NATIONAL WATER RESEARCH INSTITUTE

Final Panel Meeting Report #6: Surface Water Augmentation and Direct Potable Reuse

Based on an Expert Panel Meeting Held September 24, 2015
(Panel Meeting #6)

Prepared By:
Expert Panel on the Development of Water Recycling Criteria
for Indirect Potable Reuse (IPR) through Surface Water Augmentation and the
Feasibility of Developing Criteria for Direct Potable Reuse (DPR)

Prepared For:
State Water Resources Control Board Division of Drinking Water
(Agreement No. 13-21041)

Submitted:
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Submitted By:
National Water Research Institute
Fountain Valley, California

www.nwri-usa.org/ca-panel.htm

ABOUT NWRI

A 501c3 nonprofit organization, the National Water Research Institute (NWRI) was founded in 1991 by a group of California water agencies in partnership with the Joan Irvine Smith and Athalie R. Clarke Foundation to promote the protection, maintenance, and restoration of water supplies and to protect public health and improve the environment. NWRI's member agencies include Inland Empire Utilities Agency, Irvine Ranch Water District, Los Angeles Department of Water and Power, Orange County Sanitation District, Orange County Water District, and West Basin Municipal Water District.

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ACKNOWLEDGMENTS

The Expert Panel (Panel) on "Development of Water Recycling Criteria for Indirect Potable Reuse through Surface Water Augmentation and the Feasibility of Developing Criteria for Direct Potable Reuse" was formed at the request of the Drinking Water Program of the California Department of Public Health (CDPH) in 2013.

The Drinking Water Program was officially transferred from CDPH to the State Water Resources Control Board (State Board) and renamed as the Division of Drinking Water (DDW) on July 1, 2014. Financial support for the Panel is being provided by DDW through Agreement No. 13-21041.

The Panel would like to thank State Board staff for the information, materials, and suggestions received from the State Board staff as part of this Panel Meeting. In particular, the Panel thanks Mr. Randy Barnard, Mr. Mark Bartson, Mr. Brian Bernados, Ms. Jing-Tying Chao, Ms. Cindy Forbes, Mr. Robert Hultquist, Ms. Karen Larson, Mr. Mike McKibben, Ms. Sherly Rosilela, and Dr. David Spath of the State Board staff for their assistance.

In addition, the Panel thanks the National Water Research Institute for administering and organizing the Panel's efforts. Specifically, the Panel would like to thank Mr. Jeff Mosher for working with the Panel in the planning and facilitating the meetings and Ms. Brandi Caskey, Ms. Suzanne Faubl, Ms. Jaime Lumia, and Ms. Gina Vartanian for their support in organizing the meetings preparing the meeting report. The Panel would also like to recognize the State Board's Direct Potable Reuse (DPR) Advisory Group for their input to the Panel.

DISCLAIMER

This report was prepared by an NWRI Expert Panel (Panel), which is administered by the National Water Research Institute (NWRI). Any opinions, findings, conclusions, or recommendations expressed in this report were prepared by the Panel. This report was published for informational purposes.

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ACRONYMS

CDPH	California Department of Public Health
DDW	State Water Resources Control Board Division of Drinking Water
DPR	Direct potable reuse
IPR	Indirect potable reuse
NWRI	National Water Research Institute
State Board	State Water Resources Control Board
SWA	Surface water augmentation

1. PURPOSE OF THE REPORT

The purpose of this report is to provide the Division of Drinking Water (DDW) of the State Water Resources Control Board (State Board) with the Expert Panel's findings and recommendations on the topics discussed and information provided to the Expert Panel at a meeting held on September 24, 2015 (Meeting #6). Specifically, the following topics were addressed:

- Draft IPR-SWA Criteria Panel finding and updated draft IPR-SWA criteria titled "Surface Water Augmentation Using Recycled Water," prepared by the State Board DDW staff and dated September 17, 2015.

- Approach to address the Panel direct potable reuse (DPR) charge per the California Water Code.

2. PURPOSE AND HISTORY OF THE EXPERT PANEL

In 2013, the National Water Research Institute (NWRI) of Fountain Valley, California, a 501c3 nonprofit, appointed state and national water industry experts to an independent, third-party Expert Panel to provide advice to the State of California on developing Water Recycling Criteria for indirect potable reuse (IPR) through surface water augmentation (SWA) and determining the feasibility of developing criteria for direct potable reuse (DPR).

The Expert Panel was formed on behalf of the Drinking Water Program of the California Department of Public Health (CDPH). As of July 1, 2014, the Drinking Water Program was officially transferred from CDPH to the State Board and renamed as the Division of Drinking Water (DDW); therefore, hereafter, the State Board will be referred to in this report as the sponsor of the Expert Panel. This Panel for the State Board is administered by NWRI.

2.1 Expert Panel Charge

The specific purpose of the Expert Panel is provided in Chapter 7.3 – entitled "Direct and Indirect Potable Reuse" – of the California Water Code[1]. The exact wording is as follows:

> 13565. (a) (1) On or before February 15, 2014, the department shall convene and administer an expert panel for purposes of advising the department on public health issues and scientific and technical matters regarding development of uniform water recycling criteria for indirect potable reuse through surface water augmentation and investigation of the feasibility of developing uniform water recycling criteria for direct potable reuse. The expert panel shall assess what, if any, additional areas of research are needed to be able to establish uniform regulatory criteria for direct potable reuse. The expert panel shall then recommend an approach for accomplishing any additional needed research regarding uniform criteria for direct potable reuse in a timely manner.

With respect to SWA, the Expert Panel's charge – as stated in Section 13562 of the California Water Code – is as follows:

> (B) Prior to adopting uniform water recycling criteria for surface water augmentation, the department shall submit the proposed criteria to the expert panel convened pursuant to subdivision (a) of Section 13565. The expert panel shall review the proposed criteria and shall adopt a finding as to whether, in its expert opinion, the proposed criteria would adequately protect public health.

[1] Appendix A contains a copy of Chapter 7.3 of the California Water Code, effective January 1, 2014. http://www.leginfo.ca.gov/cgi-bin/displaycode?section=wat&group=13001-14000&file=13560-13569 (last accessed October 6, 2014).

With respect to DPR, the Expert Panel is working with DDW to meet the following State-mandated deadlines, as required in Section 13563 of the California Water Code:

- On or before June 30, 2016, DDW shall prepare a draft report summarizing the recommendations of the Expert Panel.

- By September 1, 2016, DDW will complete a public review draft of its report.

- On or before December 31, 2016, DDW is to provide a final report to the Legislature on the feasibility of developing uniform water recycling criteria for DPR.

Please refer to Chapter 7.3 of the California Water Code (Appendix A) for a description of State Board and Panel activities as pertaining to this effort.

