

Complying with the Proposed Chromium MCL: Challenges for the Water Community

Ed Means

President



Acknowledgements

- Steve Bigley – Coachella Valley Water District
- Dr. Nicole Blute – Hazen & Sawyer
- Dr. Sunil Kommineni – ARCADIS

Outline

- Background
- Occurrence
- Regulatory Impacts

Background - Total Chromium

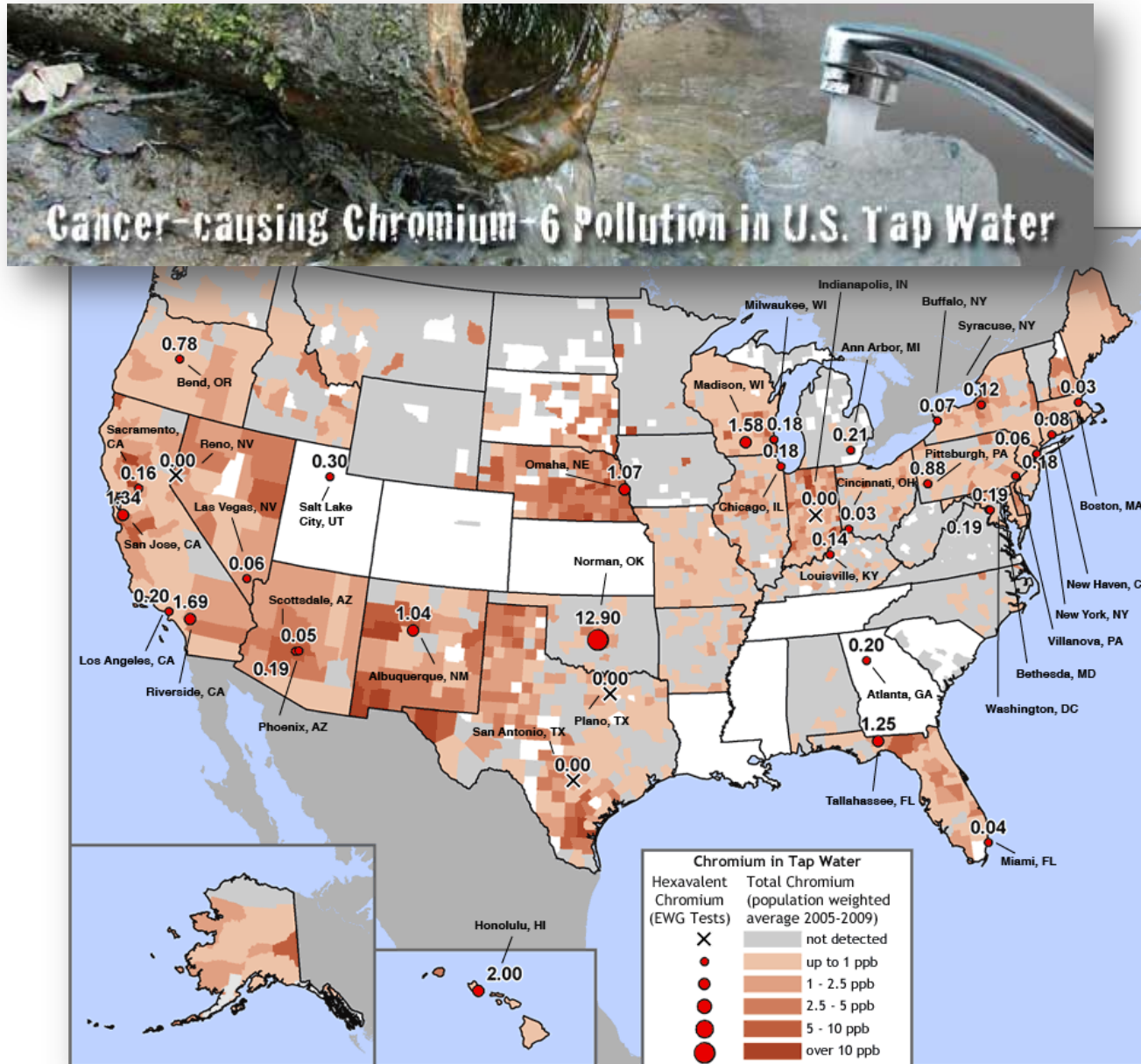
- Receiving increased attention from public, politicians and drinking water community
- Occurs naturally and from anthropogenic sources
- Two forms: non-toxic Cr(III) and carcinogenic Cr(VI)
- MCLs for total chromium
 - Federal: 100 µg/L
 - California: 50 µg/L
 - WHO Guideline: 50 µg/L

Background - Hexavalent Chromium

- First made famous in 1993 by Erin Brockovich about Hinkley, CA
- In 2010, Environmental Working Group (EWG) reported trace levels of Cr(VI) in 31 of 35 US tap waters



Background - EWG Report – 12/2010



Tainted water?

Water in 31 of 35 cities tested in 2009 by the Environmental Working Group, including Bethesda and the District, contained hexavalent chromium.

CITY	PARTS PER BILLION
Norman, Okla.	12.90
Honolulu	2.00
Riverside, Calif.	1.69
Madison, Wisc.	1.58
San Jose, Calif.	1.34
Tallahassee	1.25
Omaha	1.07
Albuquerque	1.04
Pittsburgh	.88
Bend, Ore.	.78
Salt Lake City	.30
Ann Arbor, Mich.	.21
Atlanta	.20
Los Angeles	.20
Bethesda, D.C., Phoenix	.19
Chicago; Milwaukee; Villanova, Pa.	.18
Sacramento	.16
Louisville	.14
Syracuse, N.Y.	.12
New Haven, Conn.	.08
Buffalo	.07

