increase in dissolved PAH concentrations observed between asphalt-sealed test plots and the asphalt-sealed in-use lot should be presented. This should discuss the alternative factor that use characteristics are an obvious difference between the in-use lots versus the test plots that could relate to PAH sources and concentrating phenomena.

40. USGS Statement

Page 8 – PAHs (Scrapings); paragraph 1

"ΣPAH_{part} concentrations in scrapings from all sealed test plots or parking lots exceeded the PEC (22,800 µg/kg)."

Objection

This statement falls in the category of mischaracterizations of the actual results and findings of the study in the report text. Comparing a streambed sediment screening level to material that was not even in particulate form, but had to be scraped up with a metal tool and then processed with organic solvents in the laboratory in order to extract the PAH content is clearly an egregiously irrelevant analogy that is intended simply to imply criticism for the sealer products. The adherent material on paved surfaces is no way environmentally analogous to particulate streambed sediments and choosing to compare the results obtained to a sediment screening level improperly attempts to imply such an analogy. See Comments 31, 32, and 37, above.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity, Integrity and Impartiality and Nonadvocacy by virtue of:

- failing to interpret results from the study in an unbiased manner;
- failing to present the relationship between the samples collected in the study and the streambed sediment for which the cited screening criteria were developed in a straightforward, unbiased manner; and
- failing to interpret the concentration results from the residue samples impartially.

Relief Requested

The statement should be eliminated from the report in conjunction with applying the requested relief regarding Comments 31, 32, and 37, above.

41. USGS Statement

Page 9 – Major and Trace Elements (Metals) (Runoff from Parking Lots in Use); paragraph 1

"Lead and zinc were the trace elements most elevated in particulates washed from the parking lots on the basis of comparison to PECs. The PEC for lead was exceeded in samples from some coal-tar-sealed parking lots (TCQ, OSL, LBJ, and UTN) and in samples from both unsealed concrete lots (LAC, LOW) but the PEC was not exceeded in any of the samples from asphalt-sealed or unsealed asphalt parking lots. The PEC for zinc was exceeded in samples from every parking lot except WWB (asphalt-sealed), ZLK (unsealed asphalt), and OSL (coal-tar-sealed)."

Objection

Comparisons to streambed sediment screening levels are inappropriate for metals from the particulate samples collected, similar to the objections specified regarding PAHs in Comments 31, 32, 37, and 40, above. The same basis and reasons for the objections related to PAHs apply for the metals results as well.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Objectivity, Integrity and Impartiality and Nonadvocacy by virtue of:

- failing to interpret results from the study in an unbiased manner;
- failing to present the relationship between the samples collected in the study and the streambed sediment for which the cited screening criteria were developed in a straightforward, unbiased manner; and
- failing to interpret the concentration results from the residue samples impartially.

Relief Requested

The characterizations of the results for metals analysis should be made based on the numerical values obtained from different types of surfaces and comparisons between the test plots versus the in-use lots, highlighting relative differences.

Comparisons of metals concentrations from the samples collected in this study to streambed sediment screening criteria should be eliminated since they are not analogous materials.

42. USGS Statement

Page 2 – Table 1.

Column "Date sealant applied"

Objection

This objection falls in the category of information related to methods not being disclosed and serving to conceal study design choices that promote bias in the results. Because so many of the lots were sealed in July or June of 2003, the level of date specification provided is inadequate. When the field work for the study was initiated, apparently around August 5, 2003, lots specified to have been sealed in July or June 2003 could have cured for anything from around 6 to 60 days. Such differences in curing time would be of major significance to interpreting washoff results and the relative time for vehicle use-related constituents to have accumulated and cannot be evaluated without more specificity regarding the dates sealant was applied.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity, and Integrity by virtue of:

- being inadequately transparent with regard to the time interval between sealing and sampling of in-use lots;
- being incomplete with regard to the date specification in the column; and

- failing to present the error associated with the significant differences in curing time that could result from choosing newly sealed lots.

Relief Requested

Further resolution on the specific date of application should be provided, or footnoted and disclosed if not available, for all of the recently sealed lots.

43. USGS Statement

Page 11 – Table 2.

