Summary Minutes of the United States Environmental Protection Agency (U.S. EPA) Science Advisory Board (SAB) Mercury Review Panel Teleconference July 20, 2011

Meeting of the Mercury Review Panel[1]

Date and Time: July 20, 2011, 1:00 p.m. – 4:00 p.m. Eastern Time

Location: By Teleconference

Purpose: To discuss a draft (July 12, 2011) panel report, *Peer Review of EPA's Draft National-Scale Mercury Risk Assessment*[2]

SAB Members and Liaison Participants:

Panel Members

Dr. Stephen M. Roberts, Chair
Dr. David T. Allen
Dr. Thomas Burbacher
Dr. James Burch
Dr. Hilary Carpenter
Dr. Celia Chen
Dr. Miriam Diamond
Dr. Thomas Holsen
Dr. James Hurley
Dr. Leonard Levin
Dr. C. Jerry Lin
Dr. Jana Milford
Dr. M. Christopher Newland
Dr. Nicholas Ralston
Dr. Stephen L. Rathbu
Dr. Eric P. Smith,
Dr. Edwin van Wijngaarden

SAB Staff Office Participants

Dr. Angela Nugent, Designated Federal Officer (DFO)

Teleconference Summary:

The teleconference discussion generally followed the issues and timing as presented in the agenda,[3] unless otherwise identified below.

Convene the meeting

Dr. Angela Nugent, Designated Federal Officer (DFO) formally opened the advisory meeting and took roll. She noted that the panel meeting was conducted under the auspices of the SAB and had met the requirements of the Federal Advisory Committee Act. As part of those requirements, the teleconference was announced in the Federal Register[4] and EPA had provided an opportunity for the public to provide oral and written comments. She announced that there had been no request for oral comment and that one set of written comments had been provided for the committee's consideration prior to the meeting.[5] These comments had been posted on the SAB website and circulated to panel members.

She asked members of the public participating by teleconference to contact her so that their names could be listed in the minutes (Attachment A).

Purpose of meeting and review of the agenda

Dr. Stephen Roberts, the Panel Chair, welcomed panel members and reviewed the purpose of the meeting, to reach closure on substantive issues and edits to a July 12, 2011 draft panel report entitled *Peer Review of EPA's Draft National-Scale Mercury Risk Assessment.*[6] He introduced Ms. Lydia Wegman, from the EPA Office of Air Quality Planning and Standards (OAQPS). Ms Wegman thanked the chair and panel for their work and helpful comments. Her office intends to address the comments provided by the panel in revisions to EPA's Mercury Risk Assessment.

Dr. Roberts asked panel members to focus their teleconference comments on substantive issues in the draft document to ensure that the text clearly and accurately reflected the panel views.

Panel discussion of substantive issues

The first substantive topic addressed mercury deposition patterns. Dr. Zachary Pekar, OAQPS, referenced the memorandum provided to the DFO on July 1, 2011 on "Clarification and Updating of Mercury Deposition Maps Provided in the Technical Support Document: National-Scale Mercury Risk Assessment."[7] He explained that as a result of comments made by members of the SAB Mercury Review Panel at their June 15-16, 2011 meeting that EPA had plotted intermediate calculations, rather than final calculations of CMAQ results on watershed maps. He had provided updated maps in the July 1, 2011 memorandum and stated that EPA plans to use the new plans in revisions to the Mercury Risk Assessment. SAB members expressed satisfaction with EPA's response and noted that the new figures match expectations regarding distribution of mercury deposition.

The panel chair noted that the panel will reference the July 1, 2011 memorandum in section 9.1.1 of the panel report, which provides comment on analytical results related to mercury deposition from EGUs. The section will also support EPA's plan to include updated figures from the memorandum in EPA's Technical Support Document as replacements for figures 2-1 to 2-4 in the current draft.

The second substantive issue concerned EPA assumptions concerning the size of fish consumed. This issue was highlighted for discussion by a public commenter. The Panel agreed to add language calling for EPA to better explain its rationale for assuming that subsistence consumers eat fish larger than seven inches in length and for EPA to provide references supporting its assumptions. This language should appear in section 5.1 and uncertainties related to the size of fish consumed should be discussed in section 8.1. in response to charge question 12. The panel report should clarify that panel members do not assume that smaller fish are not consumed.

Many other substantive issues were discussed as the panel reviewed the matrix displaying Panel members' comments by section of the report.[8] The resolution of each comment is documented in Attachment B.

After conclusion of the discussion of comments in the matrix, the Panel briefly discussed one other topics. One member suggested that the report advise EPA to better justify its choice of a Hazard Quotient of 1.5 as a benchmark. The Panel agreed to add this language.

Discussion of next steps

The Panel chair asked participants if they agreed that the draft report, when edited to reflect the changes discussed during the teleconference, was a consensus report of the Panel and ready to be transmitted to the chartered SAB for review. All agreed to the edits and to transmission, given that the changes were faithfully implemented. The chair and DFO committed to revise the report and to provide it to panel members for a brief review for editorial comments. Ms Lydia Wegman noted that EPA was moving ahead to implement the necessary changes in the report identified by the Panel and that there would be no further peer review of the document.