Proposed goal limit set by the California EPA

Las Vegas, New York	.06
Scottsdale, Ariz.	.05
Miami	.04
Boston; Cincinnati	.03

NONE DETECTED

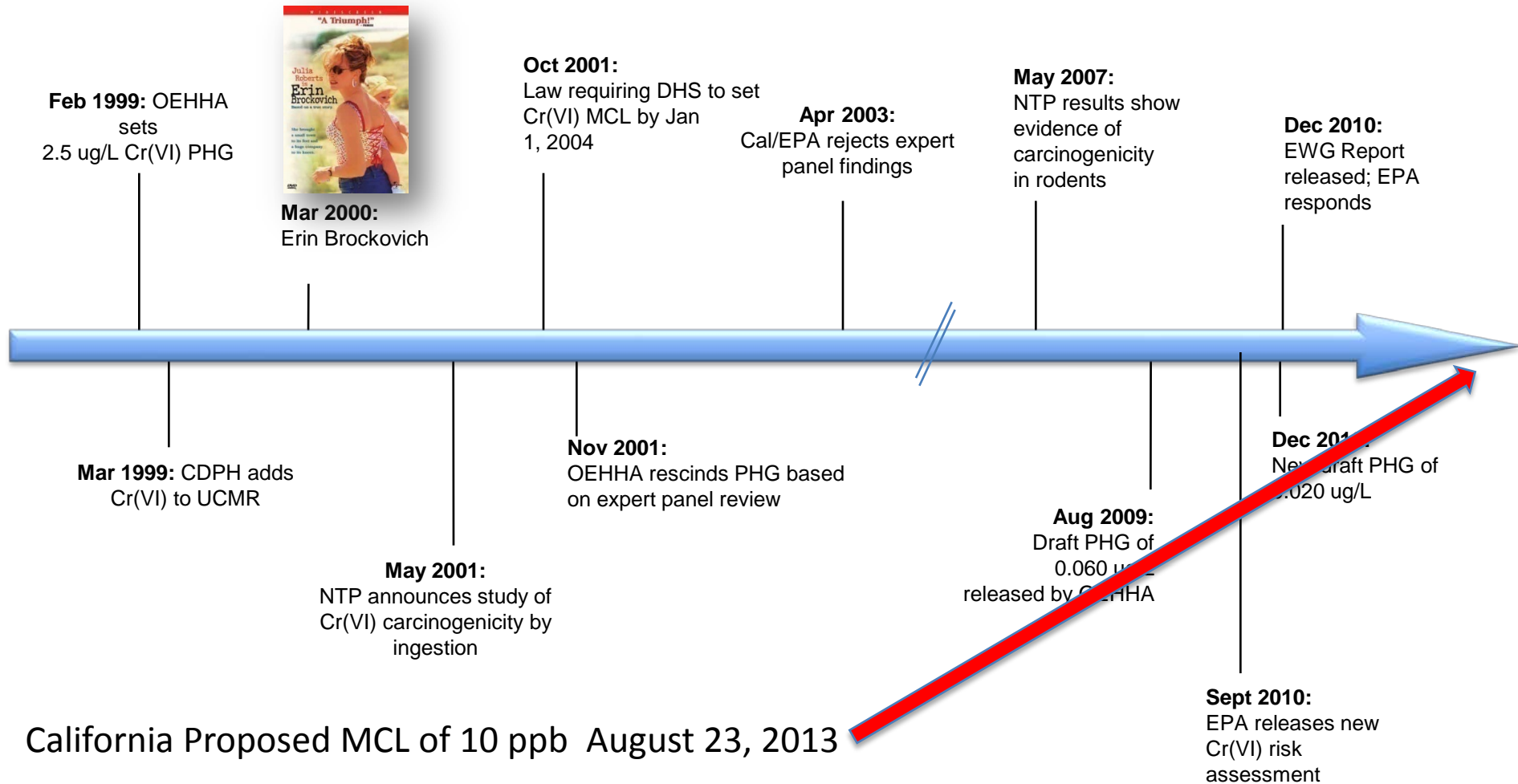
Indianapolis; Plano, Tex.; Reno, Nev.; San Antonio

SOURCE: Environmental Working Group

The Washington Post

Courtesy of Sunil Kommineni of ARCADIS

Background - Regulatory History



Occurrence - California Cr6

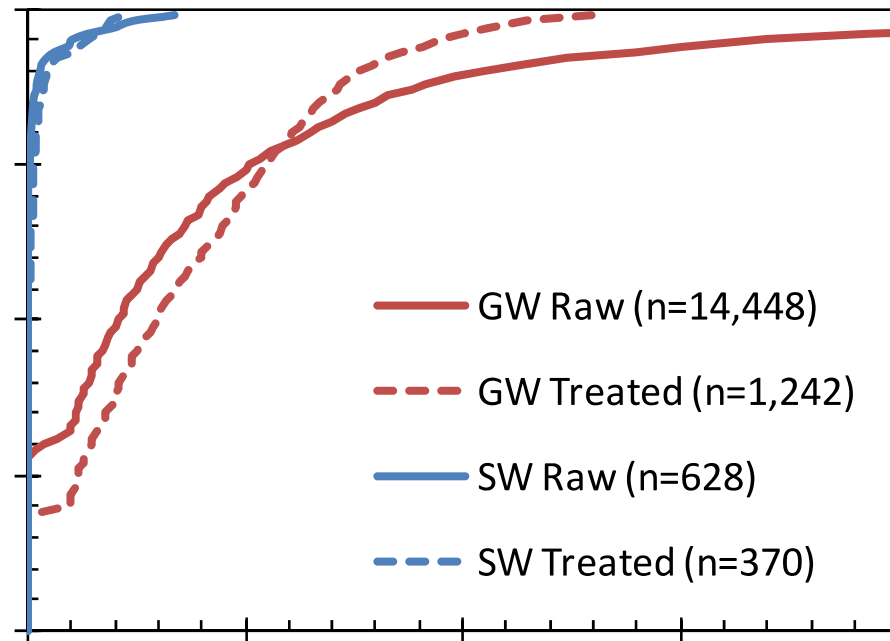
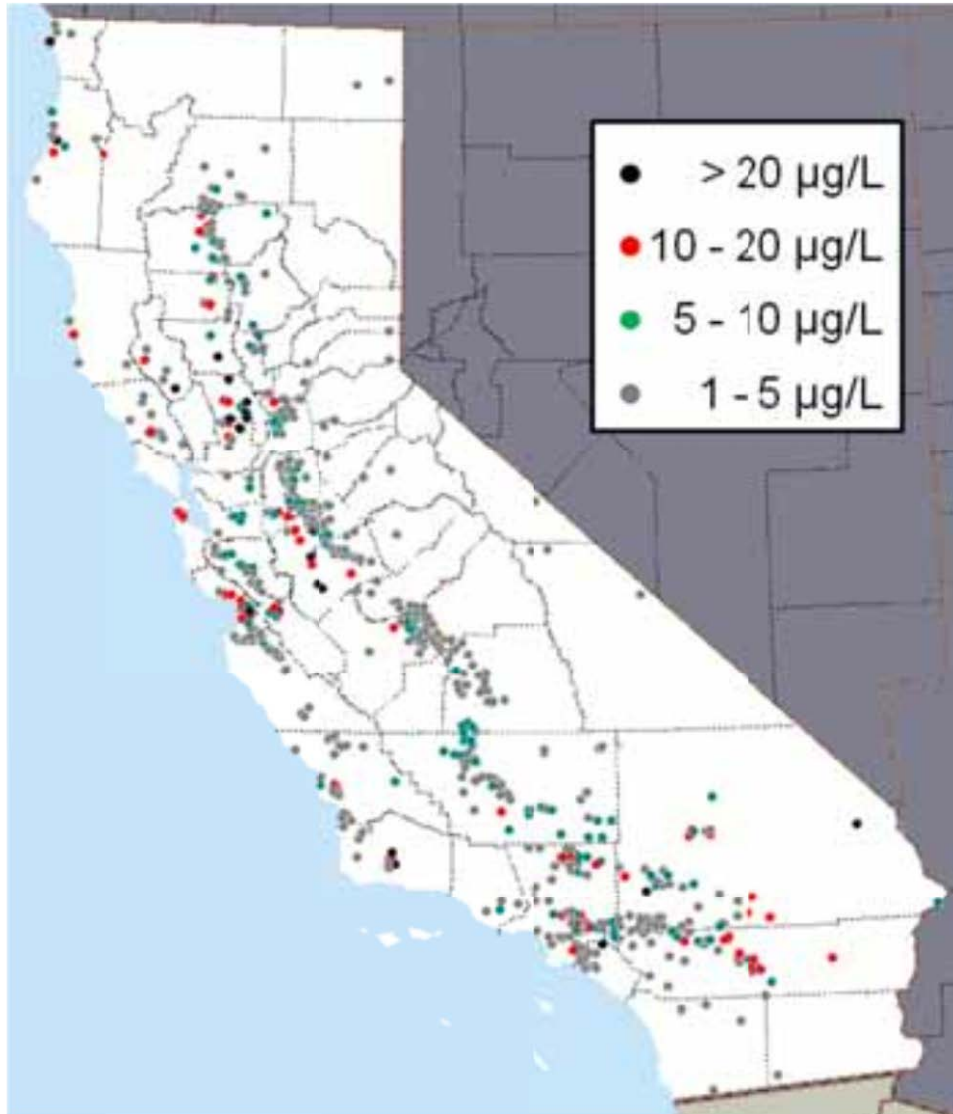


