Reviewer's report

Title: Modeling Personal Polycyclic Aromatic Hydrocarbon (PAH) Exposure in Human Subjects in Southern California

Version: 1 Date: 17 April 2012

Reviewer: Roy Harrison

Reviewer's report:

The authors describe an interesting study in which volunteer subjects carried a continuous monitor for PAH and a GPS. The GPS data were analysed to identify the location of the subject and the location data were used to develop models of personal exposure based upon time activity patterns.

The interesting and largely novel feature of this work is the use of GPS tracking which seems to have been very successful in identifying the location of the volunteer subjects without the usual requirement for extensive use of questionnaires and activity diaries.

There is one major weakness to the work which the authors acknowledge only relatively late in the manuscript. The PAS sampler used in this work has highly variable sensitivity to different PAH. The PAH mixture will differ between microenvironments; road traffic emissions, for example, show a very different congener profile to environmental tobacco smoke. The concentrations measured in different microenvironments hence will reflect not only the aggregate concentration but also the nature of the PAH mixture. The consequence is that the apportionment of exposure is not reliable and a strong caveat needs to be expressed very early in the paper rather than the point about differential sensitivity being drawn out towards the end. It is, however, to the credit of the authors that they have freely discussed this point.

I recommend the following as major compulsory revisions:

(a) The caveats about the differential sensitivity of the PAS instrument should be moved to the Introduction or Methods section and reflected in the Abstract as it renders the results for PAH exposure as very uncertain.

(b) Interestingly, the quality assurance section of the paper focuses on cleaning up the data but says nothing about the quality assurance of the PAS instrument. The instrument is described as having a range of 0-4000 ng/m³ and a sensitivity of approximately 10 ng/m³. No definition is given of the term sensitivity. What is the lowest detectable concentration with this instrument? What is its repeatability at low level concentrations? Mean and median concentrations appear to be around 10 ng/m³ with some averages in Table 1 for specific categories being as low as 6 ng/m³. The lower end of some ranges of concentration are as low as 1.1 ng/m³. How can an instrument with a “sensitivity” of approximately 10 ng/m³ and a measurement range of 0-4000 ng/m³ measure a concentration of 1.1
ng/m^3? There are real concerns about the quality of the data which need to be clearly resolved before this work could be published in anything like its current form.

(c) The last paragraph on page 8 relating to the GPS data uses the terms sensitivity, specificity and precision. None of these is defined and hence the reader is left entirely uncertain of their meaning.

(d) Page 10, penultimate sentence starting “In this study ......” is wholly obscure and needs to be clarified.

(e) Page 13 – although it becomes clear later, the meaning of the term “GPS speed” is not at all clear and a few words of explanation are needed.

(f) Page 22, third paragraph – it is difficult to reconcile the PAH exposures in this paragraph with those cited on page 14. Why do they appear to be substantially different?

The manuscript is pleasingly free of minor errors and hence there are no minor essential revisions.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare that I have no competing interests