The Designated Federal Officer adjourned the meeting at 4:45 p.m.

Respectfully Submitted: Certified as True:

/Signed */Signed/*

_____ _____

Dr. Angela Nugent
DFO, SAB Mercury Review Panel

Dr. Stephen M. Roberts
Chair, SAB Mercury Review Panel

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by committee members during the course of deliberations within the meeting. Such ideas, suggestions, and deliberations do not necessarily reflect definitive consensus advice from the panel members. The reader is cautioned to not rely on the minutes 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: Members of the Public and EPA Participating in the Teleconference

Rick Bolfing, Kentucky Bureau of Air and Radiation

Sharan Campleman, Electric Power Research Institute

Victoria Finkle, Inside EPA

Jane Halbedel Sierra Club

Bryan Hubbell, EPA, OAQPS

John Jansen, Southern Company

Allison Jenkins, Texas Commission on Environmental Quality

Amy Lang

David Michaud

Zachary Pekar, EPA, OAQPS

Lou Pocalujka, Consumers Energy

Pranesh Selvendiran

Lydia Wegman, EPA, OAQPS

Linda M. Wilson, NYS Office of the Attorney General

Attachment B
Substantive comments received from members of the SAB Mercury Review Panel and resolutions identified during the June 20, 2011 Teleconference

	Page,Line	Comment	Commenter	Decision reached during 07/20/11 Teleconference
	Passim			
1.		Use of term "methylmercury" and "mercury" in the Executive summary throughout the document: Just as the TSD was very inconsistent in its use of methylmercury and mercury, the comment document of the Panel is also very inconsistent. We need to make sure that when we say "fish tissue methylmcury data" (p. 3, 2nd paragraph) that the data were in fact methylmercury. Most state and federal monitoring programs analyze total Hg. Even though >90% of total Hg in piscivorous fish is methylmercury, both the TSD and our comment on it should be accurate about what data were actually reported.	Chen	Clarify early in the document that methyl mercury is the focus, but that very often fish tissue measurements do not discriminate between methyl mercury and mercury. Explain that even when mercury is what's measured, the methyl mercury component is very high. Cite the Bloom article to support the Panel's assumption that all mercury is in the methyl form.
2.		General comment on fish tissue methylmercury data. I don't think that anywhere in the document, nor our response, have we mentioned that fish in the study were probably not all analyzed directly for methylmercury. It is highly unlikely that they were. Most agencies measure total Hg and assume that all Hg present in fish tissue is in the methyl form. This is a standard assumption in the literature, but we should state that fairly early in the report and the following reference would work best for our assumption that all Hg is in the methyl form: Bloom, NS. 1992. On the Chemical Form of Mercury in Edible Fish and Marine Invertebrate Tissue Canadian Journal of Fisheries and Aquatic Sciences Vol. 49, No. 5, p 1010-1017.	Hurley	
3.		Since such a large number of requests are made by the Panel to EPA for revisions, expansion, clarification etc in the TSD, it would be useful to	Levin	Do not add table.

	Page,Line	Comment	Commenter	Decision reached during 07/20/11 Teleconference
		prepare a summary of all such recommendations to EPA in a simple table, probably at the beginning of the Panel Report to EPA SAB. That would be a good synoptic view of what the Panel is requesting to make the TSD complete and satisfactory from what appears to be judged unsatisfactory at the moment.		
	Letter to the Administrator			
4.	cover letter page 1; lines 45-46;	In at least two places (once in the draft cover letter, once in the draft report), nearly identical language is used stating unconditional approval of the risk assessment Change existing text The SAB founds that the risk assessment provides an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs to The SAB **FINDS** that the **DESIGN OF AND APPROACH TO THE** risk assessment **IS ABLE TO** provide~~s~~ an objective, reasonable, and credible determination of the potential for a public health hazard from mercury **CURRENTLY** emitted from U.S. EGUs.	Levin	Change text to: The SAB finds that the design of and approach to the risk assessment is able to provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury currently emitted from U.S. EGUs Also: Page 2 Line 18– drop first sentence and provide different segue from the discussion of the approach to discussion of the analysis
5.	Page 2, Lines 8-9.	There appear to be some data from all states. I would say that "… watersheds in some states with areas with relatively high mercury deposition from U.S. EGs were under-sampled due to lack of fish tissue methymercury data."	Rathbun	Make change
6.	2	bottom of page, "The Panel agreed that fish nutrients can potentially influence neurological effects associated with methylmercury...". I recommend replacing "influence" with ameliorate since "influence" does not convey the positive benefits that can accrue with fish consumption.	Diamond	Make change