Figure 9. Cumulative probability distributions of CDPH hexavalent chromium data in ground and surface waters divided into raw and treated samples (75th percentile concentration per sample location, non-detects set to zero).

Occurrence - California Cr6



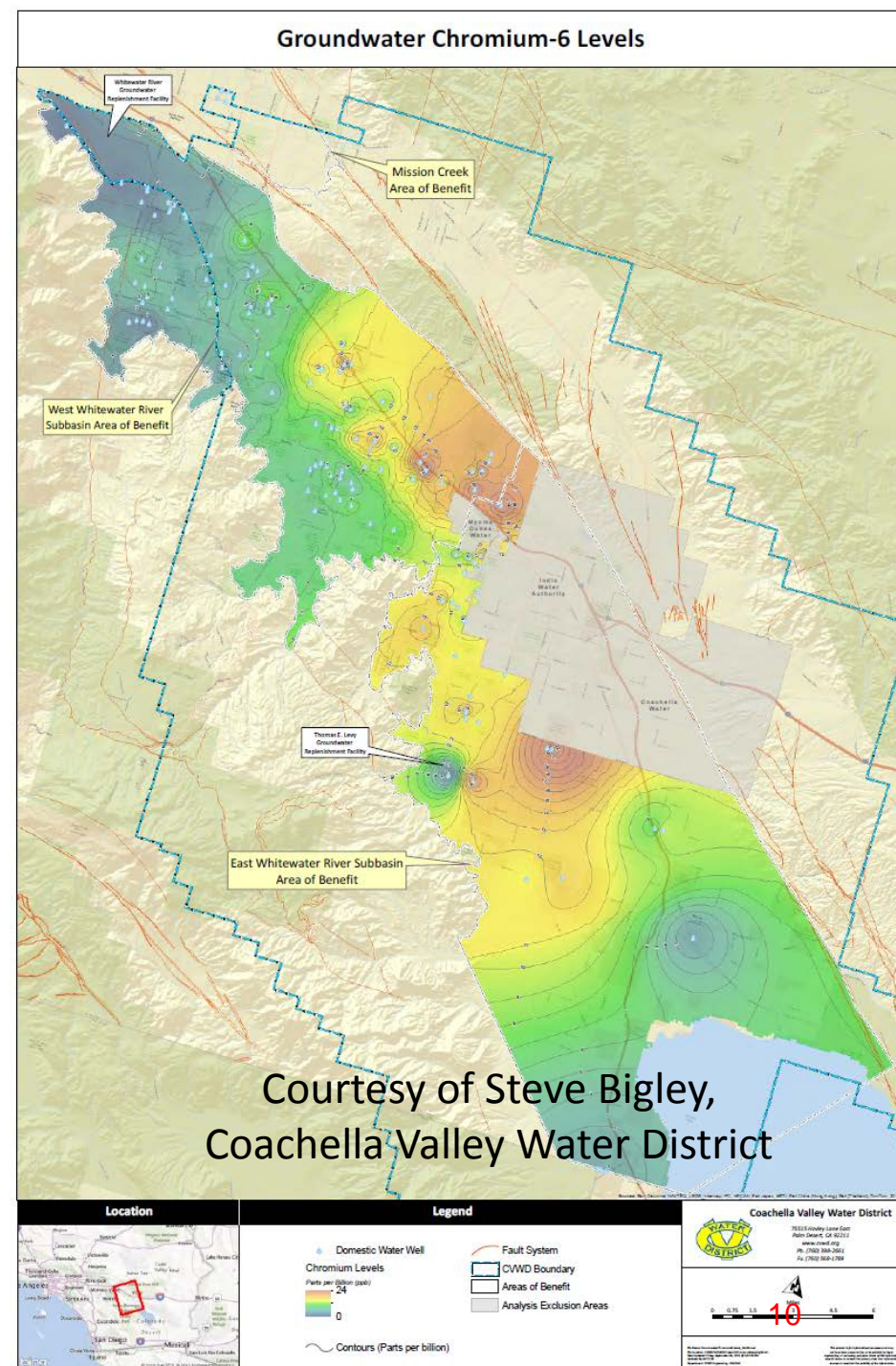
California pin map
of 75th percentile
hexavalent
chromium
concentration from
the CDPH database
by system

Source: WRF #4414, Total Chromium
and Hexavalent Chromium Occurrence
Analysis, 2012

