Summary Minutes
U.S. Environmental Protection Agency
Science Advisory Board
Perchlorate Advisory Panel

Panel Members: See Panel Roster[1]

Date and Time: Tuesday September 25, 2012, 1:00 AM - 5:30 PM

Location: Meeting conducted by teleconference

Purpose: To discuss substantive comments the panel's draft report *Draft (9/5/2012) Advice on Approaches to Derive a Maximum Contaminant Level Goal for Perchlorate* regarding EPA's draft white paper *Life Stage Considerations and Interpretation of Recent Epidemiological Evidence to Develop a Maximum Contaminant Level Goal (MCLG) for Perchlorate*

Attendees:

Panel Chair:	Dr. Stephen M. Roberts	
Panel Members:	Dr. Grant W. Anderson	Dr. Julie B. Herbstman
	Dr. Hugh A. Barton	Dr. Judy LaKind
	Dr. Nancy Carrasco	Dr. Paul H. Lipkin
	Dr. Claude Emond	Dr. Jennifer Peck
	Dr. Jeffrey Fisher	Dr. Joanne F. Rovet
	Dr. Mary A. Fox	Dr. Cheryl R. Stein
	Dr. Wendy J. Heiger-Bernays	
SAB Staff Office:	Mr. Thomas Carpenter, Designated Federal Officer	
Others Present:	See Attachment A	

Meeting Materials: All meeting materials are available on the SAB Web site at the Perchlorate Advisory Panel September 25, 2012 Meeting Page.

Convene Meeting

The meeting was announced in the Federal Register[2] and preceded according to the meeting agenda, as revised. Mr. Thomas Carpenter, Designated Federal Officer (DFO) for the Perchlorate Advisory Panel, convened the meeting at 1:00 p.m. on September 25, 2012. He stated that the EPA Science Advisory Board (SAB) was a chartered federal advisory committee and reviewed Federal Advisory Committee Act (FACA) requirements. He noted the panel's compliance with government ethics requirements and stated that the members have no conflicts of interest or the appearance of a loss of impartiality. Mr. Carpenter stated that as DFO, he would be present during the panel's business and deliberations. He informed participants that summary minutes of the meeting would be prepared by the DFO and certified by the Chair. He stated that the SAB Staff Office had convened an ad-hoc panel inviting experts to participate in the review of the available data and information to support a Maximum Contaminant Level Goal for perchlorate. The panel responded to Charge questions on exposed individuals at different life stages, epidemiologic and biomonitoring data, and physiologically-based pharmacokinetic (PBPK)

analyses to develop a consensus advisory report. Mr. Carpenter also noted that the panel provided preliminary comments and they are posted on the SAB web site.[3]

Introduction of Members, Purpose of Meeting, and Review of the Agenda
Dr. Roberts stated that the teleconference was convened to the review the *Draft (9/5/2012) Advice on Approaches to Derive a Maximum Contaminant Level Goal for Perchlorate,*[4] hereafter referred to as the Advisory Report and provided a brief overview. The organization of the draft advisory report directly responds to the Charge[5] to the SAB.

Dr. Roberts reviewed the meeting agenda[6] and provided an overview of how the panel would develop a consensus advisory report providing advice in response to the charge questions.

Public comments
Dr. Richard C. Pleus of InterTox Incorporated spoke on behalf of the Perchlorate Study Group. He highlighted key points from the Perchlorate Study Group's written comments and noted that the report lacked citations supporting hypothyroxinemia as a health effect rather than hypothyroidism, there is limited discussion addressing dose /response issues, and the panel should consider expanding the Charge to include other aspects of the rule in addition to the MCLG. Dr. Pleus also expressed concern that the SAB may be commenting on "policy areas or statements" rather than science issues. Two members of the panel asked for specific examples of policy statements in the report to help the panel better understand Dr. Pleus' distinction. Dr. Pleus offered to provide clarification after the teleconference and that letter[7] is posted on the SAB website.

Dr. Kevin Morley with the American Water Works Association also spoke at the meeting. He noted the written comments were also provided by AWWA and reiterated their position that the panel consider that the No Observed Effect Level is more protective of public health than using a No Observed Adverse Effect Level and therefore it is not necessary to develop a MCLG for perchlorate. He also noted the report should have more information and citations on dose-response and potential adverse effect. He stated that providing sufficient iodine supplements to mitigate hypothyroxinemia should be considered by the panel.