	Page,Line	Comment	Commenter	Decision reached during 07/20/11 Teleconference
7.	Page 2, Line 34.	Does this refer to selenium? Can we be more specific regarding what fish nutrients may potentially have neurologic effects?	Rathbun	add (e.g., omega-3 fatty acids)
8.	Pg 3, line 29	Existing text reads *but not the largest, edible fish, the 75th percentile fish concentration was selected for watersheds with more than one fish concentration value.* Should this be one or more?	Smith	Should be "one or more"
	Executive Summary			
9.		The issue of the uncertainty in the mercury emissions inventory should be brought to the fore by inclusion in the Executive Summary. The issue is listed amongst sources of uncertainty in the response to question 12. As I comment below, the emissions inventory underpins the final results and "take home" message of the entire risk assessment. A major result of the Risk Assessment is that 5% (and up to 30%) of total Hg deposition is attributable to US EGUs in 2005 and drops to 2% in the 2016 scenario. This finding then is translated into US EGU-attributable risk. What is the source of the 95% of atmospheric mercury emissions? We discussed that the EGU emissions were probably best quantified, but the uncertainty in the non-EGU emissions becomes equally important when the results are expressed as a percentage of total emissions. During the public meetings we were provided few additional insights into the uncertainties in this inventory. An example of the type of discussion needed is provided by the discussion of the fish tissue database that our comment discussed at length. Issues raised were differences in methods and protocols used by the variety of agencies from which fish tissue data were gathered, that could lead to not only uncertainties in the overall results, but also biases in, for example, spatial extent of elevated mercury concentrations. Is the same true of the inventory? Do the inventory data come from different sources that use different methods to derive estimates (e.g., emissions factors)? Might there be regional differences in the accuracy of inventory data? Might there be differences according to sector, e.g., greater accuracy amongst EGUs but lower accuracy amongst other emitters? Given the uncertainties, I recommend that this issue receive greater attention in our final	Diamond	- Page 4 of ES, line 17, add sentence to that paragraph "The Panel recommends that the EPA provide additional discussion of the emissions inventories used in the risk assessment."

	Page,Line	Comment	Commenter	Decision reached during 07/20/11 Teleconference
		report. The Executive Summary is well written and encapsulates well most of the discussion. There is one nagging and potentially important point that's missing however. That point is whether the results make sense. While the Panel agrees with the overall method used (i.e., the scientific approach is defensible), the results of the analysis hinge on information – Hg emissions inventory of EGU and non-EGU sources – to which we are not privy and have no sense of its uncertainty. Thus, while we can endorse the method used, etc., the final results of the analysis could be wrong if the emissions inventory contains errors. At the end of the day, I'm left wondering what sources of Hg are contributing most of the risk in all watersheds since it isn't EGU-derived Hg. I recommend that the EPA "ground truth" model results for several watersheds. Do the results make sense?		
10.	1	In the Executive Summary, it may be useful (for the SAB Quality Review) to state that the panel was provided with 14 charge questions, many with multiple parts, and that the Executive Summary will highlight the main findings, not detail the responses to individual charge questions	Allen	Insert suggested text on bottom of page 1
11.	1	Here and elsewhere near the beginning, it is not made clear exactly what the risk assessment consists of, which parts of the risk assessment are in the Technical Support Document (TSD), and whether [risk assessment]=[TSD] or is a subset, superset, etc.	Levin	Insert text identifying what the TSD is vis a vis the risk assessment
12.	1, line 16	should read "specifically hazardous to children…"	Rathbun	See next comment
13.	1, line 16	Change language from "subsistence fisher women" to "women who consume local fresh water fish in a subsistence manner." (The language change I suggest here is necessary because the mothers, themselves, do not need to be the people who actually fish in order to be addressed by this model.)	Stern	Change to a version of the suggested language
14.	1, 19-23	The draft text reads: The contribution of U.S. EGUs to the HQ for each watershed was calculated by comparing U.S. EGU deposition rates with total deposition to the watershed, including other sources, assuming that	Swain	Make change

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		the contribution of U.S. EGUs to fish tissue concentrations and risk is proportional to their contribution to total emissions. The last word should be changed to "deposition," rather than "emissions," as fish tissue concentrations of mercury in a waterbody are thought to be proportional to mercury deposition in that waterbody's watershed, not emissions.		
15.	2	(top). Do we really want to use the term "cursory" for our general overview of the quality of the document? That word can actually be stricken from that sentence and we would still get the same point across – that it was lacking critical details on methodologies. I just think that a reader of the report will probably spend most of their time on the Executive Summary and the term "cursory" might be a little too negative.	Hurley	Change to "to lack some critical details…" Drop word cursory. Also edit page 7, first sentence to be similar
16.	Pg 2 Ln 6.	Replace "and what the results are intended to represent" with "and allow better translation of the results"	Hurley	Make change
17.	Pg. 2	Change language [draft report] With this understanding, the Panel viewed the risk assessment favorably, concluding that it provides an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs To: With this understanding, the Panel viewed the DESIGN OF AND APPROACH TO THE risk assessment favorably, concluding that it IS ABLE TO provides an objective, reasonable, and credible determination of the potential for a public health hazard from mercury CURRENTLY emitted from U.S. EGUs	Levin	Make change identified in 4 above
18.	2, 3rd	Change to: "They noted that a number of measures of potential	Levin	Make change

