

Project Sheet for SAB-EEAC

1. **Project Title: Mortality Risk Valuation for Policy Analysis**
2. **Project Short Title: Mortality Risk Valuation**
3. **Fiscal Year SAB Activity: 2005**
4. **Quarter SAB Activity Desired to Begin: 3rd quarter**
5. **Assistant Administrator/Regional Administrator making request: OPEI (Stephanie Daigle, Acting Associate Administrator OPEI)**
6. **Requesting Office: National Center for Environmental Economics (NCEE)**
7. **Requesting Official: Al McGartland**
8. **Requesting Official's Title: Office Director, NCEE**
9. **Program Contact: Nathalie Simon**
10. **Program Contact's Phone: 566-2347**
11. **Program Contact's Mail Code: 1809T**
12. **Background for this SAB Advisory Project:**

The U.S. Environmental Protection Agency (EPA) uses a value of statistical life (VSL) to express the benefits of mortality risk reductions in monetary terms for use in benefit cost analyses of its rules and regulations. EPA has used the same central default value (adjusted for inflation) in its primary analyses since 1999 when the Agency updated its *Guidelines for Preparing Economic Analyses* (2000). Prior to the release of the *Guidelines*, EPA sought advice from the Science Advisory Board's Environmental Economics Advisory Committee (SAB-EEAC) on the appropriateness of this estimate and its derivation. In 2000, EPA also consulted with the SAB-EEAC on the appropriateness of making adjustments to VSL estimates to capture risk and population characteristics associated with fatal cancer risks.¹ Currently, the Agency is engaged with the SAB Advisory Council on Clean Air Act Compliance Analysis (the Council) on appropriate approaches to valuing mortality risks in the context of the 812 Second Prospective Analysis.²

¹ *An SAB Report on EPA's White Paper Valuing the Benefits of Fatal Cancer Risk Reductions*, #EPA-SAB-EEAC-00-013, July 27, 2000.

² *Review of the Revised Analytical Plan for EPA's Second Prospective Analysis – Benefits and Costs of the Clean Air Act 1990-2020*, #EPA-SAB-COUNCIL-ADV-04-004, May 2004.

Reductions in mortality risk constitute the largest quantifiable benefits category of many of EPA's rules and regulations. As such, mortality risk valuation estimates are an important input to most of the Agency's benefit cost analyses.

EPA's *Guidelines* advise analysts to use a central VSL estimate of \$4.8 million in 1990 dollars. Based on the gross domestic product (GDP) deflator this converts to approximately \$6.2 million in 2002 dollars. This value is an average of 26 estimates assembled for EPA's first retrospective analysis of the Clean Air Act.³ Each estimate is from a different study, with 21 of the estimates from hedonic wage studies and the remaining five derived from contingent valuation (CV) studies. The estimates range from \$0.7 million to \$16.3 million (1997 dollars) and the studies were published between 1976 and 1991. The estimates are fit to a Weibull distribution that is often used in probabilistic assessments of uncertainty in benefits calculations.

EPA is now in the process of revising and updating its *Guidelines* and as such would like to revisit its approach to valuing mortality risk reductions. The literature has grown considerably since EPA's default estimate was derived and several EPA-funded reports have raised issues related to the robustness of estimates emerging from the mortality risk valuation literature. Furthermore, several meta-analyses have been conducted of this literature, providing new means of deriving central, default values for consideration. EPA's goal in bringing this issue to the SAB-EEAC is to seek expert opinion and guidance regarding the most appropriate way in which to proceed in updating the VSL estimate used to assess the mortality risk reductions from environmental policy.

To provide useful background information for the SAB-EEAC, NCEE's consultants in meta analysis, Dr. Ingram Olkin and Dr. Betsy Becker, will draft a report that reviews the three existing meta-analyses of the VSL literature. NCEE plans to facilitate this report by convening an invitation-only meeting with other meta-analysis experts who will join Dr. Olkin and Dr. Becker to discuss the current meta-analyses of VSL estimates. This invitation-only meeting will be an opportunity for the meta-analysis experts to discuss recent work and develop consensus on how meta-analysis has been, and can be, applied to VSL estimates. This one-day meeting will be attended by several meta-analytic experts, authors of the existing VSL meta-analyses, and NCEE staff. Following the meeting, Dr. Olkin and Dr. Becker will summarize the discussion in a report to the SAB-EEAC. The report will focus on key issues and considerations in the application of meta-analysis techniques to VSL estimates.