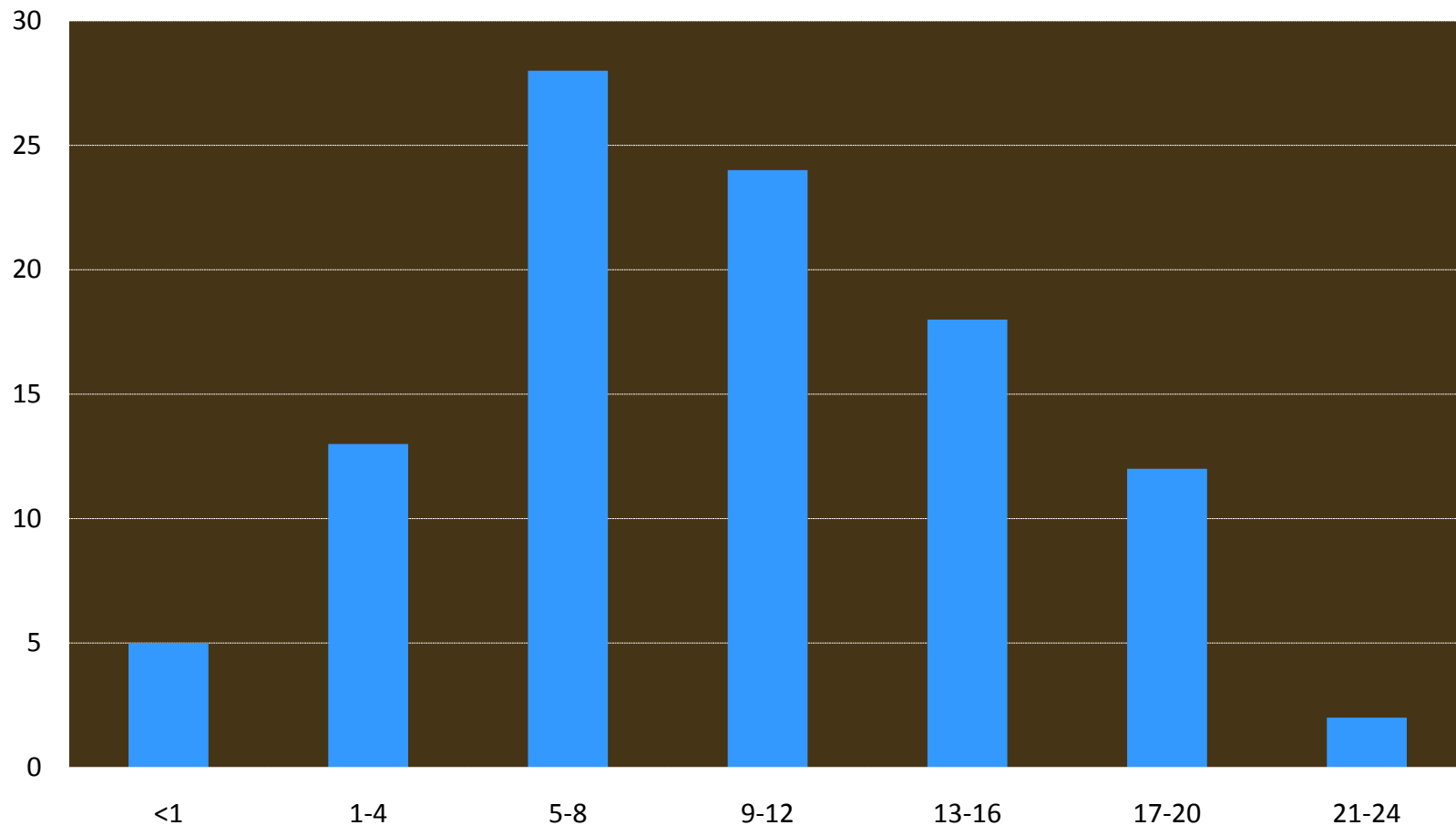
Coachella Valley Chromium-6 Occurrence*

- Found Naturally in Coachella Valley Groundwater
 - Erosion of ultra-mafic sediments found near faults
- Levels from <1 to 21 ppb
- >50% of CVWD delivered water exceeds 10 ppb
- Chromium-6 levels below detection in Colorado River water used for replenishment

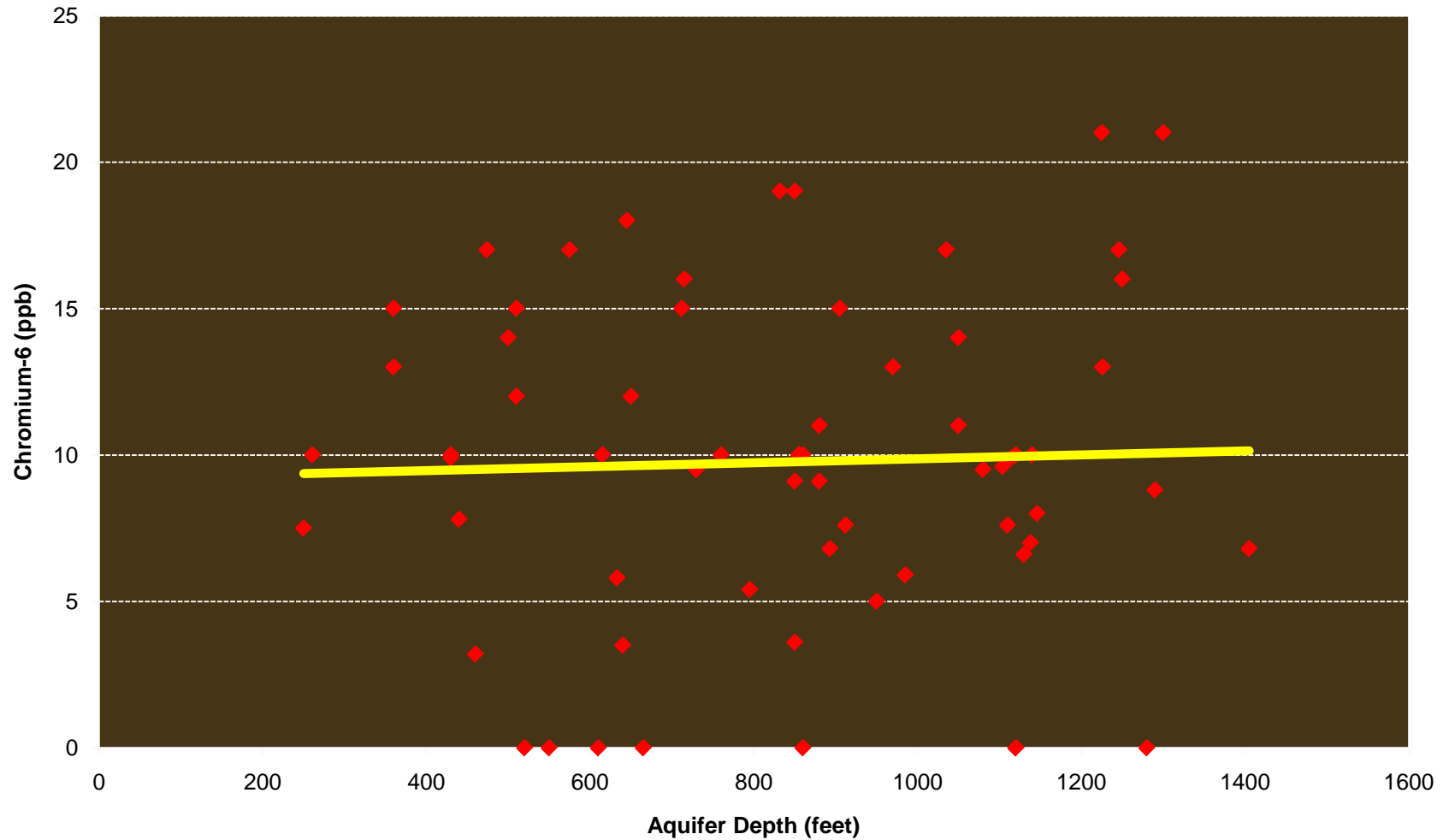
**U.S. Geological Survey Studies and local water agency routine monitoring*



CVWD Well Chromium-6 Levels



Groundwater Chromium-6 Distribution



Draft MCL Impact

CDPH Cost Analysis* for Draft MCL (10 ppb)

	Based on These Service Connection Groups			
	<200	200-999	1,000-9,999	>10,000
Impacted Sources	65	13	81	152
Impacted Systems	55	10	29	34
Impacted Service Connections	2,453	4,418	113,550	1.6 M
Total Annualized Cost	\$13.6 M	\$3.8 M	\$37 M	\$101.4 M
Average Annual Cost Per Service Connection	\$5,627	\$857	\$326	\$64

**Procedure for Cost-Benefit Analysis of Hexavalent Chromium (CDPH, 2013)*

Statewide Impact of Draft MCL (10 ppb)

	CDPH Estimate	ACWA, AWWA, AWWA (CA/NV), CWA Consultants ⁽¹⁾ Estimate
Wells Impacted	311	1,360
Capital Cost	\$871 million	\$4.1 billion*
Annualized Cost	\$156 million	\$616 million*
* After excluding PWS' s with mixed surface water and groundwater sources there were 1,027 impacted groundwater sources used for these cost estimates.		

