

Overview of Workshop on CECs by WateReuse Association

Ronald W. Crites, P.E.
Natural Systems Service Leader
February 22, 2011

WATEREUSE CALIFORNIA

- **CEC Monitoring and Risk Communication Workshop**
 - February 1, 2011 – Orange County Water District
 - February 2, 2011 – Santa Clara Valley Water District
- **Presenters**
 - Dave Smith, WATEREUSE CALIFORNIA
 - Liz Haven, Water Resources Control Board
 - Bobbi Larson, Somach, Simmons & Dunn
 - Jean Debroux, Kennedy Jenks
 - Laura Kennedy, Kennedy Jenks
 - Mark Millan, Data Instincts
 - Ron Wildermuth, West Basin Municipal Water District
 - Patsy Tennyson, Katz and Associates

SWRCB's Recycled Water Policy

- Developed by stakeholders
- Adopted February 2009
- Establishes or clarifies
 - SWRCB support for and goals water recycling
 - Permitting framework (including landscape GP)
- Requires Salt/Nutrient Management Plans
- CECs
 - Insufficient basis for monitoring requirements
 - Mandates Panel creation



CEC Panel Process

- Stakeholder Advisory Group
 - Identified panelists
 - Developed agenda for first Panel meeting
 - Provide perspectives & information to Panel
- SCCWRP
 - Coordinate meetings
 - Facilitate communications
 - Logistical & technical support of Panel



Panelists

- Paul Anderson, AMEC, HH toxicologist
- Nancy Denslow, UF, biochemist
- Jörg Drewes, CSM, treatment engineer
- Adam Olivieri, EOA, epidemiologist
- Dan Schlenk, UCR, env toxicologist
- Shane Snyder, U of Az, chemist



Panel's Definition of CECs

- Personal care products
- Pharmaceutical residues
- Industrial, agricultural, and household chemicals
- Natural hormones
- Food additives (e.g., phytoestrogens, caffeine, sweeteners)
- Transformation products
- Inorganic constituents (e.g., boron, chlorate, gadolinium)
- Nanomaterials



#2 - Application of framework: CEC monitoring

	Basis	Irrigation	Potable Reuse
Known knowns	Human Health	none	17 beta-estradiol, caffeine, triclosan, NDMA
Unknown knowns	Treatment Plant Perform	turbidity, coliform, chlorine	Δ gemfibrozil, DEET, caffeine, iopromide, sucralose, NH ₃ , NO ₃ , DOC
Unknown unknowns	Bioanalytical Screen	Further method development needed	



Implementation of Panel Recommendations

- Final SWRCB direction pending
- Key issues
 - RWQCB role
 - DPH request for additional monitoring
 - Occurrence data collection
 - Update health-based list



State Water Board Staff Approach: Implementing CEC Advisory Panel Recommendations

WaterReuse CEC Workshop
February 1 and 2, 2011
Liz Haven, Assistant Deputy Director
State Water Resources Control Board



State Water Board Staff Steps

- August meeting with California Department of Public Health (CDPH)
- September 13, 2010: received CDPH letter
- November 18, 2010: issued Notice of Public Hearing and Staff Report
- December 15, 2010: State Water Board held Public Hearing to receive oral comments
- December 20, 2010: issued Notice of deadline extension for written comments
- January 10, 2011 (noon): deadline for written comments



Coming Soon to a Permit Near You: CEC Monitoring Requirements

Bobbi Larson

February 1, 2011—Fountain Valley

February 2, 2011— San Jose

Monitoring Requirements

Landscape irrigation projects



- **No New Requirements**
- Continue to Monitor performance indicators (turbidity, coliform, chlorine residual)
- General Permit for landscape irrigation Monitoring and Reporting Program will not be re-opened

Monitoring Requirements

Groundwater Recharge Projects



- Implement Panel recommendations
- For surface spreading projects only: May be required to also monitor for up to 13 additional compounds per CDPH
- WaterReuse position is that CECs should not be required baseline monitoring for all projects

Considerations for your Monitoring Program

Jean Debroux, PhD
Kennedy/Jenks Consultants

Chemicals of Emerging Concern (CECs)

