

**Preliminary Comments from Members of the Chartered SAB on the SAB
Draft Report *SAB Review (10/22/2012) of EPA’s Retrospective Cost Study of the
Costs of EPA Regulations:
An Interim Report of Five Case Studies (March 2012)***

List of comments received

Comments from lead reviewers	2
Comments from Dr Terry Daniel	2
Comments from Dr. Otto Doering	6
Comments from Dr. Robert Johnston	8
Comments from Dr. Stephen Polasky.....	11
Comments from other SAB Members.....	13
Comments from Dr. Joseph Arvai	13
Comments from Dr. Ingrid Burke	14
Comments from Dr. George Daston.....	16
Comments from Dr. Michael Dourson.....	17
Comments from Dr. David Dzombak	19
Comments from Dr. Bernd Kahn.....	21
Comments from Dr. Catherine Karr	22
Comments from Dr. Nancy Kim.....	23
Comments from Dr. Cecil Lue-Hing.....	24
Comments from Dr. Francine Laden.....	25
Comments from Dr. Surabi Menon	26
Comments from Dr. Elizabeth Matsui.....	27
Comments from Dr. James Mihelcic.....	28
Comments from Dr. H. Keith Moo-Young.....	29
Comments from Dr. Eileen Murphy	30
Comments from Dr. Amanda Rodewald	31
Comments from Dr. James Opaluch.....	32
Comments from Dr. Duncan Patten.....	35
Comments from Dr. Stephen Roberts.....	36
Comments from Dr. Daniel Stram	37
Comments from Dr. Jeanne Van Briesen.....	38
Comments from Dr. John Vena.....	40

Comments from lead reviewers

Comments from Dr Terry Daniel

General comments

The panel has provided a very compelling and insightful review of the Phase 1 cost study by NCEE, as well as useful suggestions for the planned Phase 2 study and extensions. The text is clear and very readable, perhaps to a fault. Key points of the panel's review (in the letter, the executive summary and the main body) are often nested in a flowing narrative in such a way as to risk their being overlooked. The nice readable narrative should be preserved as much as possible, but key points, especially specific recommendations in response to charge questions in all sections of the review, should be called out more clearly, perhaps this could be accomplished simply by altering the font and/or format.

The most important substantive recommendation in the review is to shift further the level of analysis of the NCEE cost study (and future studies) from the "case" to the multiple factors/drivers of ex ante and ex post costs within cases (the statement on the bottom page 19 is particularly clear on this point). The subject NCEE report is sometimes less clear than it should be in presenting (and following in practice) the declared goal of informing future rule/regulatory ex ante cost estimate methods, rather than achieving an "accurate" aggregate cost estimate per case. As a practical matter, the case-based approach seems doomed by the lack of sufficient resources and data to support studies of more than a few cases, and given such small samples (5 or 10 cases) efforts at "random sampling" have little chance to improve the generalizability of findings. Coupling the shift to a finer grain of analysis with the suggested addition of a study that applies a less intense/qualitative analysis to an expanded sample of cases (selected in a stratified random fashion based more on the component factors/drivers they represent) would help to overcome many of the limitations imposed by the very small number of cases sampled in the Phase 1 and Phase 2 studies as currently designed. This approach would seem to serve far better to meet the stated ultimate goal of improving cost estimation models to support future rule- and regulation-making in the Agency. The emphasis on a finer-grained factor-/driver-based approach might also productively be applied more strongly post hoc to a revision of the Phase 1 study and report.

The recommendation to focus sampling and analysis on factors/drivers of costs is also consistent with the panel's call for the development of an explicit conceptual model to guide the current NCEE studies. Such a model would best be built upon information about individual factors/drivers and then, in a recursive process, would guide the identification and sampling of relevant factors/drivers that offer the best opportunities for generalization across the many categories of rules and regulations of concern to EPA.

Another conclusion/recommendation of the panel that currently has to be teased out of the text of the review is that the NCEE focus on cases where there are significant differences (+/- 25%) between ex ante and ex post cost assessments risks failing to learn what factors tend to be associated with a better fit between these cost estimates. The review is clearer in pointing out the possible selection biases viz. cases that are chosen for study (i.e., the "looking under the lamp

post” problem), but even this point would benefit by being called out more strongly from the narrative in which it is embedded.

Specific Quality Review questions

1. *Were the original charge questions to the SAB panel adequately addressed?*

Yes, however, the response to specific questions/sub-questions should be more strongly called out in the text. Given the way that SAB reviews are likely to be read (or skimmed) specifically to identify needed changes in the subject study/report, embedding key recommendations in a flowing narrative risks having many points missed by the key audience.

2. *Are there any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee’s report?*

No errors or omissions were noticed.

3. *Is the Committee’s report clear and logical?*

Yes, the Panel has provided an insightful and readable analysis with very useful recommendations for the NCEE cost study. As noted under item 1 above, the key recommendations should be called out more clearly in the presentation.

4. *Are the conclusions drawn or recommendations provided supported by the body of the Committee’s report?*

Yes. The recommendations regarding shifting from cases toward greater emphasis on component factors/drivers of costs and cost estimation differences is particularly well founded in the review and accompanied by specific suggestions about how to best implement and capitalize on this approach. The linkage between the specific recommendations and the supporting arguments could be made more apparent by setting the specific recommendations out more clearly in the text.

Suggestions for specific sections of the review

Letter to the Administrator

As for the rest of the panel report, the letter reads very well. However, the "smooth" narrative style (and the brevity) risks having key points overlooked.

Compounding the above problem, the first paragraph of the letter potentially misdirects the reader to think that the main goal of the NCEE study was “to compare cost estimates ex post ... to ex ante ... predictions.” The second paragraph encourages this misdirection by concluding with “it is not possible to draw meaningful conclusions regarding general tendencies to under- or over-estimate costs in ex ante evaluations.” While these statements do respond to specific questions in the charge to the panel, this presentation gives too much emphasis to the general/aggregate comparison of cost estimates (per case), which is not (and by design could not be) the main goal of the NCEE study. In fairness to the NCEE report, the intent to focus on

drivers of costs (estimates) and not the accuracy of aggregate estimates *per se*, is stated several times, even if it is not always rigorously adhered to everywhere in the report.

In contrast (but perhaps too little and too late) the fourth paragraph of the letter finally presents the SAB panel's most important recommendation, the "development of a conceptual framework as well as a [stronger] focus on the drivers of compliance costs." But this is not clearly identified as a particularly important recommendation that could be implemented to improve the current and planned studies, and it is not described sufficiently to assure that the Administrator (and other readers) will understand its significance. This key point is further diluted by the presentation in the preceding paragraph of a rather unrealistic set of recommendations (suggestions) urging the Agency "to invest the resources needed to do a proper evaluation." In the current budget climate a beleaguered Administrator (or acting) might well choose not to read beyond this paragraph.