⁽¹⁾ Jacobs Engineering Group (2013) and Water Quality and Treatment Solutions, Inc. (2013) Technical Review of Occurrence and Economic Analyses for California Draft Chromium-6 Drinking Water MCL

Problems with CDPH Cost Estimate*

■ Occurrence

- Used existing State Cr-6 data
 - Limited by 2001-2002 test approach
- Did not use surrogate total Cr data
- Did not account for variability

■ Water Supply Conditions

- Estimated well sizes
 - Did not use regional office data
- Estimated well use
 - Did not use data in annual reports

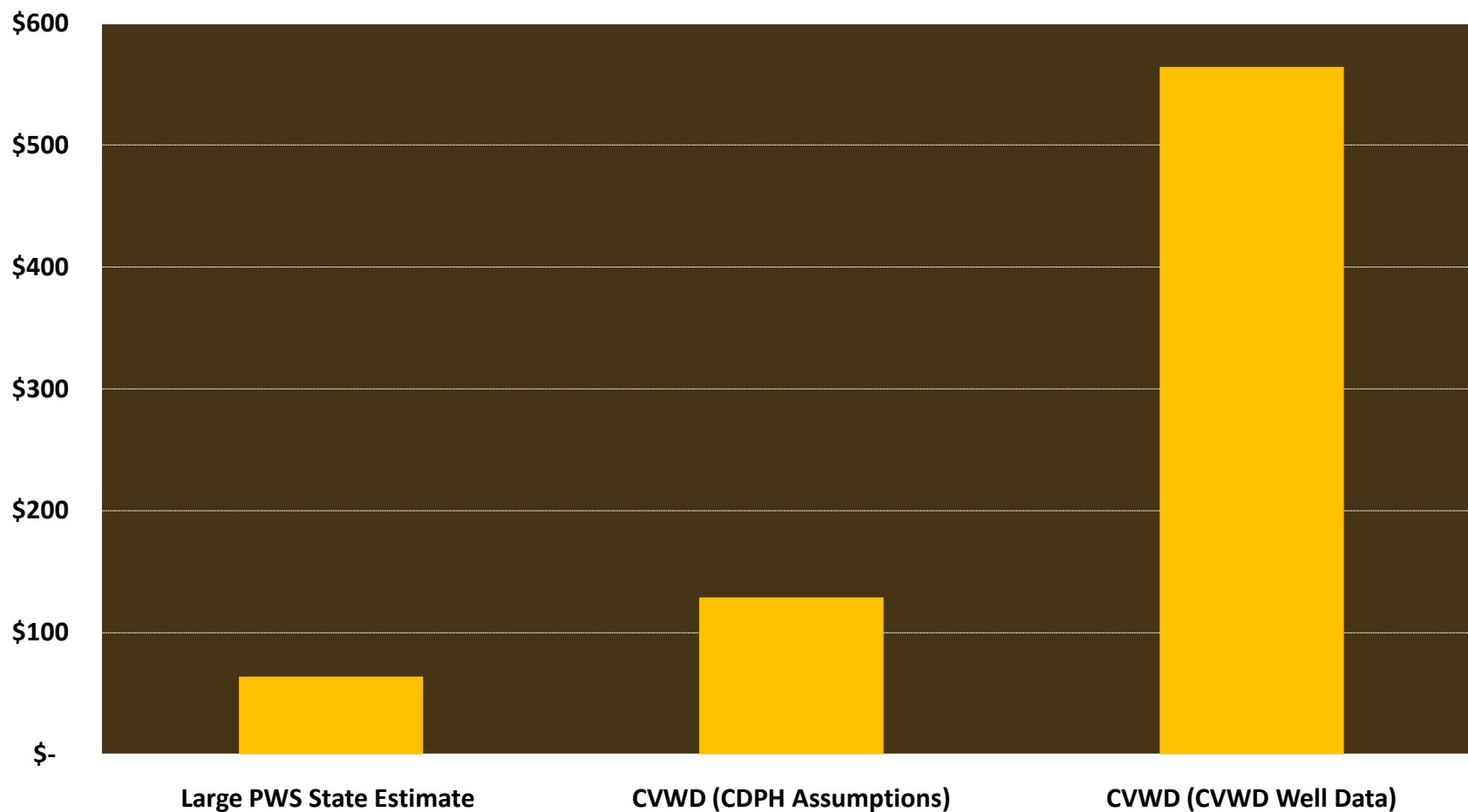
■ Treatment technology

- Feasible
- Used results of City of Glendale studies
 - Did not adjust costs for residential well sites (land and buildings)

Key Cost Driver	CDPH Assump-tions	CVWD Well Data
Wells Impacted	27	57
Well Design Capacity (gpm)	325	1,903
Well Use Rate	67%	33%
Land & Buildings	No	Yes

