



Regulatory Questions that Mixture Science Can Help Address

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CONVERGING ON CANCER
 WASHINGTON DC
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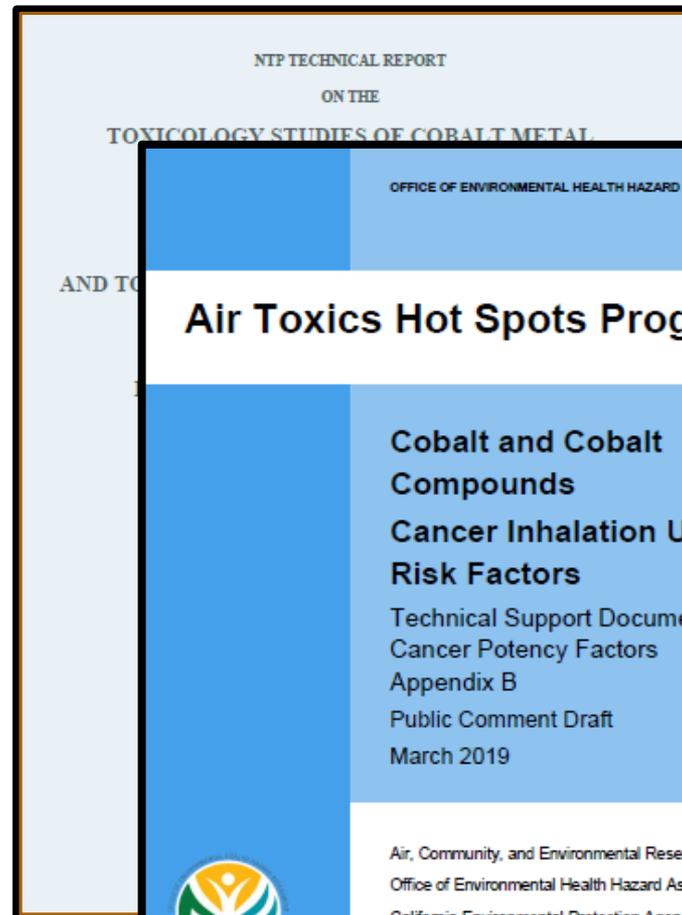
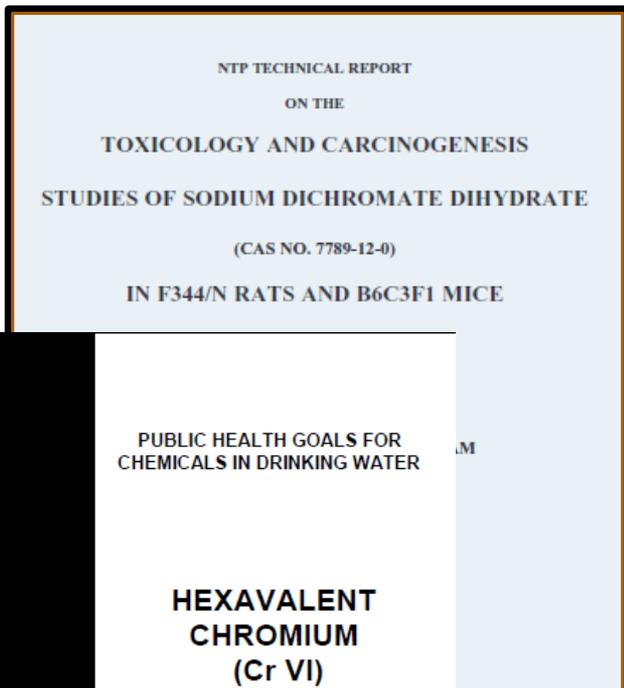


Exposures usually as mixtures

- Mixtures in Varied Regulatory Domains, e.g.
 - Consumer Products
 - Point and non-point environmental releases from industrial and agricultural activities
 - Legacy exposures, e.g., through drinking water
 - Foods, typically include bioactive, sustaining chemicals
- Placed based exposures experienced by communities
- The complex milieu of mixtures that we consume and host through everyday living



Assessment basis: single chemicals



PUBLIC HEALTH GOALS FOR
CHEMICALS IN DRINKING WATER

**HEXAVALENT
CHROMIUM
(Cr VI)**

July 2011

Governor of the State of California
Edmund G. Brown Jr.

Acting Secretary for Environmental Protection
California Environmental Protection Agency
Linda S. Adams

Acting Director
Office of Environmental Health Hazard Assessment
George V. Alexeeff, Ph.D.



Consumer products



Question does the mixture poses a significant risk?