The letter should be revised to more clearly address the most important objectives of the NCEE study and to better call out and prioritize the key conclusions and recommendations of the panel.

Executive Summary

While the summary does seem to address the important findings and recommendations of the panel, there is again the risk that many of these will not be found given that they are embedded in the flowing narrative text. Granted that some of these are itemized at the end, but there is still a need to call out the key responses to the charge questions and issues more clearly in the body of the summary. Moreover, given the importance of the second itemized recommendation, an additional sentence or two elaborating the "focus on factors/drivers" point would be very useful.

Introduction

This section is very brief and may not sufficiently orient the reader to the key issues to be addressed in the review. There is also very little information about how the panel was composed and how they conducted their review. For example, it is only later in the review that the reader (may) discover that in addition to (or as part of) the cited teleconferences, the panel did have briefings by and interactions with relevant EPA staff.

As in the cover letter discussed above, the first paragraph of the introduction tends to misdirect the reader about the key goals of the NCEE studies reviewed. While the leadoff description of the goal as being to determine "...whether EPA's ex ante costs are higher or lower than ex post costs" is consistent with several statements of the NCEE's objectives for the RCS, it does emphasize too much the question of whether aggregate cost estimates generally differ. The NCEE study does make similar statements in several places and the literature reviewed at the beginning of the NCEE report seems to have this focus. But the more complete and careful statements of the objectives of the NCEE study emphasize a focus on the "drivers" of costs and cost estimates (ex ante and ex post) and the few cases (5 or even 10) included in the study(s) clearly (and admittedly) are not sufficient to contribute significantly to the general question beyond what the reviewed literature already indicates.

The SAB panel will later make this distinction more clear and will strongly recommend that the NCEE bring even greater focus on the component drivers of costs and cost estimates as the best way to contribute toward the ultimate goal "to identify areas in which to improve EPA's ex ante [and presumably also ex post] cost modeling." This brief introduction should make the distinction between aggregate estimates of the costs of rules/regulations (ex ante/ex post and differences or ratios therein) and the recommended increase in emphasis on a finer-grained study of the multiple factors/drivers of costs for any rule/regulation, which is where the limited NCEE study (with the panel's recommended extensions) is most able to make an important contribution.

Response to charge questions

This section is quite properly organized under the specific charge questions, but there is still a tendency to embed key conclusions and recommendations too deeply in the text. The panel developed many important insights and arrived at important conclusions and useful recommendations. It is important that these be presented in a way that the key audience will be most likely to find and respond appropriately to them. Section 3.1.2, as an example, does a better job of more clearly calling out the key points.

With regard to the recommendation to re-start (with some revisions) the PACE survey, it would be appropriate to cite the fact that SAB reviews of the NCEE (and prior versions of the unit) have consistently recommended the reinstatement of the PACE surveys and/or similar continuing monitoring/assessment systems.

The recommendation of an expanded qualitative study based on a larger sample of cases is very well founded, especially if guided by an explicit conceptual model, as recommended, and focused for sampling and analysis on factors/drivers of costs rather than on cases per se. It would be most useful if that study were closely and strategically coordinated with the Phase 1 and Phase 2 studies already planned. In particular, there should be overlap among the cases (and factors/drivers) included. The idea is something like the "ground truthing" of land surveys based on satellite images—the same cases (or some sub-set sampled to represent key component factors/drivers) should be assessed in both less intense/qualitative terms and in more intense/quantitative approaches.

Comments from Dr. Otto Doering

First, I would like to commend the Environmental Economics Advisory Committee for their review of this long and difficult study. I believe that the committee was able to successfully synthesize the issues raised by the report and respond most appropriately to the charge questions.

I believe that the charge questions were adequately addressed.

I believe that there are not technical errors or omissions in the report or issues that are not adequately dealt with in the SAB committee's draft report.

I believe that the SAB's draft report is clear and logical.

I believe that the conclusions drawn and the recommendations provided are supported by the body of the draft report.

The following comments relate to specific parts of the draft report.

Executive Summary: At the outset I sense in the EPA study a back and forth on the objective of the EPA exercise. The Draft report might emphasize even more that the purpose of the EPA exercise probably needs to be the improvement of EPA future ex ante cost modeling. This is not a justification of past EPA estimates. This makes the stress in the Draft report on the development of a consistent framework even more compelling as a device to ascertain weaknesses in the estimation process.

While a systematic approach to long term improvement of ex ante cost analysis is necessary and important, there may be some need for caution in terms of cost and effort to create an extensive effort in this direction. Here the later suggestions for a "qualitative" approach make sense.

My bias is that timeline is a critical factor in assessing ex ante costs against ex post analysis. While this is mentioned as the last bullet in section 3.1.2 on page 9, I think the time factor might be highlighted earlier as a key issue in such comparisons. Among other things it is the critical factor in new technology adoption that might lower costs.

I agree strongly that a "weight of evidence determination" cannot be made whether ex ante costs were high or low on the basis of ex-post analysis. This request for such a determination worried me that a concern of the agency was to assess past accuracy where the full focus should be on improving future performance. The response to this by the Draft report was most appropriate emphasizing the improvement in ex ante analysis.

Charge Question 1: Difference between ex ante and ex post analyses can also result from an incomplete inclusion of relevant costs or the inclusion of irrelevant costs.

Charge Question 2: The importance of the differences that might be due to inconsistent baselines between the ex ante and ex post analyses is a very important point. This should carry over to suggestions about developing a consistent methodology.

Charge Question 3: The suggestion about developing a story which requires good knowledge of the industry is a very valid one! Knowledge of the industry is key to successful cost analysis. On page 10, even with randomization, I believe that situations and industries can be so specific that generalization will be difficult. The suggestion on page 12 with respect to comparability is very important.

Charge Question 4: The continuing argument for a more systematic approach is right on.

Charge Question 8: The following statement on page 18 should be highlighted in the text: “The best way to evaluate their (ex ante cost estimates) accuracy is to identify systematic errors in procedures, methods and data used in previous ex ante analyses and to uncover the key factors or driving forces that cause the differences between ex ante and ex post cost analyses.”

Charge Question 10: I believe that it would take a high level of resources to build a really good data base and analysis program to do this task.

Further comments:

I believe that there is an increasingly well-developed effort in Europe to look at the cost of regulations. It might be helpful to see if there would be some things that could be learned from their efforts.

Also: I had thought that I might see reference to the National research Council’s recent Review of the EPA’s Economic Analysis of Final Water Quality Standards for Nutrients for Lakes and Flowing Waters in Florida. While this does not perform an ex-post, it does review the EPA’s ex ante analysis and of more value it provides a detailed framework for incremental cost analysis of a rule change. This might be a helpful initial template for the development of a consistent approach. Many of the issues highlighted in the Draft report are considered here in addition to the provision of a framework for analysis.