Within footnote: "E, estimated; <, less than; "

Column "ΣPAH_{part}"

Objection

This objection falls in the category of identifying a failure to follow generally accepted conventions regarding statistical representations and the exclusion of results such that bias could be introduced. The footnote definitions are insufficiently specific and clear. According to the report text, the qualifier "E" is used for three separate data quality or detection limit circumstances – See Comment 30. The separate meanings of the qualifier should be made clear on the table itself.

The definition for "<" is insufficiently specific. It appears that results flagged with this indicator were not detected at the method detection limit. This should be specified.

The results summed and presented in the column headed ΣPAH_{part} should be rounded consistently using standard conventions subsequent to revising the units to present the numbers on a clearer scale -- See Comment 33, above.

As currently presented, rounding conventions are confusing and are apparently not applied consistently among sample types.

For the unsealed test plot:

- a calculated sum of 410,600 is rounded down to 410,000
- a calculated sum of 14,500 is rounded down to 14,000.

For asphalt-sealed in-use lots:

- a calculated value of 836,000 is rounded down to 830,000, and
- a calculated value of 775,500 is rounded down to 770,000.

While, for the coal tar-derived sealed in-use lots:

- a calculated sum of 8,917,000 µg/kg is rounded up to 9,000,000 – the "two digit" strategy apparently employed seemingly should have produced a rounded value of 8,900,000, and
- a calculated sum of 512,500 is rounded up to 520,000.

Since the coal tar derived sealer lot values were seemingly rounded using a different convention that other groups, the rounding conventions that can produce the listed values should be clearly described.

For ΣPAH_{part} specifically, the handling of non-detects in calculating the summation column is not disclosed in the table or the text. Based on the presented value for the unsealed test plot, ASP, it appears that concentrations below the detection limit were assumed to be zero.

In environmental studies, state and federal agencies typically do not permit the levels that, in point of fact, could be present slightly below the detection limit to be treated as zero concentrations in the computation of summation values for PAHs or other types of chemicals where multiple analytes are typically summed. A standard convention is to substitute a value equal to one-half the detection limit, or the detection limit itself depending on the situation, for the specific analytes that were below the corresponding detection limit. This ensures that compounds which may be present just below the detection limit do actually contribute to the sum presented as the "overall PAH level."

The choice to treated levels below the detection limit of the laboratory as zero is significant to the interpretation of the results because it disproportionately affects different types of samples. This choice serves to produce lower ΣPAH_{part} values for unsealed test plots and in-use lots because values for multiple chemicals were completely excluded by virtue of being below the corresponding detection limit. However, for the coal tar-derived sealer samples, numerical values were generally available for all individual compounds contributing to the sum, so no chemicals were excluded from summation.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity, and Integrity by virtue of:

- being inadequately transparent with regard to multiple definitions for a qualifier and lack of specifying a detection limit or reporting limit threshold, and
- failing to apply rounding conventions in a clear and unbiased manner;
- failing to document the method used to handle non-detect values and apply environmental agency conventions in summing multiple chemicals; and
- failing to present the error associated with excluding certain chemicals from summations for certain samples.

Relief Requested

Footnotes should be expanded and defined specifically as outlined above.

Rounding conventions should be disclosed and applied using standard expectations.

The summation of ΣPAH_{part} should be recomputed using standard conventions of including surrogate values for non-detect results and statistical testing should be repeated with the revised summation numbers.

44. USGS Statement

Page 21 – Table 3.

Within footnote: "E, estimated; <, less than; " also

Column "ΣPAH_{diss}"

Objection

Regarding footnote definitions, the objections raised with regard to Table 2 (See Comment 43) apply to this table as well.

Regarding rounding conventions and handling of surrogates, the points raised in Comment 43 apply to this table as well, with the exception that exclusion of results below detection limits was disclosed in the text for ΣPAH_{diss}.

Basis for Our Objection

This objection is based on failure of the presented statement to meet the criteria of Utility, Objectivity, and Integrity by virtue of:

- being inadequately transparent with regard to multiple definitions for a qualifier and lack of specifying a detection limit or reporting limit threshold, and
- failing to apply rounding conventions in a clear and unbiased manner;
- failing to document the method used to handle non-detect values and apply environmental agency conventions; and
- failing to present the error associated with excluding certain chemicals from summations for certain samples.

