

MEMORANDUM

To: Holly Stallworth, DFO
Science Advisory Board Staff Office

From: Nathalie B. Simon, Associate Director
National Center for Environmental Economics

Date: August 22, 2006

Subject: Charge Questions for SAB-EEAC September meeting

The purpose of this memorandum is to transmit two sets of charge questions for consideration by the Science Advisory Board's Environmental Economics Advisory Committee (SAB-EEAC) during our consultation with them scheduled for September 14 and 15, 2006. The first set is focused on the use of meta-analysis as a means to combine estimates of mortality risk valuation for use in policy analysis. The second is focused on valuing changes in life expectancy of various lengths.

The charge questions follow from two reports that were recently submitted to the SAB-EEAC for review and will inform revisions to our *Guidelines for Preparing Economic Analyses*. These documents are: (a) a report from the EPA Work Group on VSL Meta-analyses and (b) a whitepaper entitled "Willingness to Pay for Environmental Health Risk Reductions when there are Varying Degrees of Life Expectancy."

As indicated in the accompanying materials, advice on these issues will not only be important to the revision of our *Guidelines for Preparing Economic Analyses* but will be of immediate relevance to the Agency as we continue to pursue our regulatory agenda. We look forward to the SAB-EEAC's timely advice on these matters.

Thank you for your efforts and the efforts of the SAB-EEAC in supporting improvements to our *Guidelines for Preparing Economic Analyses* and our guidance on mortality risk valuation in particular. We look forward to the SAB-EEAC's review.

Please contact me if you have any questions about the attached charge.

Attachment

Cc: Al McGartland

Meta-analysis of Mortality Risk Valuation Estimates

In May 2004 EPA's Science Advisory Board-Environmental Economics Advisory Committee (SAB-EEAC) met to discuss the Agency's approach to mortality risk valuation and plans to update this approach. Part of the discussion centered on the appropriateness of mortality risk valuation estimates derived through meta-analytic techniques and specifically the use of three existing meta-analyses of the mortality risk valuation literature (Kochi, et al. (2006), Mrozek and Taylor (2002), Viscusi and Aldy (2003)). At the time, SAB-EEAC expressed an interest in learning more about meta-analytic techniques as well as having an expert assessment of their application in the context of mortality risk valuation. To accommodate these requests, EPA convened a workgroup of meta-analysis experts on December 9-10, 2005 to discuss the use of meta-analysis techniques in determining central estimates of mortality risk valuation. Included in these discussions were the same three meta-analyses of the mortality risk valuation literature.

Although EPA recognizes that the SAB-EEAC has not yet had the opportunity to deliberate on the appropriate mortality risk valuation metric for use in policy analysis, EPA respectfully submits the report documenting the findings and conclusions of the Meta-analysis Workgroup (hereafter "workgroup") and requests responses to the following questions:

1. In light of the workgroup's findings, what approach or approaches are the most scientifically appropriate to derive summary estimates of mortality risk valuation for use in environmental policy analysis? Should meta-regression techniques be applied to selected estimates or are other methods (e.g., fitting distributions) more appropriate? Please specify which methods, aside from or in addition to meta-regression techniques the Agency should explore.
2. Using the approach identified above, what measures/estimates should be combined? VSL estimates? The coefficient on fatal risk? Other? How should the Agency select the measures to be combined? Should a single, preferred estimate be selected from each study or should all estimates be included?
3. Should original studies be required to use a common empirical specification (functional form and choice of covariates) in order to be included in a meta-analysis? What data are required of the original studies to be included?
4. Given the various approaches used in the literature, what is the most scientifically appropriate measure to derive when combining estimates from multiple studies? A single central point estimate, a single distribution, or a range of estimates in economic analyses? How can such a measure best reflect the uncertainty and variability in mortality risk valuation estimates?

5. How should stated preference studies and revealed preference studies be considered together in a scientifically appropriate method to derive summary estimates of mortality risk valuation?
6. How should the Agency use studies based on specific sub-samples (e.g., elderly) in developing summary estimates of mortality valuation estimates for environmental policy analysis?
7. Most studies that combine estimates adjust the data from the original studies to some extent. For example, some studies adjust for after-tax wages, whereas others do not. Is there a set of such modifications that the SAB-EEAC believes to be critical when deriving summary estimates from the literature? Are there some data modifications that are generally incompatible with a sound approach to synthesizing existing estimates? What are the implications for interpreting results?
8. What reporting and other protocols should the researchers conducting the combination study follow? How should the analysis handle zero or negative mortality risk valuation estimates from studies that otherwise meet its selection criteria for inclusion?
9. What future research or additional data would offer the most improvement in the Agency's ability to derive summary estimates of mortality risk valuation for environmental policy analyses over the short run? What longer-term research is most needed for improved summary mortality risk valuation estimates?

References:

- Kochi, Ikuho, Bryan Hubbell, and Randall Kramer. 2006. "An Empirical Bayes Approach to Combining and Comparing Estimates of the Value of a Statistical Life for Environmental Policy Analysis," *Environmental and Resource Economics*, May: 1-22.
- Mrozek, Janusz R., and Laura O. Taylor. 2002. "What Determines the Value of Life? A Meta-Analysis." *Journal of Policy Analysis and Management*. 21(2): 253-270.
- Viscusi, W. Kip, and Joseph E. Aldy. 2003. "The Value of a Statistical Life: A Critical Review of Market Estimates throughout the World," *Journal of Risk and Uncertainty*, 27(1): 5-76.

Valuing Changes in Life Expectancy

The U.S. Environmental Protection Agency (EPA) is in the process of revising its *Guidelines for Preparing Economic Analyses* and as such is revisiting the guidance offered on valuing mortality risk reductions for environmental policy. There are many aspects to these revisions that will be addressed with external advisors including the Science Advisory Board – Environmental Economics Advisory Committee (SAB-EEAC). Current guidance directs analysts to apply a value of statistical life (VSL) estimate when calculating the benefits associated with a reduction in mortality risk for use in a benefit-cost analysis (BCA). However, by reducing the risk of a fatality, most policies actually extend lives rather than save them, *per se*, with the resulting change in life expectancy ranging anywhere from 1 year or less to upwards of 30 years. This raises the issue of whether EPA’s constant VSL approach is the most appropriate methodology to use and whether other scientifically sound approaches exist to value mortality risk reductions from environmental policy.

These issues are reviewed in a white paper prepared by EPA and entitled “Willingness to Pay for Environmental Health Risk Reductions when there are Varying Degrees of Life Expectancy.” The paper is intended to provide the necessary background and context to the SAB-EEAC as they consider the following questions:

1. What is the most appropriate methodology to use when valuing changes in life expectancy of varying lengths? Is it appropriate to use a standard VSL to value reductions in mortality risk when information on life expectancy loss is not available?
2. It is anticipated that EPA will need to issue rules with varying changes in life expectancy in a relatively short time-frame. What approaches to valuing changes in life expectancy of varying lengths can be implied using existing research? How applicable and relevant is the existing literature and how does the existing theoretical and empirical literature inform these issues?
3. Are there other areas of the literature that should be examined and how would they inform this issue in the short-term (i.e., less than 6 months)?
4. What type of long-term research can inform these issues?
5. What paradigms should be considered when valuing changes in life expectancy of varying lengths? How will these paradigms inform us in the short-term?
6. More generally, based on the economics literature, under what conditions is it most important to provide information on life expectancy and baseline risks as part of an economic analysis of environmental policy? If the information cannot be incorporated directly into monetized benefits estimates, how might it best be provided as a supplemental analysis?