Peer Review Summary Document

(4/13/2015)

Peer Review Plan

http://www.usgs.gov/peer_review/docs/toxicity_of_sealcoated_pavement_runoff.pdf [27 KB PDF]

Title and Authorship of Information Product Disseminated

Acute toxicity of runoff from sealcoated pavement to *Ceriodaphnia dubia* and *Pimephales promelas*, By Barbara J. Mahler, Christopher G. Ingersoll, Peter C. Van Metre, James L. Kunz, and Edward E. Little.

Peer Reviewers Expertise and Credentials

Reviewer #1: A University Distinguished Professor, Associate Provost, and Dean of Graduate School at Miami University. The reviewer holds an undergraduate degree from Wittenberg University and a doctoral degree in environmental toxicology and fisheries and wildlife from Michigan State University. The reviewer has taught courses on subjects including ecological risk assessment and environmental biology, has served as consultant to a variety of federal and private agencies and as President of the Society of Environmental Toxicology and Chemistry in North America, and is a member of the U.S. Environmental Protection Agency's (EPA) Science Advisory Board Ecological Processes and Effects Committee. Areas of the reviewer's research include photochemistry and toxicology of polycyclic aromatic hydrocarbons in fish and invertebrates, the molecular regulation of the Cytochrome P-450 metabolizing system in fish, the fate and dynamics of sediment pollutants in fish and invertebrates, and the modeling and statistical analysis of toxicity dose-response relationships.

Reviewers #2-4: Three anonymous reviewers chosen by the scientific journal *Environmental Science and Technology*. The reviewers were selected on the basis of the subject matter of the paper, the experts available in a given area, and knowledge of the habits of proposed reviewers (*Environ. Sci. Technol.*, vol. 23, no. 1, 1989, p. 30).

Charge Submitted to Peer Reviewers

The reviewers were asked to make an objective evaluation of the research, with particular emphasis on the interpretation and discussion of results. They were notified that the subject matter could receive attention on a nationwide scale and be scrutinized at a high level of detail.

Summary of Peer Reviewers Comments

Reviewer #1: Had several comments and suggestions on the first version reviewed, but found the revised version to be "outstanding," to integrate the important pieces, and to be suitable for submittal to and publication in the journal. In the review of the first version, one of the reviewer's principal suggestions was that addition of a risk model, e.g., a dose-response model, would increase the scientific value. The reviewer remarked that the discussion on ultraviolet radiation should focus on ultraviolet-a (UVA) rather than ultraviolet-b (UVB), because UVA is the actinic wavelength range for most PAHs that cause

photo-induced toxicity. The reviewer also noted that the experimental design cannot address photomodification as a mode of action. As a final comment, the reviewer suggested a number of additional publications that could be referenced.

Reviewers #2–4: Overall the reviewers stated that the paper presents “a timely and important topic that [will] move the science forward,” and that it “provides important contributions to the ongoing assessment of the hazards posed to aquatic systems by use of coal tar sealants.” Comments among the three reviewers of the initial submittal touched on many of the same issues. The reviewers requested that detailed information on analytical methods and chemical results, which were previously published or provided in the Supporting Information section, be provided in the main text. They also requested that variance among replicates be discussed. The reviewers recommended that the approach used for the dose-response curve be reconsidered, because tissue concentrations were estimated rather than measured. An additional recommendation was that the portion of the Discussion section on environmental relevance be better supported with data and references. Additionally, Reviewer #4 requested expansion of the chemical characterization of the runoff.

Summary of USGS Response to Peer Reviewer Comments

Wherever appropriate, editorial revisions suggested by the reviewers were incorporated into the manuscript, which strengthened the overall clarity.

To address Reviewer 1’s recommendation regarding inclusion of a risk model, a dose-response model based on estimated tissue concentrations was developed for the first version submitted to the journal. However, in response to subsequent comments from the other reviewers the dose-response model was modified to be an exposure-response relation, which does not rely on estimated tissue concentrations. In response to Reviewer 1’s comment that the paper should focus primarily on results from the coal-tar-runoff exposures, the abstract was revised accordingly, and the text was clarified to indicate that the asphalt product applied was hypothesized to be an asphalt-coal tar blend. In response to a related comment from Reviewer 4, a revision was made to refer to the runoff from the asphalt-sealcoated surfaces as “AS/CT-blend” to add clarity. In response to Reviewer 1’s remark to focus on UVA rather than UVB, revisions were made in the text where UVA and UVB were discussed to avoid putting emphasis on one or the other. The text also was revised to clarify that the experimental design did not address photomodification. Reviewer 1 commented that the resulting revisions “hit the mark.”

In response to Reviewers 2–4 request for additional details on analytical methods and results, a figure from the Supporting Information section was moved into the text, but, following the journal’s Guidelines to Authors, the fairly large table of chemical data was retained in the Supporting Information section. A sub-section on Analytical Methods, which includes information on sample handling and storage, was added in the Materials and Methods section. In response to the request for additional information on variance among replicates, a sub-section that discusses variance was added in the Results section. (Note that complete data for all replicates is retained in the Supporting Information section). Figure 2 was modified to indicate the range of results among replicates for each sample. In response to a reviewer recommendation to simplify the approach used for the dose-response curve, the approach was modified to consider only whole-water concentrations rather than tissue concentrations, and termed an exposure-response curve. The species-specific nature of the computed phototoxic equivalents is emphasized, and figure 3 was modified to better indicate that the explanatory variables are not equivalent. In response to a reviewer recommendation to better develop the discussion of environmental relevance,

the section of the Discussion addressing environmental relevance of exposures was revised to put measured concentrations into context by comparing them with published concentrations, and a discussion of factors that might affect intensity and penetration of photoradiation was added. Although Reviewer 4 requested expansion of the chemical characterization, this was not possible "after the fact," in that the samples the reviewer requested would have had to have been collected and analyzed during the study. Accordingly, a paragraph was added to the Discussion section that outlines the potential value of additional chemical analyses in future studies, including analysis of the 10% diluted samples, measurement of the compounds in the dissolved phase, and characterization of many more of the thousands of compounds that coal tar comprises.

The Dissemination

The product will be published as an article in *Environmental Science and Technology* and will be available at http://pubs.acs.org/journal/esthag.