Relief Requested

Footnotes should be expanded and defined specifically as outlined above.

Rounding conventions should be disclosed and applied using standard expectations.

The summation of ΣPAH_{diss} should be recomputed using standard conventions of including surrogate values for non-detect results.

45. USGS Statement

Page 24– Table 5.

Column "Suspended sediment concentration"

Columns "Percent greater than 63 μm" and "Percent less than 63 μm"

Column "Volume sample represents (L)"

Footnote 2: "Some samples collected beginning 9/26/05 from a ...."

Footnote 4: "Ignored outlier based on comparison of suspended concentration to mass of sediment recovered during filtration."

Objection

This objection falls in the category of identifying a failure to follow generally accepted conventions regarding statistical representations and the exclusion of results such that bias could be introduced. There are a number of questions raised by the data presentation format chosen for Table 5. As noted in Comment 21, specific methods used for analysis of suspended sediment concentrations are not disclosed in the text nor table. Similarly, methods used to determine the percentage of particles greater than 63 μm and percentage of particles less than 63 μm are not reported. No mention of use of a method for size fractionation of particles is included in the methods sections of the report.

Footnote 4 suggests that the mass of sediment recovered during filtration was collected and quantified. This leads to the question of whether the size fractionation was performed on the mass of sediment recovered during filtration or the sub-sample of material collected from the churn. As indicated below, and by the authors' footnote 4, sub-samples collected from the churn may not be representative of bulk solution properties.

If the mass of sediment recovered during filtration was indeed quantified, these data should be presented along with the volume of water passed through the filter. The mass of sediment recovered by the filter divided by the volume of water filtered should provide a better estimate of the average suspended sediment concentration. Why was the average suspended sediment concentration based, apparently, on a sub-sample from the churn, which may or may not be representative of the bulk solution properties, rather than actually measuring the mass of sediment recovered on the filter?

Clearly, those sub-samples that are annotated by footnote 4 demonstrate that the authors recognized that some sub-samples resulted in suspended sediment concentrations that did not appear to be representative of bulk solution properties. In fact, these data are sufficiently non-representative that the authors choose to "ignore" these data in their calculations. The criteria used to determine when a sub-sample from the churn is "ignored" is not specified and disclosed in the report. In one case, a low estimate is ignored; but in another case, a high estimate is ignored. Ignoring the low estimate for TAR (a coal tar sample) and ignoring the high estimate for NWR (an unsealed asphalt sample) serves to overestimate the relative contribution from the coal tar-derived sealer lot compared to the unsealed lot. Also, the measured suspended sediment concentration from an unsealed lot that was ignored (1004 mg/L) was higher than all of the concentrations from coal tar sealed lots. Ignoring this actually measured value and specifying the average suspended concentration to be 323 mg/L for this sample, leading to a corresponding reduction in PAH mass calculated from this lot, should be justified. The choice to exclude the certain suspended sediment results identified in Table 5 serves to bias the subsequently computed PAH masses (Mahler et al., 2005) toward showing a difference between unpaved and coal tar-paved lots. Without adequate justification for ignoring selected data, the appropriateness of introducing this biasing factor cannot be determined.

Footnote 2 states that "some samples collected beginning 9/26/05 from a known volume of total sample thus allowing calculation of volume-weighted mean concentration." There is an obvious error in the date as no samples were collected in 2005. The actual date does not, however, appear to be 9/26/03 because a volume weighted mean is calculated for lot TCQ, which was sampled on 9/7/03. Also, it is unclear why, among six samples collected early in the study (9/7/03 or 9/8/03), information was disclosed to allow computation of a volume weighted mean for only one – lot TCQ, the only coal tar sealed lot among these samples. Since the relevance of the volume of collection was obviously apparent to the researchers at the date of this early sample, it is unclear why the corresponding volumes would only be recorded for a coal tar sealed lot and the computations for other types of lots would, instead be based on the assumption that each collection container for a given lot was equivalent.

