

Risk Assessment Guidance Manual

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Air Toxics Hot Spots program

- ▶ Legislation requires the Office of Environmental Health Hazard Assessment (OEHHA) to develop risk assessment guidelines for air toxics assessments
- ▶ Guidelines are used in evaluating potential health impacts from stationary sources of air pollution to people nearby
- ▶ Assessment includes estimating cancer risk and other health hazards from chemicals emitted by facilities



Why the Recent Updates?

- ▶ Legislature passed the Children's Environmental Health Protection Act in 1999
- ▶ Law requires us to explicitly consider the special susceptibility of infants and children and other populations when assessing risk from air toxics
- ▶ This triggered a re-assessment of our risk assessment guidelines



Updating the Guidelines

- ▶ Over the last decade, OEHHA revised our previous guidelines using new data and analyses about both exposure and sensitivity of infants and children
- ▶ We produced three Technical Support Documents which have undergone review by CAPCOA, ARB, the public, and peer review
- ▶ The documents were finalized, and form the basis of the updated Risk Assessment Guidance Manual.



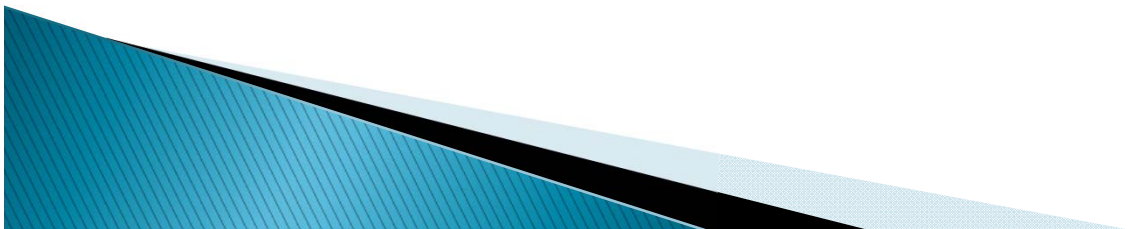
Risk Assessment Guidance Manual

- ▶ The Guidance Manual integrates the information from the three Technical support Documents into a user manual for conducting risk assessment in order to implement the changes to the guidelines.



Key Changes

- ▶ Cancer risk estimates take into account
 - biological sensitivity at early ages.
 - higher exposures at younger ages.
- ▶ Uncertainty Factors for reference levels revised to protect infants and children
- ▶ Updated air dispersion model (now AERMOD), including option for spatial averaging, particularly for small footprint facilities.



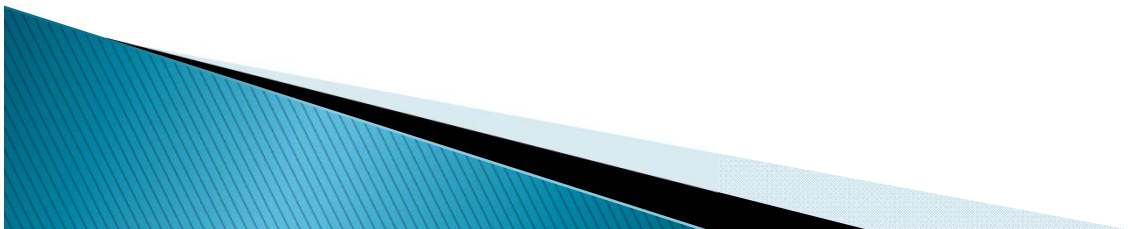
Factors Used to Estimate Cancer Risk

- ▶ Exposure, the estimated dose of the chemical in the air per pound of body weight (concentration multiplied by breathing rate)
- ▶ Cancer Potency Factor – how powerful a carcinogen is in causing cancer
- ▶ How long people are exposed
- ▶ And, how old you are when exposed

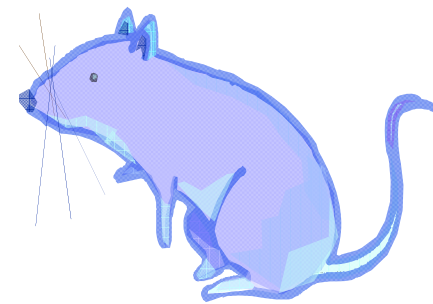
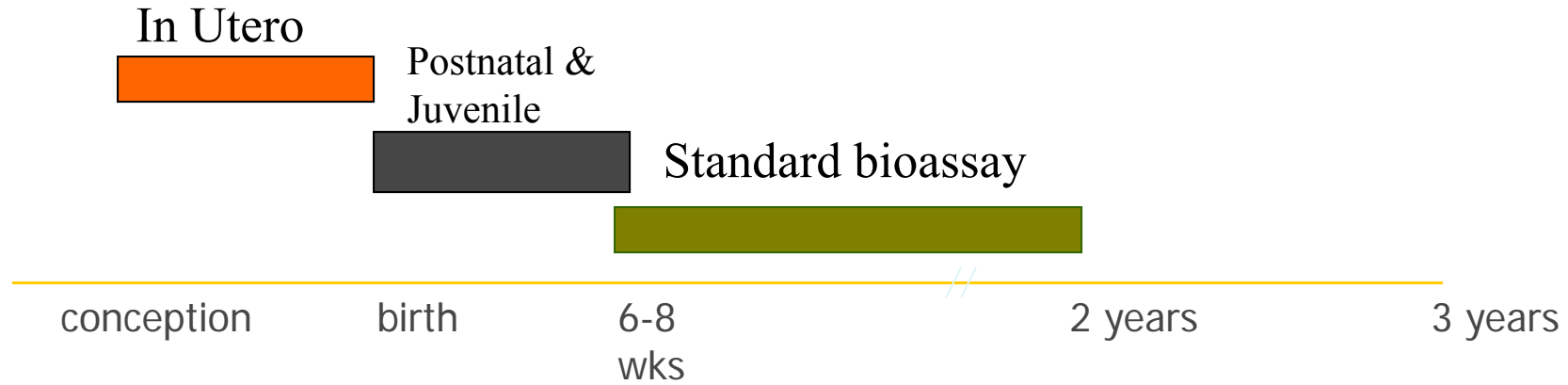