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	paragraph	neurodevelopmental effects of methylmercury exist, some of which have greater sensitivity TO DIFFERENTIAL MERCURY EXPOSURE than DOES IQ loss		
19.	2, line 29	After discussion of IQ, insert sentence "However, the panel agreed that because the RfD, from which the HQ is calculated is an integrative metric of risk, it constitutes a reasonable basis for assessing risk."	Stern	Make change
20.	2, line 31	Revise sentence "... used in the risk assessment has validity, IQ loss..	Stern	OK
21.	Page 3, line 5	Change text to read should read "suited to follow deposition patterns of a single source such as EGU, and increase the likelihood …" I would remove the word 'relatively' on Line 6 since this term seems somewhat vague.	Rathbun	Make change
22.	Page 3, Lines -14 to -13.	We may wish to remark that since the 75th percentile will be underestimated, the risk assessment will be conservative; i.e., yield underestimates of risk to subsistence fisher populations.	Rathbun	Instead of saying conservative, drop second half of sentence, so sentence reads:"The 75th percentile concentration and exposure will be underestimated"
23.	Page 3, line13	Line -13 implies that we are making population-level inferences to the 88,000 HUC12s in the U.S. I would rewrite this to state: "to estimate the number and percentage of fish-sampled watersheds where populations may be at risk."	Rathbun	Make change
24.	Page 3, line 21	It is not clear why NJ is included in this list. There are a reasonable number of watersheds with fish Hg data available - if not through EPA, certainly through the NJDEP.	Stern	Revise sentence to read: "The Panel was concerned about the absence of fish tissue data from some watersheds in states with higher levels of mercury deposition." – don't mention states
25.	3, line 44-45	While I know what "as consumed" refers to, it is not clear what is meant here"	Stern	Revise to read " edible fraction of the fish"
26.	4, line 12	Should this be "Inclusion of several additional sources of variability and	Rathbun	Change from "specific" to

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		uncertainty was recommended"?		"additional"
27.	4, 3rd paragraph:	In the discussion of whether to exclude watersheds with existing fish advisories, it is true that studies show that most people disregard advisories and therefore, they should not be excluded. But they should also not be excluded because they should be counted in terms of their potential to expose humans to Hg since the idea is that reducing emissions would also reduce Hg in those systems as well.	Chen	Drop reference to fish advisories
28.	Pg 2 Ln 7.	Replace "understanding" with "additional information"	Hurley	Make change
29.	Page 2, Line 11	Replace "findings. The Technical Report is wholly inadequate in providing this." With "and the Technical Report needs to be strengthened to provide this description."	Hurley	Make change suggested by Dr. Hurley
30.	Page 2	ES, p. 2 The language "unsuitable in its present form" and "wholly inadequate" is too strong and is not consistent with the findings and tone of the rest of the document. I would suggest changing to "… inadequate in its present form to fully support agency decision making …" Also, please change "wholly inadequate" to "inadequate."	Milford	
31.	Pg 3, ln 6.	The sentence "The Panel noted that one disadvantage of smaller watershed size is that the number of fish samples with methylmercury data is diminished." might better read "The Panel noted that one disadvantage of smaller watershed size is that *within a given watershed,* the number of fish samples with methylmercury data is diminished."	Hurley	Make change
32.	Page 3 par 3 line 6 –	Replace "…the 75th percentile concentration will be underestimated," with "the 75th percentile concentration most likely will be underestimated,"	Hurley	Make change
33.	Page 7, par	See discussion above for the term "cursory". Suggest replacing "The	Hurley	Change whole sentence to

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	1 –	Panel had difficulty evaluating the Technical Support Document because it is much too cursory." To "The Panel had difficulty evaluating the Technical Support Document because it lacked the proper detail necessary for full evaluation of the proposed risk assessment."		read: "The Technical Support Document needs to do a much better job of explaining what was done and why, translating the results into findings that relate to the key goals of the analysis, and describing where the uncertainties lie.
34.	7, first line of paragraph responding to Question 1	Please consider changing the first sentence in the second paragraph of the response to "The overall approach used in the study is to estimate potential risk at a national scale, attributable to mercury released from U.S. EGUs and deposited to inland waterbodies, for recent (2005) and future (2016) emissions levels." The original sentence suggests the risk assessment was more comprehensive than it actually was.	Milford	Make change
35.	7, Line 28-32	Revise existing text "Human exposure and potential health effects in these at risk watersheds are then assessed by examining the main exposure pathway of ingestion of self-caught fish from inland water bodies for maximally exposed individuals (subsistence fishers)." To read as follows: Human exposure and potential health effects in these at risk watersheds are then assessed through the pathway of ingestion of self-caught fish from inland water bodies for maximally exposed individuals (subsistence fishers assume a default intake rate that is waterbody-independent)."	Stern	Change to a version of the suggested language
36.	7, Line 41	Revise existing test "a determination of potential exposure at watersheds" to read " determination ofwatershed impact with exposure addressed as a potential outcome."	Stern	Make change
37.	P.7, line 10	might read "for vulnerable subsistence fisher populations" deleting the material in parentheses.	Rathbun	Make change

