



**Board Workshop**  
**Draft Report to Legislature on Feasibility of Developing Uniform Water Recycling Criteria for Direct Potable Reuse**  
October 6, 2016 1:00 – 4:00 pm  
CalEPA Headquarters  
Sacramento, CA

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**WELCOME & WORKSHOP OVERVIEW**

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**Workshop Overview**

- **Welcome & Review of Workshop Rules**  
Cindy Forbes, SWRCB-Division of Drinking Water, Deputy Director
- **Overview of State Water Board Process**  
Mark Bartson, SWRCB-DDW, Chief – Technical Operations Section
- **Advisory Group: Highlights and Recommendations**  
Garry Brown, Advisory Group Chair
- **Expert Panel: Findings and Recommendations**  
Adam Olivieri & Jim Crook, Expert Panel Co-Chairs
- **Draft Report to Legislature on DPR & Moving Toward Criteria**  
Randy Barnard, SWRCB-DDW, Chief – Recycled Water Unit  
Robert Hultquist, SWRCB-DDW, Recycled Water Specialist
- **Potable Reuse Public Health Protection Research**  
Brian Bernados, SWRCB-DDW, Recycled Water Specialist
- **Conclude and Open for Public Comments**

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### Review of Workshop Rules

- Please sign in
- Remember to silence your electronic devices
- Fill out a speaker card if you wish to comment
- Comments may be limited to a set amount of time based on the number of people wishing to speak
- Please save questions for end of each presentation segment
- Only written comments addressed to the Board Clerk will be considered, address will be provided in presentation slides

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### OVERVIEW OF STATE WATER BOARD PROCESS

Mark Bartson P.E.  
Division of Drinking Water  
Chief – Technical Operations Section

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### Statutory Requirements

Task	Deadline	Status
Adopt Groundwater Recharge Regulations	Dec 31, 2013	✓
Adopt Surface Water Augmentation Regulations	Dec 31, 2016	On track
Prepare Draft Report on Expert Panel Recommendations & Research Status	June 30, 2016	✓
Release Public Review Draft Report on Feasibility of Developing Direct Potable Reuse Criteria	Sept 1, 2016	✓
Submit Final Report to the Legislature	Dec 31, 2016	On track

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### Schedule

- Public Comment Period for Draft Report
  - 45 days per CWC § 13563
  - Draft Report posted Sept 8, 2016
  - Comments are due **Oct 25, 2016, at noon**
- Public Workshops
  - Oct 4, 2016 at Metropolitan WD, Los Angeles
  - Oct 6, 2016 at CalEPA HQ, Sacramento
- Final Report to the Legislature: Dec 31, 2016

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### Submission of Written Comments

- Written comments are due **Oct 25, 2016, at noon**
- Send comment letters addressed to:  
**Jeanine Townsend, Clerk to the Board**
- Indicate on subject line:  
"Comment Letter – Report to the Legislature on DPR"
- By e-mail: (PDF format, max 15 MB)  
[commentletters@waterboards.ca.gov](mailto:commentletters@waterboards.ca.gov)
- By fax: (916) 341- 5620
- By mail:
 

<u>Hand/ Courier Delivery</u>	<u>U.S. Mail</u>
1001 I Street, 24 <sup>th</sup> Floor	P.O. Box 100
Sacramento, CA 95814	Sacramento, CA 95812-0100

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### Subscribe to SWRCB Listserve for updates:

[http://www.waterboards.ca.gov/resources/email\\_subscriptions/swrcb\\_subscribe.shtml](http://www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.shtml)

Drinking Water → "Recycled Surface Water Augmentation & Direct Potable Reuse"

### DDW Report to the Legislature:

[http://www.waterboards.ca.gov/drinking\\_water/certlic/drinkingwater/rw\\_dpr\\_criteria.shtml](http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/rw_dpr_criteria.shtml)