2.2 Expert Panel Members

The Expert Panel is made up of 12 individuals who meet the requirement in Section 13565 of the California Water Code that the Panel "shall be comprised, at a minimum, of a toxicologist, an engineer licensed in the state with at least three years' experience in wastewater treatment, an engineer licensed in the state with at least three years' experience in treatment of drinking water supplies and knowledge of drinking water standards, an epidemiologist, a limnologist, a microbiologist, and a chemist."

Expert Panel members include:

- *Panel Co-Chair:* Adam Olivieri, Dr.P.H., P.E., EOA, Inc. (Oakland, CA)
- *Panel Co-Chair:* James Crook, Ph.D., P.E., Environmental Engineering Consultant (Boston, MA)
- Michael Anderson, Ph.D., University of California, Riverside (Riverside, CA)
- Richard Bull, Ph.D., MoBull Consulting (Richland, WA)
- Dr.-Ing. Jörg E. Drewes, Technische Universität München (Munich, Germany)
- Charles Haas, Ph.D., P.E. Drexel University (Philadelphia, PA)
- Walter Jakubowski, M.S.., WaltJay Consulting (Spokane, WA)
- Perry McCarty, Sc.D., Stanford University (Stanford, CA)
- Kara Nelson, Ph.D., University of California, Berkeley (Berkeley, CA)
- Joan B. Rose, Ph.D., Michigan State University (East Lansing, MI)
- David Sedlak, Ph.D., University of California, Berkeley (Berkeley, CA)
- Tim Wade, Ph.D., United States Environmental Protection Agency (Durham, NC)

Background information about the NWRI Panel process can be found in Appendix B, and brief biographies of the Expert Panel members can be found in Appendix C. More information about the Expert Panel can also be found on the NWRI website at www.nwri-usa.org/ca-panel.htm.

3. PANEL MEETING #6

A one-day meeting of the State Board's Expert Panel (Panel Meeting #6) was held on September 24, 2015, in Berkeley, California. The specific focus of the meeting was on DPR, although time was devoted to the State Board's draft IPR-SWA Criteria (dated September 17, 2015).

3.1 Specialty Seminar on DPR

A Specialty Seminar on "Direct Potable Reuse in California" was held one day prior to Panel Meeting #6 on September 23, 2015, at the David Brower Center in Berkeley, California. This public event was organized by NWRI, the State Board, and UC Berkeley School of Public Health for the express purpose of discussing and reviewing issues related to DPR that will be addressed by the Expert Panel in its evaluation of the feasibility of developing uniform water recycling criteria for DPR. Approximately 120 people attended the seminar, representing government agencies, academia, utilities, consulting firms, environmental groups, and others.

The morning session provided a vision of how DPR could be implemented. Presentations highlighted the role of reuse in California's water supply, experience and needs at advanced water treatment facilities, current guidance and future regulations pertaining to DPR, and ongoing research for the DPR Research Initiative, which represents $20 million in research studies undertaken by the WateReuse Research Foundation and others.

The afternoon session addressed challenges associated with implementing DPR projects, featuring cutting-edge research. Specifically, presentations addressed the use of bioanalytical tools (i.e., bioassays) and how to achieve reliability using redundancy and monitoring in the advanced treatment process. To ensure public feedback, each presentation was followed by a question and answer session. The agenda for the Specialty Seminar is provided in Appendix D. Additional information, including presentation slides, can be found on the NWRI website at www.nwri-usa.org/ca-panel.htm.

The Panel was able to use the information presented at the Specialty Seminar as discussion points during Panel Meeting #6, which was held the next day.

3.2 Panel Meeting #6 Background Material

Prior to Meeting #6, the following background material was provided to the Panel:

- Draft IPR-SWA Panel finding and updated DDW draft criteria on *"Surface Water Augmentation Using Recycled Water,"* prepared by the State Board DDW staff and dated September 17, 2015.

- *Final Panel Meeting Report #5: Surface Water Augmentation – IPR Criteria Review (Based on an Expert Panel Meeting Held June 2-3, 2015)*, submitted to the State Board on July 2, 2015, by the Expert Panel on the Development of Water Recycling Criteria for

Indirect Potable Reuse through Surface Water Augmentation and the Feasibility of Developing Criteria for Direct Potable Reuse.

- Tchobanoglous, G., J. Cotruvo, J. Crook, E. McDonald, A. Olivieri, A. Salveson, and R.S. Trussell (2015). *Framework for Direct Potable Reuse*, WateReuse Association, Alexandria, VA.

3.3 Panel Finding Letter for Surface Water Augmentation

Prior to Panel Meeting #6, the Panel developed a draft IPR-SWA criteria finding letter addressed to the State Board on the "Expert Panel Finding of Proposed Criteria for Regulating Indirect Potable Reuse of Advanced Treated Water by Surface Water Augmentation in California." The draft was shared with the State Board, who responded with comments. The Panel addressed these comments in a final draft (dated September 23, 2015), which was provided to the State Board for discussion at Meeting #6. While the Panel has approved the letter containing the Panel's findings based on the September 17, 2015 version of the DDW proposed IPR-SWA criteria, the letter has been tabled for final signature until after receipt and review of an updated version of the DDW criteria.

3.4 DPR Briefing Papers

The Panel discussed and agreed to use a "Briefing Paper" approach to address and document the Panel's DPR charge per the California Water Code. The approach involves preparing separate technical/scientific DPR Briefing Papers on seven key topic areas, as described below. The key topic areas were identified based on (1) the review of the document, *Framework for Direct Potable Reuse* (Tchobanoglous et al., 2015), as well as (2) the Panel's expert opinion on the following overarching questions:

- Definition of DPR; develop a description of the continuum of potable reuse options including the use of inadequate environmental buffer.
- The availability and reliability of recycled water treatment technologies.
- Multiple barriers and sequential treatment processes that may be appropriate at wastewater and water treatment facilities.
- Available information on health effects.
- Mechanisms to protect the public from exposure to off-spec water.
- Monitoring needed to ensure the protection of public health.
- Other scientific or technical issues that may be necessary, including the need for additional research.

Each DPR Briefing Paper will: (1) outline a particular issue (topic); (2) summarize pertinent available technical and/or research information; (3) recommend and prioritize practical engineering, monitoring solutions, and/or research; and (4) provide overall conclusions and recommendations. An executive summary summarizing the findings recommendations of the DPR Briefing Papers will be prepared along with the final versions of the DPR Briefing Papers. A list of the DPR Briefing Paper topics, along with a brief summary of potential content, is provided below:

1. **Bio-Analytical Tools (Bioassays)** – Issues related to their use in advanced treated wastewater (ATW) and drinking water.
2. **Quantifying Treatment Facility Reliability** – Description of multiple barriers (redundancy, inherent performance, and mechanical reliability); online monitoring tools (sensors, surrogates and indicators); and performance objectives (process and overall facility compliance).
3. **Analytical Methods/Tools** – Approaches for assessing chemical water quality in ATW and drinking water (emphasis on indicators and surrogates).
4. **Molecular and Other Pathogen Monitoring Methods** – For monitoring indicators, surrogates, and pathogens in ATW and drinking water.
5. **Antibiotic Resistant Bacteria and Antibiotic Resistant Genes in Water** – State of the science, relative sources, potential exposure pathways (relevant), relative significance of concern.
6. **Comparative Health Risks** – Associated with existing potable water supplies subject to discharge from municipal wastewater, stormwater, and agricultural runoff.
7. **Public Health Surveillance** – Example programs, ongoing national and state programs, health endpoints, sensitivity and interpretation of data, non-health based data, and feasibility of a DPR surveillance program.

