

Peer Review Summary Document

(3/20/2015)

Peer Review Plan

<https://www.usgs.gov/atom/73843> [18 KB PDF].

Title and Authorship of Information Product Disseminated

Exposure to Runoff From Coal-Tar-Sealed Pavement Induces Genotoxicity and Impairment of DNA Repair Capacity in the RTL-W1 Fish Liver Cell Line, by Aude Kienzler, Barbara J. Mahler, Peter C. Van Metre, Nathalie Schweigert, Alain Devaux, and Sylvie Bony.

Peer Reviewers Expertise and Credentials

Reviewer #1: The reviewer has a Master of Science degree in Toxicology from Oregon State University, Corvallis, Oregon, and a Bachelor of Science degree in Biology from Gonzaga University, Spokane, Washington. The reviewer has been a Biologist with the U.S. Geological Survey (USGS) since 2002, serves as a key technical advisor and project manager regarding freshwater toxicity issues, and has published more than 16 articles in the scientific peer-reviewed literature. The reviewer's research focuses on mechanisms underlying changes in water chemistry and subsequent changes in aquatic communities, in particular fish, invertebrates, and algae in freshwater ecosystems.

Reviewers #2-4: These three anonymous peer reviewers were selected by the scientific journal *Science of the Total Environment* 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.

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

Peer Reviewer #1: Found the study to be well-conducted, and commented that the article was well prepared, readable, and required few revisions. The reviewer suggested that the PAH profiles of the exposure medium be included in the Supporting Information section. The reviewer questioned to what degree the exposure of trout liver cells to runoff from coal-tar-sealed pavement is of interest, given that coal tar is known to have high concentrations of PAHs and that many PAHs are known carcinogens, and wondered whether it might not be of more interest to evaluate individual compounds instead. The reviewer also questioned the environmental significance of cancer rates in short-lived animals unless it can be linked to changes in population fitness.

Peer Reviewer #2: Found the scientific content to be important to the field and to adding novel insights to the research of heterocyclic compounds. The reviewer commented that the methods used are state-of-the-art and that the study was thoroughly conducted. The reviewer also noted that the data, as presented in well-designed graphs and tables, support the conclusions drawn. The reviewer's only suggestion for improvement was to add more elements to the graphical abstract to improve its comprehensibility.

Peer Reviewer #3: Considered the paper to be well organized and well written, and found the study to be well-designed and conducted. The reviewer's principal recommendation was that the disparate nature of the two endpoints (genotoxicity and DNA repair capacity) be clarified. The reviewer remarked that that Materials and Methods section contained some material that would be better placed in the Results section. The reviewer also recommended that the discussion of base-excision repair (BER) capacity be strengthened with additional discussion of enzymes reported in the literature to affect BER. The reviewer also made suggestions for minor editorial revisions.

Peer Reviewer #4: Found the study to be very interesting and the paper to be well written. The reviewer had no suggestions for revision.

Summary of USGS Response to Peer Reviewer Comments

Most of the editorial revisions suggested by the reviewers were incorporated into the manuscript, which strengthened the overall clarity. In response to Reviewer #1's request, a table of PAH concentrations for all runoff samples used for exposures was added to the Supplementary Information section. In response to the Reviewer #1's comment regarding the use of trout liver cells, the authors point out that the cells are a model—the assumption is that reaction of DNA in fish liver cells to an environmental toxicant is representative of the reaction of DNA in other fish cells, and indeed, in cells of other vertebrates. In response to Reviewer #1's suggestion that an investigation of individual compounds might be of more interest, it is pointed out that the objective was to measure the effects of the "real life" complex mixture of PAHs (and associated compounds) found in runoff associated with a commonly used consumer product. The PAH profile of this mixture is strongly correlated ($r=0.95$) with that of stream and lake sediments across much of the United States. Therefore, the authors believe that the approach taken is more environmentally relevant than a single-compound laboratory exposure experiment. In response to Reviewer #2's suggestion to add elements to the graphical abstract, information was added regarding dilution strength and target used, but it was also pointed out that the objective of the graphical abstract is to have as little text as possible. In Response to Reviewer #3's recommendation to better clarify the differences between the two endpoints, each endpoint was discussed in a different sub-section of the Methods and Results section and text was added to the Introduction and Discussion sections to better describe the differences between and complementarity of these two endpoints. The material flagged by Reviewer #3 in the Methods section was retained because (a) these results have already been published and thus are not strictly a result and (b) they describe the exposure medium, and therefore, strictly speaking, are part of the study methods. Regarding Reviewer #3's recommendations to add additional information regarding BER, there are two citations, but despite an extensive search of the published literature, little information on the effects of PAHs and related compounds on BER capacity was uncovered other than what is cited. Reviewer #4's comments did not require any revisions.

The Dissemination

The product will be published as an article in *Science of the Total Environment* and will be available at <http://www.journals.elsevier.com/science-of-the-total-environment/>.