### DDW Contact

Randy Barnard, (619) 525-4022

[randy.barnard@waterboards.ca.gov](mailto:randy.barnard@waterboards.ca.gov)

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**Investigation must include**

1. Recommendations of the Expert Panel;
2. Recommendations of the Advisory Group;
3. Regulations and guidelines on DPR from jurisdictions in other states, federal government, and other countries;

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**Investigation must include**

4. Research by the State Water Board regarding unregulated pollutants (Recycled Water Policy)
5. Water quality and health risk assessments associated with existing potable water supplies subject to discharge from municipal wastewater, storm water, and agricultural runoff;

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**Investigation must include**

6. Results of the State Water Board's investigations pursuant to CWC §13563
  - Reliability of treatment to protect public health.
  - Multiple barriers that may be appropriate.
  - Health effects.
  - Mechanisms to protect public health if problems occur.
  - Monitoring needed to ensure protection of public health.
  - Any other scientific or technical issues, including the need for additional research.

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## Expert Panel Charge

*Advise State Water Board on public health issues and scientific and technical matters regarding:*

- Development of uniform water recycling criteria for indirect potable reuse through surface water augmentation
- Investigation of the feasibility of developing uniform water recycling criteria for DPR
- Assess needs for additional research and recommend an approach for completion

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## Tasks of the Advisory Group

- Advise the Expert Panel regarding investigation of the feasibility of developing uniform water recycling criteria for DPR
- Make recommendations to DDW on any other relevant topics such as:
  - Practical considerations for regulations that are protective of public health and achievable by project proponents

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## ADVISORY GROUP HIGHLIGHTS AND RECOMMENDATIONS

Garry Brown  
Advisory Group Chair

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### Advisory Group Members

- **Chair:** Garry Brown, Orange County Coastkeeper
- Randy Barnard, SWRCB Division of Drinking Water
- Amy Dorman, City of San Diego
- Conner Everts, Environmental Justice Coalition for Water
- Jim Fiedler, Santa Clara Valley Water District
- Julie Labonte, San Diego Regional Chamber of Commerce
- Al Lau, Padre Dam Municipal Water District
- Bruce Macler, U.S. EPA
- Traci Minamide, LA Sanitation
- Edward Moreno, MD, MPH, Health Officer, Monterey County Health Dept.
- Keith Solar, San Diego County Taxpayers Association
- Fran Spivy-Weber, State Water Resources Control Board
- Ray Tremblay, Sanitation Districts of Los Angeles County
- Andria Ventura, Clean Water Action
- Mike Wehner, Orange County Water District

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### Advisory Group Recommendations

- Consensus on 19 recommendations
- DPR, when implemented appropriately, has the potential to provide a reliable source of water supply that is protective of public health for communities in California
- Two types of recommendations:
  - Related to the feasibility of developing criteria
  - Not related to the feasibility of developing criteria

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### Advisory Group Recommendations Examples by Type

Related to the Feasibility of Developing Criteria	Not Related to the Feasibility of Developing Criteria
<ul style="list-style-type: none"> <li>• Wastewater source control, operation optimization, and planning requirements for DPR</li> <li>• Operator training and certification</li> <li>• Technical, Managerial, and Financial (TMF) capacity</li> <li>• Changes to Consumer Confidence Report</li> <li>• Research priorities</li> </ul>	<ul style="list-style-type: none"> <li>• Communications and public outreach</li> <li>• Phasing of potable reuse regulations</li> <li>• Potable reuse terminology</li> <li>• Environmental justice</li> <li>• Environmental impact</li> <li>• Impact to water rates</li> </ul>

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### Operator Certification Recommendations

- A training and certification program is needed for operators employed at advanced water treatment facilities (AWTF)
- Protection of public health is paramount for successful implementation of DPR projects
  - Operation by experienced and well-trained staff to make sure the treatment processes function properly, regulatory requirements are met consistently, and water produced is safe for public consumption

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### Operator Certification Recommendations

