

Chromium-6 Regulation: Impacts on Water Supply

**California Water Commission
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Tim Worley

My Background

- **2011–Present** – Executive Director, California-Nevada Section, AWWA
- **Previous positions – 1989-2011**
 - AWWA – Sr. Mgr. of Technical Programs
 - MWD of So. Calif. – Asst. Mgr., External Affairs
 - Three Valleys Mun. Water Dist. – Dep. General Mgr.
- **MA Public Policy, PhD Political Science** –
The Claremont Graduate University

AWWA—Calif.-Nevada Section

- Public health through safe drinking water and sanitation since 1881
- California-Nevada Section since 1920
 - Largest of 43 Sections throughout North America
- Science and education for total water solutions



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Why Chromium 6?

1. Chromium 6 occurs naturally in groundwater
 2. Drinking water regulation (MCL) for Cr6 = 10 ppb
 3. Extreme cost to remove Cr6 to proposed MCL
 4. First strategy: Avoid wells with Cr6
 5. Get more surface water, if possible
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Cases:

- City of Watsonville
- Santa Ynez River Water Cons. Dist.
- City of Woodland

Where does Cr6 occur?

- Industrial contamination – a few localized areas
- Natural occurrence in geologic formations
 - “State rock” —Serpentine
- Uncommon in surface water, common in groundwater



Current and Proposed MCL

- Total Chromium is regulated in drinking water
 - MCL since 1977 has been a surrogate for Cr6
 - Federal MCL = 100 parts per billion (ppb, or $\mu\text{g}/\text{L}$)
 - California MCL = 50 ppb
- Proposed MCL specifically for Cr6 (Calif. only)
 - Proposed at 10 ppb, specified Best Available Technology and monitoring
 - Final regulation April 15 (or June 15 if modified)
 - USEPA doing risk assessment of Cr6 with new scientific findings

Cr6 occurrence at low levels

CDPH estimate, impacted water sources = 311*

**Technical analysis by Jacobs Engr. Group revealed several problems.*

1. CDPH did not use most current data
2. CDPH did not use data on Total Chromium
3. Did not extrapolate impact to small systems
4. Standard practice uses 20% margin of safety (for this MCL, 8 ppb)

Cr6 occurrence at low levels

Jacobs' Technical Review corrections:

Estimate	Data Used	Sources Impacted	% of CDPH Estimate
CDPH estimate	Cr6	311	100%
Jacobs' replication of CDPH estimate	Cr6	310	99.7%
CDPH estimate extrapolated to small systems	Cr6	642	206.4%
CDPH estimate with most recent Cr6 data	Cr6	335	107.7%
CDPH estimate at 8 µg/L (ppb)	Cr6	483	155.3%
Proposed estimate using Cr ^{Total} before extrapolation at 10.5 µg/L	Cr6 and Total Cr	863	277.5%
Proposed estimate using Cr ^{Total} before extrapolation at 8 µg/L	Cr6 and Total Cr	1,195	384.2%
Proposed estimate	Cr6 and Total Cr	1,360	437.3%

Setting a drinking water standard

- Must have a Public Health Goal
- Must set MCL as close to PHG as feasible...
- Feasibility determination is to address:

“...the costs of compliance to public water systems, customers, and other affected parties with the proposed primary drinking water standard, including the cost per customer and aggregate cost of compliance, using best available technology.”

What is economically feasible?

- CDPH estimated annualized cost per connection
 - Range was \$64 – \$5,630/connection/year*

**Technical analysis by WQTS, Inc. revealed several problems:*

1. Underestimated occurrence of Cr6
2. Misstated per capita use rate, and peaking factor
3. No allowance for land acquisition, or building construction cost

Corrected economic analysis—10 ppb

Statewide cost of compliance calculations

Cost Component (\$Millions)	CDPH Estimate	WQTS Adjusted Estimate
Capital Cost	\$871	\$4,085
Annual O&M Cost	\$74	\$231
Total Annualized Cost	\$157	\$616

Strategies for compliance

1. Only use wells below MCL
2. Blend wells below MCL with wells above MCL
3. Blend or replace wells with surface water
4. Incur treatment cost only as a last resort

City of Watsonville

- Economic disadvantaged, 17% unemployment
- **Current:** 90% Groundwater (14 wells), 10% Corralitos Creek
 - No new source to replace wells
- **Strategy:** No alternative to treatment
- **Impact:** \$25.7 M capital; \$1.7 M annual O&M
 - Without assistance, 78% rate increase required

Santa Ynez River Water Cons. District

- **Current:** 48% SWP (39% exchange for Lake Cachuma entitlement); 52% groundwater
- **Strategy:** No likely alternative to treatment
 - No new supply from SWP or Cachuma Project
 - Upland Groundwater Basin used for storage, high demands, and pressure
- **Impacts:** 7 of 8 wells affected; 21-60% rate increase; Ag (vineyards) supply cut first

City of Woodland

- **Current:** All wells exceed MCL
 - Average of Cr6 monitoring results = 18 ppb
- **Strategy:** Replace with Sacramento River water
 - Woodland-Davis Clean Water Agency
 - 30 mgd treatment plant (expandable to 34 mgd)
 - Capital cost = \$228 Million

Significance for the Water Commission?

- Water quality and water supply are related
- At 10 ppb the Cr6 MCL will cost California up to \$4 Billion
 - Far exceeds State Revolving Funds
- Replacement with surface water is one strategy, but not always possible
- The Water Commission should investigate further, and report to Governor

Thank you for the invitation

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