

**Summary Minutes of the  
U.S. Environmental Protection Agency Science Advisory Board  
Environmental Economics Advisory Committee  
Public Teleconference  
August 4, 2016**

**Date and Time:** Thursday, August 4, 2016, 1:00 p.m. – 5:00 p.m.

**Location:** By teleconference

**Purpose:** To discuss the Science Advisory Board (SAB) Environmental Economics Advisory Committee’s draft report on the review of the EPA’s proposed methodology for updating mortality risk valuation estimates for policy analysis.

**Participants:**

*Members of the U.S. Environmental Protection Agency Science Advisory Board Environmental Economics Advisory Committee*

(Panel roster is provided in attachment A)

Dr. Madhu Khanna  
Dr. Kevin Boyle  
Dr. Richard Carson  
Dr. Mary Evans  
Dr. Wayne Gray  
Dr. Matthew Kotchen  
Dr. Matthew Neidell  
Dr. James Opaluch  
Dr. Daniel Phaneuf  
Dr. Andrew Plantinga  
Dr. Richard Ready  
Dr. Kerry Smith  
Dr. Stephen Swallow  
Dr. George Van Houtven  
Dr. JunJie Wu

*EPA Science Advisory Board (SAB) Staff:*

Dr. Thomas Armitage, Designated Federal Officer

*EPA Representatives:*

Dr. Al McGartland, EPA National Center for Environmental Economics  
Dr. Kelly Maguire, EPA National Center for Environmental Economics  
Dr. Steve Newbold, EPA National Center for Environmental Economics  
Dr. Nathalie Simon, EPA National Center for Environmental Economics

*Other Attendees:*

Lynn Blake-Hedges, U.S. EPA/OSCPP  
Leland Deck, U.S. EPA/OAR  
Charmaine Hanson, U.S. EPA/OPP  
Maria Hegstad, Inside EPA  
Lindsey Jones, Texas Commission on Environmental Quality

**Teleconference Summary:**

**Convene the Teleconference**

Dr. Thomas Armitage, Designated Federal Officer (DFO) for the EPA Science Advisory Board (SAB) Environmental Economics Advisory Committee, convened the teleconference at 1:00 p.m. Eastern Time. He identified Committee members who were on the call. He noted that the Committee operates as part of the EPA Science Advisory Board (SAB), which is a chartered Federal Advisory Committee under the Federal Advisory Committee Act (FACA) and is empowered by law to provide advice to the EPA Administrator. He stated that summary minutes of the teleconference would be prepared and certified by the Chair. He noted the Committee's compliance with ethics requirements. Dr. Armitage indicated that meeting materials were available on the SAB web site. These meeting materials included: the Federal Register Notice announcing the teleconference,<sup>1</sup> teleconference agenda,<sup>2</sup> Committee roster,<sup>3</sup> the Committee's draft (5-5-16) report to the EPA,<sup>4</sup> the Committee's draft (7-22-16) report to the EPA,<sup>5</sup> section-by-section compilation of member comments on the (5-5-16) report,<sup>6</sup> and additional comments from Committee member Dr. Kerry Smith on the Committee's draft (7-22-16) report to the EPA.<sup>7</sup> Dr. Armitage noted that time had been included on the agenda to hear oral public comments but no requests to speak had been received from members of the public and no written public comments had been received. He also indicated that public access to the teleconference had been provided through a conference line and live audio webcast. He asked members of the public listening to the webcast to send him an email at [armitage.thomas@epa.gov](mailto:armitage.thomas@epa.gov) indicating that they were on-line.