- Reflected in the white paper entitled “Potable Reuse Operator Certification Framework” prepared by the California Urban Water Agencies (CUWA)
- Provides nine (9) recommendations on program elements and considerations
- Recognizes the need for interim certification program
  - Potential collaboration with CWEA and AWWA ad hoc committees

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### EXPERT PANEL OVERVIEW AND FINDINGS

Adam Olivieri, Ph.D., P.E.  
Jim Crook, Ph.D., P.E.  
Expert Panel Co-Chairs

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**DRAFT REPORT TO  
LEGISLATURE ON DPR**

Randy Barnard, P.E.  
Chief – Recycled Water Unit  
Division of Drinking Water

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**Report Contents**

- Exec summary
- Introduction, history, projects
- Independent input
- Feasibility
- Conclusions
- Implementation plan
- Appendix

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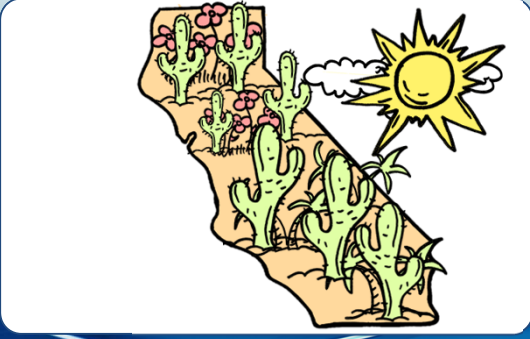
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**Background**