Comments from Dr. Robert Johnston

The committee report provides a detailed review of the *Retrospective Cost Study* (RCS) and offers reasonable suggestions for moving forward in comparisons of *ex ante* and *ex post* regulatory cost estimates. The report accurately highlights both the strengths and weaknesses of the study. I agree with the report's conclusions that a more systematic and large sample approach is required in order to provide generalizable findings, and that additional and more systematic data collection is required. I also agree that the Agency should invest the resources needed to do a proper evaluation. Nonetheless, there are a few areas of the report in which additional clarification and information would be useful. In addition, the report gives uneven treatment to charge questions, with substantial attention to some questions and terse responses to others. To a certain extent this may be unavoidable, as the charge questions go on at great length. Nonetheless, the report could be improved by somewhat more detailed and specific answers to a few of the charge questions.

1) Were the charge questions to the committee adequately addressed?

I believe that the charge questions to the committee were adequately if unevenly addressed. Most of the charge questions included numerous sub-parts, and it would have been difficult for any one report to comprehensively address each and every one of these sub-parts in great detail. As a result, some charge questions are given much greater attention than others. Nonetheless, the report does a reasonable job of addressing the principal issues raised by each of the charge questions.

2) Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report?

There are no technical errors or major omissions in the report. There are, however, some areas in which clarification would have been useful, additional information could have been provided and relevant caveats could have been noted.

Among the primary and recurring themes of the report are: (1) the need for a conceptual framework for the analysis, (2) the need for more extensive ongoing data collection, and (3) the need for a larger sample of "qualitative" studies to supplement the small sample of in-depth quantitative analyses.

Among these themes, the discussion of ongoing data needs is well-motivated, but could use greater clarification. As noted by the report, the lack of data is an important limitation to *ex post* cost analyses. Yet there are inherent biases and shortcomings in different types of data that could be collected. The report recognizes the potential imperfections with data that might be used (e.g., industry survey data), but then routinely suggests the need for more of these data without addressing the amelioration of potential biases. As a result, the report could be interpreted as promoting greater collection of flawed data. For example, page 11 of the report notes that industry-wide surveys are "costly to conduct, difficult to implement and subject to strategic misreporting." It also comments that "ideally...the RCS would use only publicly available data and not rely on sources of *ex post* cost data from sources that had a vested interest in the findings..." Yet below on the same page the report concludes that "it would be very useful to resume annual administration of the PACE [Pollution Abatement Costs and Expenditures] survey and data collection based on the survey." While there is some discussion of ways in which the PACE survey ameliorates problems such as industry non-

response, the report is at least somewhat ambiguous regarding how the request to resume the PACE survey reconciles with the prior critiques of industry-wide surveys. Similarly, page 14 notes that “more detailed survey data are needed across the board,” but provides little detail regarding the form of these survey data, or how they would avoid problems such as strategic misreporting.

The request for larger samples of “qualitative” studies is similarly appropriate, but could also use additional clarification. First, the suggested studies are not formally qualitative. Instead they are quantitative but incomplete in the sense that they “do not yield bottom-line total cost estimates.” While this is stated on page 17, I would nonetheless suggest removing the potentially misleading use of the term “qualitative” throughout the report, and replacing it with more accurate terminology. Also, the report argues that large samples of these studies will be more likely to yield generalizable results. While it is true that the small sample of quantitative studies conducted by EPA do not yield generalizable results—and larger samples are required—larger samples of quantitative but incomplete analyses will not necessarily improve the situation. Larger samples are a necessary but not sufficient condition. In order to ensure generalizable findings, the proposed studies would have to be designed in a systematic way, with guidance from an underlying conceptual framework, to ensure strict comparability and the possibility of data synthesis. This could be made more clear in the report. Otherwise, EPA risks generating a large number of non-comparable and incomplete analyses. To be fair, the SAB report does call for development of a “systematic approach to categorizing expectations and deviations,” and elsewhere in the report comments on the need for a systematic methodology for comparing rules. However, I think that too little attention is paid to the challenges of developing formally comparable analyses, particularly when these analyses are incomplete. This is a severe challenge commonly encountered in meta-analysis and other forms of systematic data synthesis.

Related to the above comment, there is a substantial literature devoted to methods for data synthesis in economics (e.g., meta-analysis). Given the emphasis of the charge questions on the provision of generalizable results regarding *ex ante* and *ex post* cost estimates—and that the committee has recommended the implementation of a large number of qualitative studies for the explicit purpose of data synthesis—it would be useful to discuss relevant insights from this literature. Particularly important are the findings of this literature with regard to sampling issues that can be critical when synthetic findings are sought.

Responses in Section 3.2.3, Weight of Evidence Conclusions, are less responsive than elsewhere in the report. For example, among the charge questions is “What are the drawbacks, if any, to applying a consistent [hard metric] across the case studies given their differences in data quality?” While the report states that “The SAB is less in favor of drawing a hard line than reporting actual numbers...” it neither provides a rationale nor explicitly addresses the drawbacks to the use of hard metrics. (Earlier, on page 10, the report does state that “important to understand the reasons for cost differences even if these differences fall below the 25% threshold,” but this is the only discussion of this issue in the report.) More detail could be provided in this section.

Finally, as a minor point, the discussion of charge question #1 (related to the adequacy of the literature review) focuses more heavily on the need for a conceptual model than on the adequacy of the literature review. While I agree that a conceptual model is needed, the report could have been improved by more specific attention to the comprehensiveness of the review, which is the primary focus of the charge question.

3) Is the draft report clear and logical?

The charge questions in this case were neither concise nor well suited to succinct responses. For example, charge question (3) alone included seven sub-parts. Many of the charge questions were also at least somewhat ambiguous (e.g., “is there anything more we could do with the data”). Despite this, I found the committee report to be clear and logical. There is a bit of redundancy throughout the report, but this appears to be related to underlying redundancy in the charge questions.

4) Are the conclusions drawn or recommendations provided supported by the body of the draft report?

Yes, the conclusions and recommendations are supported by the body of the draft report. At the same time, there are a number of non-trivial challenges involved in complying with the report’s recommendations, and the report does not provide clear guidance as to how these challenges could or should be addressed. For example, as noted above, greater attention could be paid to the challenges of the recommended *ex post* data collection and in developing systematically comparable “qualitative” analyses of the type suggested by the report.

Minor Points:

On page 10 there is a typographic error (“five rules include in Phase I”)

On page 13 there is a typographic error (two periods after “ex ante estimate”)

Comments from Dr. Stephen Polasky.

Overall, I think the review comments are constructive and responsive to the charge tasks. I think the review comments rightly emphasize that the main problem faced by EPA in the task of trying to compare ex ante cost estimates with ex post cost estimates is a lack of data with which to compute ex post costs. If anything, I think that the review comments should emphasize the problem of data even more. It is hard to see how EPA will do a better job on this task without better data about costs. The last of the four bulleted recommendations to me is the most important. EPA should “Consider ways to collect ex post cost information routinely, either within the Agency or in collaboration with other agencies to facilitate detailed quantitative comparisons of ex post and ex ante costs in the future.” The suggestion to restart PACE, or to start something similar, is a very good suggestion.