Panel members were provided with a guidance document describing the approach for the DPR Briefing Papers, as well as next steps to move the process forward. They were assigned to particular topics and asked to identify specific questions that would be addressed in the DPR Briefing Papers. These questions were compiled and sent back to the Panel prior to Meeting #6.

A summary is provided in Table 1 of the Panel lead author, internal and/or external reviewers, timeline for preparation of draft papers, and Panel meeting dates in relation to preparing the DPR Briefing Papers.

3.5 Panel Meeting #6 Agenda and Logistics

Staff from NWRI, the Co-Chairs of the Panel, and State Board collaborated on the development of an agenda for Panel Meeting #6, which is included in Appendix E. The agenda was based on meeting the following specific objectives:

- Discuss any outstanding IPR-SWA questions, if needed.
- Review and discuss Specialty Seminar topics.
- Identify key issues for the DPR Briefing Papers.
- Discuss the overall Panel schedule for the preparation of the draft Report on DPR.

The Panel met with State Board staff during an open morning session to review (1) the status of the DDW staff process to finalize the draft IPR-SWA criteria and (2) the process for the Panel to finalize its findings. This session was followed by a presentation given by State Board staff to clarify the requirements (i.e., scheduling, deliverables) of the state-mandated review process of DPR feasibility. The next discussion focused on material presented at the DPR Specialty

Seminar. Lastly, the Panel met in a closed session, focusing most their efforts on the development of the DPR Briefing Papers.

3.6 Panel Meeting #6 Attendees

All Panel members participated at Meeting #6 except Dr. McCarty, who attended the Specialty Seminar but was unable to attend the Panel meeting. Drs. Drewes and Haas participated via a web-enabled conference call. Other attendees included NWRI staff and State Board DDW staff. A complete list of Panel meeting attendees is included in Appendix F.

Table 1: DPR Briefing Paper Topics, Leads, and Schedule

	Briefing Paper Topic	Panel Lead/ Other Authors*	Internal Draft Date	Panel Review Meeting Dates	Notes
1	Bioanalytical Tools (issues related to use in ATW and drinking water)	Richard Bull/ Kevin Crofton, Michael Dennison	Draft two weeks prior to Panel meeting; due date Nov 17, 2015	Meeting #7 (Dec 1-2, 2015)	Intent is to finalize at Meeting #7 (Dec. 2015)
2	Quantifying Treatment Facility Reliability (evaluation of multiple barriers and monitoring tools)	Charles Haas/ Jörg Drewes/ Perry McCarty/ Kara Nelson	Draft two weeks prior to Panel meeting; due date Nov 17, 2015	Meeting #7 (Dec 1-2, 2015) – draft only	Intent is to finalize at Meeting #8 (Feb. 2016)
3	Analytical Methods/Tools for Measuring Chemical Water Quality in ATW and drinking Water (emphasis on surrogates)	Davis Sedlak/ Jörg Drewes	Draft two weeks prior to Panel meeting	Meeting #8 (Feb. 23-24, 2016)	
4	Molecular and Other Methods for Monitoring Pathogens in ATW and Drinking Water	Joan Rose/ Kara Nelson	Two weeks prior to Panel meeting	Meeting #9 (March 2016)	
5	Antibiotic Resistant Bacteria and Antibiotic Resistant Genes in ATW and Drinking Water	Walt Jakubowski/ Joan Rose/ Ryan Reinke/ Kellog Schwab/ Nick Ashbolt	Two weeks prior to Panel meeting	Meeting #8 (Feb. 23-24, 2016)	
6	Potential Health Risk Assessments Associated with Existing Potable Water Supplies Subject to Discharge from Municipal Wastewater, Stormwater, and Agricultural Runoff	Co-Chairs/ Brian Pecson/ Rhodes Trussell/ Charles Haas/ Michael Anderson	Two weeks prior to Panel meeting	Meeting #10 (April/May 2016)	Based on National Research Council Report/DDW additional data
7	Public Health Surveillance	Tim Wade/ Walt Jakubowski/ Michael Anderson	Two weeks prior to Panel meeting	Meeting #11 (June 2016)	
	DPR Panel Preliminary Findings	Co-Chairs		Meeting #11 (June 2016) – internal draft	Internal draft based on the results of Panel Meeting and review or Briefing Papers – intend to send to DDW staff as a draft in July after internal Panel review

*Note: The first person listed for each topic is the lead author.

4. SUMMARY OF PANEL COMMENTS AND RECOMMENDATIONS

Based on Panel discussions, the Panel organized comments and recommendations under the following topics:

- General Statements
- Surface Water Augmentation through Indirect Potable Reuse
- Direct Potable Reuse

These topic-based comments and recommendations are provided below.

4.1 General Statements

- The Co-Chairs of the Expert Panel will attend the State Board meeting to be held on December 15, 2015, in Sacramento, California.

- Questions or recommendations from the DPR Advisory Group would be discussed at future Panel meetings.

4.2 Surface Water Augmentation through Indirect Potable Reuse

Based on discussions with the State Board at Meeting #6, it was determined that the draft regulations on "Surface Water Augmentation Using Recycled Water" (dated September 17, 2015) could change due to revisions resulting from an internal review by the State Board; therefore, the Panel and DDW decided to postpone the submission of the letter on "Expert Panel Findings of Proposed Criteria for Regulating Indirect Potable Reuse of Advanced Treated Water by Surface Water Augmentation in California." The Panel will wait to complete its review of the proposed IPR-SWA criteria until:

- DDW completes some or most of the process for internal State Board review of the criteria.

- The Panel has had the opportunity to review the revised criteria that will be submitted by DDW to the Panel, including any changes resulting from the State Board's internal review process.

- DDW provides clarity on the meaning of "proposed" as referenced in Section 13562 of the California Water Code in which "the expert panel shall review the proposed criteria and shall adopt a finding as to whether, in its expert opinion, the proposed criteria would adequately protect public health."

The Panel believes that providing an approval of the revised proposed criteria per the above (rather than the current draft criteria dated September 17, 2015) is more appropriate since modifications could occur during the DDW staff internal review process. It could also

strengthen the credibility of the Panel's support for the criteria and, thus, the public's and stakeholders' views of the process.

4.3 Direct Potable Reuse

4.3.1 State Board Deadlines and Deliverables

The Panel will do its best to meet the State's deadlines. The Panel will share as much work as possible with the State during this time.