- Exposure is to the mixture
- Absent mixture/product test, based on one or two identified carcinogens
 - Risk addition
- Formulations often fixed and known only to manufacturer
- Focus - direct consumer exposure, not later phases in the life cycle
- Environmental persistence and degradants often not assessed



OEHHA Synthetic Turf Study



Identifying chemicals released from crumb rubber and artificial grass

- Air and turf samples, including in biofluid simulants

Evaluating exposure: inhalation, swallowing, and skin contact.

Evaluating hazards and toxicological activities of chemicals based on

- Individual components measured
- NTP conducted 14 day gavage, feed and bedding studies also to be considered



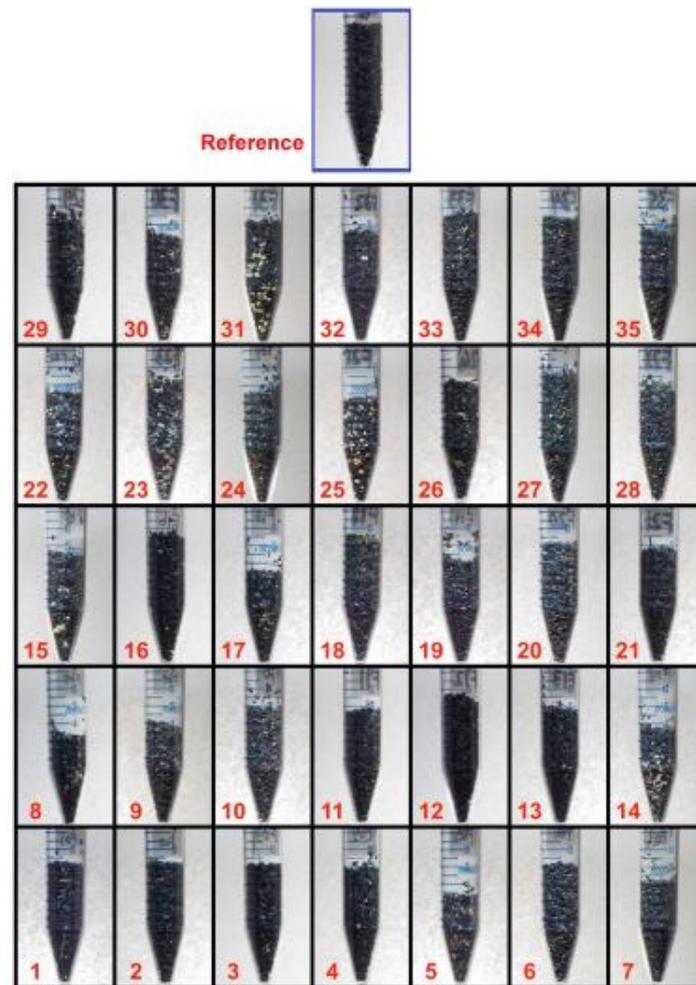
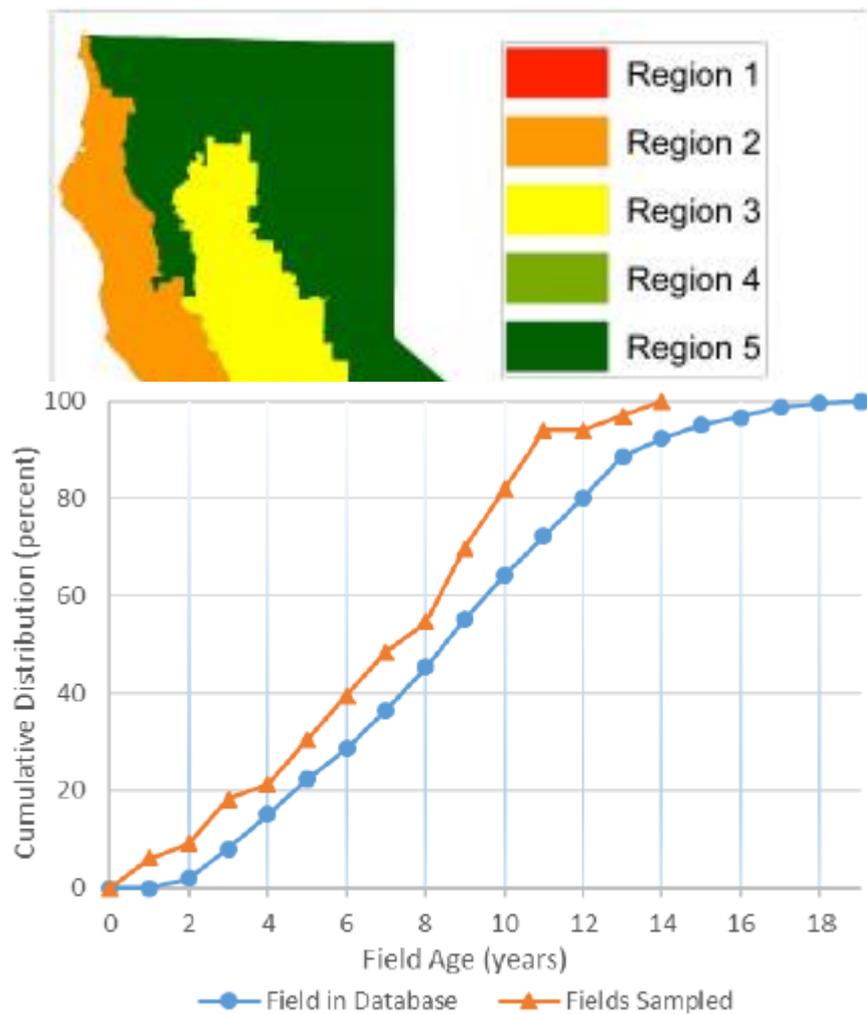
Time activity study