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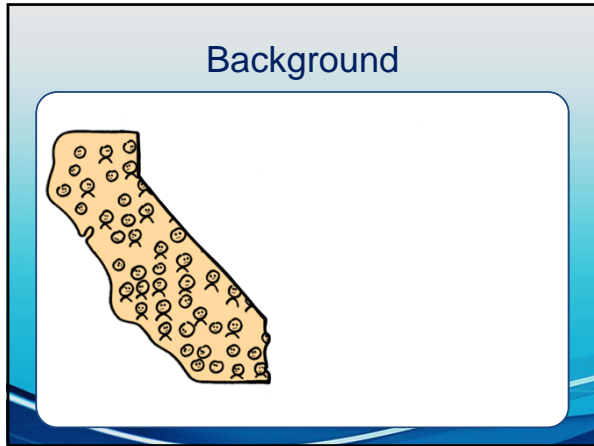
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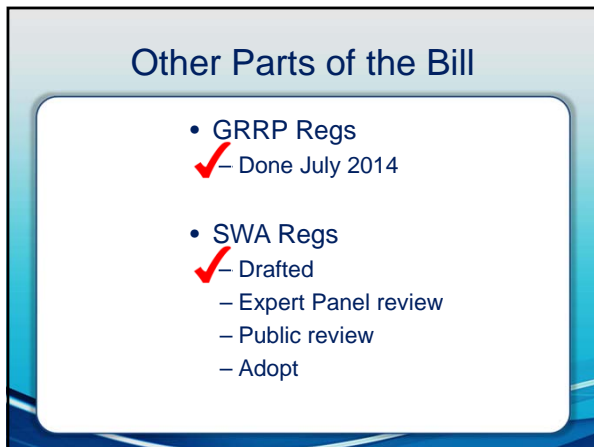
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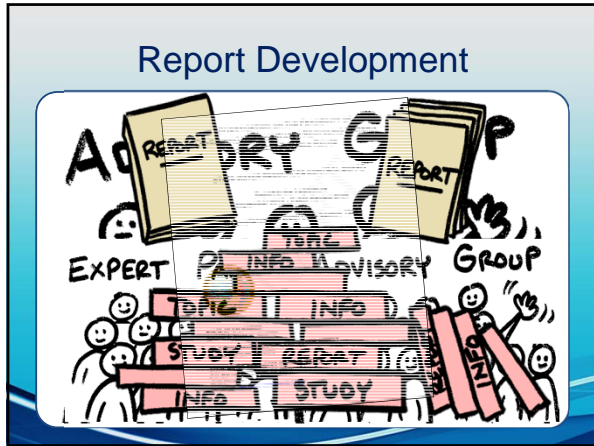
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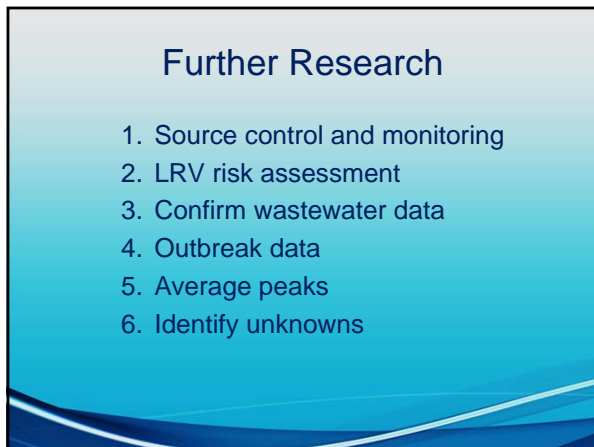
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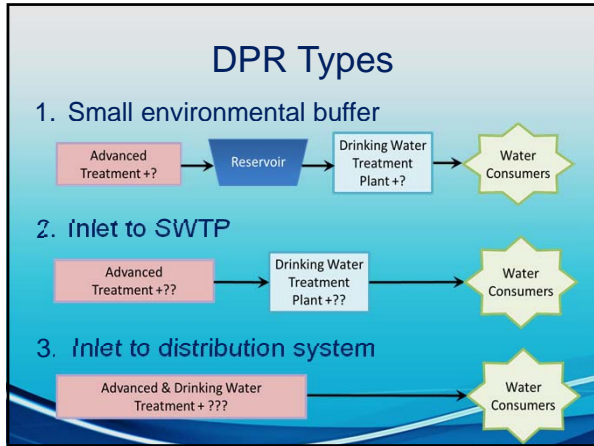
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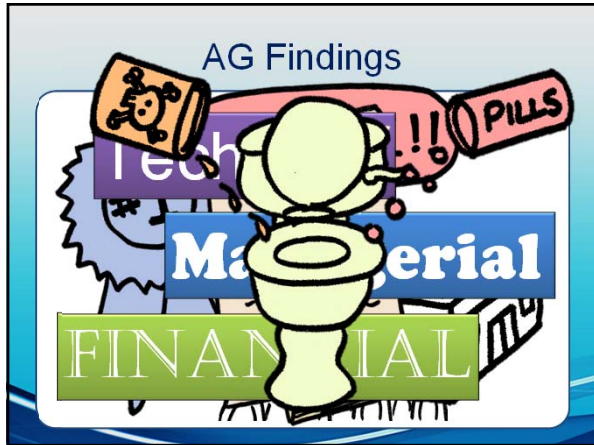
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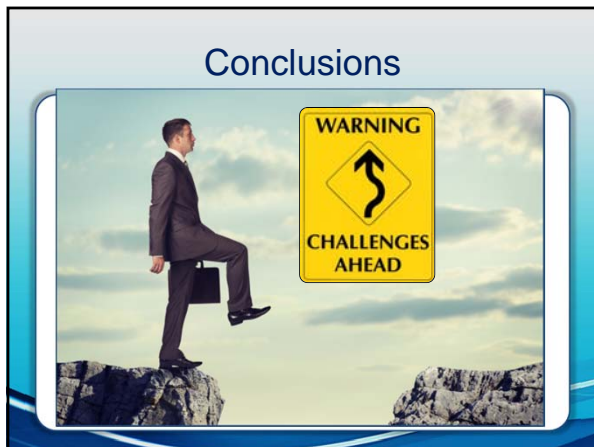
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### Path Forward