Before starting on systematic data collection, however, I would ask how the information is likely to be used. In the executive summary the review asserts that “it is important to have the most accurate possible estimates of the costs of specific regulations in order to assess the impact of regulations on the regulated community and design cost-effective regulations in the future.” But the review also notes that this is true only “If EPA has the discretion to choose a regulation based on net benefits...” When does EPA have such discretion? More generally, when would better information about cost result in changes in policy? Before investing resources in data collection efforts I would want to see an analysis of the value of information. Ideally, I would like EPA to collect cost information and use it in the way suggested by the review comments. But if the agency does not use estimates of cost in setting policy then I’m not sure that the exercise of data collection and analysis is worth the expense, especially given tight budgets.

My other general comment is that I’m not convinced about the need for a “conceptual framework” and I’m not convinced that the review comments suggestions about the conceptual framework are that helpful. The question that EPA seeks to address is how do ex ante cost estimates compare with ex post costs? In trying to answer that question I would want to know:

- Are ex ante estimates unbiased?
- If ex ante estimates appear to be are biased, what factors explain the tendency to over- or under-estimate costs?
- What is the degree of variance of estimates?
- Are there ways to reduce variance?

Perhaps the review committee has more sophisticated issues in mind but I would be happy if EPA focused on these questions revolving around mean and variance of estimates.

Specific comments:

In the opening paragraph of the executive summary there is a claim that there is a lot more attention paid to benefits than to costs. While true, I think it is also more difficult in accurately estimate benefits than costs so that the emphasis on collecting information about benefits is not necessarily misplaced. Perhaps the point should be made clearly that estimates of net benefits require good information about both benefits and costs and the cost side is in need of attention.

Section 3.1.1: This question is about the adequacy of the literature review so the inclusion of the need of a conceptual framework seems misplaced here. I would move the material on the framework to section 3.1.2 (or perhaps drop it altogether).

Section 3.1.2: the review comments suggest an alternative classification scheme with five bullet points. Are these five points meant to be separate points? I didn't really see the logic of laying things out in this fashion. Is it important to distinguish between inherent uncertainties and exogenous shocks? Exogenous shocks seem to be an important source of inherent uncertainty. Also, shouldn't EPA try to anticipate the behavioral response of firms to regulation in its ex ante estimates? I'm not convinced that this alternative classification scheme is the best approach.

Section 3.1.3: I view this section as dealing with the real question that EPA faces: what should they do when they have poor information. One answer that the review rightly points to is the need to collect better data on a systematic basis. But when data is poor (such as it is currently), can EPA do something useful? That is the essence of charge question 3. The second paragraph in response to charge question 3 is helpful but further thought on how much use this systematic approach with a poor data base is likely to generate would be really helpful to the agency. I would have liked to have seen the review comments go further here. The section on *Methodology for Comparing Rules* was quite helpful.

Sections 3.2.1 and 3.2.2: I thought charge questions 4 and 5 were difficult. What the review has as general responses to these charges are reasonable and there are some useful specific examples. My only comment on this section is that more discussion of the specific case studies would have been helpful.

Section 3.2.3: This section was too brief and needs to go into more depth. I don't think the one sentence answer "When multiple methods corroborate each other, a particular conclusion is more defensible" is a sufficient answer to the question about cases where "*drawing conclusions is less or more defensible.*"

Section 3.3: The suggestion about doing more studies but less in depth, more qualitative and less quantitative, is an interesting one. I agree this is worth a try. I would emphasize, however, the need to evaluate the approach and modify as needed.

Section 3.3.2: I disagree with the statement: "It is not possible to make general statements as to the accuracy of ex ante cost estimates." One can compare ex ante with ex post and see if on average ex ante is greater or less than ex post. To make meaningful conclusions one needs to have a sufficient number of cases. But what justification is there for saying you cannot make general statements about accuracy? Of course there is uncertainty that will make it virtually impossible for ex ante to be equal to ex post but I would want to know if there is a tendency to over- or under-estimate (and then to know why). I also don't understand the claim "'the bias of ex ante cost estimates' is an invalid concept." I'm mystified by this comment.

Comments from other SAB Members

Comments from Dr. Joseph Arvai

General comments:

I appreciate that a great deal of work went into this report. Even though this is not my area, I found the report to be well written and easy to follow.

1) Were the charge questions to the committee adequately addressed?

Yes.

2) Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report?

To the best of my knowledge, no.

3) Is the draft report clear and logical?

The draft report is very clearly written, and it is quite methodically argued. Even someone without expertise should be able to follow it.

4) Are the conclusions drawn or recommendations provided supported by the body of the draft report?

As far as I can tell, yes.

Comments from Dr. Ingrid Burke

1) *Were the charge questions to the committee adequately addressed?*

The full report addresses all of the charge questions, but the Letter and the Executive Summary do not. None of the pieces (Letter, Summary, Full report) make the recommendations stand out, so it is very difficult to find whether the charge questions were adequately addressed.

I recommend that the Letter include a bit more language about the recommendations in the report (it skips some important material in its effort to be brief), that the Executive Summary find a way to highlight recommendations beyond those listed at the end (there were others!), and that the recommendations in the full report be highlighted, or bulleted (even numbered) so that one could be sure that the report supports a complete summary and Letter.

2) *Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report?*

Not that I could find.

The Executive Summary and report state:

“In fact, as acknowledged in one case study, EPA overestimated costs “in order to avoid preparing estimates that were too low and could be challenged”, and in the Full report, page 8 “As EPA moves forward in its next phases of the RCS, it will be important to uncover and state incentives faced by the regulator. Interestingly, EPA acknowledges its own data manipulation in one case study: “EPA was “conservative in its cost estimates, in order to avoid preparing estimates that were too low and could be challenged.”¹ Economic analysis should not be manipulated to satisfy other objectives.”

I would like to have the SAB discuss this, and the value that will be gained, or lost, by including this.

3) *Is the draft report clear and logical?*

Paragraphs 2 and 3 in the full report may be completely clear to an economist, but I didn't understand a lot of it. I think I should be able to. A bit more simple summary as a topic sentence, or in the body of the paragraphs, could improve its understandability to a non-technical, but highly interested, audience (e.g. I think that anyone in industry will be very interested in this report, but only the top economists will really understand this).

4) *Are the conclusions drawn or recommendations provided supported by the body of the draft report?*

See comment above under 1). The Executive Summary and Letter do not seem to be complete.

Some line by line edits:

Page 1 of letter: “The RCS is comprised of five case studies developed” Incorrect use of “comprise”, though the dictionary is gradually dropping its values. “RCS comprises” or “is composed of”, please!