Cancer Potency Derivation

- ▶ Potency estimates are based on data from standard animal studies where exposures start at maturity, or on epidemiological studies conducted primarily in adult males (occupational exposures).
- ▶ The typical studies do not include exposures in utero, or during infancy and childhood when animals and people are developing and growing.



Rodent Bioassays: Dosing Periods and Critical Windows



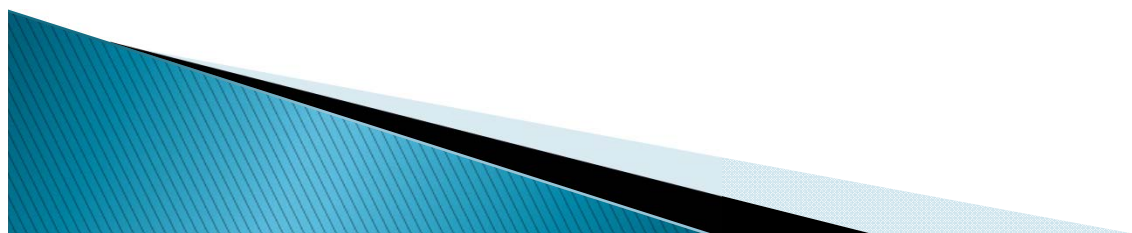
Studies of Age Susceptibility

- ▶ There are examples in both animals and humans of carcinogens that are more powerful when exposure occurs early in life (e.g., arsenic, radiation, polycyclic aromatic hydrocarbons, others)
- ▶ OEHHA evaluated studies in the literature to compare potency of the carcinogen when the animals were exposed in early life *vs.* as adults
- ▶ Developed Age Sensitivity Factors or ASFs



Data Indicate Increased Sensitivity in Young

- ▶ Our analyses indicate that, in general, cancer risk is higher the younger one is exposed to cancer-causing chemicals.
 - animal studies show exposure to many carcinogens in early life are more harmful (higher potency) than adult exposure
- ▶ Thus, we incorporated Age Sensitivity Factors that weight early in life exposures to cancer-causing chemicals into cancer risk estimates.



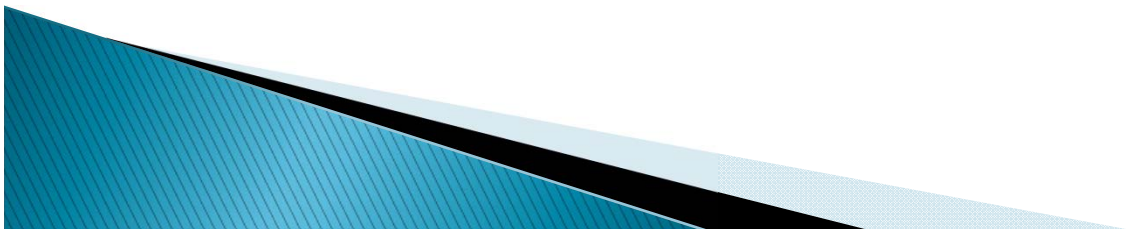
Summary of Age Sensitivity Factors (ASFs)

- ▶ Age Sensitivity factors are science-informed weighting factors
- ▶ Factor of 10 for exposures during the 3rd trimester to <2 years of age
- ▶ Factor of 3 for exposures occurring from age 2 to <16 years of age
- ▶ Similar factors used by U.S. EPA
- ▶ The values are “average” values, not worse case.



New information on exposure

- ▶ Infants and children breathe more air, eat more food, and drink more water per pound of body weight than adults
- ▶ Using the latest data, we developed intake rates for age groupings that match the ASF groups for easier estimation of cancer risk
- ▶ Exposure estimates increased because we were able to account for the youngest age groups with the latest data.