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38.	p. 9, 18-24	I think we need to say something about why we think the RfD (i.e., HQ) is a more appropriate metric of MeHg effect. I suggest the following language: "The reason for this is that the RfD is an integrative measure reflecting a range of neurobehavioral effects and it incorporates pharmacoknetic variability"	Stern	Make change
39.	9, line 36-38	Need a cited reference for the phrase "..not highly correlated…" in " … the Psychomotor Development Index has been most sensitive measure and, while this is a component of the Bailey Scales of Infant Development, it is not highly correlated with cognitive measures."	Levin	Chris Newland will provide reference
40.	10, 1st line, last paragraph	"There is no credible alternative …" [not alternate, which means "every other one" in a series]	Levin	No change - Agency charge question/not the panel response
41.	10, bottom	Why should we expect a larger decrease in the tails of the distribution?	Rathbun	Drop last two sentences
	4. Overview of Risk Metrics and the Risk Characterization Approach			
42.	11	Can't recall if we discussed this but in some states lakes are not real lakes but are man-made. Virginia, for example, only has two natural lakes. Characteristics of these man-made lakes are quite different from natural lakes.	Smith	No change
43.	11, last paragraph	refers to the legend of Figure 2-6 indicating that almost 300 samples were from Western sites, however, the legend for Figure 2-6 doesn't appear to refer at all to westerns site nor does that map have the western part of the country.	Chen	Revise text to indicate that 2,170 out of 2,461 watersheds are from Eastern U.S.
44.	12, last paragraph	The phrase "…there are some states that receive elevated mercury deposition from U.S. EGU emissions and…" seems broad and indefinite. What is meant by " elevated mercury deposition"? Does this mean any deposition above what would be present if no (U.S.) EGUs operated? Above natural background deposition? Or above some unspecified lower	Levin	Put "relatively elevated deposition" in quotes

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		threshold value? Simply remove the word "elevated," which can ambiguously mean "higher than otherwise" or alternatively "unacceptably high."		
45.	13, line 1	As noted previously, there is considerable and regularly updated Hg fish data from NJ. It is not clear where this statement originated.	Stern	No change
46.	13, line 25	"Researchers have developed empirical relationships for fish methylmercury concentrations using water chemistry and land cover data. These empirical relationships have been used to estimate methylmerucy concentrations for different fish species across states and regions." I suggest that references be added to this. Are the empirical relationships available to estimate fish Hg levels across all types of water chemistries or are their limitations to the use of these relationships? Have the relationships (a few or many?) been well evaluated	Diamond	Cecila Chen will provide references
47.	14, line 4	*only one fish sample with a fish tissue methylmercury concentration available*. -- do we want to clarify this to be ... concentration available for fish greater than x in.	Smith	No
48.	Page 14, Lines 6-7.	Could we make a precise statement indicating what percentage of watersheds only had a single fish sample?	Rathbun	Eric Smith will provide suggested language
49.	Page 14	Should we add a bit to the legend of figure 1 *Figure 1*. Sample size plot for lakes and rivers using Excel data provided to the panel. The x axis (groupN) corresponds to the variable N_observations_post_river that is the number of observations in the post period for data from rivers within the HUC. When sample sizes are 20 or greater, a category is used i.e. 20 corresponds to 20 to 25, 25 corresponds to 26 to 30, etc. The figure is just for rivers, not lakes and rivers.	Smith	Make change – Add language
50.	Page 15	Add to legend for Figure 2 *Figure 2: Comparison of mercury concentrations in fish as it relates to sample size in river and lakes combined using Excel data provided to the panel. The fitted curve is based on a loess smoother with smoothing parameter 0.2*. -- The figure is just for rivers.		Make change
51.	14	p. 12 3rd paragraph: This paragraph shows the inconsistency of the use of fish methylmercury (1st line) and fish mercury (4th line).	Chen	Edit document for consistency

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52.	14, Bottom	The rapid increase in the estimated 75th percentile for small samples is likely to be a statistical artifact associated with estimating 75th percentiles when the sample size is small. The continued increase in estimated 75th percentile with increasing sample size suggests sampling is biased in favor of watersheds with higher fish Hg concentrations. For example, the detection of high fish Hg levels in a watershed may prompt states to put more fish sampling effort into that watershed.	Rathbun	No change
53.	Page 14 par 1 and Figure 1.	I'm a little confused here, especially by the statement that begins in line 3: "Much concern was raised about the fact that **over half** of watersheds have only one fish sample with a fish tissue methylmercury concentration available." Figure 1 shows that about 650 watersheds have only one fish methylmercury measurement. I assume that there are 2,461 watersheds used. That's not over half. Also, eyeballing the bars in the plot, they don't seem to add up to 2,461. We need to clarify the apparent discrepancy.	Hurley	See response to item 48
54.	15	P. 15. "The Panel recommended that the document provide more detail (preferably in tabular form)...." I'm concerned about the amount of work involved with this recommendation (compiling information "...on the scope and purpose of each sampling program, methods used, the types of fish obtained,..." etc.). This could be an enormous effort! I suggest that the EPA first assess the relative magnitude of error introduced by this uncertainty and then judge whether this uncertainty merits the output of effort necessary to provide the information suggested. The information compiled (e.g., purpose of each program) will not necessarily better constrain the uncertainty in the analysis.	Diamond	Revise language to delete reference to tabular format. Instead direct EPA to provide general discussion of differences in state agency sampling programs that introduce uncertainty in the analysis.
55.	16, Top	I think that it would be difficult to provide much detail regarding the methods used to obtain fish samples given that each state likely uses their own unique methods.	Rathbun	
56.	16, line 7	should read "…fish tissue data, which may or may not represent the fish in the watershed or the fish consumed	Rathbun	Make change