4.3.2 DPR Briefing Papers

- The DPR Briefing Papers will focus on key topic areas and be limited to 10-20 pages each.

- The DPR Briefing Papers will serve as the mechanisms by which the Panel provides its Findings and Recommendations to the State Board.

- The Panel wants to be efficient in its efforts. Current research and experience in potable reuse will need to be incorporated into these DPR Briefing Papers. The Panel assumes that the WateReuse project compiling and summarizing IPR- and DPR-related investigations (WRRF 15-01) will be available in a timely manner (i.e., early 2016).

- The DPR Briefing Papers will be assembled into a single Panel Report for submission to the State Board. An Executive Summary will be included.

- It would be helpful if the State Board reviewed the draft DPR Briefing Papers prior to future Panel meetings.

    - The Panel, as needed and appropriate, may solicit input and information from the State Board that would be helpful in preparing the DPR Briefing Papers.

    - A process should be developed to allow the State Board to request clarification on issues discussed in the draft DPR Briefing Papers before they are finalized.

CALIFORNIA WATER CODE
CHAPTER 7.3 DIRECT AND INDIRECT POTABLE REUSE
SECTION 13560-13569

13560. The Legislature finds and declares the following:

(a) In February 2009, the state board unanimously adopted, as Resolution No. 2009-0011, an updated water recycling policy, which includes the goal of increasing the use of recycled water in the state over 2002 levels by at least 1,000,000 acre-feet per year by 2020 and by at least 2,000,000 acre-feet per year by 2030.

(b) Section 13521 requires the department to establish uniform statewide recycling criteria for each varying type of use of recycled water where the use involves the protection of public health.

(c) The use of recycled water for indirect potable reuse is critical to achieving the state board's goals for increased use of recycled water in the state. If direct potable reuse can be demonstrated to be safe and feasible, implementing direct potable reuse would further aid in achieving the state board's recycling goals.

(d) Although there has been much scientific research on public health issues associated with indirect potable reuse through groundwater recharge, there are a number of significant unanswered questions regarding indirect potable reuse through surface water augmentation and direct potable reuse.

(e) Achievement of the state's goals depends on the timely development of uniform statewide recycling criteria for indirect and direct potable water reuse.

(f) This chapter is not intended to delay, invalidate, or reverse any study or project, or development of regulations by the department, the state board, or the regional boards regarding the use of recycled water for indirect potable reuse for groundwater recharge, surface water augmentation, or direct potable reuse.

(g) This chapter shall not be construed to delay, invalidate, or reverse the department's ongoing review of projects consistent with Section 116551 of the Health and Safety Code.

13561. For purposes of this chapter, the following terms have the following meanings:

(a) "Department" means the State Department of Public Health.

(b) "Direct potable reuse" means the planned introduction of recycled water either directly into a public water system, as defined in Section 116275 of the Health and Safety Code, or into a raw water supply immediately upstream of a water treatment plant.

(c) "Indirect potable reuse for groundwater recharge" means the planned use of recycled water for replenishment of a groundwater basin or an aquifer that has been designated as a source of water supply for a public water system, as defined in Section 116275 of the Health and Safety Code.

(d) "Surface water augmentation" means the planned placement of recycled water into a surface water reservoir used as a source of domestic drinking water supply.

(e) "Uniform water recycling criteria" has the same meaning as in Section 13521.

13561.5. The state board shall enter into an agreement with the department to assist in implementing this chapter.

13562. (a) (1) On or before December 31, 2013, the department shall adopt uniform water recycling criteria for indirect potable reuse for groundwater recharge.

(2) (A) Except as provided in subparagraph (C), on or before December 31, 2016, the department shall develop and adopt uniform water recycling criteria for surface water augmentation.

(B) Prior to adopting uniform water recycling criteria for surface water augmentation, the department shall submit the proposed criteria to the expert panel convened pursuant to subdivision (a) of Section 13565. The expert panel shall review the proposed criteria and shall adopt a finding as to whether, in its expert opinion, the proposed criteria would adequately protect public health.

(C) The department shall not adopt uniform water recycling criteria for surface water augmentation pursuant to subparagraph (A), unless and until the expert panel adopts a finding that the proposed criteria would adequately protect public health.

(b) Adoption of uniform water recycling criteria by the department is subject to the requirements of Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

13562.5. Notwithstanding any other law, no later than June 30, 2014, the department shall adopt, by emergency regulations in accordance with Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, requirements for groundwater replenishment using recycled water. The adoption of these regulations is an emergency and shall be considered by the Office of Administrative Law as necessary for the immediate preservation of the public peace, health, safety, and general welfare. Notwithstanding Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, emergency regulations adopted by the department pursuant to this section shall not be subject to review by the Office of Administrative Law and shall remain in effect until revised by the department.

13563. (a) (1) On or before December 31, 2016, the department, in consultation with the state board, shall investigate and report to the Legislature on the feasibility of developing uniform water recycling criteria for direct potable reuse.

(2) The department shall complete a public review draft of its report by September 1, 2016. The department shall provide the public not less than 45 days to review and comment on the public review draft.

(3) The department shall provide a final report to the Legislature

by December 31, 2016. The department shall make the final report available to the public.

(b) In conducting the investigation pursuant to subdivision (a), the department shall examine all of the following:

(1) The availability and reliability of recycled water treatment technologies necessary to ensure the protection of public health.

(2) Multiple barriers and sequential treatment processes that may be appropriate at wastewater and water treatment facilities.

(3) Available information on health effects.

(4) Mechanisms that should be employed to protect public health if problems are found in recycled water that is being served to the public as a potable water supply, including, but not limited to, the failure of treatment systems at the recycled water treatment facility.

(5) Monitoring needed to ensure protection of public health, including, but not limited to, the identification of appropriate indicator and surrogate constituents.

(6) Any other scientific or technical issues that may be necessary, including, but not limited to, the need for additional research.

(c) (1) Notwithstanding Section 10231.5 of the Government Code, the requirement for submitting a report imposed under paragraph (3) of subdivision (a) is inoperative on December 31, 2020.

(2) A report to be submitted pursuant to paragraph (3) of subdivision (a) shall be submitted in compliance with Section 9795 of the Government Code.

13563.5. (a) The department, in consultation with the state board, shall report to the Legislature as part of the annual budget process, in each year from 2011 to 2016, inclusive, on the progress towards developing and adopting uniform water recycling criteria for surface water augmentation and its investigation of the feasibility of developing uniform water recycling criteria for direct potable reuse.

(b) (1) A written report submitted pursuant to subdivision (a) shall be submitted in compliance with Section 9795 of the Government Code.

(2) Pursuant to Section 10231.5 of the Government Code, this section is repealed on January 1, 2017.

13564. In developing uniform water recycling criteria for surface water augmentation, the department shall consider all of the following:

(a) The final report from the National Water Research Institute Independent Advisory Panel for the City of San Diego Indirect Potable Reuse/Reservoir Augmentation (IPR/RA) Demonstration Project.