- Building partnerships



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### MOVING TOWARD CRITERIA

Bob Hultquist, P.E.  
Recycled Water Specialist  
(Retired Annuitant)  
Division of Drinking Water

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### A Good Basis

- Expert Panel, Advisory Group, WaterReuse DPR research initiative, other research products, and experience with IPR have provided an understanding of how DPR might be done safely
- Panel identified the critical aspects of criteria and have described research areas that could inform criteria development

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### Safe Practice to Criteria

- Our experience with the development of IPR criteria has shown that it is a sizable step, however,
  - from being confident that something can be safe
  - to producing criteria that assure that it will be accomplished safely, in every case, all the time.

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### Criteria Objectives

- When the Expert Panel embarked we offered several objectives for criteria. The criteria:
  - Must be enforceable (enable an objective compliance determination);
  - Must be unambiguous regarding the critical protective features; and
  - Must assure that any proposal that can comply will actually produce safe water continuously.

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### Criteria Development Questions

- We posed several questions to the Panel we would face when developing criteria - questions that relate to writing objective criteria to address system reliability
- The questions have been pared down and the Panel has provided us with scientifically valid means to evaluate the efficacy of barriers

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### Knowledge Gaps Remain

- Key Panel findings on DPR performance and reliability lead to further questions.
- **Extra LRV Capacity**
  - “Use a treatment train ... with multiple, independent treatment barriers ... that meet performance criteria greater than the public health threshold goals ... for microorganisms”
  - How much additional LRV capacity is necessary?

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### Knowledge Gap Treatment Diversity

- “Ensure the independent treatment barriers represent a diverse set of processes ... in the treatment train that are capable of removing particular types of contaminants by different mechanisms.”
  - How do we define treatment “diversity”?
  - Is there a way to identify the degree of diversity necessary?

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### Knowledge Gap Chemical Peak Attenuation

- Regarding short-term discharges of chemicals into the wastewater collection system -
- “... incorporating a final treatment process ... after the advanced water treatment train may result in some “averaging” of these potential chemical peaks.”
  - How much “averaging” is necessary and how do we specify it?

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### DPR Criteria Framework

- Criteria framework that encompasses the three possible types of DPR and recognizes the foundation of *de facto* potable reuse and IPR. The three forms are:
  - What the Expert Panel calls “reduced environmental buffer” (<IPR)
  - Delivering water to a surface water treatment plant
  - Delivering finished water to the distribution system

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### Framework Purpose

- Whether or not criteria for all types are developed simultaneously criteria should be coordinated
- A framework across the various types will avoid discontinuities in the risk assessment/risk management approach, especially if progressively more difficult situations are addressed sequentially

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### Finally ...

- Draft criteria and then challenge them with all imaginable proposals to make sure they will always assure safe DPR projects

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## POTABLE REUSE PUBLIC HEALTH PROTECTION RESEARCH

Brian Bernados, P.E.  
Recycled Water Specialist  
Division of Drinking Water

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### Coordination with Division of Water Quality

- Recycled Water Research Workshops:
  - Monitoring and Treatment
  - Performance for Constituents of Emerging Concern
    - Tuesday October 27th and Wednesday October 28th, 2015
  - Use of in vitro Bioassays to Assess the Safety of Recycled Water and Drinking Water
    - February 17-18, 2016

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### Replacing the Environmental Barrier

- WRRF 12-06: *Guidelines for Engineered Storage for Direct Potable Reuse*
- “DPR has inherent risks that differ from . . . indirect potable reuse (IPR).
- One alternative for DPR is to replace the environmental buffer with an engineered storage buffer that provides real time monitoring of the actual microbes before distribution.



LADWP Valley Generating Station  
has four 7 MG tanks unused

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### Real-Time Pathogen Monitoring Technologies

- *WaterReuse Research Foundation (WRRF) Project 11-01, "Monitoring for Reliability and Process Control of Potable Reuse Applications".*
- Generally, the ability to detect virus and protozoa to the levels needed to ensure  $10^{-4}$  risk of illness, are not yet available.
- Need to overcome issues with
  - robustness,
  - sensitivity,
  - precision, and
  - reliability.



