

A Real-World Refutation of a Precautionary Cancer Risk Assessment: Cal OEHHA's Oral Hexavalent Chromium Risk Assessment

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Statutory Criteria for Setting Drinking Water Standards in California [HSC §116365(b)]

1. MCL set by USEPA, if any.
2. Public Health Goal set by Office of Environmental Human Health Hazard Assessment (OEHHA).
3. Technological feasibility.
4. Economic feasibility.

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CDPH's BCA Contains at Least Six Fatal Defects

1. It materially underestimates *engineering* costs.
2. It does not estimate *opportunity* costs.
3. It does not estimate benefits.
4. It materially understates cost-effectiveness ratios by misinterpreting OEHHA's cancer risk assessment.
5. It does not say which alternative MCLs are (or are not) economically feasible.
6. It assumes OEHHA's estimate of low-dose cancer risk is correct.

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Fatal Defect 6

**CDPH ASSUMES OEHHA RISK
ESTIMATE IS CORRECT**

The OEHHA PHG Is Conceptually Inappropriate for Use in Estimating Risk or Regulatory Benefits

1. By design, the PHG is a precautionary risk management decision, not a risk assessment tool.
 - a. “PHGs for carcinogens ... shall be set at levels that OEHHA has determined do not pose any significant risk to health.”
 - b. “In cases of insufficient data for OEHHA to determine a level that creates no significant risk, OEHHA shall set the PHG at a level that is protective of public health with an adequate margin of safety.”

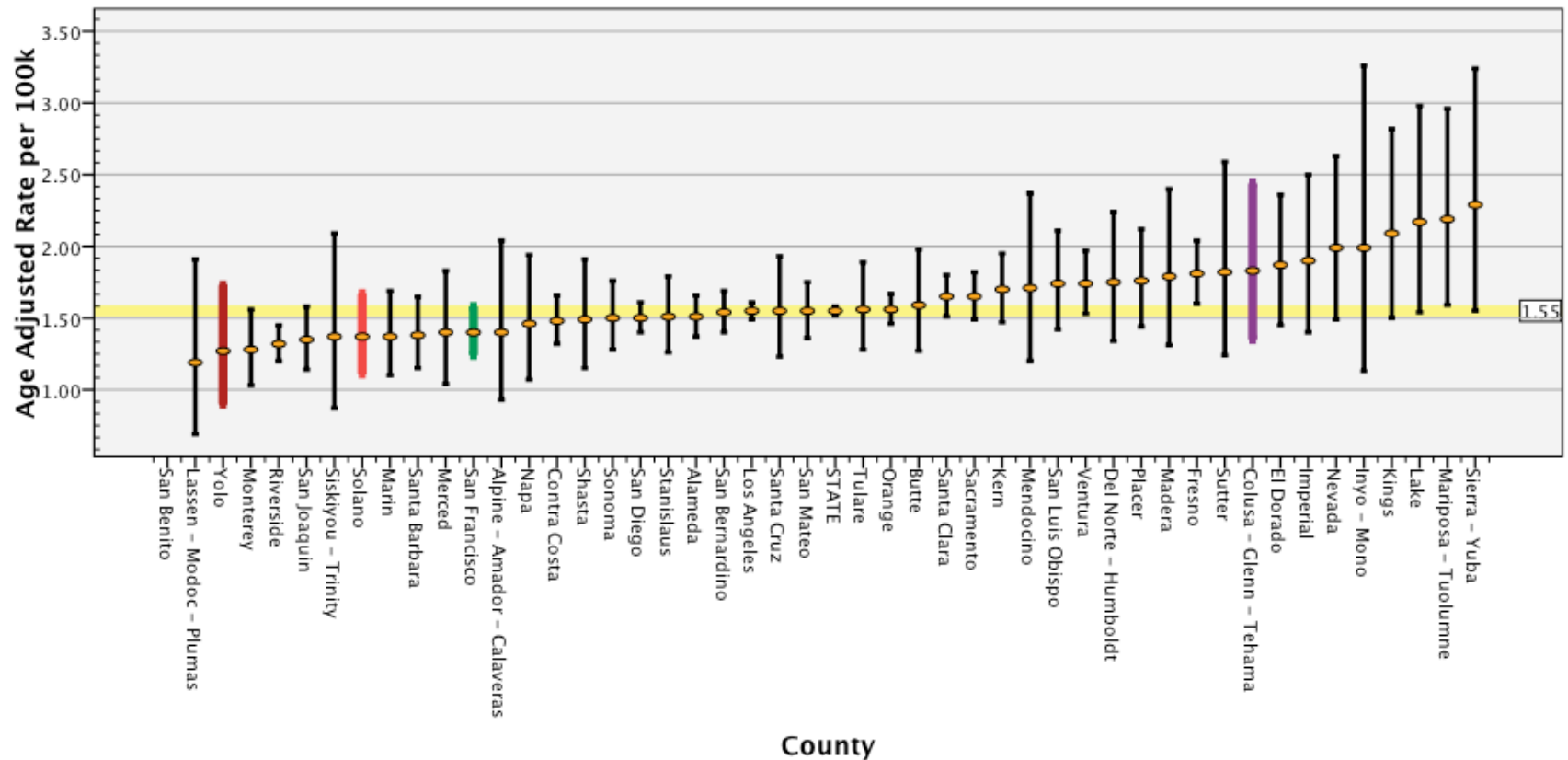
OEHHA Risk Assessment is Invalid and Unreliable for Benefit-Cost Analysis