Same page, farther down: “The SAB finds the case studies are useful in showing that there are often significant divergences in assumptions”. I suggest “finds THAT the case studies are useful”, to avoid elliptical use.

Page 1, ES: “on unpriced goods and services like clean air or clean water”. “Such as” is more correct.

Page 4, first two paragraphs. Topic sentences are very narrow relative to what the paragraph must be trying to do. In fact, I don’t think those are topic sentences at all.

Page 4, further down: “Focusing only on regulations for which data is available” should say “data are”

Page 10, Full report: “The five rules include in Phase 1 were”. I believe this should say “included”.

Page 13, Full report: (actually an error in the writing of the Charge Question): “*Comprehensive, detailed data on compliance costs simply was not available for any of the case studies.* “. This should say “data...were” .

Page 17:” Instead, the SAB suggest concentrating” should say “suggests”.

Comments from Dr. George Daston

This report provides a review of five case studies undertaken by EPA to determine how accurate its estimates of the cost of regulation are. The report finds that five disparate case studies are insufficient to support conclusions about accuracy, but does provide insight into the reasons why a priori estimates may be incorrect. The committee recommends that EPA be more objective and consistent in its cost estimations.

We were asked to address four specific questions as part of the quality review.

1. whether the original charge questions to SAB Standing or Ad Hoc Committees were adequately addressed;
2. whether there are any technical errors or omissions in the report or issues that are inadequately dealt with in the Committee's report;
3. whether the Committee's report is clear and logical; and
4. whether the conclusions drawn or recommendations provided are supported by the body of the Committee's report.

Question 1: The charge questions posed to the review panel were all adequately addressed.

Question 2: I found no technical errors in the report.

Question 3: I found the report to be clearly and logically presented.

Question 4: I found the conclusions of the report to be well documented and supported. The overarching recommendation is that EPA make the investment to do a proper job of evaluating retrospectively its estimates of the cost of regulation. I agree with this very reasonable recommendation. However, I also believe that the letter to the Administrator should acknowledge the committee's recommendation that EPA should make its ex ante cost estimates as objective as possible, immediately. It seems to me that manipulating the estimate to achieve a desired outcome (first paragraph on p. 3) is inappropriate and needs to be highlighted.

Comments from Dr. Michael Dourson

Were the charge questions adequately addressed?

I believe so, but I have several suggestions for the panel to consider. Specifically,

PDF Page 13, sentence reading: The SAB suggests that EPA do more, but shorter qualitative analyses of regulations. [text section is found on PDF Page 25]

Or perhaps EPA could do a specific quantitative focus on a smaller part of the overall regulation. For example, EPA might analyze its estimated cost for monitoring arsenic in water at 50 ppb versus the cost of monitoring it at 10 ppb. While such a specific analysis is not the cost-sense of the whole regulation, it might shed some light in how the ante and post estimates of cost are similar or not.

PDF Page 18, sentence starting: Start with a “story” about the ways in which the industry... I really like this suggestion, but I am afraid that I cannot state with any certainty why. Perhaps it is because determining a critical effect (i.e., the first adverse effect or its known and immediate precursor in the dose scale) for any particular chemical relates to the syndrome of toxicity that a chemical causes, that is, it relates to a clinical story about how the chemical is causing its effects in humans.

PDF Page 20, top line: “cost differences”

Or does the panel mean to say that it is important to understand the reasons for the cost similarity? 25% +/- is likely to be within the range of precision of such estimates and thus a discussion of "differences" is not scientifically meaningful.

PDF Page 20, sentence starting: *Sources of Cost Data and Related Information:*

Could not cost data be procured from the annual reports of companies affected both before and after the regulation? The reports will likely have the benefit of an audit and company policy might dictate that additional details will be given out at the request of any shareholder.

PDF Page 21, sentence starting: Instead of comparing a single ex ante estimate with a single ex post estimate it might be better to generate a range of estimates under...

I agree with the panel on this suggestion. Such a range might naturally start with stating the imprecision of the estimate. For example, in noncancer risk assessment for chemical exposures to humans, a Reference Dose (RfD) is developed. Its stated uncertainty (or imprecision) is "with uncertainty spanning perhaps an order of magnitude" (Barnes and Dourson, 1988; EPA, 2002). RfDs have both uncertainty and imprecision. The imprecision part comes from the repeatability of the overall process. That is, how close to the first RfD would a second expert body come if it had to repeat the process. In such cases, the imprecision might be best characterized as 3-fold (i.e., -30% to +300%) on either side of the RfD (Felter and Dourson, 1998; EPA, 2002).

The second part, that of uncertainty comes from the fact that each uncertainty factor is conservative, based on the behavior of the average chemical (Dourson and Stara, 1983). Thus, each RfD is meant to be protective, because each uncertainty factor is conservative. Furthermore, the use of multiple uncertainty factors is known to result in even more conservative RfDs (Swartout et al., 1998). In such cases, the uncertainty might be best characterized as 3-fold to 10-fold above the RfD.

Are there any technical errors or omissions in the report or issues that are not adequately dealt with in the draft report?

I am not able to answer this question.

Is the draft report clear and logical?

The draft was very clear. I enjoyed reading and learning about a new area of science.

Are the conclusions drawn or recommendations provided supported by the body of the draft report?

I am not able to answer this question.

Comments from Dr. David Dzombak

1. Were the original charge questions adequately addressed?

Yes, the original charge questions are addressed adequately.

2. Are there any technical errors or omissions in the report or issues that are not adequately dealt with in the Panel's report?

I found no technical errors or omissions.

3. Is the Panel's draft report clear and logical?

The body of the draft report is well organized. It responds to the charge questions systematically and clearly. The Executive Summary needs to be improved, however, as the nature of the charge questions are not clear, there are long paragraphs encompassing multiple topics that need to be sub-divided, and the Executive summary ends abruptly with a bullet list.

- (a) The Letter to the Administrator is concise and summarizes the key findings of the report. More information about the nature of the charge questions could be given in the opening paragraph, in summary form.
- (b) The paragraph construction in the Executive Summary needs to be improved. There are long paragraphs encompassing multiple topics that need to be sub-divided. The two long paragraphs on the first page of the Executive Summary (p.2) serve as examples of the problem.
- (c) Some paragraphs in the Executive Summary have been constructed without sufficient attention to topic sentences. For example, in the paragraph on the top of page 4, the topic sentence focuses on the case study on arsenic in drinking water. The rest of the paragraph discusses aspects of other case studies. A more appropriate topic sentence is needed.
- (d) The Executive Summary ends with a section entitled "Moving Forward", the last part of which is a bullet list of four specific recommendations. The body of the report does not end with a list of explicit recommendations as provided here. The Executive Summary needs to reflect directly the contents of the body of the report. If the panel desires to summarize overarching recommendations succinctly, this should be done in the Executive Summary and in the body of the report with a concluding section entitled "Overarching Recommendations" or something like that. Further, ending the Executive Summary with a bullet list is awkward. I suggest that the overarching recommendations be introduced with a bit more text, and be discussed with some text after they are listed.
- (e) The charge questions are alluded to in the titles of the sub-sections of the Executive Summary, but this doesn't provide sufficient information about what specifically was requested in the charge questions. More specific information about the charge questions needs to be provided in the Executive Summary. The questions do not need to be repeated in their entirety here, but each of the seven charge questions needs to be summarized separately. An Executive Summary needs to be able to stand alone.