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57.	17 2nd paragraph, lines 18-19]	Object to and disagree with the phrase "The risk assessment provided a thorough literature review and…" As was noted several times at the RTP Panel meeting, a number of relevant references were omitted in the TSD document, some of which would substantively change numerical estimates used in the TSD and risk assessment. Among these were peer literature citations with alternative cooking loss factors for fish mass, estimates of EGU contributions to putative IQ loss, etc. In some cases, the only literature that was cited on a topic was by EPA authors (on, e.g., cooking loss factor), while literature that was not cited, also by EPA authors, would have detracted from the TSD conclusions. Suggest omitting those words completely and changing the phrase to "The risk assessment used sources that reported daily consumption for populations of low socioeconomic status…"	Levin	Make suggested change
58.	p. 17 Response paragraph 3.	The concern about seasonality seems overstated. Given access to a freezer or other processing, fish consumption may not be as seasonally variable as fishing.	Milford	Insert "however " sentence, something like: "Fish derived mercury could be overestimated if seasonality assumption, but some communities preserve fish for consumption in non-fishing season"
59.	17, line 38	After "as prepared," insert text: Add: "Data on consumption generated from Southern states (e.g., Burger's data from South Carolina) may reflect year-round consumption, whereas fishers in Northern states may only fish for 9 months a year or less. For such populations, the consumption rate should be annualized to g fish/wk/yr	Smith	Add
60.	18, Question 8	[The Panel support for selecting fished waterways based on a minimum of 25 individuals from target populations may in fact be misplaced. Since sport anglers often select waterways based on their isolation, under-fishing, and lack of disturbance to the ecosystem, how is one to know whether subsistence anglers might choose waterways to fish based on the same criteria? In other words, it is difficult to wholeheartedly back a screening method that may be itself flawed.	Levin	Add "possibility that more remote waterways are fished by subsistence anglers as well"

	Page,Line	Comment	Commenter	Decision reached during 07/20/11 Teleconference
61.	19	The response to "Limitations/uncertainty associated with MMAPs approach and proportionality assumption". Two issues are presented in the response. The first is a critique of MMAPs and the second is the evaluation of CMAQ results. For example, "There are quite a few comparisons, for example, between mercury wet deposition as modeled by CMAQ and as observed by the Hg Deposition Network." These two points should be clearly separated in our response. The discussion of MMAPs relates to whether you can use the assumption of simple proportionality to translate from fish concentration A under deposition regime A to fish concentration B under deposition regime B.	Diamond	Add reference regarding mercury wet deposition looking like what's measured (ask EPA provide reference). Jerry Lin will provide reference. Miriam will provide rewrite, which will separate out discussion of proportionality assumption with lead in sentence
62.	20	I have one minor comment (probably not substantive) on page 20 line 6 - I think the (II) should be deleted so it reads "mercury deposited" not "mercury(II) deposited."	Holsen	Make change
63.	21	R-MCM has been evaluated on a population of watersheds, but not all that are covered in the Risk Assessment, e.g., highly turbid rivers. I would add the comment that R-MCM is very data intensive, but that this intensity makes running the model impractical. Furthermore, running R-MCM won't necessarily add additional insight into whether MMAPs is adequate because the key point to MMAPs is the assumption that the proportionality holds when the system reaches steady state. Few (one from ELA?) data sets would be available to test the efficacy of either model over time as a system responds to changes in loadings and has time to reach steady state. Thus, I am not convinced that "running an alternative model framework would provide additional reassurance that the Mercury Maps "base case" approach was a valid one..." (last sentence of answer to Question 9).	Diamond	Page 21, line 16, change "would" to "may"
64.	21, Answer 10	What is the basis for using the threshold value of 39.7 pounds of mercury reported under TRI as the criterion for including/excluding a watershed? The document states that the 39.7 pounds of mercury releases pertained to all media. How many watersheds were excluded using this criterion, that received mostly atmospheric releases of mercury?	Diamond	No change
65.	22 last	Please delete the suggestion about omitting watersheds with fish	Milford	Delete bullet

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	bullet	advisories or indicate that some panel members disagree with this suggestion. I don't believe it represents a consensus of the panel. EPA should not be ignoring potential risks just because fish advisories have been posted.		
66.	22 last bullet	There are few sampled waterbodies without some level of Hg advisory. However, it needs o be kept in mind that advisories generally take the form of restriction on the frequency of consumption rather than a strict eat/don't eat advisory. Therefore, this criterion should be deleted.	Stern	
67.	23, line 44	Replace ‘’slope with ‘power’	Rathbun	Change to “power coefficient”
68.	24, 1st and 2nd full paragraphs	(Several instances) The term “omega-3” (as in omega-3 fatty acids) is modified to “n-3.” This is primarily a Microsoft typographic problem. Suggest solving it by spelling out “omega” to change entries to “omega-3.”		Make change
69.	24	p. 24, paragraphs 4 and 5: Since the demonstration of nutritional selenium intake and reduced Hg effects have not been demonstrated in humans, these the prediction of accentuated adverse effects of high MeHg exposures in populations with poor selenium intakes seems premature to state and considering their selenium intake also seems premature as well.	Chen	Shorten paragraphs 3 and 4 to two sentences. Describe the masking effects of selenium and note the extent to which this information translates to human health populations is not clear at this time. Nick Ralston will send references supporting the masking effects of selenium
70.	26 and -27, last line page report-26	The two figures now become Figure 3 and Figure 4; add reference text on page report-26 to read “…public meeting on June 15, 2011 and reproduced below (see Figures 3 and 4, next page).”	Levin	Make change