1. Cr(VI) range: 0-100+ ppb.
2. But small intestine cancers (SICs) are rare.
 - a. Statewide age-adj rate: $1.55/10^5$.
 - b. County-wide age-adj rate range: $1.19-2.29/10^5$.
 - i. Yolo ($1.27/10^5$, 95% CIs = 0.90-1.73)
 - ii. Solano ($1.37/10^5$, 95% CIs = 1.11-1.67)
 - iii. San Francisco ($1.40/10^5$, 95% CIs = 1.25-1.58),
 - iv. Colusa-Glenn-Tehama ($1.83/10^5$, 95% CIs = 1.35-2.44).
 - c. 4-county rates are not significantly different
3. PHG risk model predictions may be falsifiable.

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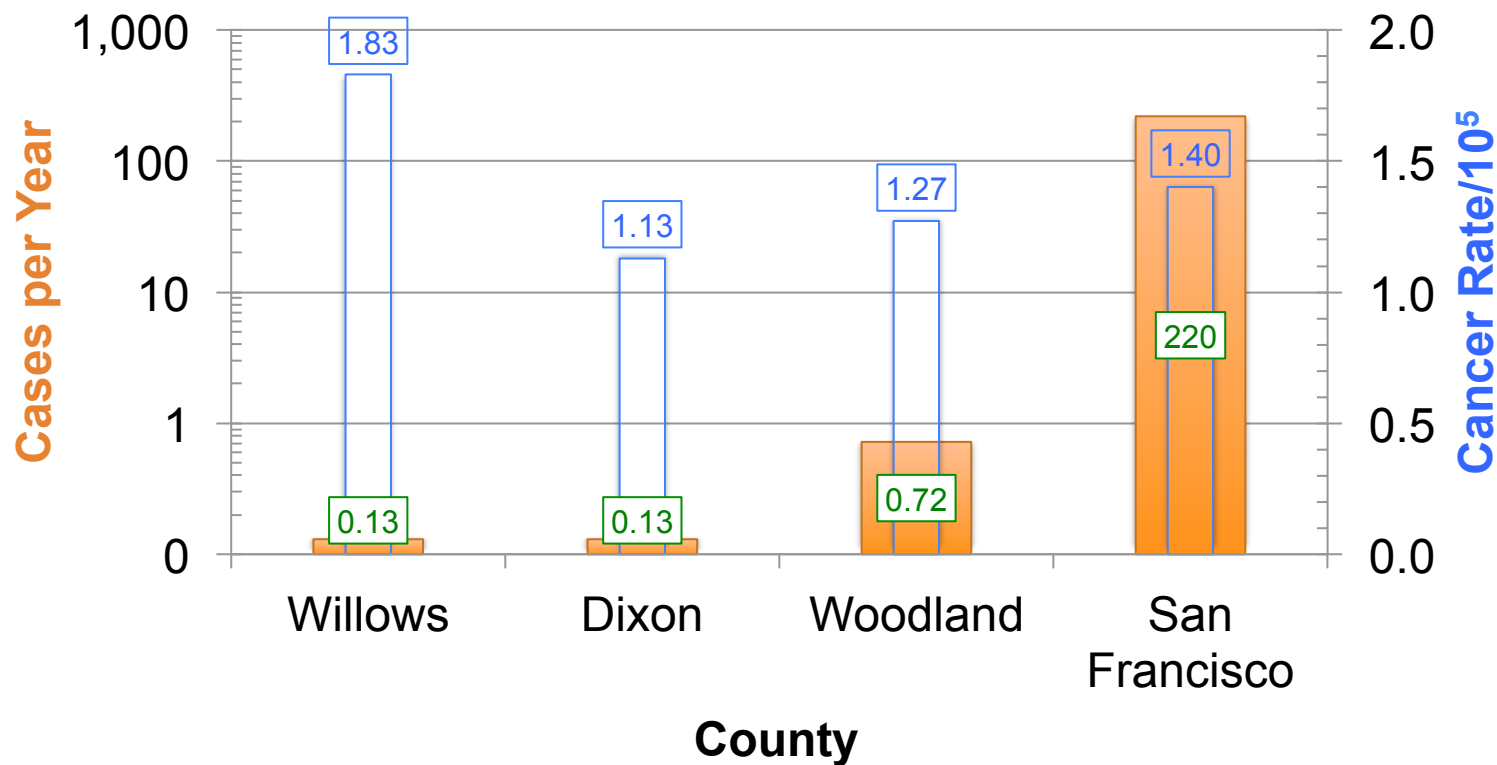
4. PHG risk model implies:
 - a. For Solano:
 - i. Cr(VI) in DW causes ~100% of SICs.
 - ii. Cr(VI) from other sources causes ~0% of SICs.
 - b. For San Francisco:
 - i. Cr(VI) in DW causes ~0% of SICs.
 - ii. Cr(VI) from other sources causes ~100% of SICs.
 - c. In general:
 - i. Cr(VI) causes > 100% of SICs if DW concentration > 20 ppb.
 - ii. Cr(VI) from other sources causes < 0% of SICs.

Age-Adjusted Average Incidence of Cancer of the Small Intestine/10⁵ (1988-2010), by County