(b) Monitoring results of research and studies regarding surface water augmentation.

(c) Results of demonstration studies conducted for purposes of approval of projects using surface water augmentation.

(d) Epidemiological studies and risk assessments associated with projects using surface water augmentation.

(e) Applicability of the advanced treatment technologies required for recycled water projects, including, but not limited to, indirect potable reuse for groundwater recharge projects.

(f) Water quality, limnology, and health risk assessments

associated with existing potable water supplies subject to discharges from municipal wastewater, stormwater, and agricultural runoff.

(g) Recommendations of the State of California Constituents of Emerging Concern Recycled Water Policy Science Advisory Panel.

(h) State funded research pursuant to Section 79144 and subdivision (b) of Section 79145.

(i) Research and recommendations from the United States Environmental Protection Agency Guidelines for Water Reuse.

(j) The National Research Council of the National Academies' report titled "Water Reuse: Potential for Expanding the Nation's Water Supply Through Reuse of Municipal Wastewater."

(k) Other relevant research and studies regarding indirect potable reuse of recycled water.

13565. (a) (1) On or before February 15, 2014, the department shall convene and administer an expert panel for purposes of advising the department on public health issues and scientific and technical matters regarding development of uniform water recycling criteria for indirect potable reuse through surface water augmentation and investigation of the feasibility of developing uniform water recycling criteria for direct potable reuse. The expert panel shall assess what, if any, additional areas of research are needed to be able to establish uniform regulatory criteria for direct potable reuse. The expert panel shall then recommend an approach for accomplishing any additional needed research regarding uniform criteria for direct potable reuse in a timely manner.

(2) The expert panel shall be comprised, at a minimum, of a toxicologist, an engineer licensed in the state with at least three years' experience in wastewater treatment, an engineer licensed in the state with at least three years' experience in treatment of drinking water supplies and knowledge of drinking water standards, an epidemiologist, a limnologist, a microbiologist, and a chemist. The department, in consultation with the advisory group and the state board, shall select the expert panel members.

(3) Members of the expert panel may be reimbursed for reasonable and necessary travel expenses.

(b) (1) On or before January 15, 2014, the department shall convene an advisory group, task force, or other group, comprised of no fewer than nine representatives of water and wastewater agencies, local public health officers, environmental organizations, environmental justice organizations, public health nongovernmental organizations, the department, the state board, the United States Environmental Protection Agency, ratepayer or taxpayer advocate organizations, and the business community, to advise the expert panel regarding the development of uniform water recycling criteria for direct potable reuse and the draft report required by Section 13563. The department, in consultation with the state board, shall select the advisory group members.

(2) Environmental, environmental justice, and public health nongovernmental organization representative members of the advisory group, task force, or other group may be reimbursed for reasonable and necessary travel expenses.

(3) In order to ensure public transparency, the advisory group established pursuant to paragraph (1) shall be subject to the Bagley-Keene Open Meeting Act (Article 9 (commencing with Section 11120) of Chapter 1 of Part 1 of Division 3 of Title 2 of the

Government Code).

(c) On or before June 30, 2016, the department shall prepare a draft report summarizing the recommendations of the expert panel.

(d) The department may contract with a public university or other research institution with experience in convening expert panels on water quality or potable reuse to meet all or part of the requirements of this section should the department find that the research institution is better able to fulfill the requirements of this section by the required date.

13566. In performing its investigation of the feasibility of developing the uniform water recycling criteria for direct potable reuse, the department shall consider all of the following:

(a) Recommendations from the expert panel appointed pursuant to subdivision (a) of Section 13565.

(b) Recommendations from an advisory group, task force, or other group appointed by the department pursuant to subdivision (b) of Section 13565.

(c) Regulations and guidelines for these activities from jurisdictions in other states, the federal government, or other countries.

(d) Research by the state board regarding unregulated pollutants, as developed pursuant to Section 10 of the recycled water policy adopted by state board Resolution No. 2009-0011.

(e) Results of investigations pursuant to Section 13563.

(f) Water quality and health risk assessments associated with existing potable water supplies subject to discharges from municipal wastewater, stormwater, and agricultural runoff.

13567. An action authorized pursuant to this chapter shall be consistent, to the extent applicable, with the federal Clean Water Act (33 U.S.C. Sec. 1251 et seq.), the federal Safe Drinking Water Act (42 U.S.C. Sec. 300f et seq.), this division, and the California Safe Drinking Water Act (Chapter 4 (commencing with Section 116270) of Part 12 of Division 104 of the Health and Safety Code).

13569. The department may accept funds from nonstate sources and may expend these funds, upon appropriation by the Legislature, for the purposes of this chapter.

APPENDIX B: Panel Background

About NWRI

For over 20 years, NWRI – a science-based 501c3 nonprofit located in Fountain Valley, California – has sponsored projects and programs to improve water quality, protect public health and the environment, and create safe, new sources of water. NWRI specializes in working with researchers across the country, such as laboratories at universities and water agencies, and are guided by a Research Advisory Board (representing national expertise in water, wastewater, and water reuse) and a six-member Board of Directors (representing water and wastewater agencies in Southern California).

Through NWRI's research program, NWRI supports multi-disciplinary research projects with partners and collaborators that pertain to treatment and monitoring, water quality assessment, knowledge management, and exploratory research. Altogether, NWRI's research program has produced over 300 publications and conference presentations.

NWRI also promotes better science and technology through extensive outreach and educational activities, which includes facilitating workshops and conferences and publishing White Papers, guidance manuals, and other informational material.

More information on NWRI can be found online at www.nwri-usa.org.

About NWRI Panels

NWRI also specializes in facilitating Independent Advisory Panels on behalf of water and wastewater utilities, as well as local, county, and state government agencies, to provide credible, objective review of scientific studies and projects in the water industry. NWRI Panels consist of academics, industry professionals, government representatives, and independent consultants who are experts in their fields.

The NWRI Panel process provides numerous benefits, including:

- Third-party review and evaluation.
- Scientific and technical advice by leading experts.
- Assistance with challenging scientific questions and regulatory requirements.
- Validation of proposed project objectives.
- Increased credibility with stakeholders and the public.
- Support of sound public-policy decisions.

NWRI has extensive experience in developing, coordinating, facilitating, and managing expert Panels. Efforts include:

- Selecting individuals with the appropriate expertise, background, credibility, and level of commitment to serve as Panel members.

- Facilitating hands-on Panel meetings held at the project's site or location.
- Providing written report(s) prepared by the Panel that focus on findings and comments of various technical, scientific, and public health aspects of the project or study.

Over the past 5 years, NWRI has coordinated the efforts of over 20 Panels for water and wastewater utilities, city and state agencies, and consulting firms. Many of these Panels have dealt with projects or policies involving groundwater replenishment and potable (indirect and direct) reuse. Specifically, these Panels have provided peer review of a wide range of scientific and technical areas related water quality and monitoring, constituents of emerging concern, treatment technologies and operations, public health, hydrogeology, water reuse criteria and regulatory requirements, and outreach, among others.

