Overview of IPR/DPR Expert Panel’s DPR Briefing Paper Topics

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Panel Co-chairs

October 22, 2015
DDW-DPR Advisory Group Meeting
Topics Covered

• *Indirect vs Direct Potable Reuse (DPR)*
• *Panel Charge – DPR*
• *Approach - Briefing Topics & Feasibility Report*
• *Schedule*
• *Opportunity for Input*
Indirect vs. Direct Potable Reuse

- **Indirect potable reuse (IPR):**
  - Augmentation of a drinking water source (surface water or groundwater) with reclaimed water followed by an environmental buffer that precedes normal drinking water treatment (working)

- **Direct potable reuse (DPR):**
  - Introduction of reclaimed water directly into a potable water supply distribution system downstream of a water treatment plant or into the raw water supply immediately upstream of a water treatment plant (per CWC)
Figure 1. Flow diagrams for IPR: (a) with a groundwater aquifer as an environmental buffer; and (b) with a surface water reservoir as an environmental buffer (Tchobanoglous et al., 2015).
* Draft DDW regulations currently require primary and secondary treatment, microfiltration, reverse osmosis, advanced oxidation (e.g., H₂O₂/UV), disinfection, and stabilization.
Direct Potable Reuse

Figure 2.1. Flow diagrams for DPR: (a) with ATW introduced upstream of a DWTF; and (b) finished water introduced into the drinking water supply distribution system downstream of a DWTF. (Tchobanoglous et al 2015)
San Diego’s Potable Reuse Plan

**Water Sources**
- Local Runoff
- Imported Water
- Colorado River
- Northern California

**Water Reclamation Plant**
- Traditional Recycled Water Uses
  - irrigation
  - industrial

**Advanced Water Purification Facility**
- Membrane Filtration
- Reverse Osmosis
- UV Disinfection/Advanced Oxidation

**Drinking Water Treatment Plant**
- Coagulation
- Filtration
- Disinfection (Ozone & Chlorine)

**Flow Diagram**

- Wastewater from Homes & Businesses flows to the Water Reclamation Plant.
- Recycled Water is treated at the Advanced Water Purification Facility.
- Purified Water is stored in a Reservoir.
- Drinking Water Treatment Plant processes the water with coagulation, filtration, and disinfection.
- Drinking Water is supplied to Homes & Businesses directly or indirectly through DPR Barrier.
Compensation for Loss of the Gap

• Means to compensate for loss of some or all of the environmental buffer could include:
  – More robust multiple treatment barriers
  – Enhanced monitoring for CECs or surrogates
  – Real-time or near real-time monitoring capability
  – Short term storage of product water to provide time for monitoring results prior to use as a potable supply
  – Alternative water supply source or means to quickly correct failure
Panel Charge for DPR

Water Code, Chapter 7.3, Section 13565. (a)(1)

- ... advising the department on public health issues and scientific and technical matters ... (on) ... 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.
DPR Briefing Paper Approach and Topics

• **Briefing Paper Scope:**
  – *Issue and background:* (summarize pertinent available research/technical information)
  – Propose practical engineering/monitoring solutions and/or research
  – *Provide overall conclusions and recommendations*
DPR Briefing Overarching Questions

• **Overarching Questions:**
  – Definition of DPR (continuum) including 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 public health from off-spec water and/or other failures.
  – Monitoring needed to ensure the protection of public health.
  – Other scientific or technical issues that may be necessary, including the need for additional research.
DPR Briefing Paper Topics

- **Briefing Paper Topics (examples of content):**
  - 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** – measurement of chemical water quality in ATW and drinking water (emphasis on indicators and surrogates).
  - 4) **Molecular and Other Pathogen Monitoring Methods** – for monitoring pathogens in ATW and drinking water.
DPR Briefing Paper Topics (cont’d)

• Briefing Paper Topics (examples of content):

  – 5) Antibiotic Resistant Bacteria (ARB) and Antibiotic Resistant Genes (ARG) 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, storm water, 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 DPR surveillance program.
## DPR Briefing Paper Draft Schedule

<table>
<thead>
<tr>
<th>Briefing Paper Topic</th>
<th>Panel Lead (Reviewer)</th>
<th>Panel Review Meeting Dates</th>
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<tbody>
<tr>
<td>1 - Bioanalytical Tools</td>
<td>Richard Bull (Kevin Crofton, Michael Dennison)</td>
<td>Dec 1-2 2015</td>
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<tr>
<td>2 - Quantifying Treatment Facility Reliability</td>
<td>Charles Haas (Jörg Drewes/Perry McCarty/Kara Nelson)</td>
<td>Dec 1-2, 2015 and Feb 2016</td>
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<tr>
<td>3 - Analytical methods/tools for chemicals</td>
<td>David Sedlak (Jorg Drewes)</td>
<td>Dec 1-2, 2015</td>
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<tr>
<td>4 - Molecular and other methods for pathogens</td>
<td>Joan Rose (Kara Nelson)</td>
<td>Feb 2016 and March 2016</td>
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<tr>
<td>5 - Antibiotic Resistant Bacteria (ARB) and Antibiotic Resistant Genes (ARG)</td>
<td>Walt Jakubowski (Joan Rose/Ryan Reinke/Kellog Schwab/Nick Ashbolt)</td>
<td>Feb 2016</td>
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<td>6 - Comparative Health Risks</td>
<td>Co-Chairs/Brain Pecson (Rhodes Trussell/Charles Haas/Michael Anderson)</td>
<td>April/May 2016</td>
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<td>7 - Public Health Surveillance</td>
<td>Tim Wade (Walt Jakubowski/Michael Anderson)</td>
<td>June 2016</td>
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<tr>
<td>DPR Panel Preliminary Findings</td>
<td>Co-Chairs</td>
<td>June 2016 (internal draft)</td>
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Note: The first person listed for each topic is the lead.
Questions?