**Review of Agenda and Purpose of the Teleconference**

Dr. Madhu Khanna, Chair of the SAB Committee, reviewed the teleconference objectives and agenda. She stated that the Committee was holding teleconferences on August 4th and 5th to continue discussing its draft report of findings and recommendations for the review of the EPA White Paper titled: *Valuing Mortality Risk for Policy Assessment: A Meta-Analytic Approach*. Dr. Khanna noted that: (1) the Committee had held a meeting on March 7-8, 2016 to review the White Paper and supporting documents and deliberate on responses to 17 charge questions; (2) the Committee had developed a draft report (dated 5-5-16) responding to the charge questions; (3) on June 16-17, 2016 the Committee had held two teleconferences to discuss the draft report; (4) on the June 16-17 teleconferences the Committee discussed the first half of the draft report (Sections 3.1-3.2) which contained the responses to charge questions 1-8; (5) Committee members' comments on the 5-5-16 draft report had been included in a section-by-section compilation of comments dated 6-14-16; and (6) after the June 16-17 teleconferences a revised draft of the report (dated 7-22-16) had been prepared to incorporate changes discussed. Dr. Khanna indicated that the 7-22-16 draft was a marked up version showing all of the changes in the report. She further indicated that this draft of the report had been posted on the SAB meeting website and sent to all Committee members.

Dr. Khanna indicated that, in particular, the draft (7-22-16) Committee report contained revisions to clarify the recommendations concerning: study validity, income adjustment of the value of statistical life (VSL), criteria for including hedonic wage studies in the meta-analysis, estimating the marginal willingness to pay for reduced risk of immediate death, and population weighting and benefit transfer. She noted that she wanted the committee to complete the discussion of the report on the teleconferences on August 4 and 5 and reach agreement on any additional changes needed. She further indicated that some of the revisions suggested in the compilation of comments could probably be incorporated with little discussion. In addition, she indicated that members should focus the discussion on points that lacked consensus, were inaccurate or problematic, needed to be added, and needed additional explanation. In particular, Dr. Khanna noted that the Committee should clarify the recommendations concerning: use of studies that had not been published in the peer-reviewed literature, valuing r risk for cancer, and estimating income elasticity of VSL.

Dr. Khanna noted that the Committee would first hear brief remarks from EPA about report clarification. She stated that following EPA remarks there was time on the agenda for oral public comments but no requests to speak had been received. Dr. Khanna noted that, as indicated on the agenda, the Committee would: (1) discuss Sections 3.3 through 3.5 of the draft report (the Committee's responses to charge questions 9 through 17); (2) discuss any further issues concerning the revision of responses to charge questions 1 – 8; (3) discuss the executive summary; and (4) discuss the letter to the Administrator. She noted that following the discussion of the responses to the charge questions in the Committee's report the Committee would brief clarifying comments from EPA and members of the public. Dr. Khanna further noted that after the teleconferences, the revisions discussed would be incorporated into another draft of the report. That draft would be sent to the Committee for review and concurrence before it was sent to the chartered SAB to for quality review. Dr. Khanna then called for comments from the EPA

### **Comments from EPA's National Center for Environmental Economics**

Dr. Nathalie Simon of the EPA's National Center for Environmental Economics provided brief comments. She thanked the Committee for its work and indicated that it was important to hear the SAB recommendations. She noted that it would be useful for the Committee to divide its recommendations into short and long term categories. She indicated that she would be available on the call to answer questions from Committee members.

Dr. Khanna thanked Dr. Simon for her comments. Dr. Khanna indicated that no requests had been received to provide oral public comments and called for discussion of the Committee's report.

### **Discussion of the Committee's Draft Report**

Dr. Khanna asked the Committee to discuss the sections of the draft report. She first called for comments from the lead writer of the section and then asked for comments and discussion from other members of the Committee.

#### *Section 3.3.1 – Response to Charge Question 9*

The Committee discussed the draft response to Charge Question 9. Members discussed whether the methods applied in EPA's meta-analysis were appropriate. A member commented that the Committee's draft report had stated that the White Paper provided defensible estimates of VSL. He expressed concern about this statement because of adjustments performed as part of the meta-analysis. Members discussed

the transformation of the data used in the meta-analysis. A member commented that if all of the estimates used in the meta-analysis were comparable, the analysis would have been appropriate. Another member commented that all of the estimates used were not comparable. He therefore noted that the analysis and the Committee's report should indicate that the summary estimates as reported in the White Paper were not appropriate.