Original Source: "Considerations for your Monitoring Program", Kennedy/Jenks Consultants

■ Panel Recommended CECs

CEC	Purpose
17B-estradiol	Health-based indicator
Caffeine	Health-based indicator
NDMA	Health-based indicator
Triclosan	Health-based indicator
Gemfibrozil	Treatment-based indicator
Iopromide	Treatment-based indicator
Deet	Treatment-based indicator
Sucralose	Treatment-based indicator
NDMA	Treatment-based indicator
Caffeine	Treatment-based indicator

Secondary Monitoring CEC
1,2,3-Trichloropropane
Hydrazine
Quinoline

Chemicals of Emerging Concern (CECs)

Original Source: "Considerations for your Monitoring Program", Kennedy/Jenks Consultants

■ CDHP added CECs

CDHP Notification List
Boron
Chlorate
1,4-Dioxane
NDEA
NDPA
1,2,3-Trichloropropane
Naphthalene
Vanadium

Other Chemicals
Chromium-6
Diazinon
NPYR
N-Nitrosodiphenylamine
Bisphenyl A
Carbamazepine
TCEP

■ Other site-specific chemicals

Sampling and Analysis Protocol

Original Source: "Considerations for your Monitoring Program", Kennedy/Jenks Consultants

- Hypothetical Surface Spreading operations
 - 7 sampling locations (may be as little as 3)
 - 11 CEC sampling events during first 5 years
 - Field blank, replicate and matrix spike for each sampling event
- CEC analytical cost ONLY: \$450,000 to \$600,000
 - Does not include:
 - Sampling
 - Non-CEC performance-based surrogate analysis
 - Data analysis
 - Data Reporting
 - Additional samples due to QA/QC or exceedances

Kennedy/Jenks Consultants

Risk Assessment Study of PPCPs in Recycled Water

Laura Kennedy

Kennedy/Jenks Consultants

Compounds of Interest

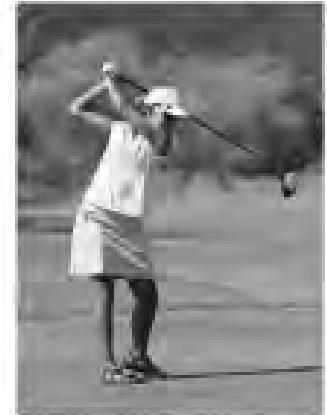
Original Source: "Risk Assessment Study of PPCPs in Recycled Water", Kennedy/Jenks Consultants

PPCP	Type of Substance	Common usage	CEC Panel?
Ibuprofen	Over the counter (OTC) pharmaceutical	Non-steroidal anti-inflammatory	
Acetaminophen	OTC pharmaceutical	Analgesic	
17-beta estradiol	Prescription pharmaceutical	Synthetic and naturally occurring hormone	X
Fluoxetine	Prescription pharmaceutical	Antidepressant	
Caffeine	Ingredient in food and drink	Stimulant	X
Triclosan	Personal care product	Antimicrobial	X
Sulfamethoxazole	Prescription pharmaceutical	Antibiotic	
N,N-Diethyl-meta-toluamide (DEET)	Personal care product	Insect repellent	X
Perfluorooctanesulfonic acid (PFOS)	Organic compound formerly used in common products	Fluorosurfactant	
Bisphenol A	Organic compound used in common products	Various uses, primarily plastics manufacturing	**

Non-Potable Exposure Scenarios

Original Source: "Risk Assessment Study of PPCPs in Recycled Water", Kennedy/Jenks Consultants

- Parks, playgrounds, school yards: Children
- Agricultural irrigation: Agricultural workers
- Freeway, highway, and urban landscaping: Landscape workers
- Golf courses: Golfers



Relative Risks for PPCPs

Original Source: "Risk Assessment Study of PPCPs in Recycled Water", Kennedy/Jenks Consultants