4. Are the conclusions drawn or recommendations provided supported by the body of the Panel's report?

The conclusions and recommendations are adequately supported in the body of the report. As noted in Comment 3(d), however, the overarching recommendations listed at the end of the Executive Summary are not provided explicitly at the end of the body of the report. Either a new section needs focused on overarching recommendations to be introduced at the end of the body of the report, or the bullet list needs to be removed from the end of the Executive Summary and the thoughts given there incorporated into appropriate places in the preceding text of Executive Summary.

Comments from Dr. Bernd Kahn

Both the EPA report and the SAB review are extremely well written, full of insight, and informative. My responses to the usual four quality review questions are, respectively, yes, no, yes, and yes. I have the following suggestions:

1. Although moving to phase two, i.e., performing 5 more case studies, would surely expand EPA insight into the various causes of difference between reported ex ante and ex post values, far more benefit could be derived by reestablishing an expanded Bureau of Census PACE data collection and designating a small EPA group for analyzing these data for ex post cost estimation.
2. It is not clear from the Review whether EPA has a systematic process for arriving at ex ante costs. The more open the system, such as inviting responses from industry, state regulators, and public concern groups, the more data will be available for the estimate, but this may already be the practice.
3. As indicated in the Review, identifying major causes of large differences in ex ante and ex post costs is more important than arriving at quantitative differences for specific rules. Moreover, it is unlikely that consistent differences will appear for a wide variety of rules.
4. In view of the many noted sources of error, notably misinformation provided both ex ante and ex post and important technical or economic developments that impact releases, it seems more important to cite these problems as part of the prediction than attempt to arrive at a very good prediction. Naturally, periodic examination of costs should be part of the regulatory effort, to discover major – order of magnitude – deviations from predictions as a learning experience.

Comments from Dr. Catherine Karr

- 1) Were the charge questions to the committee adequately addressed? YES
- 2) Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report? NO
- 3) Is the draft report clear and logical? YES
- 4) Are the conclusions drawn or recommendations provided supported by the body of the draft report? YES

Comments from Dr. Nancy Kim

General comment.

The report will help EPA move forward. The recommendation to do some shorter, qualitative analyses provides a useful way for EPA to make progress, probably needing less time and resources than carrying out the revisions for the more detailed case studies.

Quality Review Comments

1. Were the charge questions to the committee adequately addressed?
Yes.
2. Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report?
No.
3. Is the draft report clear and logical?
Yes.

When reading the report, the recommendation to do more, but shorter qualitative analyses of regulations appeared frequently and the reasoning for carrying out these qualitative analyses was persuasive. Should a recommendation for doing the qualitative analyses be included in the Letter to the Administrator?

The panel may want to consider adding a phrase such as “The SAB recommends...” to emphasize points in its report. Doing so may help to clarify which comments the panel thinks are most important.

4. Are the conclusions drawn or recommendations provided supported by the body of the draft report?
Yes.

Comments from Dr. Cecil Lue-Hing

General comments

The report is well written, easy to read and understand.

Specific comments

Letter to the Administrator

The letter is well written and the recommendations are clearly stated.

The Executive Summary

The Executive Summary is well organized, well written and offers a good summary of the conclusions and recommendations found in the body of the report.

The Body of the Report

The report is well organized, well written and easy to read. The 10 charge questions posed by the EPA to the Panel were appropriately addressed.

Quality Review Questions

1 – Were the original charge questions to the committee adequately addressed?

Yes

2 – Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?

None that I could find

3 – Is the Panel's draft report clear and logical? and

Yes

4 – Are the conclusions drawn or recommendations provided supported by the body of the Committee's report

Yes.

Comments from Dr. Francine Laden

1) Were the charge questions to the committee adequately addressed?

Yes – the charge questions are adequately addressed.

2) Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report?

The report is very thorough and appears to adequately deal with all important issues.

3) Is the draft report clear and logical?

Yes – the draft report is clear and logical

4) Are the conclusions drawn or recommendations provided supported by the body of the draft report?

The conclusions and recommendations are supported by the body of the draft report

Comments from Dr. Surabi Menon

Q1: Were the charge questions to the committee adequately addressed?

The charge questions pertaining to methodology, evaluation and moving forward have all been addressed. One suggestion is that when discussing the selection of rules for the study that characterize the difference between ex post and ex ante costs for different rules, it would have been useful to recommend what factors would be best to consider. This might help guide the recommendations on suggested changes.

Q2: Are there technical errors or omissions or issues that are not adequately dealt with in the draft report?

There were no particular errors in the draft report that I could identify.

Q3: Is the draft report clear and logical?

The report is logical and mostly clear. In a few cases it was not specific in describing why for instance the EPA should report actual numbers instead of hard metrics to describe if costs were over or under estimated. The reasoning may be that the data quality and availability could result in inconsistencies when using hard metrics consistently and in some cases or perhaps in all cases a range in actual numbers may be more appropriate.

Q4: Are the conclusions drawn or recommendations provided supported by the body of the draft report?

Yes, the recommendations are supported adequately. The suggestion of constructing a robust baseline under analytical challenges addressed under charge question 5 is an important point.

Comments from Dr. Elizabeth Matsui

I reviewed the three SAB reports and assessed whether the charge questions were adequately addressed, whether there were any technical errors or omissions, whether the draft reports were clear and logical, and whether the conclusions/recommendations were supported by the body of the draft report.

Comments from Dr. James Mihelcic

1) Were the charge questions to the committee adequately addressed?

Yes

2) Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report?

I felt the one issue that was not addressed in the report is that it appears the case studies are focused on traditional regulatory control approaches to protection of human health and the environment. With the movement of EPA towards sustainability, I believe the SAB should be recommending to EPA to develop some case studies that have a focus on sustainability or at least pollution prevention or green approaches for management of water. Also, are their geographical differences in the cost of regulations that we should recommend that EPA consider in future analyses?

3) Is the draft report clear and logical?

Yes, however, I believe the five case studies that are referred to in Appendix A should be mentioned specifically in the Report's Introduction.

4) Are the conclusions drawn or recommendations provided supported by the body of the draft report?

Yes,

Typo. Six lines from bottom of page 13, there are two periods after "ex ante estimate.."

Comments from Dr. H. Keith Moo-Young

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

Yes. The original charge questions were adequately addressed.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

After reading the report, I did not find any technical errors or omissions.