A member commented that the report could recognize that imperfect data were available, but the methods used to analyze the data were appropriate. Another member commented that the strategy used to conduct the meta-analysis was innovative. He commented that at a conceptual level the approach was interesting, but the analysis did not involve routine population weighting, and it was not well explained in the White Paper. The Chair asked members to work on developing a consensus statement for the charge question response. A member commented that the report could state that the EPA's meta-analytic approach was defensible for use with ideal data sets. Another member commented that the appropriate question to answer was, what weight should be given to hedonic and stated preference studies? Another member commented that the analysis was challenging because all of the studies used in the analysis were not comparable. He suggested that the hedonic wage and stated preference study estimates could be presented separately and a range of expected results could be provided.

A member commented that, in the short run, EPA could indicate the tradeoff was being measured in each study and derive two sets of estimates (one for hedonic wage and one for stated preference studies). He advised against developing a single estimate. He suggested that, in the long run, research be conducted to investigate how to progress from two survey measures to one. Another member commented that the Committee's report should identify what EPA had done well and what the Committee would like to see done in the future. He commented that some aspects of EPA's analysis were defensible. The Chair commented that it was important to incorporate the members' concerns into the report but also to indicate what had been done well. Another member commented that it was difficult to judge where the analysis was defensible. The Chair asked the lead writer to revise the response to the charge question incorporating concerns discussed, indicating what had been done well, and identifying work that could be done in the future to address the concerns.

#### *Section 3.3.2 – Response to Charge Question 10*

The Committee discussed the response to Charge Question 10. Members discussed the findings and recommendations concerning EPA's influence analysis. The Chair indicated that some corrections had been suggested and were included in the compilation of comments on the report. A member noted that the report suggested using a robust estimation technique that limited the influence of a particularly influential. He suggested that this could be a median analysis. Another member commented that there was no reason not to do a median analysis but it might not be necessary to mention this in the Committee's report. A member commented that the relatively small number of VSL estimates used in the EPA analysis underscored the importance of conducting an influence analysis. Other members expressed support for conducting an influence analysis. Members commented that they agreed with the draft charge question response and that, apart from some minor edits and corrections, the response did not need revision. The Chair asked the lead writer to incorporate the revisions discussed.

#### *Section 3.4.1 – Response to Charge Question 11*

The Committee discussed the response to Charge Question 11. The Chair indicated that two issues should be discussed and clarified: (1) the Committee's recommendations regarding the use of studies that had not been published in the peer-reviewed literature, and (2) the Committee's recommendations

regarding the use of new terminology, i.e., the use of value of risk reduction (VRR) instead of value of statistical life (VSL).

A member suggested that, in the short term, peer-reviewed studies be used in the analysis, but in the long term, a peer review process be established to review and use other studies. He also noted that in the long term, work could also be undertaken to complete new studies. Another member suggested that in the future, a wider range of studies could meet threshold criteria for use. He commented that such studies need not necessarily be VSL studies, but could provide estimates of risk trade-offs.

The Committee discussed the appropriate time frame for future VSL updates. Members commented that a five-year time frame for updates was appropriate if new information was available. Members commented that EPA should consider using other kinds of information (e.g., transportation studies) in addition to the results of hedonic wage and stated preference studies. A member suggested that the Committee indicate how EPA would benefit from using different types of literature. A member noted that it might be useful to use studies from the transportation literature, but a conceptual framework was needed to show how such studies would be used. The Chair agreed that a theoretical model and statistical framework could guide the use other studies. The Chair asked the lead writer to incorporate the revisions into the report.