More information about the NWRI Independent Advisory Panel Program can be found on the NWRI website at http://nwri-usa.org/Panels.htm.

APPENDIX C: Expert Panel Member Biographies

Adam Olivieri, Dr.PH, P.E. (Panel Co-Chair)
Vice President
EOA Inc. (Oakland, CA)

Adam Olivieri has 35 years of experience in the technical and regulatory aspects of water recycling, groundwater contamination by hazardous materials, water quality and public health risk assessments, water quality planning, wastewater facility planning, urban runoff management, and on-site waste treatment systems. He has gained this experience through working as a staff engineer with the California Regional Water Quality Control Board (San Francisco Bay Region), as staff specialist (and Post-doc fellow) with the School of Public Health at the University of California, Berkeley, project manager/researcher for the Public Health Institute, and as a consulting engineer. He is currently the Vice president of EOA, Inc., where he manages a variety of projects, including serving as Santa Clara County Urban Runoff Program's Manager since 1998. Olivieri is also the author or co-author of numerous technical publications and project reports. He received a B.S. in Civil Engineering from the University of Connecticut, an M.S. in Civil and Sanitary Engineering from the University of Connecticut, and both an MPH and Dr.PH in Environmental Health Sciences from University of California, Berkeley.

James Crook, Ph.D., P.E. (Panel Co-Chair)
Water Reuse and Environmental Engineering Consultant (Boston, MA)

Jim Crook is an environmental engineer with more than 40 years of experience in state government and consulting engineering arenas, serving public and private sectors in the U.S. and abroad. He has authored more than 100 publications and is an internationally recognized expert in water reclamation and reuse. He has been involved in numerous projects and research activities involving public health, regulations and permitting, water quality, risk assessment, treatment technology, and all facets of water reuse. Crook spent 15 years directing the California Department of Health Services' water reuse program, during which time he developed California's first comprehensive water reuse criteria. He also spent 15 years with consulting firms overseeing water reuse activities and is now an independent consultant specializing in water reuse. He currently serves on several advisory panels and committees sponsored by NWRI and others. Among his honors, he was selected as the American Academy of Environmental Engineers' 2002 Kappe Lecturer and the WateReuse Association's 2005 Person of the Year. Crook received a B.S. in Civil Engineering from the University of Massachusetts and both an M.S. and Ph.D. in Environmental Engineering from the University of Cincinnati.

Michael Anderson, Ph.D.
Professor of Applied Limnology and Environmental Chemistry and Chair
Department of Environmental Sciences
University of California, Riverside (Riverside, CA)

Michael Anderson, a Professor of Applied Limnology and Environmental Chemistry, has taught courses at the University of California, Riverside, since 1990. His research focus includes water and soil sciences, with particular emphasis in applied limnology and lake/reservoir management; surface water quality and modeling; fate of contaminants in waters, soils, and sediments; and environmental chemistry. Current research projects include laboratory, field, and modeling studies in support of the development of species conservation habitat at the Salton Sea, sponsored by the California DWR and DFG, and a survey of organochlorine pesticides and Polychlorinated Biphenyls (PCBs) in McGrath Lake that is funded by the Los Angeles Regional Water Quality Control Board. He and his students also recently completed studies quantifying the abundance and distribution of quagga mussel veligers in the reservoirs of the Colorado River Aqueduct, as well as assessing the ecological and biological conditions at Lake Elsinore. In addition, he has served on various panels and workgroups, including as member of the California Department of Water Resource's Salton Sea Hydrologic Technical Workgroup (2007-2008). Anderson received a B.S. in Biology from Illinois Benedictine College, M.S. in Environmental Studies from Bemidji State University, and Ph.D. in Environmental Chemistry from Virginia Tech.

Richard Bull, Ph.D.
Consulting Toxicologist
MoBull Consulting (Richland, WA)

Since 2000, Richard Bull has been a Consulting Toxicologist with MoBull Consulting, where he conducts studies on the chemical problems encountered in water for water utilities, as well as federal, state, and local governments. Bull is a Professor Emeritus at Washington State University, where he maintains Adjunct Professor appointments in the College of Pharmacy and the Department of Environmental Science. Formerly, he served as a senior staff scientist at DOE's Pacific Northwest National Laboratory, Professor of Pharmacology/Toxicology at Washington State University, and Director of the Toxicology and Microbiology Division in the Cincinnati Laboratories for the U.S. Environmental Protection Agency. Bull has published extensively on research on central nervous system effects of heavy metals, the carcinogenic and toxicological effects of disinfectants and disinfection by-products, halogenated solvents, acrylamide, and other contaminants of drinking water. He has also served on many international scientific committees convened by the National Academy of Sciences, World Health Organization, and International Agency for Research on Cancer regarding various contaminants of drinking water. Bull received a B.S. in Pharmacy from the University of Washington and a Ph.D. in Pharmacology from the University of California, San Francisco.

Dr.-Ing. Jörg E. Drewes
Chair Professor, Chair of Urban Water Systems Engineering
Technische Universität München (Munich, Germany)

Jörg Drewes joined the Technische Universität München in 2013. Prior, he was a professor in the Department of Civil and Environmental Engineering at Colorado School of Mines (CSM), where he taught from 2001 to 2013. While at CSM, he served as the Director of Research for the National Science Foundation's Engineering Research Center *ReNUWIt* (which included Stanford University, University of California Berkeley, New Mexico State University, and CSM). He also served as Co-Director of CSM's Advanced Water Technology Center (AQWATEC). Drewes is actively involved in research in the areas of energy efficient water treatment and non-potable and potable water reuse. Current research interests include treatment technologies leading to potable reuse and the fate and transport of persistent organic compounds in these systems. He has published more than 250 journal papers, book contributions, and conference proceedings, and served on National Research Council Committees on *Water Reuse as an Approach for Meeting Future Water Supply Needs* and *Onsite Reuse of Graywater and Stormwater*. He also currently serves as Chair of the International Water Association (IWA) Water Reuse Specialist Group. Drewes received a Cand. Ing. (B.S.), Dipl. Ing. (M.S.), and Doctorate (Dr.-Ing.) in Environmental Engineering from the Technical University of Berlin, Germany.

Charles Haas, Ph.D.
Department Head, L.D. Betz Professor of Environmental Engineering
Drexel University (Philadelphia, PA)

Charles Haas is the Department Head of the Civil, Architectural, and Environmental Engineering at Drexel University since 1991. He is also the L.D. Betz Professor of Environmental Engineering and Director of the Drexel Engineering Cities Initiative. Prior to joining Drexel, he served on the faculties of Rensselaer Polytechnic Institute and the Illinois Institute of Technology. Haas specializes in water treatment, risk assessment, environmental modeling and statistics, microbiology, and environmental health. He received a B.S. in Biology and M.S. in Environmental Engineering, both from the Illinois Institute of Technology. He also received a Ph.D. in Environmental Engineering from the University of Illinois at Urbana-Champaign.