Guidance Manual Changes that Increase Cancer Risk Estimates

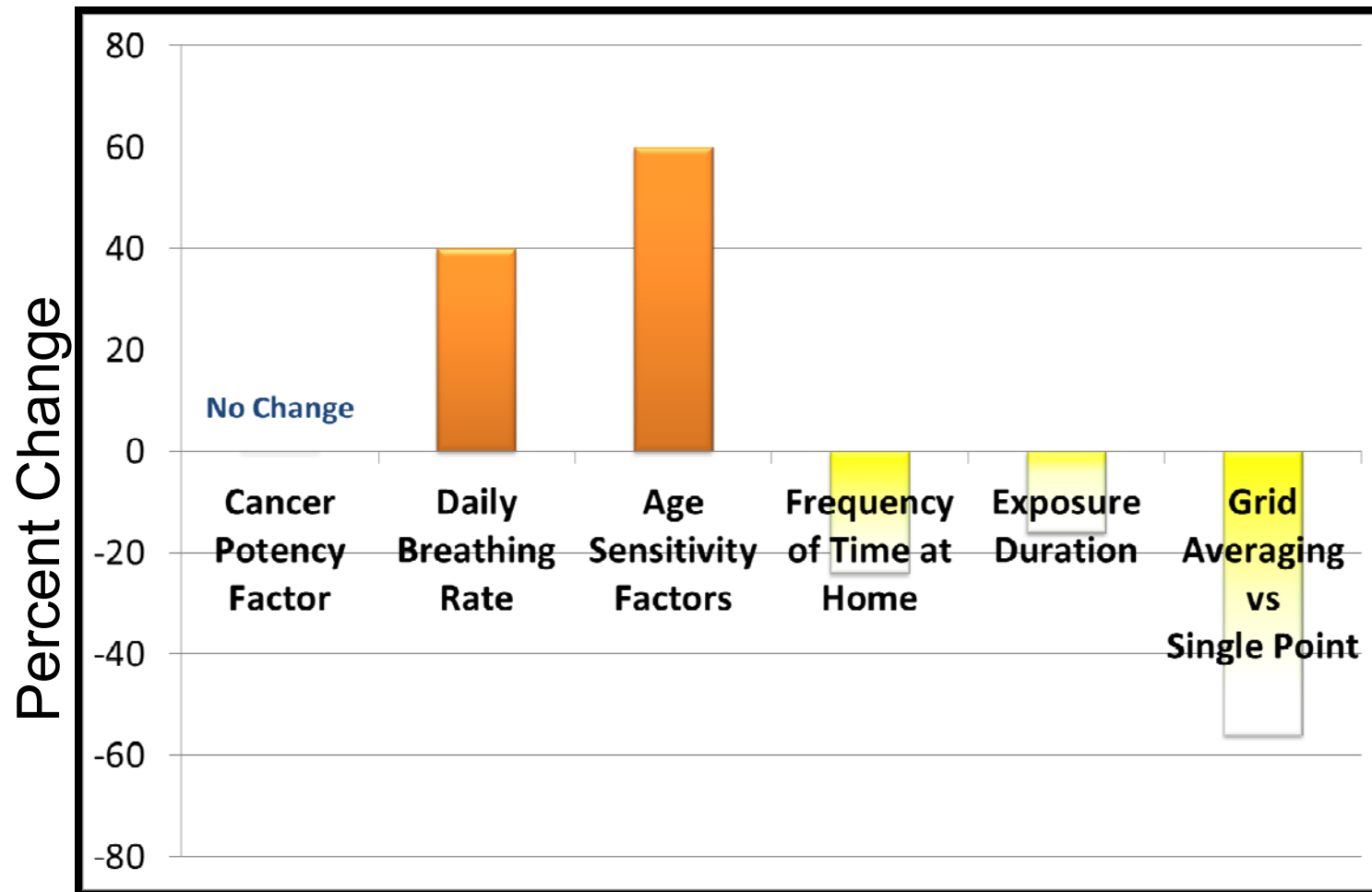
Two main changes that increase cancer risk estimates are:

- ▶ Applying Age Sensitivity Factors that account for sensitivity of the young to cancer-causing chemicals
- ▶ New data and analyses of how much infants and children breathe indicate higher exposures for the young.

These two factors may increase the cancer risk estimates by 2 to 3 fold



Magnitude of change in cancer risk estimate from new variables



Potential change in cancer risk estimate (inhalation) – 2015 Risk Assessment Methodology to 2003 Risk Management Policy

Scenario	Exposure Duration (Residents)	Using new Breathing Rate and ASFs
Residential Individual (e.g., Permitting, NSR, Hot Spots)	70 years	~3 x Higher
	30 years	~2.7 x Higher

- Spatial Averaging method to estimate exposure may reduce risk up to 50%;
- Including the Frequency of Time at Home for ages <16 may reduce the risk by about 20%

Timing

- ▶ CAPCOA, ARB, public and peer review of the Guidance Manual have been completed
- ▶ OEHHA is finalizing guidelines following peer review comments
- ▶ ARB is amending their software program, HARP, to reflect changes
- ▶ OEHHA will have the Guidance Manual ready to release along with the updated software
- ▶ Expected February, 2015

