Reviewer's report

Title: Near-highway exposure to motor vehicle pollutants: Emerging evidence of cardiac and pulmonary health risks

Version: 2 **Date:** 19 March 2007

Reviewer: MaryBeth Smuts

Reviewer's report:

General

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Discretionary Revisions (which the author can choose to ignore)
Revie w of “Near Highway Exposure to Motor Vehicle Pollutants: Emerging Evidence of Cardiac and Pulmonary Health Risks”

EPA estimates that 35 million people live within 100 meters of a major highway. The understanding of pollutant emissions, exposures and health impacts associated with roadways is a major environmental health research issue. The public health community should be provided with summaries of pollutant concentrations, exposure parameters and health impacts near roadway and transportation centers in order to focus attention on current exposures and potential health impacts of future transportation projects. Therefore, the article does address a timely and critical issue.

Discretionary Revisions
1. In the authors’ Background and methods section that substitute for an introduction the article is described as a review of literature on exposure measurements and health outcomes related to proximity to highways. One, then, expects a critical review of the literature or a complete annotated bibliography on the topic but the authors only provided a very narrow summary of some near roadway studies. It is essential that the authors provide sufficient information on their methods to back up their approach to the topic. a. a. There was not enough information in the Background and methods section to evaluate how the literature was selected for review.
b. Additional information should be provided on what were the keywords searched for in Medline
c. How was “bootstrapping” back to older studies done since there is a potential to be mislead down only one side of the research is a single’s author’s references are used.
d. The reviews of the papers seemed not to be done in the same format or at least key pieces of information, such as definitions, confounders were not consistency presented. The article would benefit from presenting the literature reviews in a standard way and the format for the review be stated in the Background and methods section.

2. The article would also benefit from an introduction or Enhanced Background and methods section that provided an overview of the types of sources and total range of pollutants from the mobile sources and road conditions, the mix of traffic types such as diesel and gas, the range of operating conditions such as speed and braking amounts that can be described the sources and their total range of pollutants. The authors then could present their reasoning for narrowing the literature review to what appears to be a focus on a smaller group of pollutants, mainly the ultra fine particles.

3. Similarly, the article does not provide an operating definition of the range of what highways or high volume roadways are considered in any of the papers reviewed. There is also the same type of absence of describing or mentioning types of monitoring devices. This overview of monitoring devices would aid in the understanding of how emissions are reported and provide a better understanding of black carbon, elemental carbon and particle sizes. The selection of papers relating health effects to traffic proximity is also

limited, focusing on coronary and pulmonary effects and adult cancer. Other health impacts have been reported, such as adverse birth outcomes, low birth weight and childhood cancer. I'm uncertain why these are absent, was it due to authors' selectivity or to limited Medline searches? Without a key and overview of the complexity of the topic, the selection and summary of the articles appear to be randomly strung together.
The authors have mixed studies with urban street traffic with highways/thruway studies; therefore, it is difficult to have confidence in their conclusion on p. 5 that certain pollutants are elevated near high volume roadways without consistent definitions.

4. A lengthier introduction to the selection and format of the review would eliminate the minor criticisms relating to mentioning a term or observation without relating it importance in context to the near roadway emissions to exposure to health effects complexity found throughout the article. On p. 3, the introduction of only a small set of traffic related pollutants: nitrogen oxides, carbon monoxide, black carbon and ultra fine and other sized particles gives the reader a limited view of pollutants associated with highways and/or vehicles. A general overview of what definitions are available for highways and what pollutants are associated with highway traffic would correct this deficiency.

5. Although there is a listing of abbreviations at the end on p.12, the authors should still follow the convention of using the complete term with its abbreviation with the first introduction of the term.

6. Careful editing should be done to avoid errors in sentence construction that confuses the descriptions.
a. Is Shi et al's measurement of UFP number and mass concentration and size distribution the same as in Zhu et al's UFP number concentration and size distribution? b. Also with the review of Shi et al's findings, did the particle number concentration decrease 5 –fold with every 30 m or within 30 meter of roadways.

7. Several of the literature summaries are too abbreviated and provide statements that do need clarification. An example of a too edited summary is on page 4 of Hitchins et al and Morawaska et al's observations that wind speed and directions and confounding roadway inputs are important in measuring highway gradients leaves the reader with questions about what are the other confounders. The whole paragraph underscores the complexity of the scientific problem and does emphasis my point that in summaries of near highway research, there is a need for consistency in measurements and reporting conditions being included.

8. In the summaries of the health studies there appears to be a confusing mix of exposure and concentration studies that allude to increase risk but the level and potential health impact isn't well described, such as the second paragraph on page 6. Sometimes, the authors haven't made the clear link that some of the pollutants are linked to traffic, such as on page 6, Hoek et al study on nitrogen dioxide and black smoke. Again, if the introduction provided an overview of traffic related pollutants and some of the measuring confusion in terminology, this lapse would be avoided.

9. The review of the Gauderman et al asthma study should be the standard for the authors' summaries of research findings. This summary included the confounders and the risk boundaries and provided the strength of the research findings. The summaries of the other asthma studies should have more detail than a statement that the general risk is higher as in the descriptions of studies on p.7, paragraph 2.

10. On page 8, there is the statement that elevation of the residence is an important factor but there is no backup reason for this statement.

11. In order for this paper to contribute to useful policy development, there is a need to characterize what high volume roadways are and characterize the vehicle type and alterations in speed in relationship to health impacts.

12. The health sections reviews of associated pediatric lung function and cancer did provide more details in the literature summaries and enabled the reader to see the strength and weaknesses of the associations and study parameters.
a. Although the review of Brunekreef paper raises more questions from its lengthier description, such as what were the distances measured if largest decrements found a within 300 m. This was the first summary that included a traffic number with the phrase "major roadway".
b. In the summary of the Dutch study, there is no description of how the children were classified; for example if children's homes were close to highway but their school was further away, would misclassification led to weak associations observed as was the case.

13. These sections with more critical review of the scientific findings underscored the incomplete details and lack of critical reviews found in the other sections. One would have liked throughout the article a

summary of each of the studies uncertainties. This type of listing of strengths and weaknesses of the research findings, using definitions of traffic density and highway volumes, would allow for better policy and future research development.

What next?: Accept after discretionary revisions

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.