Walter Jakubowski, M.S.
Consultant
WaltJay Consulting (Spokane, WA)

Walter Jakubowski has degrees in Pharmacy from Brooklyn College of Pharmacy, Long Island University; in microbiology from Oregon State University, and graduate training in epidemiology from the University of Minnesota. He has research publications on hospital pharmacy; on microorganisms in oysters and clams under the federal Shellfish Sanitation

Program, and more than 40 peer-reviewed publications on determining the health effects and public health significance of pathogens, especially intestinal protozoa and viruses, in drinking water, waste water and municipal sewage sludge. He has served as a consultant to the World Health Organization on pathogenic intestinal protozoa (for development of the International Drinking Water Guidelines), and to the Pan-American Health Organization on environmental virus methods. He was instrumental in conducting the first international symposium on *Legionella* and Legionnaire's Disease at the Centers for Disease Control. He has more than 48 years of experience working with waterborne pathogens, especially enteric viruses, *Giardia* and *Cryptosporidium.* He initiated landmark studies on the human infectious dose of *Cryptosporidium* and chaired the Joint Task Group on Pathogenic Intestinal Protozoa for *Standard Methods for the Examination of Water and Waste Water* from 1978 to 2005. He was a charter member of U.S. EPA's Pathogen Equivalency Committee and served on that committee until his retirement from the U.S. Public Health Service/Environmental Protection Agency in 1997. Since then, he has been practicing as a private consultant while serving on various professional committees, panels, and boards.

Perry McCarty, Sc.D.
Silas H. Palmer Professor of Civil and Environmental Engr. Emeritus
Stanford University (Stanford, CA)

Perry McCarty is the Silas H. Palmer Professor of Civil and Environmental Engineering Emeritus at Stanford University. McCarty received the Clarke Prize Award in 1997 for his significant contributions to the areas of water treatment, reclamation, groundwater recharge, and water chemistry and microbiology. He is universally recognized for his research on understanding contaminant behavior in groundwater aquifers and sediments. McCarty has received numerous honors, including being elected to the National Academy of Engineering and American Academy of Arts and Sciences, as well as receiving an honorary doctorate from the Colorado School of Mines. He was also awarded the John and Alice Tyler Prize for Environmental Achievement in 1992 and the Stockholm Water Prize in 2007. McCarty received his B.S. from Wayne State University, and both his M.S. and Sc.D. from Massachusetts Institute of Technology.

Kara Nelson, Ph.D.
Professor
University of California, Berkeley (Berkeley, CA)

Kara Nelson is a Professor in Civil and Environmental Engineering at the University of California, Berkeley. She received her B.A. degree in biophysics from U.C. Berkeley, her M.S.E. degree in environmental engineering from the University of Washington, and her Ph.D. in environmental engineering from U.C. Davis. Her research program addresses critical issues at the intersection of public health and the environment, with a focus on reducing the threat posed by waterborne pathogens by improving our engineering infrastructure to make it more effective,

affordable, as well as maximize its environmental benefits. Specific research areas include mechanisms of pathogen inactivation, molecular techniques for pathogen detection, optimizing treatment processes, water reuse, and challenges with providing safe drinking water and sanitation in the developing world. Dr. Nelson has published over 50 articles in peer-reviewed journals, including two invited reviews, and one book chapter. She is the Director of Graduate Education at the National Science Foundation Engineering Research Center for Reinventing our Nation's Urban Water Infrastructure (ReNUWIt), the faculty leader of the Research Thrust Area on Safe Water and Sanitation at Berkeley Water Center. Dr. Nelson was awarded the Presidential Early Career Award for Scientists and Engineers (PECASE) at a ceremony in the White House in 2004. This award is the nation's highest honor for scientists in the early stages of their career.

Joan B. Rose, Ph.D.
Homer Nowlin Endowed Chair for Water Research
Michigan State University (East Lansing, MI)

Joan Rose, a professor at Michigan State University, has made groundbreaking advances in understanding water quality and protecting public health for more than 20 years and has published over 300 articles. She is widely regarded as the world's foremost authority on the microorganism *Cryptosporidium* and was the first person to present a method for detecting this pathogen in water supplies. She examines full-scale water treatment systems for the removal of pathogens. In 2001, she received the Athalie Richardson Irvine Clarke Prize from NWRI for her advances in microbial water-quality issues. She served as the Chair of the Science Advisory Board for the U.S. Environmental Protection Agency's Drinking Water Committee for 4 years, and currently serves on the Science Advisory Board for the Great Lakes. In addition, she is Co-Director of the Center for Water Sciences (which includes work with the Great Lakes and Human Health Center of the National Oceanic & Atmospheric Administration) at Michigan State University, where she is also Director of the Center for Advancing Microbial Risk Assessment. Rose received a B.S. in Microbiology from the University of Arizona, an M.S. in Microbiology from the University of Wyoming, and a Ph.D. in Microbiology from the University of Arizona.

David Sedlak, Ph.D.
Malozemoff Professor, Department of Civil and Environmental Engineering
University of California, Berkeley (Berkeley, CA)

David Sedlak is a Professor of Civil and Environmental Engineering at the University of California, Berkeley. He is also Co-Director of the Berkeley Water Center and Deputy Director of the National Science Foundation's Engineering Research Center for Reinventing the Nation's Urban Water Infrastructure (ReNUWIt). His research focus is on the fate of chemical contaminants, with the long-term goal of developing cost-effective, safe, and sustainable systems to manage water resources. Sedlak's previous experience includes Staff Scientist at ENVIRON Corporation and membership on the National Research Council's Committee on Water Reuse.

He has individually or co-authored over 70 peer-reviewed publications, among many other publications and presentations. Sedlak published a book in 2014 called "Water 4.0: The Past, Present, and Future of The World's Most Vital Resource," where he points out that most of the population gives little thought to the hidden systems that bring us water and take it away and how these marvels of engineering face challenges that cannot be solved without a fundamental change to our relationship with water. Sedlak received a B.S. in Environmental Science from Cornell University and a Ph.D. in Water Chemistry from the University of Wisconsin.

Tim Wade, Ph.D.
Epidemiology Branch Chief
United States Environmental Protection Agency (Durham, NC)

Tim Wade is the Epidemiology Branch Chief at the United States Environmental Protection Agency (U.S. EPA) and Assistant Professor of Epidemiology at the University of North Carolina, Chapel Hill. Wade has been working with the U.S. EPA since 2005, conducting a series of epidemiologic studies to evaluate the health effects of arsenic exposure in well water in Inner Mongolia. As Branch Chief, Wade determines research priorities, directs staff and post-doctoral students, and manages an annual budget of over $1 million annually. In 2011, Wade received the EPA Office of Water Bronze Medal for his exceptional service to the Office of Water in the development of recreational water quality criteria. He received a B.A. in Biological Science from California Polytechnic at Pomona, a B.A. in Psychobiology from Claremont McKenna College, and both an MPH and Ph.D. in Epidemiology from the University of California at Berkeley.