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71.	26, bottom	In addition to recommending that the figures be added to the report, we may also wish to recommend that they be accompanied by a written explanation of how the calculations were conducted.	Rathbun	Make change
72.		In the discussion of uncertainty, we may wish to suggest that for each source uncertainty, the direction of its effect on the overall risk assessment be described at least qualitatively. For example, the small fish sample sizes results in underestimates of the 75th percentiles which propagates to conservative underestimates of risk.	Rathbun	Make change
73.	28, last sentence of 1st paragraph	Disagree with the entire sentence: "Notwithstanding the sources of uncertainty inherent in the approach, the Panel was of the opinion that the analysis presented in the TSD is sound and reasonable." I feel we are unable to conclude anything about soundness or reasonableness without some quantitative assessment of uncertainty and variability in the component calculations, and the resulting risk results.	Levin	Resend: "Notwithstanding the uncertainties, the panel was of the opinion that the approach presented in TSD was sound and reasonable."
74.	pp. 28 – 30	The response to q. 12 needs to be copy edited, as this section contains several typos	Milford	Copy edit
75.	28-30	not sure how to fix this other than rewriting in prose, but the bulleted nature of these responses is inconsistent with how the responses to the other charge questions have been structured.	Van Wijngaarden	No change in format
76.	p. 28	In addition to recommending that the figures be added to the report, we may also wish to recommend that they be accompanied by a written explanation of how the calculations were conducted.	Rathbun	Make change
77.	p. 28	The bullet reading "Appendix F should identify meteorology boundary conditions from the model GEOS-CHEM, which that provides input to CMAQ " [sic] should be deleted. GEOS-CHEM provides chemical boundary conditions, not meteorology boundary conditions.	Milford	Make change
78.	29	2nd bullet: the second sentence, "The uncertainty in locations….", does not seem to make sense.	Chen	Miriam Diamond will revise language to clarify that the concern is How uncertain are we in the

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				2016 scenario that particular EGUs will have lower emissions
79.	p. 29	Third bullet, second sub-bullet. As written, this bullet is problematic, because the Air Quality Modeling TSD itself provides only cursory and apparently erroneous information about CMAQ model performance. Perhaps this bullet could be dropped and the first sub-bullet revised to simply say "More detailed description of model performance and uncertainty in CMAQ, including references to existing evaluations of the model."	Milford	Make suggested change
80.	report-29, "Hot spots" bullet	The term "Hot spots" should be shown throughout in quotes; the term has never been defined with scientific precision, and is loosely used by EPA and others to variously refer to: any deposition above natural background; deposition above some threshold; concentrations focused on a single location [an actual definition used by a government speaker]; etc. The text for the bullet should read "Appendix F should address whether the Mercury Maps approach, as implemented, is adequate to characterize **THE EXISTENCE AND EXTENT OF** mercury hot spots	Levin	Make change
81.	30, lines 8-10	Regarding adjustment between raw and cooked weight of fish: EPA relied on a single older study for this adjustment factor (1.5) in the TSD. Alternative and newer peer-reviewed papers were cited at the RTP Panel meeting that showed some mercury loss as well as fish mass loss upon cooking, and these alternative sources should be acknowledged and cited in the Panel report. There are many other citations possible, so that the basic uncertainty in the value chosen by EPA, and whether that value is too high or too low, remain to be determined and should be determined before the TSD is deemed completed.	Levin	Add citations that Leonard Levin will provide
82.	31, section 9.1.1, paragraph 2, first line.	"EPA's observations about mercury deposition as depicted in TSD Figures 2-1 to 2-4 are supported by analytical results" While I agree with this statement for the modified Figures 2-1 to 2-4 that we received after the panel meeting, these Figures were incorrect in the original report. This sentence should be clarified.	Allen	Add text to indicate that EPA's observations about mercury deposition as