- Video-taped players for exposure measurement
- Hand-to-mouth parameters

On-line survey of activity

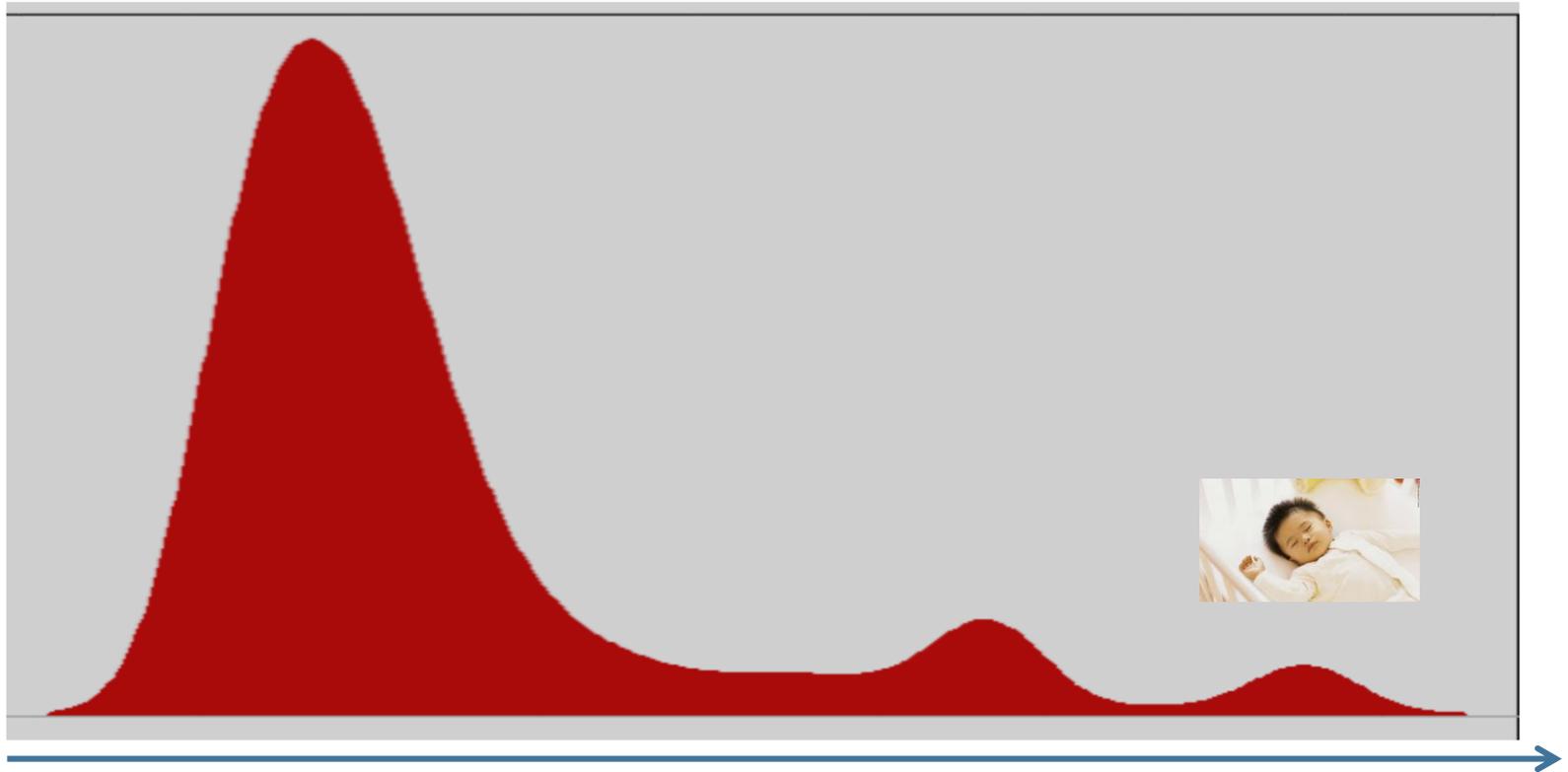


OEHHA Synthetic Turf Study



Considering those at higher risk

Frequency of
Risk in
Population

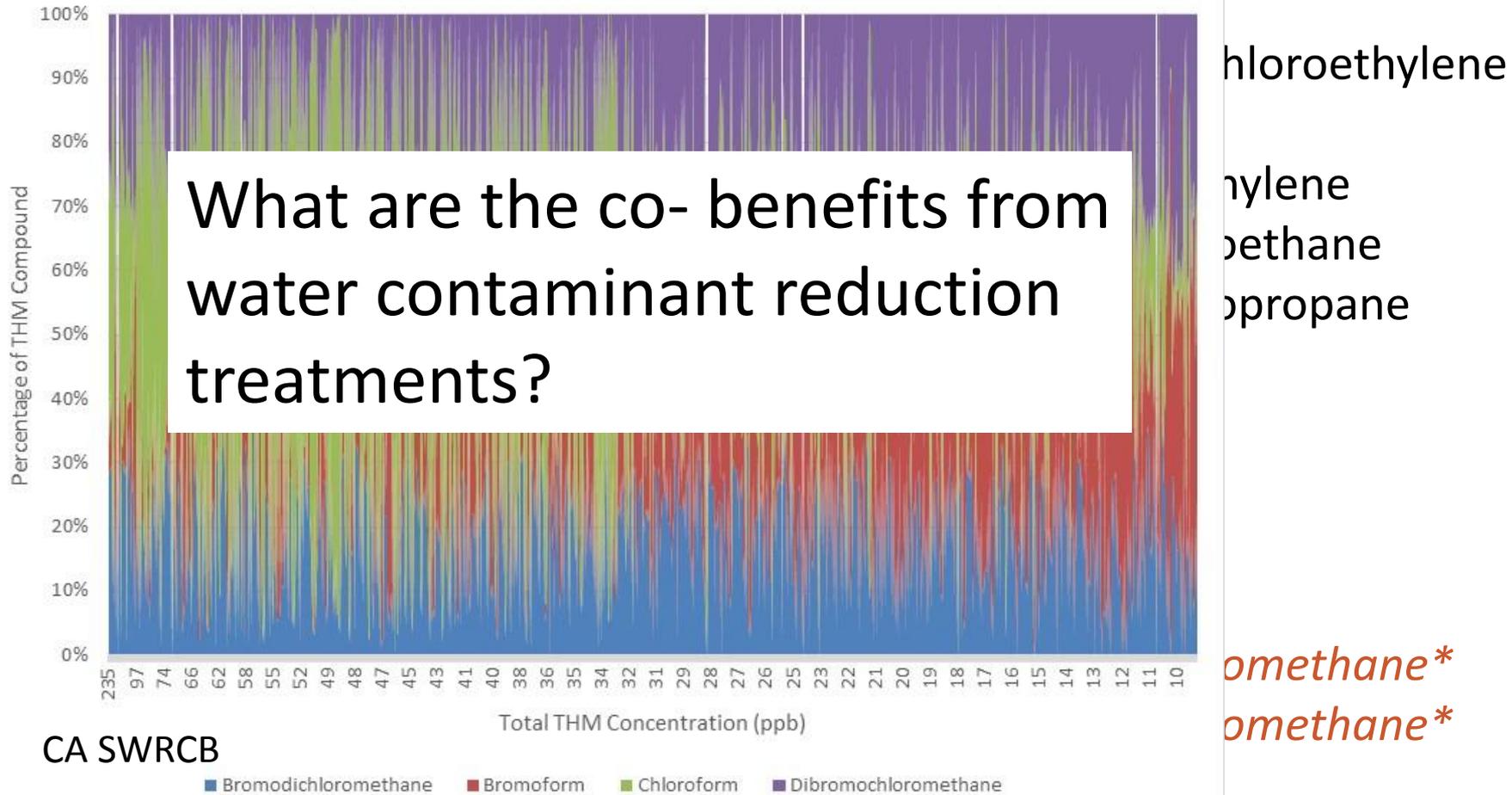


Risk of Cancer from a Given Exposure to a Mixture



CA Drinking water

Percentage of THMs as Total Concentration Decreases



draft

Air emissions

- What are the co-benefits of emission reductions?
- What is the cumulative risk from a facility?
- What is the cumulative risk from all emissions in the community?

What is the cumulative cancer burden from all environmental exposures in the community?



Co-exposures & dose response



Population
Response