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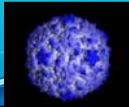
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### Research New Molecular Methods

- WRF Project 4508 Literature Review states, "Online monitoring for pathogens is particularly crucial to capture acute threats to public health"
- bulk indicators may or may not directly correlate to the safety of the water."
- Newer analytical methods are examined in detail.
- Expert Panel report recommends **collecting pathogen concentration data** via:
  - quantitative polymerase chain reaction (qPCR),
  - digital droplet PCR (ddPCR) and
  - flow cytometry.



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### Redundant Treatment 12-06

- "Another approach to mitigating the inevitable process failures in a DPR scenario is to build in **redundant** treatment.
- The challenge with allowing redundancy to stand in for process monitoring is that,
- if improperly monitored, redundant processes may fail unnoticed and simultaneously,
- thus process redundancy alone does not provide for failsafe operations."



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### Rapid Response to a Failure

From "Application of Risk Reduction Principles to Direct Potable Reuse," WRRF 11-10

Critical characteristics of monitoring are:

- **Independence.** Dependence on the performance of other elements creates risk. So, need to adequately monitor each process step independently.
- **Response Time.** Need to identify the failure, make a decision about the response & implement the response.
- **Sensitivity.** The monitoring method must confirm the level of treatment achieved by the process.

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### Hazard Analysis Critical Control Point (HACCP)

- 13-03 "Critical Control Point Assessment to Quantify Robustness and Reliability of Multiple Treatment Barriers of a DPR Scheme"

- HACCP was developed by the food industry
- Specific monitoring for each process:
  - Critical control points.
  - Parameters for each.
  - Failure mode = at what point has it stopped functioning?
  - Follow-up actions – automatic or operator initiated?
  - Hazards – what can go wrong upstream?
- Plans tailored to each site.



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### Operations

- DPR depends on the capability of the operator
- Specialized initial and on-going training
- 15-05 *Developing Curriculum and Content for DPR Operator Training*
- High level of expertise needed
- Appropriate setpoints - meaningful
- Verification – frequent checks to a bench unit
- Proper interpretation of info



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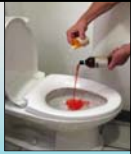
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### DPR Expert Panel Report Chapter 8 Chemicals Source control



In progress, is WRRF 13-12,  
*Evaluation of Source Water Control Options and the Impact of Selected Strategies on DPR*

Expert panel states, "Because of the lack of an adequate environmental buffer . . . , **short-duration releases** of chemical contaminants could be problematic for DPR projects.

Contaminants that are difficult to remove . . . such as acetone, methyl ethyl ketone, and methanol . . . "

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### Research - Bioassays



- WE&RF 15-02  
*Creating a Roadmap for Bioassay Implementation in Reuse Waters: A cross disciplinary workshop*
- Near Term
  - Review & improve concentration methods
  - Selection of appropriate health endpoints
  - Adapt bioassays for recycled water
  - Standardize methods, procedures, and QA/QC
  - Assess treatment performance
- Long Term
  - Link to human health significance

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**CONCLUDE & OPEN FOR  
PUBLIC COMMENT**

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### Next Steps

- Comment period ends **Oct 25, 2016, at noon**
- Review of public comments and preparation of an updated Draft Report
- State Water Board December 6, 2016 meeting (Information Item)
- Submit Final Report to Legislature: December 31, 2016

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### Submission of Written Comments

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- By fax: (916) 341- 5620
- By mail:  

<u>Hand/ Courier Delivery</u>	<u>U.S. Mail</u>
1001 I Street, 24 <sup>th</sup> Floor	P.O. Box 100
Sacramento, CA 95814	Sacramento, CA 95812-0100

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