#### *Section 3.4.2 – Response to Charge Question 12*

The Committee discussed the response to Charge Question 12. Members discussed whether information was available to determine that there was a cancer differential in VSL. A member commented that the report should be revised to indicate that, although a cancer differential was likely, adequate information was not currently available to support documentation of the differential. Members commented that in considering the cancer premium, it was important to differentiate among different types of cancer. Another member commented that the report should state that there was probably a cancer premium, and that morbidity was important, but there was not enough information available to determine the premium.

A member agreed with statements in the report indicating that VSL estimates should account for morbidity, but he noted that until better methods were available to do this, it should not be recommended.

Other members commented that a cancer premium could be justified because of morbidity preceding death, but there was not adequate information available to determine the premium. They noted that a long term recommendation could be to conduct research on whether willingness to pay to reduce the risk of an early death preceded by a period of morbidity was correctly valued by summing the value of morbidity plus mortality. The Chair asked the lead writer to revise the draft response as discussed.

#### *Section 3.5.1 – Response to Charge Question 13*

The Committee discussed the response to Charge Question 13. Members discussed recommendations concerning the development of estimates of income elasticity of VSL. A member noted that the report recommended using estimates of income elasticity for related goods and services to estimate income elasticity of VSL. He indicated that before pursuing this approach, the EPA needed to establish a conceptual rationale linking income elasticity of VSL to that of related goods and services. The Chair agreed and commented that a theoretical foundation was needed. A member commented that this could be a longer term goal.

A member commented that the relationship between income elasticity of VSL and related goods could be complex when considering a set of related market goods and services that are less than perfect substitutes for risk reduction. A member commented that it would be important to examine alternative theoretical structures to identify risk preferences. Members commented that the report should recommend that the EPA support research to enable the use of estimates of the income elasticity for other related goods to infer estimates of the income elasticity of the value of statistical life. A member commented that, in this regard, the EPA should examine micro-econometric studies with clear and credible strategies for identifying causal effects. The Chair asked the lead writer to revise the response to the charge question as discussed.

#### *Section 3.5.2 – Response to Charge Question 14*

The Committee discussed the response to Charge Question 14. Members commented that there was no methodological rationale for excluding zero or low estimates of income elasticity. A member commented that the report should state that it is highly implausible for the income elasticity of VSL to be zero or negative. Members discussed the options of: (1) conducting a sensitivity analysis to examine the effects of zero or low estimates of income elasticity of VSL, and (2) using standard errors of the individual income elasticity of VSL estimates to calculate a weighted mean. Some members again commented that they did not support excluding the low or zero values. Members indicated that the EPA should include in the analysis the estimates from the papers with low/zero estimates of the income elasticity of VSL. The Chair asked the lead writer to revise the response to the charge question to incorporate points discussed.

#### *Section 3.5.3 – Response to Charge Question 15-16*

The Committee discussed the response to Charge Questions 15 and 16. A member noted that the text should clearly indicate that there had been relatively little change in median income over the last two decades, particularly for groups represented in the samples used for hedonic wage studies. He noted that changes in per capita income had been more pronounced. He commented that this called into question what the appropriate income variable was if a causal relationship was needed. The Committee discussed this point and agreed to clarify the report text.

A member commented that the report could also note that the income elasticity of a VSL is also related to the coefficient of relative risk aversion. Several specific edits and corrections were discussed and the Chair asked the lead writer to incorporate the changes into the response to the charge question.

#### *Section 3.5.4 – Response to Charge Question 17*

The Committee discussed the response to Charge Question 17. Members discussed what should be done conceptually to determine income elasticity of non-fatal health risks. Members agreed that they did not support using income elasticity of VSL for the income elasticity value of non-fatal health risks. A member commented that hedonic wage models included fatal and non-fatal risks. The Committee discussed this point and how a value of non-fatal health risks might theoretically be derived.

Members discussed whether the recommendation to use income elasticity of expenditures on private health care products as a proxy for the income elasticity of non-fatal health risks was consistent with other recommendations in the report. Members commented that a theoretical or empirical justification was needed for this. Other members commented that research was needed to develop a conceptual model of averting expenditures to show the conditions under which the income elasticities of private

health care products could be used as a proxy. The Chair asked the lead writer to revise the text to incorporate the changes discussed.