3. Is the Committee's report clear and logical?

The report is clear and logical. The letter to the administrator may need to be strengthened by elaborating more on the conclusions and findings.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

Yes. The conclusions drawn support the body of the report.

Comments from Dr. Eileen Murphy

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

Yes. I thought the summaries of the grouped charge questions in the Executive Summary were well done.

2. Are there any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

I do not have expertise in this area.

3. Is the Committee's report clear and logical?

Yes. It is well written and a non-expert can follow it.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

Yes.

Comments from Dr. Amanda Rodewald

1. Were the charge questions adequately addressed?

Yes

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the draft report?

No.

Perhaps the most minor edit to point out in the history of SAB: there is a double period on page 13, halfway through the response to b.

3. Is the draft report clear and logical?

Yes.

4. Are the conclusions drawn or recommendations provided supported by the body of the draft report?

Yes.

Comments from Dr. James Opaluch

The EEAC report does an excellent job reviewing the RCS. However, I believe the report could be written to make the main message clearer, and doing so would be helpful to EPA NCEE in developing its studies. As I read the report, the primary conclusion is the task of improving the assessment of costs is an extremely important one, but a more systematic approach is needed. The report is clear on this message, but I think it would be useful to draw the material together in an easily accessible location. In particular, I think this message should be more clearly articulated in the letter to the Administrator.

Here's how I view the main message of the report: The task of assessing the costs of regulations is a very important one for supporting EPA regulations, but a more systematic approach is needed. This systematic approach would be based on first developing a conceptual framework that used consistently through the case studies. The framework should include the taxonomy of key factors that result in a divergence of ex ante and ex post cost estimates, and the taxonomy should be used to provide a consistent structure throughout the study. I would recommend that the framework include a set of formal hypothesis regarding the taxonomy, and that these hypotheses be subject to testing in the analysis. Also, reliance on a small number of case studies is not adequate to support the task, but rather a more comprehensive set of studies is needed. Furthermore, such as study cannot rely only on data of convenience, but rather requires primary data collection efforts be routinely applied, including use of surveys, focus groups, expert assessments and consultation with the Research Community.

All of the material in the above is included in the report, except for the discussion of hypothesis testing, but is sometimes scattered in a way that makes the point less clear. Most importantly, I think this material needs to be clearly articulated in the letter to the Administrator. As it stands, the letter does not clearly lay out the need for a more systematic approach. For example, in the first paragraph on the 2nd page, the letter indicates "EPA's sample size will need to extend far beyond the 5 case studies completed and the 5 additional case studies planned". This makes it sound like the main issue is one of sample size, when I think the conclusion of the report is a more fundamental one: a more systematic approach is needed. The statement in the letter regarding the need for an underlying conceptual framework seems almost like an afterthought. These conclusions are better articulated in the Executive Summary on the last paragraph on page 2. I believe it is important to clearly articulate these conclusions in the letter to the Administrator, although the write up in the letter may need to be somewhat briefer.

I also think the letter should more fully articulate the motivation for accurate cost estimates. Currently, the 2nd paragraph of the letter indicates that cost estimates are needed to develop cost effective regulations. But I think a more immediate need is to ensure that regulations are justified in a cost-benefit sense. And as pointed out in the first paragraph of the Executive Summary, cost analyses are also important to assess the impacts of regulation on the regulated community. I recommend that all three rationales be provided in the letter to the Administrator and elsewhere in the report.

I'm confused by the statement on the top of page 3, where the report indicates "Interestingly, the RCS recognized positive incentives for regulators to understate costs, but there may also be an incentive to overstate costs when benefits are extremely high." I read this as implying that the RCS does not recognize incentives for EPA to overstate costs. But on page 29 the EPA RCS says:

“If a proposed rule appears likely to pass a benefit-cost test even if a conservatively high estimate of costs is reported, there may be reduced incentive for regulators to refine their cost estimates or to investigate alternative pathways to compliance, such as process changes or alternative technologies. Further, regulators might conservatively overstate costs in cases when affordability criteria must be met on the grounds that if a regulation is found to be affordable when stated costs are higher than expected, the regulation will be affordable using more refined estimates of costs as well. It might also be counterproductive for regulators to strive to establish a more refined precise cost estimate, as the regulated industry might then feel compelled to protest, perhaps on the grounds that they do not want to see such cost estimates applied in other contexts.”

With respect to the issue of “ex ante and ex post differences due to inherent uncertainties” (e.g., first bullet on page 8). Did the panel consider recommending that EPA carry out sensitivity analyses with different assumptions on key parameters? This might also be useful in addressing the motivation for EPA choosing conservative estimates (e.g., middle of page 8). Ideally, a cost-benefit analysis could justify a regulation by showing that the benefits of the regulation exceed the costs across a range of reasonable outcomes. And it would be useful to see whether ex post assessments consistently fall within bound place on costs from ex ante analyses.

I strongly agree with the Review, that EPA should place the issue into a broader perspective. There is much literature on the issue of differences between ex ante versus ex post estimates outside of measures of cost of complying with environmental regulations, and these studies could provide considerable perspective on challenges faced. For example, issues such as induced innovation and learning-by-doing can shed much light on differences between ex ante and ex post cost estimates, as is recognized by the RCS and the EEAC review. But another issue should be considered as part of a broader perspective. Innovation is a major driving force in a well-functioning and prosperous economy. And well-designed environmental regulations should allow flexibility for firms to develop innovative ways to meet environmental goals. In such as case, we should expect ex ante cost estimates to be higher than ex post realizations. Induced innovation should be formally included in the framework for assessing accuracy of ex ante cost analyses, and indeed this form of divergence between ex ante versus ex post costs should be an indicator of the success of EPA programs, not as a failure of estimating costs.

I would like to reinforce the statement in the EEAC report on the top of page 11 which says “it is important to understand the reasons for cost differences even if these differences fall below the 25% threshold. In some cases, an study of the cost of a particular regulation might overestimate some elements of cost by more than 25%, and underestimate others, so that just by chance the difference in ex ante versus ex post cost is less than 25%. Such a study could be informative on how to improve cost estimates. It would be most useful for studies to break down cost differences into different components to the extent feasible, and explore individual components of cost studies, rather than simply compare the totals.

In response to Charge Question 7, the EEAC report recommends developing a large sample to identify patterns in the data. Does the EEAC believe that a meta-analysis approach might eventually be useful if a sufficiently large dataset were developed?

Literature Review

Here is a set of studies that are relevant to the issue of ex ante versus ex post cost analyses that are not referenced in the RCS:

Bailey, Peter D. , Gary Haq, Andy Gouldson , 2002. "Mind the gap! Comparing Ex Ante and Ex Post Assessments of the Costs of Complying with Environmental Regulation" *Environmental Policy and Governance*, Volume 12, Issue 5, pages 245–256, September/October.