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				depicted in analytical results as provided by EPA to the panel following the panel meeting. TSD Figures 2-1 to 2-4 should be corrected to correctly reflect total annual mercury deposition per square-meter by watershed.
83.		Finally, we mention the problems in the CMAQ-produced deposition maps a couple of times. Should we acknowledge the revised maps Zach Pekar provided us on 7/1/11?	Milford	
84.	31	Our comment that "EPA's observations are generally supported by the data presented in the assessment report". Does that refer to total Hg deposition or do we believe that the EGU-attributable deposition and non-EGU deposition accords with our knowledge? "EPA's observations about mercury deposition as depicted in TSD Figs 2-1-2-4 are supported by analytical results." What analytical results? Deposition flux, spatial pattern? These two sentences should be tightened up. I suggest that the recommendation to add to the discussion of uncertainty the review of model performance, which should be separated out from uncertainties in the inventories (EGU and non-EGU).	Diamond	Insert text to identify what is meant by EPA's "observation" in different subsections of 9.1
85.	32-33 bottom of page 32, top of 33	The first and third bullet seem contradictory. The first indicates limited coverage at high deposition sites, the third says that most of the sites have high mercury deposition. I would make the first one last and reword. Although many of the sites have high deposition, there are numerous sites that are expected to have high deposition but are not included in the study. The number of high deposition sites from this study should not be construed as the total number in the country.	Smith	Drop bullets
86.	33, line 39-30	The sentence "Also, none of the panellists were aware of the role turbidity may play in methylation." This sentence comes out of the blue in this paragraph. My recollection of the comment about turbidity relates to methylation potential, and how it might affect the assumption of the proportionality of fish mercury to atmospheric deposition, which is the basis of MMAPs.	Diamond	Remove this sentence
87.	34, first full paragraph,	"However, the panel suspects that the average mercury deposition rate that produces this incremental mercury concentration will be similar between the	Diamond	Change language – "The panel notes that …"

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	10 lines from bottom	2005 and 2016 scenarios." In fact, this is true, it's not a suspicion. It's true because MMAP "works" strictly by ratios so that no additional information will change the proportionality between Hg deposition and fish tissue concentration between 2005 and 2016.		
88.	page 35, line 34-35:	revise "that continue to be above the RfD (or above a change in 1-2 IQ points after EGU emissions are removed, if this aspect of the risk assessment is retained)." to "that continue to be above the RfD (or above a change in 1-2 IQ points, if this aspect of the risk assessment is retained) after EGU emissions are removed. Page 35 – make numbered list into paragraphs	Van Wijngaarden	Make change
89.	35 bottom	Here, we appear to be expressing a desire for population-level inferences, inferences which are clearly not possible using the available data. To obtain such inferences we would need to apply probability-based sampling designs to select watersheds for fish samples, and for sampling human populations to assess fish consumption rates among subsistence-level fishers, among other things.	Rathbun	Leave as is
90.	36 , top paragraph	Sentence "The inclusion of sport fishers with relatively higher fish consumption rates could expand the size and extent of the targeted susceptible population" is an important and critical one. EPA staff that addressed the RTP Panel meeting acknowledged they knew of, but did not cite, some references that used recreational angler data to assess the mercury-IQ effect, and that assessed the small (<4%) contribution of EGUs to this IQ effect. EPA staff emphasized their focus on subsistence anglers, taken to be a different population. But some recreational anglers are also in the subsistence angler sub-populations, and modeling and data relying on recreational angler behavior is therefore relevant to subsistence anglers as well. EPA completely ignores these alternative analyses rather than extracting relevant numerical information on, e.g., consumption rates that could inform the TSD and quantify both variability and uncertainty in the TSD analysis. This lack of further analysis of existing data	Levin	Add sentence to say that the Panel recognizes that some additional data may be available for recreational anglers, but that EPA did not have time or resources to integrate this information into the current analysis. Leonard Levin to provide citation for the Berkeley pier

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		should be noted by the Panel and acknowledged by (and corrected by) EPA		study.
91.	36, last paragraph in Question 14	This sentence is confusing and should be rewritten; suggest "While there are numerous UNQUANTIFIED sources of variability and uncertainty that are contained in the numerical estimates of potential risk, The variability and uncertainty do not CONTRADICT THIS BASIC finding.	Levin	Make change
92.	37	Disagree with the final sentence, which appears to be stating what the Panel would find in the future after changes are made to the TSD by EPA. Suggest altered wording to: "…the TSD, AFTER INCORPORATION OF the recommendations of the Panel, HAS THE CAPACITY TO MAKE an objective, reasonable and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs.		Adopt suggested change except substitute "should provide" for "has the capacity to make…
	Table of acronyms			
93.		Add: BMDL EPA GEOS-Chem HQ IQ M5RC - MMAP NESHAP PDI R-MCM SAB SES	Hurley	
94.				

Materials Cited

The following meeting materials are available on the SAB website, http://www.epa.gov/sab, at the following address: http://yosemite.epa.gov/sab/sabproduct.nsf/a84bfee16cc358ad85256ccd006b0b4b/c7093f7bfcc44b69852578b8006afb09!OpenDocument&Date=2011-07-20

[1] Roster, SAB Mercury Review Panel
[2] Draft SAB report entitled *Peer Review of EPA's Draft National-Scale Mercury Risk Assessment*.
[3] Agenda
[4] Federal Register Notice Announcing the Meeting
[5] Memo from Dr. Sharan Campleman, EPRI, dated June 18, 2011, re: Clarifying Question to SAB Technical Support Document (TSD) Mercury Risk Assessment: Charge Question #6.
[6] Draft SAB report entitled *Peer Review of EPA's Draft National-Scale Mercury Risk Assessment*.
[7] Memorandum from Zachary Pekar, July 1, 2011, Clarification and Updating of Mercury Deposition Maps Provided in the Technical Support Document: National-Scale Mercury Risk Assessment. (
[8] Panel members' comments by section of the report.