APPENDIX D: Specialty Seminar Agenda

Direct Potable Reuse in California Specialty Seminar

Wednesday, September 23, 2015

In Memory of
Robert C. Cooper, Ph.D.
Professor Emeritus, School of Public Health
University of California, Berkeley

LOCATION
David Brower Center
2150 Allston Way
Berkeley, CA 94704-4911
(510) 809-0900

Purpose: To discuss and review issues related to direct potable reuse (DPR) that will be addressed by the DPR Expert Panel organized for the State Water Resources Control Board's Division of Drinking Water. Per California Water Code Section 13560-13569, the DPR Expert Panel is charged with evaluating the feasibility of developing DPR criteria for the State of California.

8:00 am	Registration and Coffee	
8:30 am	Welcome and Opening Remarks	Jeff Mosher National Water Research Institute
8:35 am	Tribute to Robert C. Cooper, Ph.D.	John Gaston, P.E. CA Department of Public Health (ret.)

MORNING SESSION

Water Recycling in California – From Nonpotable to Potable – Visioning
Moderator: Rhodes Trussell, Ph.D., P.E. (Trussell Technologies)

8:45 am	California Water Supply Plan: Where Does Recycling Fit In?	Frances Spivy-Weber California State Water Resources Control Board
9:15 am	Regulating Potable Reuse in California	Robert Hultquist, P.E. CA Department of Public Health (ret.)

9:45 am	Groundwater Replenishment System	Jason Dadakis, P.G., C.Hg. Orange County Water District
10:15 am	**BREAK**	
10:30 am	The Future of Potable Reuse	George Tchobanoglous, Ph.D., P.E. University of California, Davis
11:15 am	Update on the WateReuse DPR Research Initiative	Julie Minton WateReuse

11:30 am **LUNCH ON YOUR OWN (Reconvene at Brower Center at 1:00 pm)**

AFTERNOON SESSION

Understanding and Addressing Potential Challenges
Moderator: Jeff Mosher (NWRI)

1:00 pm	Design of High-Throughput Screens and their Applications in the Biomedical Sciences	Michael Denison, Ph.D. University of California, Davis
1:45 pm	Translating HTP Bioassay Results to Risk Estimates	Kevin Crofton, Ph.D. US Environmental Protection Agency Computational Toxicology Program
2:30 pm	Issues Related to Application of Bioassays to Wastewater and Drinking Water	Richard Bull, Ph.D. Washington State University (ret.) DDW Expert Panel member
3:15 pm	**BREAK**	
3:30 pm	Demonstrating Redundancy and Monitoring to Achieve Reliable Potable Reuse	R. Shane Trussell, Ph.D. Trussell Technologies, Inc.
4:15 pm	Discussion	Jeff Mosher
4:45 PM	Wrap Up	Jeff Mosher
5:00 pm	**ADJOURN**	

National Water Research Institute
18700 Ward Street
P.O. Box 8096
Fountain Valley, CA 92728
(714) 378-3278
www.nwri-usa.org

APPENDIX E: Panel Meeting #6 Agenda

NATIONAL WATER RESEARCH INSTITUTE

Expert Panel

SWRCB's Division of Drinking Water (DDW)
Development of Water Recycling Criteria for
Indirect Potable Reuse through Surface Water Augmentation and the
Feasibility of Developing Criteria for Direct Potable Reuse

Meeting #6 Agenda
September 24, 2015

LOCATION
Hotel Shattuck Plaza
2086 Allston Way
Berkeley, CA 94704
(510) 845-7300
White Cotton Room (6th floor)

CONTACTS
Jeff Mosher, NWRI
(714) 705-3722 (Mobile)
Jaime Lumia, NWRI
(714) 376-9767 (Mobile)

Meeting Objectives:

- Discuss any outstanding IPR-SWA questions, if needed
- Review and discuss seminar topics
- Select key issues for DPR briefing papers
- Assign briefing papers to Panel members for preparation and agree on schedule
- Discuss overall Panel schedule for preparation of DPR draft report

Thursday, September 24, 2015

Closed Session (Panel and DDW only) Starts 8:30 am

8:30 am	Welcome and Introductions	Jeff Mosher, NWRI
8:40 am	Review Agenda and Meeting Objectives	Adam Olivieri and Jim Crook, Panel Co-Chairs
8:45 am	Discuss Outstanding Questions on State Board's Draft Criteria for SWA	Moderated by Co-Chairs
9:15 am	DPR Feasibility Review Process and Schedule	Mark Bartson, DDW
9:45 am	Follow-up Comments/Discussion on Seminar	Jeff Mosher, NWRI

10:15 am	**BREAK**	
Closed Session (Panel Only) Starts 10:30 am		
10:30 am	Discussion on the Feasibility of Developing Criteria for DPR • Approach (briefing papers) • Select key issues for briefing papers • Agree on overall schedule • Make briefing paper assignments	Moderated by Co-Chairs
12:00 pm	**BREAK FOR LUNCH SET-UP**	
12:15 pm	**LUNCH SERVED in meeting room**	
1:00 pm	Continue DPR Discussion	Moderated by Co-Chairs
3:00 pm	**ADJOURN**	

APPENDIX F: Panel Meeting #6 Attendees

Panel Members:

- *Panel Co-Chair:* Adam Olivieri, Dr.P.H., P.E., EOA, Inc. (Oakland, CA)
- *Panel Co-Chair:* James Crook, Ph.D., P.E., Environmental Engineering Consultant (Boston, MA)
- Michael Anderson, Ph.D., University of California, Riverside (Riverside, CA)
- Richard Bull, Ph.D., MoBull Consulting (Richland, WA)
- Dr.-Ing. Jörg E. Drewes, Technische Universität München (Munich, Germany) (on phone)
- Charles Haas, Ph.D., P.E., Drexel University (Philadelphia, PA) (on phone)
- Walter Jakubowski, M.S., WaltJay Consulting (Spokane, Washington)
- Kara Nelson, Ph.D., University of California, Berkeley (Berkeley, CA)
- Joan B. Rose, Ph.D., Michigan State University (East Lansing, MI)
- David Sedlak, Ph.D., University of California, Berkeley (Berkeley, CA)

National Water Research Institute:

- Suzanne Faubl, Water Resources Scientist and Project Manager
- Jaime Lumia, Events Manager
- Jeff Mosher, Executive Director
- Gina Vartanian, Outreach and Communications Manager

State Water Resources Control Board, Division of Drinking Water:

- Randy Barnard, P.E.
- Mark Bartson, P.E.
- Brian Bernados, P.E.
- Jing-Tying Chao, P.E. (on phone)
- Cindy Forbes, P.E. (on phone)
- Bob Hultquist, P.E.
- Mike McKibben, P.E.
- Sherly Rosilela, P.E.
- David Spath, Ph.D., P.E.