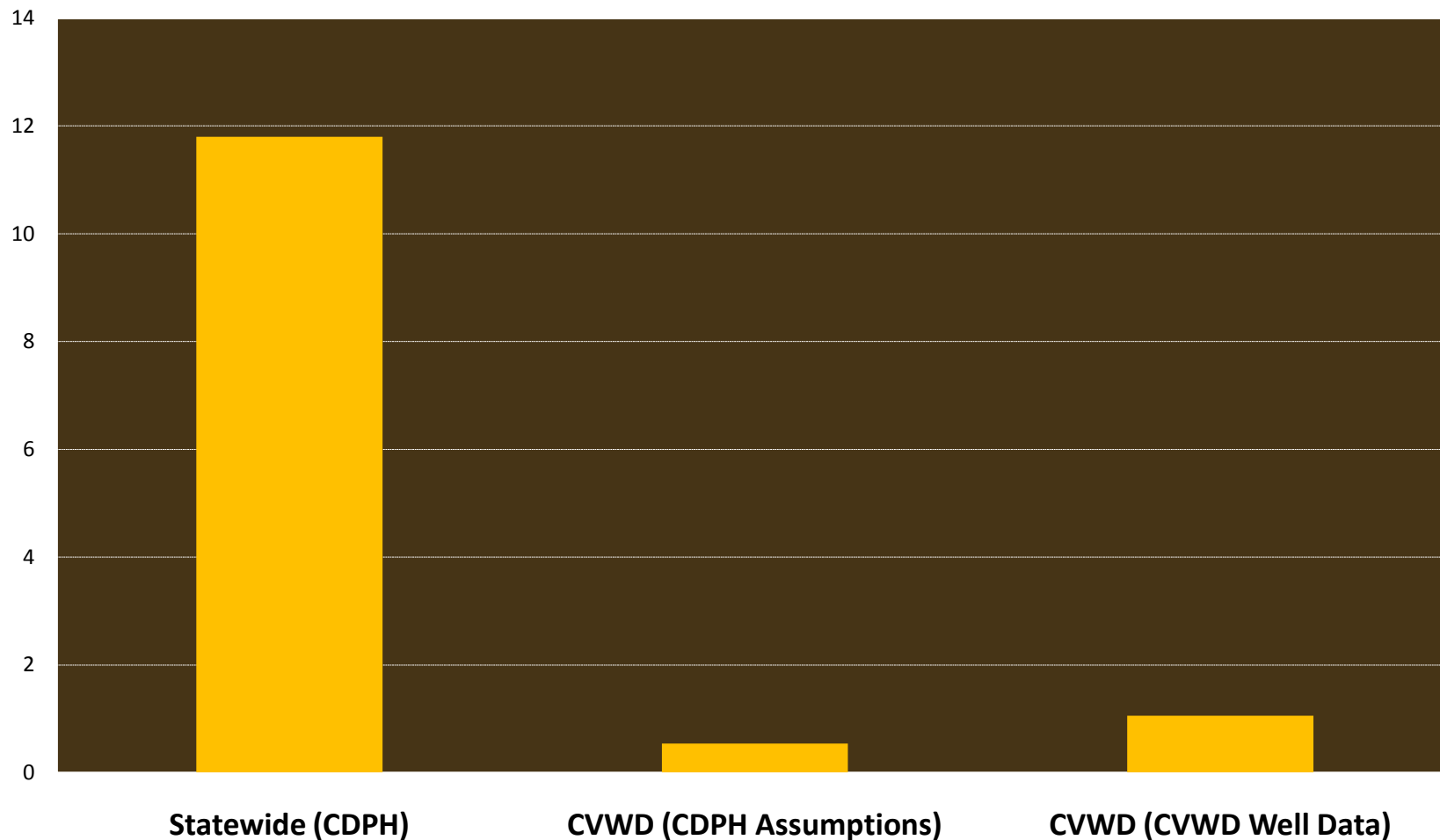
**Procedure for Cost-Benefit Analysis of Hexavalent Chromium (CDPH, 2013)*

Estimated Annual Compliance Cost Per Customer*



**CDPH Initial Statement of Reasons (Table 8) and Procedures for Cost-Benefit Analysis of Hexavalent Chromium (CDPH, 2013)*

Estimated Draft MCL Benefits



**Data for CVWD public water systems is based on calculations found in Procedure for Cost-Benefit Analysis of Hexavalent Chromium (CDPH, 2013)*

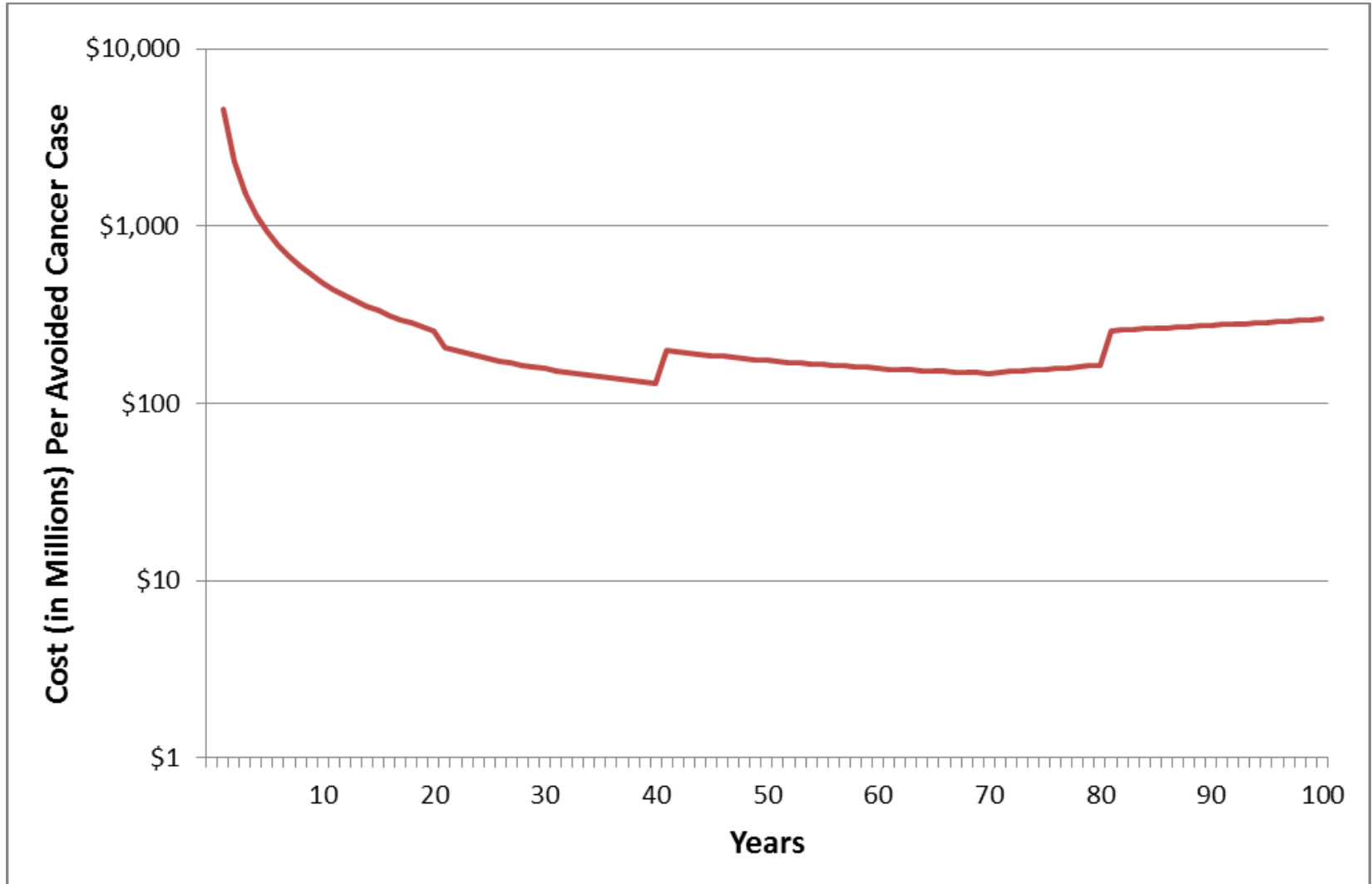
Problems with CDPH Benefit Analysis

- Benefit model used is incompatible with OEHHA linear no-threshold cancer risk model
 - Risk is based on 70-year exposure
 - Full benefits do not occur until year 70
 - First year benefit is $1/70^{\text{th}}$ of full benefit
- Different horizons used for Benefits and Costs
 - Benefits accrued indefinitely
 - Annualized costs used a single 20-year life cycle (capital replacement costs not included)