		Years of Non-Potable Recycled Water Exposure to Reach Common Exposure of Same PPCP for each Scenario			
	Comparison Exposure	Child on Playground	Agricultural Worker	Landscape Worker	Golfer
Ibuprofen	one Advil tablet (200 mg)	67,000	28,000	8,600	26,000
17-beta estradiol	hormone replacement daily dose (0.5 mg)	160,000	16,000	5,000	13,000
Fluoxetine	one dose (20 mg)	220,000	83,000	26,000	91,000
Sulfamethoxazole	one dose (800 mg)	1,900,000	220,000	69,000	1,100,000
PFOS	estimated daily adult intake from environmental factors (1,071 ng)	46	5	1.5	29
Bisphenol A	estimated daily adult intake from food (13 ug)	22	7.1	2.2	8.9
DEET	one application of DeepWoods Sportsman Off! to arms, hands, and lower legs (110,000 mg for child, 450,000 mg for adult)	110,000,000	85,000,000	26,000,000	190,000,000
Triclosan	an adult washing hands for 30 seconds with anti-bacterial soap (91 mg)	17,000	7,600	2,400	6,600
Acetaminophen	one extra-strength Tylenol tablet (500 mg)	3,000,000	350,000	110,000	1,700,000
Caffeine	one cup of coffee (100 mg)	410,000	44,000	14,000	250,000

Conclusions of Risk Assessment

Original Source: "Risk Assessment Study of PPCPs in Recycled Water", Kennedy/Jenks Consultants

- PPCPs in recycled water are not likely to result in adverse health effects for non-potable uses
- Exposure to PPCPs in recycled water is much less than common daily exposures to PPCPs