Written comments were provided by 6 individuals and they are posted on the SAB website for this meeting under Meeting Materials.

Mr. Tom Curtis American Water Works Association
Dr. Kimberly Wise, American Chemistry Council
Dr. Gail Charnley, Health Risk Strategies
Mr. Jonathan Bode, Perchlorate Study Group
Dr. John Reichard, Toxicity Excellence in Risk Assessment
Mr. Larry Ladd
Dr. Richard C. Pleus of InterTox Incorporated

Discussion of Sensitive Life Stages
Drs. Anderson, Carrassco, Lipkin and Rovet were the lead authors for this area and provided a summary of their respective reviews for the panel.

Members agreed on the responses to charge questions in this section; however, many commented on the need for further clarity, discussion, and citations of key points in the Advisory Report. They emphasized that the rationale for including a sensitive life stage analysis will be the foundation of other remaining sections of the report and should be expanded to support subsequent recommendations in a consistent manner.

Members discussed improving the draft report's definition of the sensitive lifestages for consideration. Members agreed that further discussion of hypothyroxinemic conditions and implications for the developing fetus and child of these women should be added to the rationale in section 3.1.1. and more specific examples and citations should be added to the specific questions concerning adverse effects from child and intrauterine exposure in Sections 3.1.3. and 3.1.5., respectively. Members agreed that the change to hypothyroxinemia from hypothyroidism is the appropriate thyroid condition to define the sensitive life stage for consideration.

Members expressed a desire for additional information on thyroid hormone reserves and commented that the report should be expanded to address sodium iodide symporter (NIS) levels, consequences of inhibitions, and NIS regulation. Members identified several studies that should be added to the section to support the recommendation to consider metabolic differences among life stages and the use of animal studies to support the discussion.

Members discussed the need to provide consistent definitions and terms in describing thyroid status. The current draft uses the terms subclinical hypothyroidism and hypothyroxinemic almost interchangeably and they noted this may be inaccurate and confusing to the reader. Members agreed to develop consistent language in this section and carry that language forward in other sections of the report.

Members discussed the NIS, iodide and thyroid mechanisms and which life stages are incorporated in the current PBPK model. They also discussed what efforts are underway to include further indicators of thyroid status (i.e., serum concentrations) and adverse effects predictions in future versions of the PBPK-PD model. Members agreed that the recommendation to use the PBPK modeling approach should acknowledge and document that the model addresses NIS, iodide and thyroid mechanisms and sensitive life stages identified in this section.

Members agreed that the section on "***Strengthening Future Research"*** should be better positioned as an appendix to the report or coordinated with the epidemiological section and its recommendations. Most of the recommendations focused on coordinating longitudinal studies, ongoing health data collection, and subsequent epidemiological analyses of those data.

Discussion of PBPK Modeling

Drs. Barton, Emond, and Fisher were the lead authors for this section and provided a summary of their respective reviews for the panel. Members identified several points for clarification in the preliminary comments that the authors believed could be readily addressed to improve the clarity of this section.

Members agreed with the recommendations in this section and discussed whether there are sufficient data and studies to support the use of the model and how that should be addressed under the integration of information.

Members discussed the benefits of using the PBPK model to conduct life stage analysis to develop the MCLG for perchlorate. Several members asked whether the data are sufficient to model changes in the percent iodide uptake inhibition, serum free T4, and thyroid stimulating hormone at different doses of perchlorate. The panel discussed the current capabilities of the model and how long it may take to incorporate major modules into the model (i.e., thyroid hormone prediction and neuro-developmental effects). They noted that the current model utilizes the percent iodide uptake inhibition used in the development of the RfD. A biologically based model to predict thyroid hormone levels in sera is currently being developed and may take several months to a year to complete. Lastly, incorporating neuro-developmental predictions in the model is a more long-term vision.