Boardman, Anthony E., Wendy L. Mallery, Aidan R. Vining , 1994. "Learning from ex ante/ex post cost-benefit comparisons: the coquihalla highway example", *Socio-Economic Planning Sciences*, Volume 28, Issue 2, Pages 69–84

Dayton, Julia, 1998. *World Bank HIV/AIDS Interventions: Ex Ante and Ex Post Evaluations*, World Bank Publication 389.

Grosse, Scott D., Norman J. Waitzman, Patrick S. Romano, and Joseph Mulinare. Reevaluating the Benefits of Folic Acid Fortification in the United States: Economic Analysis, Regulation, and Public Health. *American Journal of Public Health*. November 2005, Vol. 95, No. 11, pp. 1917-1922.

LaFrance, Jeffrey T. and Harry de Gorter, 1985. "Regulation in a Dynamic Market: The US Dairy Industry" *American Journal of Agricultural Economics*, Vol. 67 No. 4, pp 821-832.

Lindner, R. K. and F. G. Jarrett, 1978. "Supply Shifts and the Size of Research Benefits" *American Journal of Agricultural Economics*, Volume 60 No. 1 pp 48-58.

Rideout, Douglas B.; Omi, Philip N. , 1995. "Estimating the Cost of Fuels Treatment" *Forest Science*, Volume 41, Number 4, 1 November pp. 664-674(11)

Sappington, David E. M., Joseph E. Stiglitz, 1987. "Privatization, information and incentives" *Journal of Policy Analysis and Management* Volume 6, Issue 4, pages 567–585, Summer

Comments from Dr. Duncan Patten

1) Were the charge questions to the committee adequately addressed?

More than adequate

2) Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report?

Not my area of expertise. However:

I wonder about the many recommendations to use "qualitative" analyses that, I assume, might be compared with "quantitative" measures or be used as the "only" approach.... or is the point to use only one or the other approach and not compare them? Or, will the qualitative analyses suggest what quantitative analyses might be done. If so, how does this allow development of a strategy that is applicable across the board as approaches might differ between case studies if some are qualitative and some quantitative?

3) Is the draft report clear and logical?

Quite well written with logical steps developing to recommendations.

4) Are the conclusions drawn or recommendations provided supported by the body of the draft report?

Based on the following statement from the letter: "The SAB recommends development of a conceptual framework as well as a focus on the drivers of compliance costs. Rather than simply focusing on the question of whether EPA generally overestimates or underestimates costs, the SAB recommends a focus on the drivers of costs so that insights can be gained for future analyses", there is sound thinking on the committee's part to support this recommendation.

The other basic conclusion or recommendation is for EPA to improve this type of comparative analysis by reducing the size of metrics and using more case studies but expansion of the case studies would be using qualitative analyses which, as I see it, might not be comparable to the quantitative studies.

These are nitpicking questions but one's that may need thinking.

Comments from Dr. Stephen Roberts

1) Were the charge questions to the committee adequately addressed?

The charge questions were adequately addressed in the body of the report. The Executive Summary, although it reads well, does not appear to capture responses to all of the charge questions. For example, Charge Question 1 asks whether the report adequately summarizes the existing literature or mischaracterizes it in some way. I cannot find the answer to that question in the appropriate section of the Executive Summary (page 2). Some of the other responses also seem to be glossed over. Many of the responses are also not included in the letter to the Administrator, but this is less of an issue because the letter should emphasize the main points and recommendations.

2) Are there any technical errors or omissions or issues that are not adequately dealt within the draft report?

I did not see any technical errors or omissions, although this is not my area of expertise.

3) Is the draft report clear and logical?

I found the draft report to be clear and logical.

4) Are the conclusions drawn or recommendations provided supported by the body of the draft report?

The conclusions and recommendations are adequately supported by the body of the draft report.

Comments from Dr. Daniel Stram

1) Were the charge questions to the committee adequately addressed?

Overall I thought this was a useful review of the report and answered the specific charge questions as well as could be managed. The responses to the charge questions seemed generally on point, Suggestions about creating a sampling framework for future ex post studies as part of answer to Charge Question 7 seemed very germane.

2) Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report?;

None that I could detect

3) Is the draft report clear and logical?;

I was very happy with the overall clarity (even when the charge questions themselves seemed a bit murky). I felt that I learned a lot from reading the SAB report, even though I was starting from near zero on this topic

Comments from Dr. Jeanne Van Briesen

1. Were the charge questions to the committee adequately addressed?
 - a. Yes. Despite the large number of sub-questions within each charge question, the committee did an admirable job addressing all components of the questions. The responses identify clear areas for improvement as well as suggestions for alternative approaches that will move the work toward those improvements.
2. Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report?
 - a. I note no technical errors or omissions. I appreciated the focus on the recommendation, repeated often, that a systematic approach across the case studies is necessary.
 - b. For Charge question 5, parts a/b, the responses highlight a critical problem in the original analysis related to capital expenditures made in advance of rule promulgation, and the need for more data. And, part b suggests at a high level an approach for disentangling costs; however, this section would benefit from additional detail regarding the use of heterogeneity in regulation to assess this issue.
 - c. In section 3.3.3, can the committee give examples of how the different types of data were used within the case studies that demonstrate the context-dependency of appropriate method selection?
 - d. In section 3.2.3.a, if the question was specific to the case studies in the report (the first 5), could the response be less general? Among the five cases reviewed, are there cases where drawing conclusions is less or more defensible? This comment amounts to asking for an example in this section from the report to demonstrate the statement that conclusions are more defensible when multiple methods corroborate each other.
 - e. In section 3.2.3, b, additional content in response to the question of the drawbacks to applying a consistent metric would be helpful? Is it relevant to call +/- 25% consistent or would consistency be using some fraction related to the uncertainty in the actual case study data? Can the under or over estimation even be reported as a percentage given the earlier recommendation to provide a range of estimates rather than a single number (bottom of page 12)?
3. Is the draft report clear and logical?
 - a. The report is very clear. The authors are to be commended for creating a clear response to the multiple components of the charge questions, and providing a logical path through the material.

4. Are the conclusions drawn or recommendations provided supported by the body of the draft report?
 - a. Yes. The conclusions are supported by the report. A significant change in direction is recommended for the next phase of the activity planned by EPA. The report clearly explains why the planned approach is likely to be less useful than the recommended approach.

Comments from Dr. John Vena

1) Were the charge questions to the committee adequately addressed?

In my view Q 6 B was not answered.

2) Are there any technical errors or omissions or issues that are not adequately dealt with in the draft report? Yes no comments

3) Is the draft report clear and logical?

The executive summarizes the response to groups of charge questions which leads to very brief articulation of the responses. For example for Charge Q 2 the response provides a very nice classification scheme for factors that affect estimates. This is not mentioned in the executive summary.

4) Are the conclusions drawn or recommendations provided supported by the body of the draft report? Yes