CEC Monitoring & Risk Communications Workshop



February, 2011

Exposure Scenarios



**The
Golfer**



**Ag
Worker**



**Land-
scaper**

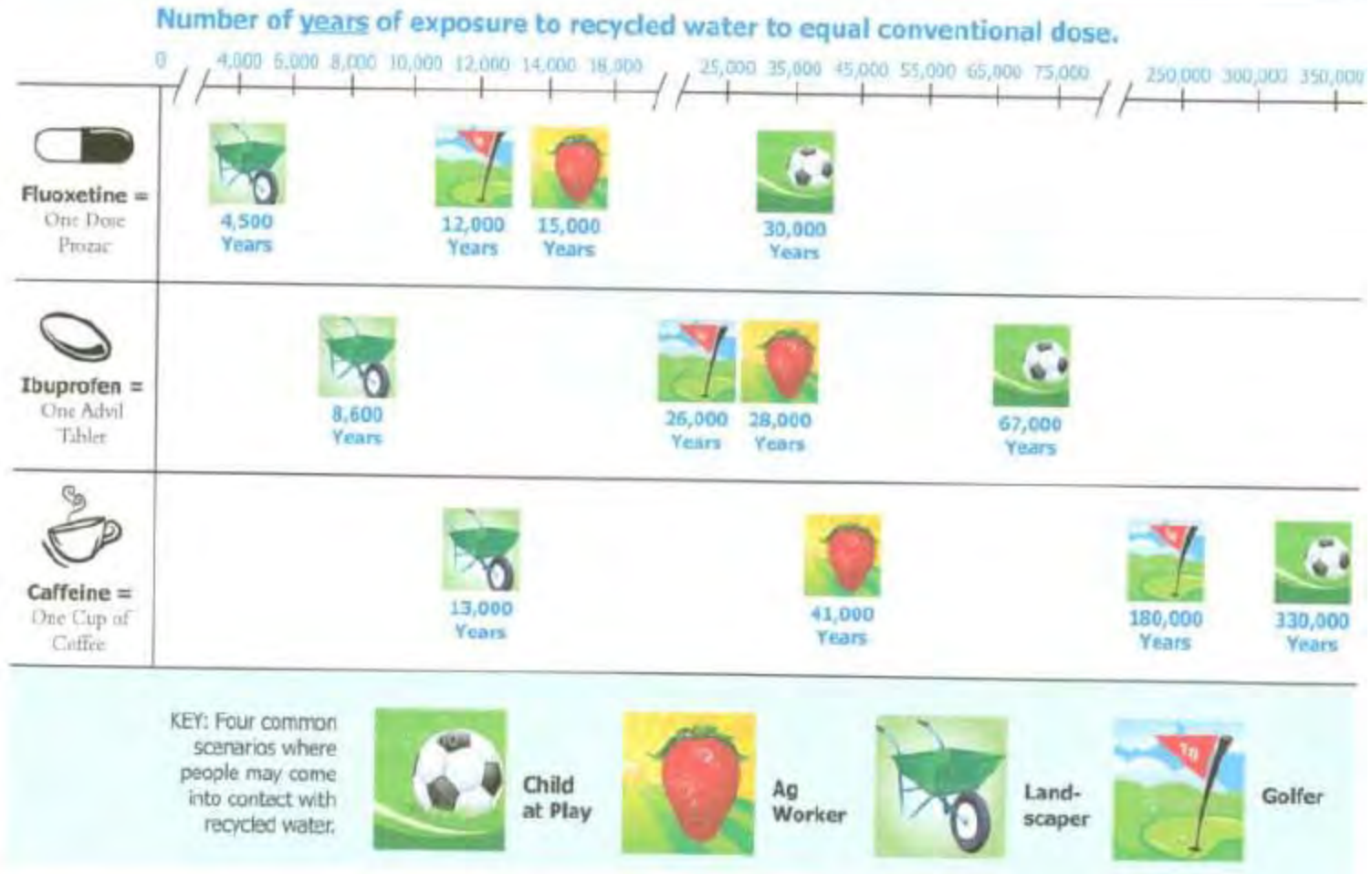


**Child
at Play**

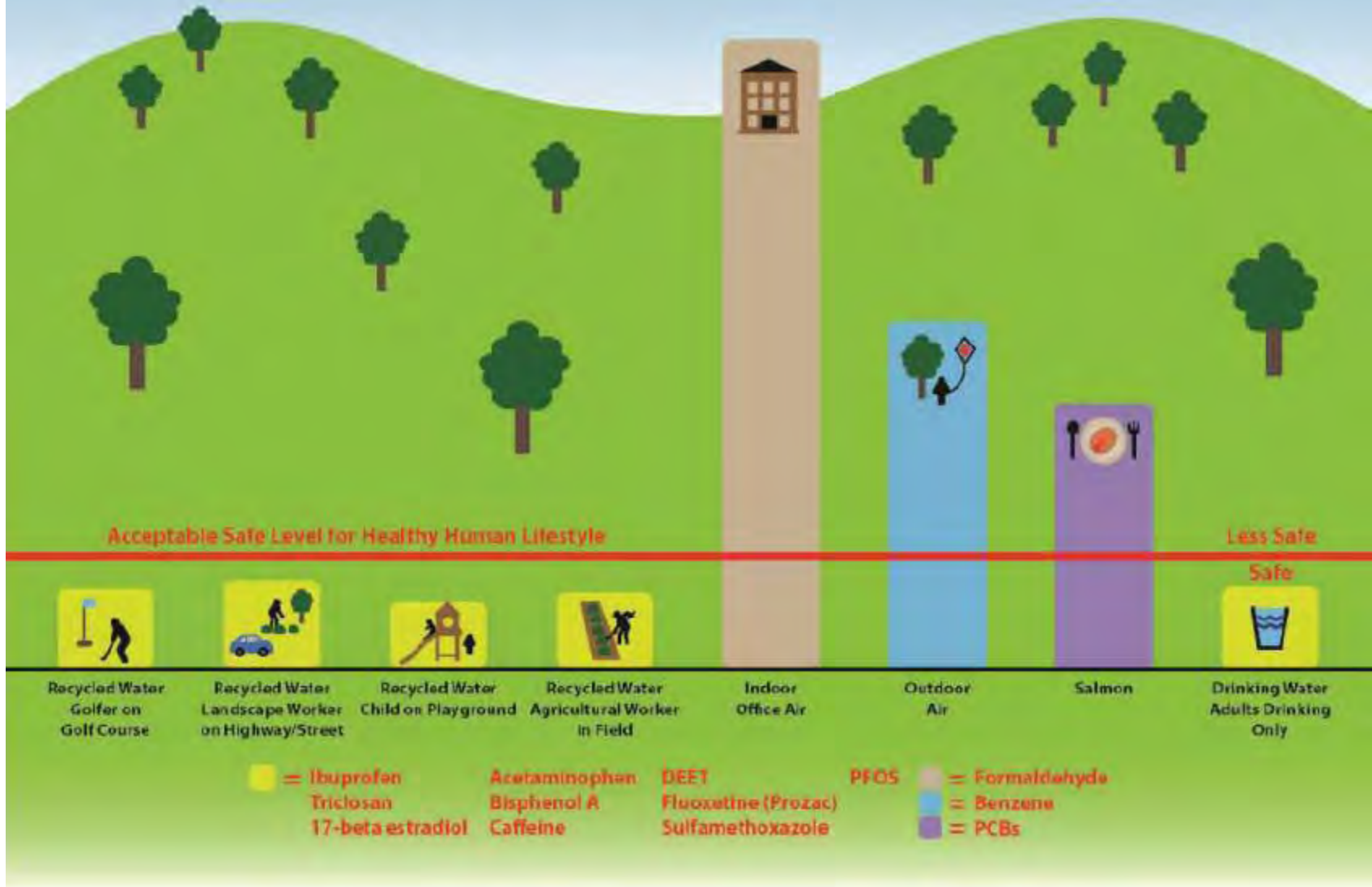
WHAT'S THE RISK?