It is unclear why the volume of the washoff water collected could not be recorded and it is relevant to the interpretation of the results that the volumes collected in each separate container, and the order in which they were collected, be disclosed. It should be anticipated that particulate concentrations would be higher at the early part of the collection compared to the end of the collection. Accordingly, the volume of each sample collection container for each sampling event should be added either as a separate column or in a revision to the column labeled "volume sample represents (L)." Currently, volumes are not listed for many of the samples.

Because three different procedures were used to estimate average suspended sediment concentrations (i.e. single sample, mean of two samples, and volume-weighted mean), an additional layer of uncertainty is added to the interpretation of results. For example, two sub-samples were collected from the runoff from the asphalt sealed lot SOC. The mean

of the two samples is 606 mg/L, the volume-weighted mean is 732 mg/L, and if only one of the samples was used, the average suspended sediment concentration could have been reported as either 1,047 mg/L or 164 mg/L. Any of these 4 values varying over 10-fold could have been designated as the final suspended sediment concentration for this sample using the choices available to the analysts. Thus, there is considerable variability in the value reported as the "average suspended sediment concentration" depending upon which of the three procedures is used to calculate this value. Accordingly, the criteria for selecting the final value should be made clear.

It should be noted that average suspended sediment concentrations in 5 of 6 of the in-use coal tar-sealed parking lots were calculated using a volume-weighted mean; whereas, average suspended sediment concentrations in only 1 of 3 in-use asphalt-sealed parking lots and 1 of 4 in-use unsealed parking lots were estimated using this procedure. No disclosure is provided that the three methods used to determine "average suspended sediment concentration" were applied differentially among the types of lots sampled and no justification is provided that this choice does not introduce bias to the subsequent computations of PAH mass.

Basis for our Objection

This objection is based on failure of the data table to meet the criteria of Utility, Objectivity, and Integrity by virtue of:

- being inadequately transparent with regard to selection criteria for "ignoring" data that was generated for determination of average suspended sediment concentrations;
- failing to report the volume of water filtered and the mass of sediment recovered during filtration;
- being inaccurate in describing which samples were selected for application of a volume-weighted mean to estimate the average suspended sediment concentration;
- treating in-use coal tar-sealed parking lots differently than in-use asphalt-sealed and unsealed parking lots when estimating average suspended sediment concentrations; and
- not documenting the method used to perform the particle size fractionation.

Relief Requested

The volume of water filtered and mass of sediment recovered from the filter should be reported for all samples. These data will aid in verification of the average suspended sediment concentrations determined by sub-sampling of churn contents. The criteria used to determine if a sample should be excluded from estimation of the average suspended sediment concentration must be documented and supported. The report should also include a discussion of the uncertainty associated with treating in-use coal tar-sealed

parking lots differently than in-use asphalt-sealed and unsealed parking lots when estimating average suspended sediment concentrations.

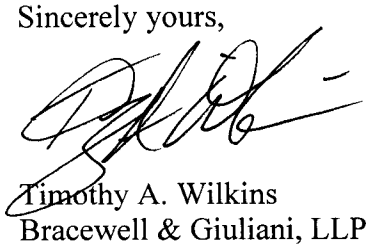
Conclusions

The objections described document significant omissions, study design factors, methodological limitations, and interpretative statements that result in the report failing to meet the requirements of the USGS quality control manual and referenced requirements from the USGS and associated agencies. These inadequacies in the quality of the information presented have adversely affected the Affected Parties.

To address the numerical details, the methodological detail needed, and appropriate interpretation, the report requires substantial reanalysis of the re-computed results and revision.

If additional clarification is desired regarding any specific objections, or there are any questions from the agency, the Affected Parties will be glad to provide additional input. We look forward to receiving the acknowledgement and notice to this complaint specified by the USGS guidelines and to resolving the requests for correction regarding this report. We appreciate your consideration of the matters addressed herein and request that USGS promptly grant the Affected Parties the relief requested in connection with each of the items addressed above as and to the extent required by the USGS, DOI, and OMB Guidelines and the Data Quality Act.

Sincerely yours,



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On behalf of the Affected Parties