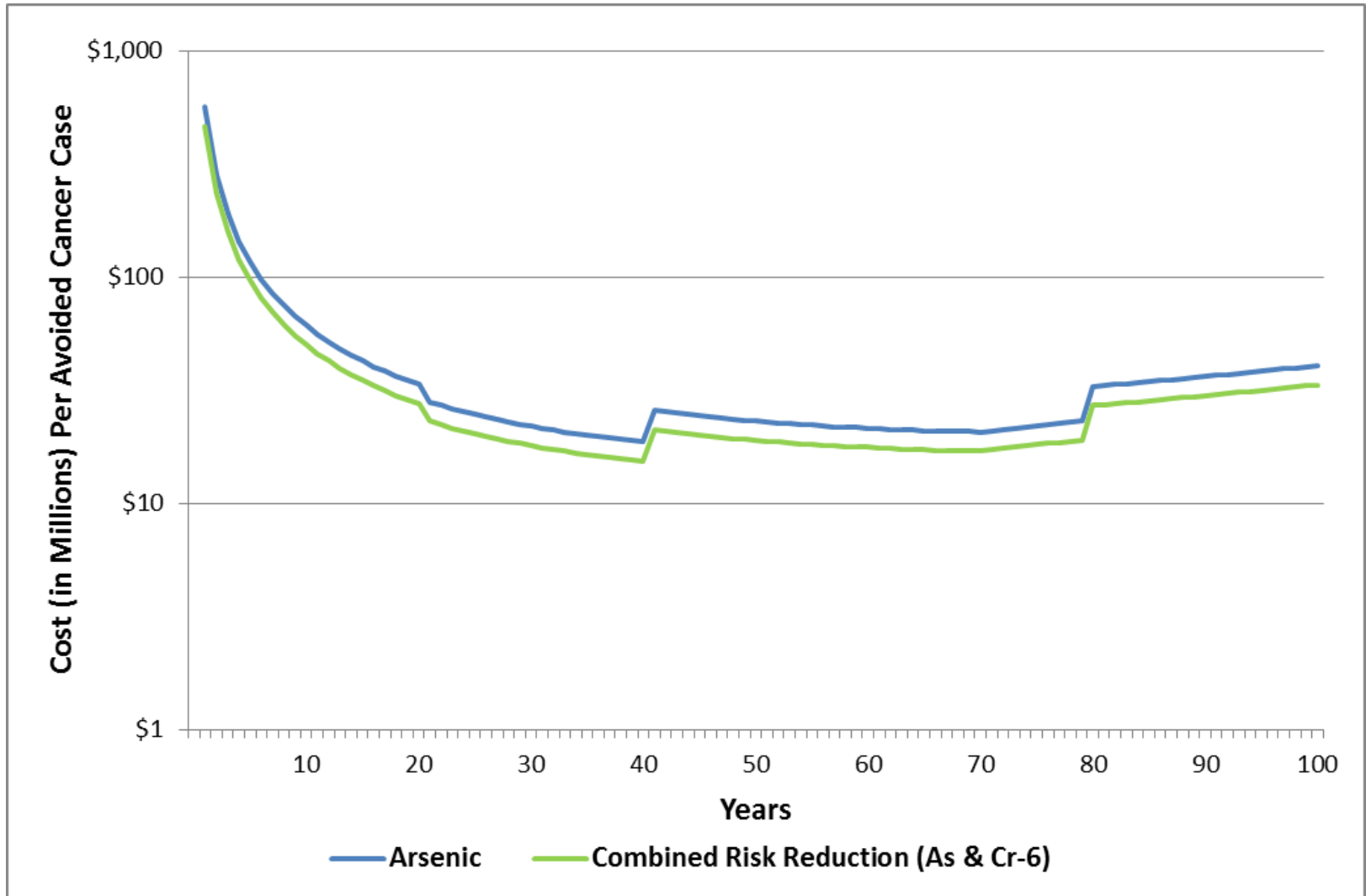
Draft Cr-6 MCL Cost Benefit Comparison CVWD Public Water Systems