A Comparison of Exposure to PPCPs from Recycled Water vs. Conventional Uses

This chart compares typical exposures to three Pharmaceuticals and Personal Care Products (PPCPs) — antidepressant, ibuprofen, caffeine — with exposure to the same chemicals in recycled water under four different scenarios in which a person may come into contact with the water. For each scenario — child at play, agricultural worker, landscaper, and golfer — the chart shows how many years one could participate in that activity before reaching a single daily dose of the chemical from typical exposures.



Concentration Comparisons of Chemicals in our Everyday Environment



It takes Time and a Commitment to a Communications Processes

- 💧 You need to be trustworthy and demonstrate that you are
- 💧 **Build trust by demonstrating “state of the art” science and technical processes that protect health & safety and make them EASY to UNDERSTAND**
- 💧 Educate the media, electeds and regulatory policymakers too!
- 💧 Education young people in regions where long term water sources are already known to be critical





Welcome!

Ron Wildermuth
Communications Manager
West Basin Municipal Water District
Home of Five Types of “Designer”
Recycled Waters



Introduction




- Complement Laura, Jean and Mark for their great work on talking points for recycled water
- Finding ways to relate technical information to the public is one of the most important things water communications must do next to being transparent
- Noting it takes minimum of 1 million years and up to 40 million years of exposure to recycled water before you get a single dose of a concerned compound is easy to understand and shows an extremely low risk
- Relates the risk to something people can relate to in their normal lives...a million years, for example is an extraordinary amount of time

Communicating Relative Risk



- Shane Snyder – Leading PPCPS researcher
- Related pharmaceutical threat to a pill: “Consider that the highest concentration of any pharmaceutical we detected in US drinking waters is approximately 5 million times lower than the therapeutic dose. This concentration is difficult to perceive, so consider these analogies.
- Distance: This concentration is roughly equivalent to $\frac{1}{2}$ of an inch in the distance between the earth and the moon,
- Time: Or in terms of time, this concentration would be equivalent to approximately one second in approximately 750 years.”



Communicating Risk in Crisis

- **In 2000, Water Factory 21 was producing NDMA a probable carcinogen**
- **When discovered by OCWD, water production was stopped, evaluated and then fixed**
- **Also, media was immediately called in and briefed on the issue**
- **One of the tools used was to relate levels of NDMA found with levels of NDMA in food products used by everyone**



NDMA is in Food On Display

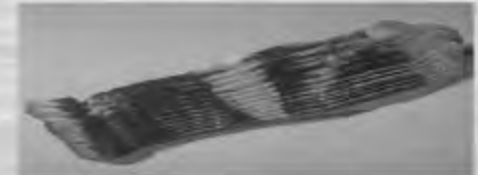
Some foods contain greater concentrations of NDMA than is allowed in water