### **Brief Clarifying Comments from EPA and Members of the Public**

The DFO noted that time had been provided for brief clarifying comments from EPA and the public. The Chair asked EPA staff or members of the public if they wanted to offer brief clarifying comments. EPA staff commented that it would be helpful if the Committee's report identified short term recommendations or alternatives to address concerns about the methodological approach. The Chair responded that the Committee was suggesting some work to be completed in the short term, but members had also identified some research needs and work to be completed in the long term. No requests to provide clarifying comments were received from members of the public.

### **Discussion of Overarching Comments**

The Chair indicated that overarching comments should be included in a new section of the Committee's report. She noted that the section-by-section compilation of members' comments contained points to be included in the overarching comments and she asked members to identify additional points to be included in this section. She noted that the Committee would discuss the executive summary and the letter to the Administrator on the call to be held the next day.

A member commented that the Overarching Comments section should include a discussion of the need for new terminology (to replace VSL). Another member commented that the term VSL was used, and would continue to be used, by economists but he understood the need for a new term to communicate with the public. The Chair asked Dr. Opaluch to develop text providing recommendations on terminology.

Dr. Smith noted that he had developed some suggested revisions of the draft report to address a number of technical issues and wanted them to be sent to members. The Chair asked the DFO to send these suggested edits to the Committee. The DFO indicated that this material would be sent to members and also posted on the SAB website. The committee discussed some of the suggested revisions. Dr. Smith noted that EPA had developed an innovative approach to conduct the meta-analysis but he commented that the SAB report should highlight concerns about some aspects of the approach and indicate that the approach, in particular population weighting, needed clarification. Committee members discussed concerns about EPA's adjustments to the estimates used in the meta-analysis. In particular, members were concerned about adjustment for income. Members commented that they understood the EPA's need to develop an updated VSL estimate in the near term. Some members indicated that, in general, they supported the approach used to conduct the meta-analysis, and to varying degrees they agreed with Dr. Smith's concerns and his proposed revisions in the draft report. The Chair indicated that the Committee could spend some time on the call to be held the following day discussing these issues.

### **Summary**

Dr. Khanna noted that it was time to recess the teleconference. She thanked Committee members for their comments, summarized some of the major points discussed, and noted that the Committee would continue discussing its draft report on a teleconference to be convened at 1:00 pm the following day.

Dr. Armitage then stated that the Panel would meet by teleconference the following day (August 5, 2016) at 1:00 p.m. Eastern Time to continue the discussion and he adjourned the teleconference.

Respectfully Submitted:

*/signed/*

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Dr. Thomas Armitage  
Designated Federal Officer

Certified as Accurate:

*/signed/*

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Dr. Madhu Khanna, Chair  
SAB Environmental Economics Advisory  
Committee

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by Panel members during the course of deliberations within the meeting. Such ideas, suggestions and deliberations do not necessarily reflect consensus advice from Panel members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters or reports prepared and transmitted to the EPA Administrator following the public meetings.

## ATTACHMENT A: COMMITTEE ROSTER

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### U.S. Environmental Protection Agency Science Advisory Board Environmental Economics Advisory Committee

#### CHAIR

**Dr. Madhu Khanna**, ACES Distinguished Professor in Environmental Economics, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, Urbana, IL

#### MEMBERS

**Dr. Kevin Boyle**, Professor and Director, Program in Real Estate, Virginia Tech, Blacksburg, VA

**Dr. Sylvia Brandt**, Associate Professor, Department of Resource Economics, University of Massachusetts, Amherst, MA

**Dr. Richard Carson**, Professor, Economics, Department of Economics, University of California, San Diego, La Jolla, CA

**Dr. J.R. DeShazo\***, Associate Professor for Public Policy, School of Public Policy and Social Research, University of California at Los Angeles., Los Angeles, CA