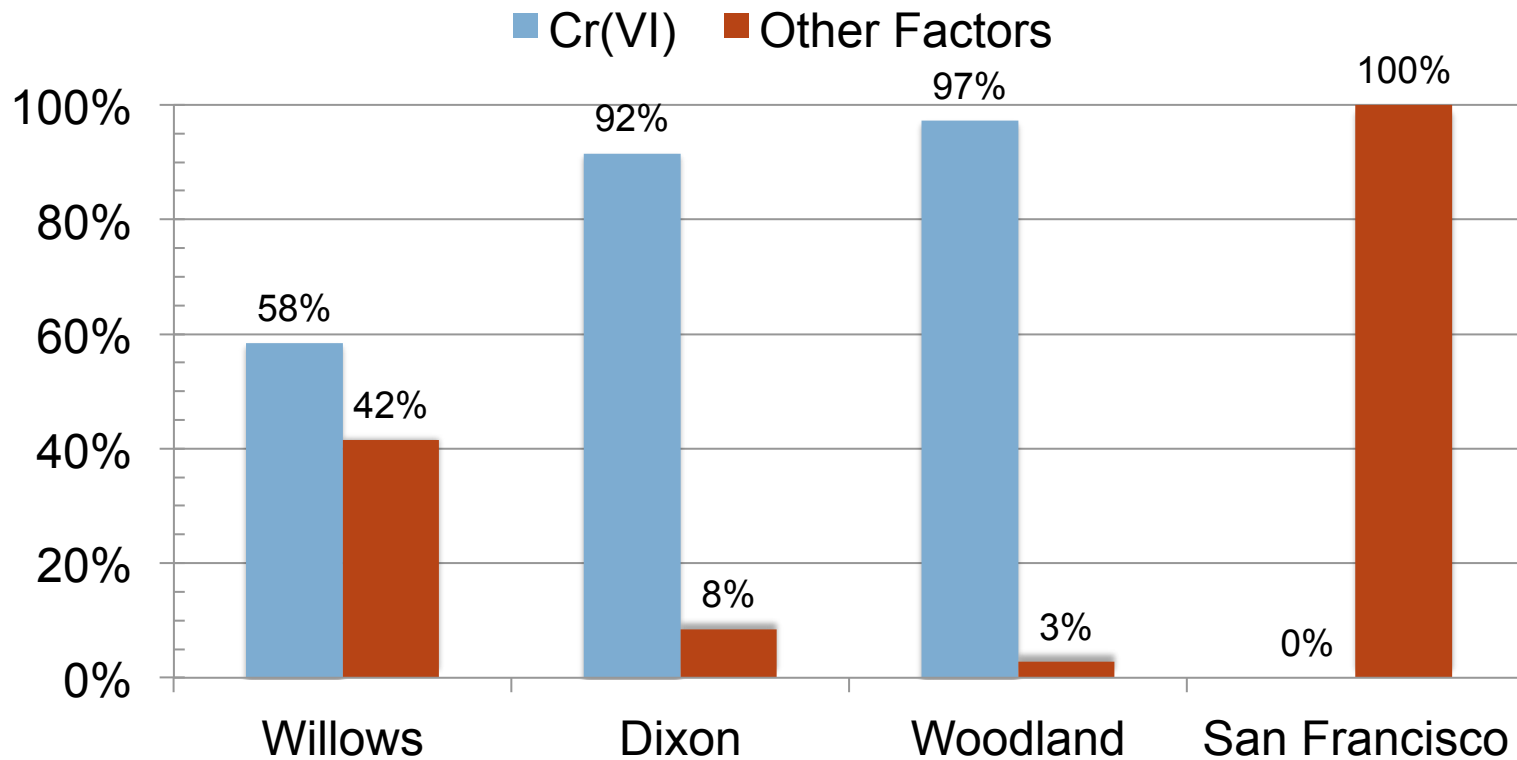
Source: California Cancer Registry

Average Annual Number of Cancers of the Small Intestine and Cancer Rate/10⁵ by Jurisdiction



Source: California Cancer Registry, 1988-2010 countywide average

Cancers of the Small Intestine 'Caused' by Average Cr(VI) Concentration or Other Factors



Sources: California Cancer Registry, 1988-2010 (Countywide); and OEHHA PHG.

SUMMARY AND CONCLUSIONS

The PHG Substantially Exaggerates Cancer Risk from Cr(VI) Ingestion

- ◎ PHG risk predictions exceed actual incidence of small intestine cancer.
- ◎ By relying on the PHG, the CDPH grossly exaggerates the benefits of achieving the MCL.
- ◎ Before correcting this error, $B/C < 0.1$ (as shown in the companion presentation\).
- ◎ After correcting this error, $B/C \approx 0$.
 - Cost = \$616 million.
 - Benefit \approx \$0.

References

RICHARD B. BELZER, 2013a. *A Review of the California Department of Public Health's Cost-Benefit Analysis in Support of a Proposed Primary Drinking Water Standard for Hexavalent Chromium (Cr VI)*.

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