Milk: 90-100 ppt
Powdered milk:
3,550 ppt



Beer: 50-7,700 ppt



Processed meats
2,600-5,350 ppt

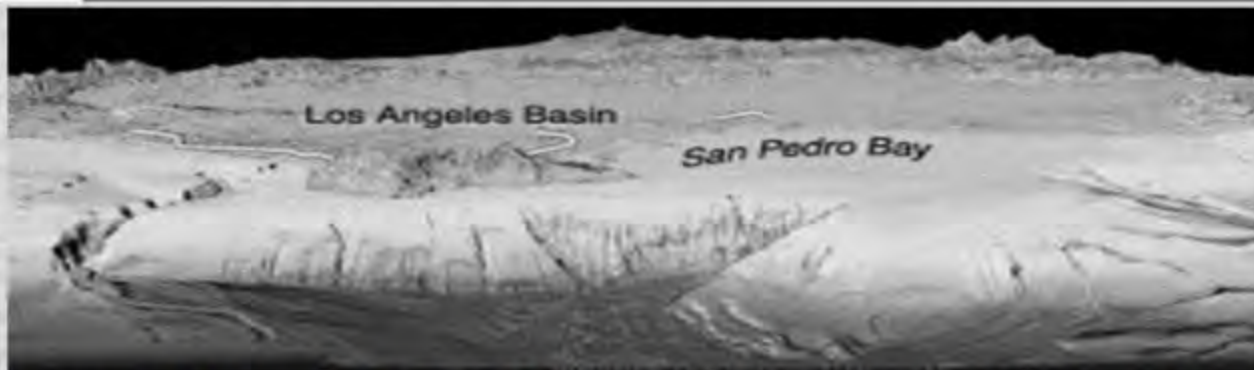


Water: 20 ppt (Action level)

We actually had these foods on display in media briefing room.



West Basin's Seawater Intrusion Barrier/GW Replenishment Water



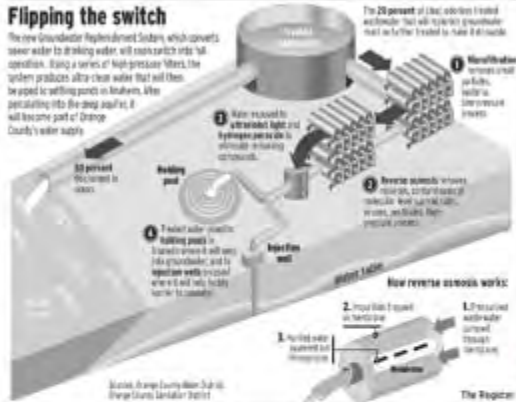
- For years, West Basin did not communicate that it made water that replenished local groundwater supplies
- Two years ago, we started communicating our IDP project and started tasting the water on our tours
- Since that time, we have carefully explained on our active tour program that our advanced treated water thru MF, RO and UV is basically CEC free and one of the highest quality waters available



Hiding or Misleading Truths Destroy Credibility

Flipping the switch

The new groundwater replenishment facility, which converts sewer water to drinking water, will convert to full operation. Using a series of high-pressure filters, the system produces ultra-clear water that will then be piped to settling ponds in Anaheim, after passing through the long pipeline, it will become part of Orange County's water supply.



- Years ago, an LA IDP project was stopped because of politics...key elected official running for office reversed his stand on project
- His excuse - They told me it was “wastewater” and I did not know it was **SEWER WATER!!!**
- So by being straight forward and saying that we were purifying sewer water and making it better than bottled water worked
 - Our candor gain us trust and credibility
 - Especially when delivered face to face

Conclusions

- SAP Panel's recommendations generally followed by the State Board
- Landscape irrigation projects have no CEC monitoring
- WaterReuse study "Risk Assessment Study of Pharmaceuticals and Personal Care Products (PPCP's) in Recycled Water to Support Public Review" comes out soon.
- Risks for Landscape irrigation from exposure to PPCPs is minimal.