**Dr. Mary Evans**, Associate Professor, Robert Day School of Economics and Finance, Claremont McKenna College, Claremont, CA

**Dr. Wayne Gray**, Professor, Department of Economics, Clark University, Worcester, MA

**Dr. Timothy Haab\***, Department Chair and Professor, Department of Agricultural, Environmental and Development Economics, Ohio State University, Columbus, OH

**Dr. F. Reed Johnson**, Senior Research Scholar, Center for Medical and Genetic Economics, Duke Clinical Research Institute, Duke University, Durham, NC

**Dr. Matthew Kotchen**, Associate Professor, School of Forestry and Environmental Studies, Yale University, New Haven, CT

**Dr. Matthew Neidell**, Associate Professor, Department of Health Policy and Management, Mailman School of Public Health, Columbia University, New York, NY

**Dr. James Opaluch**, Professor and Chair, Department of Environmental and Natural Resource Economics, College of the Environment and Life Sciences, University of Rhode Island, Kingston, RI

**Dr. Daniel Phaneuf**, Associate Professor of Agricultural and Applied Economics, Department of Agricultural and Applied Economics, University of Wisconsin-Madison, Madison, WI

\*Did not participate in the review of the EPA's proposed methodology for updating mortality risk valuation estimates for policy analysis.

**Dr. Andrew Plantinga**, Professor, Bren School of Environmental Science and Management, University of California, Santa Barbara, Santa Barbara, CA

**Dr. Richard Ready**, Professor, Department of Agricultural Economics and Economics, Montana State University, Bozeman, MT

**Dr. V. Kerry Smith**, Emeritus Regents' Professor and Emeritus University Professor of Economics, Department of Economics, W.P Carey School of Business, Arizona State University, Tempe, AZ

**Dr. Stephen Swallow**, Professor, Department of Agricultural and Resource Economics, University of Connecticut, Storrs, CT

**Dr. George Van Houtven**, Senior Economist and Director, Ecosystem Services Research, RTI International, Research Triangle Park, NC

**Dr. JunJie Wu**, Emery N. Castle Professor of Resource and Rural Economics, Department of Agricultural and Resource Economics, Oregon State University, Corvallis, OR

**Dr. Jinhua Zhao\***, Professor, Department of Economics, Department of Agricultural, Food and Resource Economics, Michigan State University, East Lansing, MI

#### **SCIENCE ADVISORY BOARD STAFF**

**Dr. Thomas Armitage**, Designated Federal Officer, Science Advisory Board, U.S. Environmental Protection Agency, Washington, DC

\*Did not participate in the review of the EPA's proposed methodology for updating mortality risk valuation estimates for policy analysis.

## Materials Cited

The following meeting materials are available on the SAB website, [www.epa.gov/SAB](http://www.epa.gov/SAB), on the August 4th meeting page of the Environmental Economics Advisory Committee.

<https://yosemite.epa.gov/sab/sabproduct.nsf/MeetingCal/97DE29B0061567E085257FE2006FD7E8?OpenDocument>

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<sup>1</sup> Federal Register Notice

<sup>2</sup> Agenda

<sup>3</sup> Committee Roster

<sup>4</sup> Draft (5-5-2016) SAB Review of EPA's Proposed Methodology for Updating Mortality Risk Valuation Estimates for Policy Analysis

<sup>5</sup> Draft (7-22-2016) SAB Review of EPA's Proposed Methodology for Updating Mortality Risk Valuation Estimates for Policy Analysis

<sup>6</sup> Section-by-Section Compilation of Environmental Economics Advisory Committee Member Comments on the Committee's Draft (5-5-16) VSL Report (As of 6/14/16)

<sup>7</sup> Comments from Dr. Smith on the 7-22-16 draft Committee report on Updating Mortality Risk Valuation Estimates for Policy Analysis