Draft Cr-6 MCL Cost-Effectiveness CVWD Public Water Systems

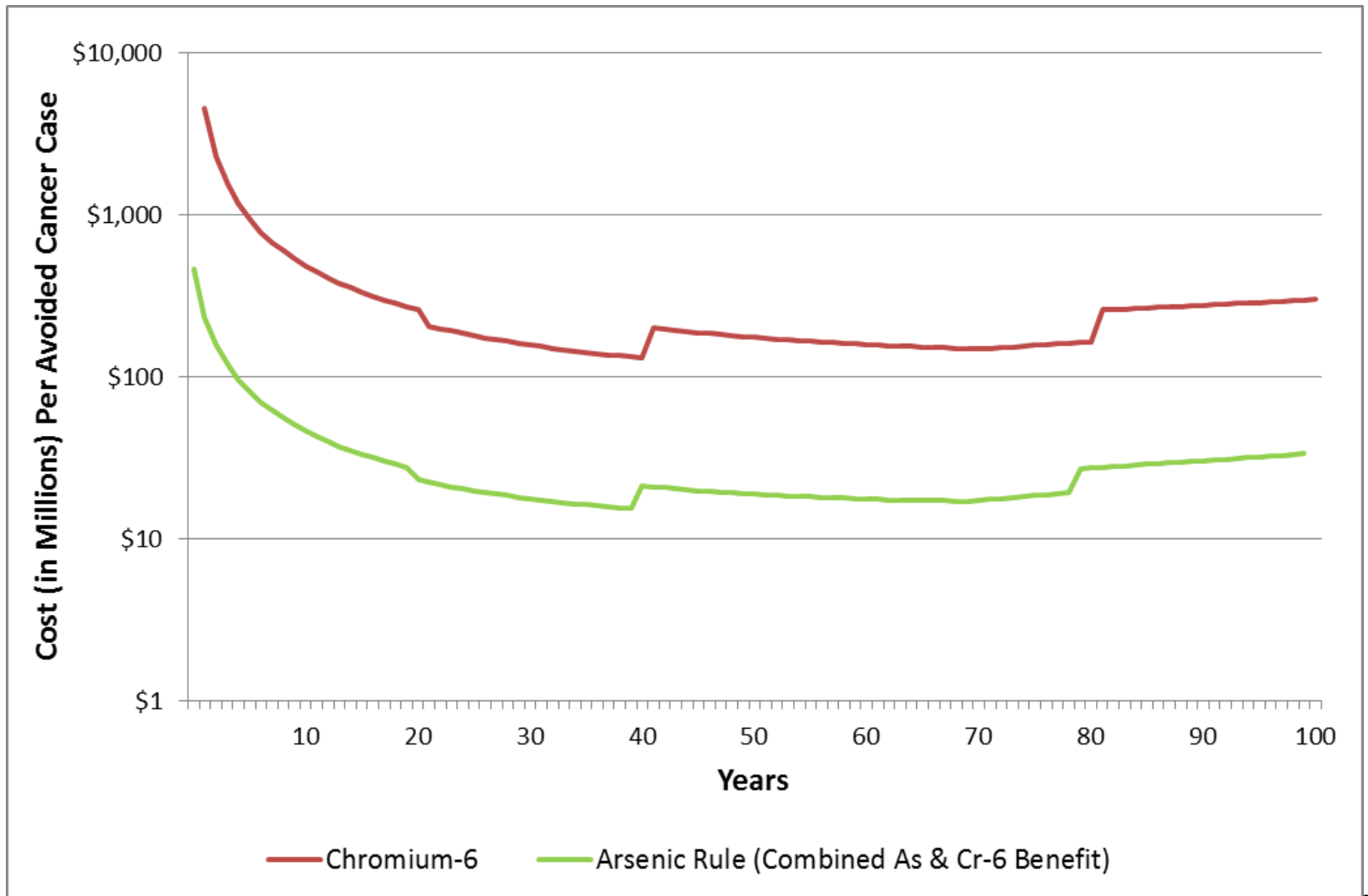


Arsenic Rule Cost-Effectiveness CVWD Public Water Systems



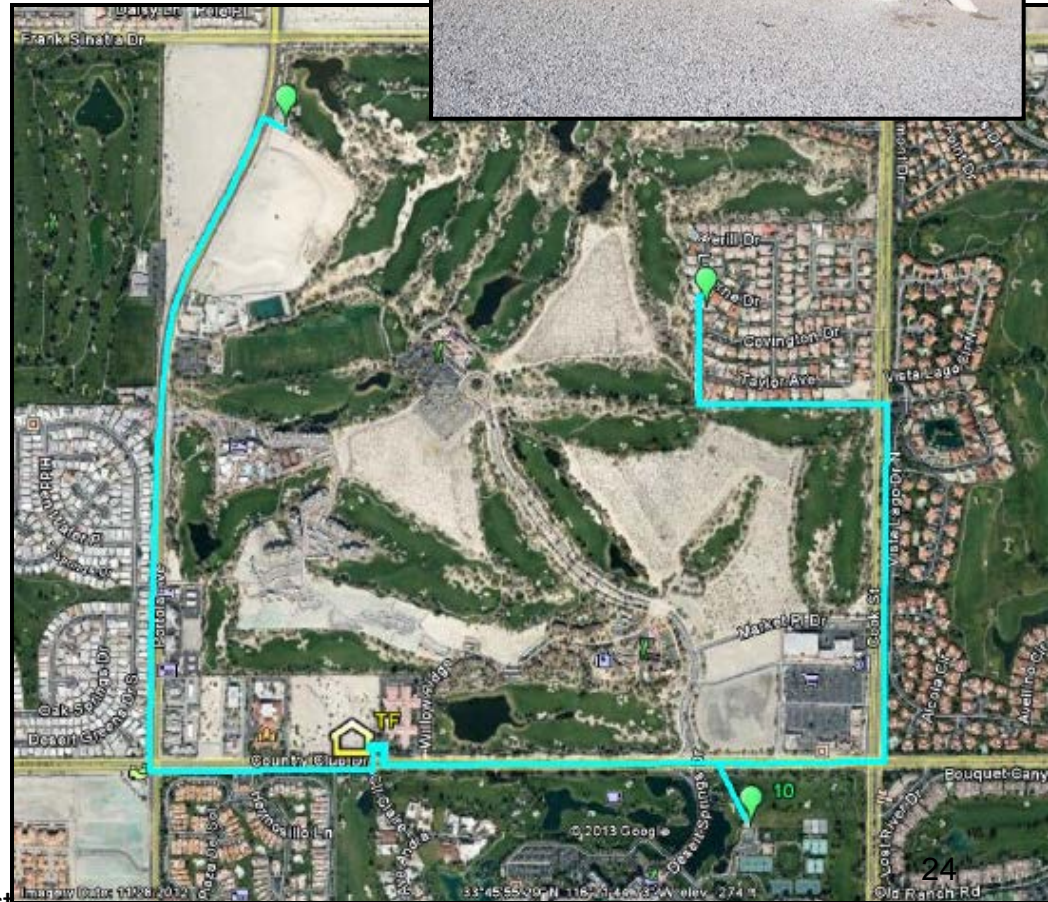
Cost-Effectiveness Comparison

CVWD PWS' s – Draft Cr-6 MCL & Arsenic Rule



CVWD Compliance Planning

- Complete treatment research (2014)
- Start Source of Supply Study
 - ✓ Evaluate Colorado River water & groundwater supplies
 - ✓ Multiple treatment technologies
 - ✓ Many consolidation options
- Evaluate funding options
- More public outreach
- Develop & implement compliance plan



Proposed MCL LA Hearing 10/11/13

- Sedate proceedings
- Water utilities dominated - most citing that benefits were significantly overstated and compliance costs were significantly understated.
- Only LA Times & San Bernardino Sun reporters present
- 11 speakers in the Sacramento hearing including 3 environmental groups
- Utilities
 - Proposal understates # of impacted utilities; especially small systems as they have little monitoring data
 - Estimated treatment cost of \$156M is "much too low"
 - Concern over cost to comply and possible abandonment of wells
 - Several ok with 10 ppb

Proposed MCL LA Hearing 10/11/13

- Coachella Valley Water District – will cost them \$500M
 - Cost is 5-7x higher than CDPH has estimated
 - CDPH only assumed 1/2 of the wells that are actually impacted in CVWD
 - The size of the wells is 1/6 the actual size; <1/4 of actual water use
 - Calculated cost per cancer avoided is \$60M which is way too high
 - Benefit/cost is 3x higher if the number is 20ppb
 - Need adequate time to comply – 10 yrs needed in CVWD case
- American Chemistry Council
 - MCL is unnecessarily stringent; Costs outweigh benefits
 - Doesn't recognize latest research showing a threshold effect 1000x higher than current MCL
 - 210 ppb is health protective
 - Cancer avoided is effectively zero at the proposed level
 - The benefits were calculated over 70 years but the costs were not

Water Community Comments

- Support regs based in sound science, balanced with technical feasibility & cost
- General lack of information to support or analyze the proposed MCL/ Public health basis for the reg is suspect
- Benefit-cost analysis is shown only for the proposed MCL of 10 µg/L.
- Occurrence data used for this proposed draft based only on entry points with observed data - very incomplete
- Exclusion of small systems w/o occurrence data skews the analysis to a lower MCL
- Treatment costs based solely on WBA, which may overestimate or underestimate actual cost

Thank You

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