Discussion of Epidemiological Studies

Members identified minor editorial changes to this section of the report. Panel members discussed whether to bring the detailed critique of the epidemiological studies identified by EPA into the main body of the report. Members noted that the main body provides a discussion of the issues the authors identified in the epidemiological studies, provides recommendations on the use of the studies, and identifies study design and data interpretation concerns that should be addressed in future studies. Members found that these were the main issues that should be provided in the advice, and the detailed review of each study was available in the appendix of the report.

Lead authors agreed to address the panel's preliminary comments and public comments in the next draft of the report.

Discussion of Integrating Information

Drs. Hieger-Bernays, Fox, and Lakind were the lead authors for this section and provided a summary for the panel. Members agreed that the earlier discussion on the teleconference will need to be included in a revised draft of this section of the report. They noted that the previous discussion regarding a more consistent definition of the sensitive life stages, defining hypothyroxinemia, how to use the PBPK-PD model, and the panel's recommendations need to be brought into this section.

Members discussed the EPA regulatory schedule (to propose an MCLG by February 2013) and options for integrating the information using the PBPK-PD model to meet that deadline. Some members felt that the panel should consider providing advice to develop the MCLG and meet the regulatory schedule. Other members felt that incorporating the schedule as a factor in providing the best scientific advice was not a fair expectation from the panel. Members discussed Figure 2 in the draft report (p.24) and the data available to implement the three-step process to develop the MCLG. Some members noted that using the PBPK-PD model with the percent iodide uptake inhibition (Step 2) could expedite the EPA analysis, yet that approach would have the same set of uncertainties as using the RfD and formulaic approach to developing the perchlorate MCLG. Members noted that the uncertainties may be more robustly examined in the PBPK-PD modeling

than the uncertainty factors used in the RfD. Members discussed providing an alternative approach that uses the best currently available data and a preferred approach that may require additional level of effort to complete. Some members believed it is important to provide options to develop the MCLG and a discussion of the uncertainties and issues for each option that would allow EPA to evaluate alternatives. It would then be incumbent upon the Agency to document the choices made to implement an option and explain uncertainties associated with that selection. Other members expressed concern that providing a series of options would diminish the importance of developing a model to predict thyroid hormone serum reduction or neuro-developmental outcomes for the fetus - a life stage that cannot be monitored.

Members agreed to develop a set of options that EPA could evaluate to develop the MCLG. The options should present a continuum of steps using the PBPK-PD model in its current state to an ideal approach preferred by the panel. The options should proceed from using the percent iodide uptake inhibition in the current model to incorporating thyroid hormone level reductions to predicting neurodevelopmental effects. Members agreed that the next draft of the advisory report should identify the steps from which an MCLG could be developed and be explicit in identifying issues associated with selecting each option.

Discussion of Executive Summary and the Letter to the Administrator
Members agreed that the key issues and recommendations were captured in the Executive Summary and the Letter to the Administrator. However, some members felt that additional recommendations should be included. The Chair and DFO requested that writing teams identify additional issues and recommendations from their respective sections for inclusion for the next draft.

Discussion of Next Steps
Dr. Roberts reviewed the points that panel members identified as key issues and asked the panel for any additional thoughts. Panel members agreed that the key issues were identified and did not identify any additional issues or comments. Dr. Roberts asked the DFO to summarize the next step for panel members to develop the Advisory Report.

Mr. Carpenter stated that writing teams would edit sections of the draft Advisory Report based on comments provided, discussed and agreed upon by the panel. The DFO and Chair would develop a new version of the report and send it to the panel. The panel will meet again via teleconference to review a revised draft of the report. After assessing the availability of the members the teleconference will be announced in a *Federal Register* notice.

Dr. Roberts asked the panel for any questions or clarifications. Hearing no request from the panel, he then called upon the DFO to adjourn the meeting

The Designated Federal Officer adjourned the meeting at 5:15 p.m.

Respectfully Submitted: Certified as Accurate:

/Signed/
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Mr. Thomas Carpenter
SAB DFO

/Signed/
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Dr. Stephen Roberts
Chair

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 not to rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters, or reports prepared and transmitted to the EPA Administrator following the public meetings.