EEAC will be provided with two documents to review: (1) a report by Olkin and Becker referenced above on meta-analysis techniques and their application to VSL estimates, and (2) a White Paper providing additional background, summarizing recent empirical findings on key points, and proposing an approach for updating the Agency's default VSL estimate. Based on these two documents, EPA-NCEE seeks a

³ U.S. Environmental Protection Agency. 1997. *The Benefits and Costs of the Clean Air Act: 1970-1990*. Office of Administration and Resources Management and Office of Policy, Planning and Evaluation, October.

full Advisory from EEAC providing responses to the charge questions as submitted and supplemented. This Advisory should provide comprehensive responses to charge questions to be used by NCEE in a forthcoming update of its *Guidelines* for mortality valuation estimates. Given the nature of the issues at hand, EPA-NCEE expects the advisory to span two meetings. The first meeting will address the meta-analysis issues. The second meeting will address revisions to the VSL estimate and the issues raised in the EPA White Paper.

13. Tentative Charge:

Based on two documents to be presented to EEAC, EPA-NCEE is seeking responses to charge questions on mortality risk valuation, including, but not limited to the following:

- Population Issues: To evaluate the benefits of environmental regulations EPA must measure individuals' marginal willingness to pay (WTP) for a reduction in risk of death. For empirical estimates of WTP to be most useful to the Agency, what is the relevant population for which WTP should be measured (e.g., all adults in the U.S.)?
- Types of Studies:
 - How appropriate are stated and revealed preference methods at measuring the WTP for a reduction in the risk of death? Can hedonic wage risk studies readily provide estimates of a marginal WTP function? Can they provide estimates of mean WTP? For which populations?
 - What criteria should a well-executed stated preference study satisfy? A well-executed revealed preference study?
- Relevant Measures/Aggregation:
 - Should the relevant aggregate measure be the mean WTP, median WTP, or the distribution of WTP values in the population? Is it more scientifically appropriate to derive a single central point estimate of VSL or single VSL distribution? Or is it more appropriate to apply a range of estimates in economic analyses? How can such a range best reflect the uncertainty and variability in VSL estimates?
 - What are the possible sources of variability in estimates of WTP from one study to another? How should the results of various studies be aggregated?
 - Several meta-analyses of various segments of the VSL literature exist. Are meta-analytic techniques appropriate for deriving summary estimates of VSL for policy analysis? If so, what are the determinants of a sound meta-analysis? What other methods, aside from or in addition to meta-analysis are appropriate for deriving central VSL estimates for use in policy analysis?

- Covariates: Should the WTP measure be conditional on covariates (e.g., age, gender, income) to allow for calculations of VSL estimates for sub-populations? For which covariates is there sufficient evidence to account for these factors in applied analysis.
- Future Research: What additional data should be collected to improve WTP estimates? What additional research is needed to appropriately use VSL estimates in evaluating environmental policy?

These questions may be revised according to findings in the EPA White Paper (discussed below); other questions may be added, as needed.

14. Applicable GPRA Goal: Goal 5 – Compliance and Environmental Stewardship

Objectives: As noted in EPA’s FY 2005 Annual Plan and Budget, “The effectiveness of EPA’s regulatory decisions depends on the analysis underlying these regulations, and the clarity with which they are presented. Their quality determines how well environmental programs actually work, and the extent to which they achieve health and environmental goals. Sound economic and policy analysis builds the foundation for EPA to meet its overarching goals, as well as to wisely use societal resources.”

Regulatory benefits associated with mortality risk reductions comprise a large portion of EPA’s quantified and monetized benefits. As such, this category of benefits is often subject to additional scrutiny. Through our efforts to update the Agency’s estimate of VSL using the best science available, we will be improving the quality of Agency analyses and contributing to EPA’s ability to meet Goal 5 challenges.

15. Description of and citation for any legal obligation/directive for SAB Review:

None

16. Principal interested and affected parties:

The outcome of this project will affect economists and analysts across the Agency.

17. Type of SAB advice requested:

SAB-EEAC Advisory.

18. Why should the SAB advise on this project?

Revisions to the Guidelines, especially revisions to recommendations on health risk valuation, will have a tremendous impact on how EPA performs its economic

analyses and may ultimately influence policy decisions. The SAB-EEAC provided valuable advice and direction on the previous version of the Guidelines. In addition, a previous consultation this year with the SAB-EEAC laid the groundwork for resolution a number of the issues discussed above.

19. Disciplinary expertise requested

Environmental economists familiar with health risk valuation and/or meta-analytic techniques.

20. Budget

FY 2005

Extramural Budget: \$50,000

FTE: 4

21. Past Peer Reviews:

The SAB-EEAC provided extensive comments on earlier drafts of the *Guidelines for Preparing Economic Analyses* prior to its release in 2000. In addition, the SAB-EEAC provided comments on the Cancer White Paper in 2000 that provided a review of the available risk valuation literature and the potential for making adjustments for various risk and population characteristics. Most recently, the SAB-EEAC consulted with EPA on a number of issues related to mortality risk valuation. This proposed project is a continuation of that work.

22. Quality Management/Quality Assurance:

n/a