Materials Cited

The following meeting materials are available on the SAB Web site, at the Perchlorate Advisory Panel September 25, 2012 Meeting **p**age at

[1] Roster SAB Perchlorate Advisory Panel
[2] Federal Register Notice Announcing the Meeting (Vol 77 Number 104, Pages 31847-31848)
[3] Comments form Members of the SAB Perchlorate Advisory Panel on the draft (9/5/2012) report.
[4] Draft (9/5/2012) Advice on Approaches to Derive a Maximum Contaminant Level Goal for Perchlorate
[5] Charge to the SAB
[6] Meeting Agenda
[7] Clarification from Dr. Richard Pleus regarding the policy areas or statements in the draft report.

Attachment A
Members of the Public Who Requested Call-in Information for the Perchlorate Advisory Panel Teleconference[1]
September 25, 2012

Ms. Michelle Babin, Ketchum Inc.
Mr. Bob Benson U.S. EPA
Scott Biernat, Association of Metropolitan Water Agencies
Mr. Kevin Bromberg, Small Business Administration
Mr. Doug Brune, U.S. EPA
Mr. Eric G. Burneson, U.S. Environmental Protection Agency
Mr. Robert Cantilli, US EPA
Ms. Jennifer L. Carr, Nevada Division of Environmental Protection
Gail Charnley, PhD, HealthRisk Strategies
T. Matthew Cho, Ph.D, Navy and Marine Corps Public Health Center
Mr. Ken Clark, Boulder Public Works/ Utilities
Dr. Perry Cohn, New Jersey Dept of Health
Dr. Lisa Corey, InterTox
Casey Deitrich, CQ Transcriptions
Ms. Sue Dempsey, Nebraska Department of Health & Human Services
Dr. Elizabeth Doyle, US EPA
Dr. Bob Howd, ToxServices
Mr. Malcolm Garg, Army Environmental Programs
Dr. Ann Marie Gebhart, ToxServices
Dr. Mary E. Gilbert, US EPA
Ms. Jessica C. Godreau, North Carolina Public Water Supply Section
Ms. Susan Goldhaber, ToxServices
Dr. Michael Firestone, US EPA
Jeanene P. Hanley, Arizona Department of Administration,
Maria Hegstad Managing Editor, Risk Policy Report
Dr. Elaine Kahn, California Environmental Protection Agency
Mr Chris Knight, Pesticide & Chemical Policy
Mr. Larry Ladd, Rancho Cordoba, California
Mr. Jason Leuck, Lockheed Martin Corporation
Dr. Bruce Macler, U.S. EPA
Mr. James McCauley, Lower Brule Rural Water System
Dr. William Mendez, ICF Inc.
Dr. Anita K. Meyer, U.S. Army Corps of Engineers
Dr. Kevin Morley, American water Works Association
Mr. Darrell Osterhoudt, Association of State Drinking Water Administrators
Dr. Gloria B. Post, New Jersey Department of Environmental Protection
Dr. Resha Putzrath,Navy and Marine Corps Public Health Center
Mr. Andrew Rak, Noblis, Inc.
Dr. Santhini Ramasany, U.S. Environmental Protection Agency
Mr. Charles Robinette, West Virginia Department of Health and Human Resource
Ms. Peggy Roefer, Southern Nevada Water Authority

[1] Based on members of the public requesting the teleconference dial in information

Mr. Jim Rollins, Policy Navigation Group
Ms. Marcia A. St. Martin, Sewerage & Water Board of New Orleans
Linda S. Wennerberg, Ph.D., NASA
Dr. Richard Pleus, InterTox
Ms. Patricia McNulty, MEYERS NAVE
Lt. Cmdr. Eva McLannan, U.S. Public Health Service
Ms. Rebecca Rehr, U.S. EPA
John F. Reichard, PhD., Toxicology Excellence for Risk Assessment *(TERA)*
Ms. Meredith L. B. Russell, U.S. Environmental Protection Agency
Mr. Daniel Olson, US EPA
Ms. Deborah Proctor, Tox Strategies
Mr. Paul M. Schlosser, U.S. EPA
Sarah Bresolin Silver, Assistant Chief Counsel,| SBA Office of Advocacy
Ms. Mina Suh, ToxStrategies
Ms. Yvonne Walker, Navy and Marine Corps Public Health Center
Ms. Patrica Ware, Daily Environment Report BNA
Kimberly Wise, Ph.D., American Chemistry Council