

# Risk Assessment Guidance Manual SBAPCD Board Meeting January, 2015



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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.

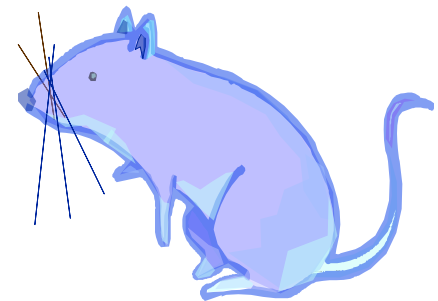
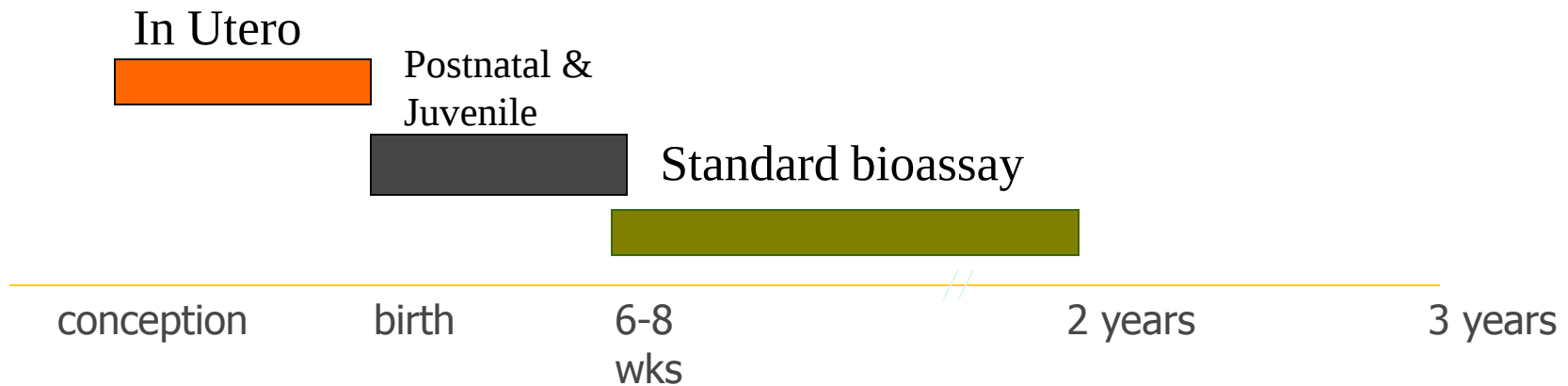
# Factors Used to Estimate Cancer Risk

- ▶ 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 3<sup>rd</sup> 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.

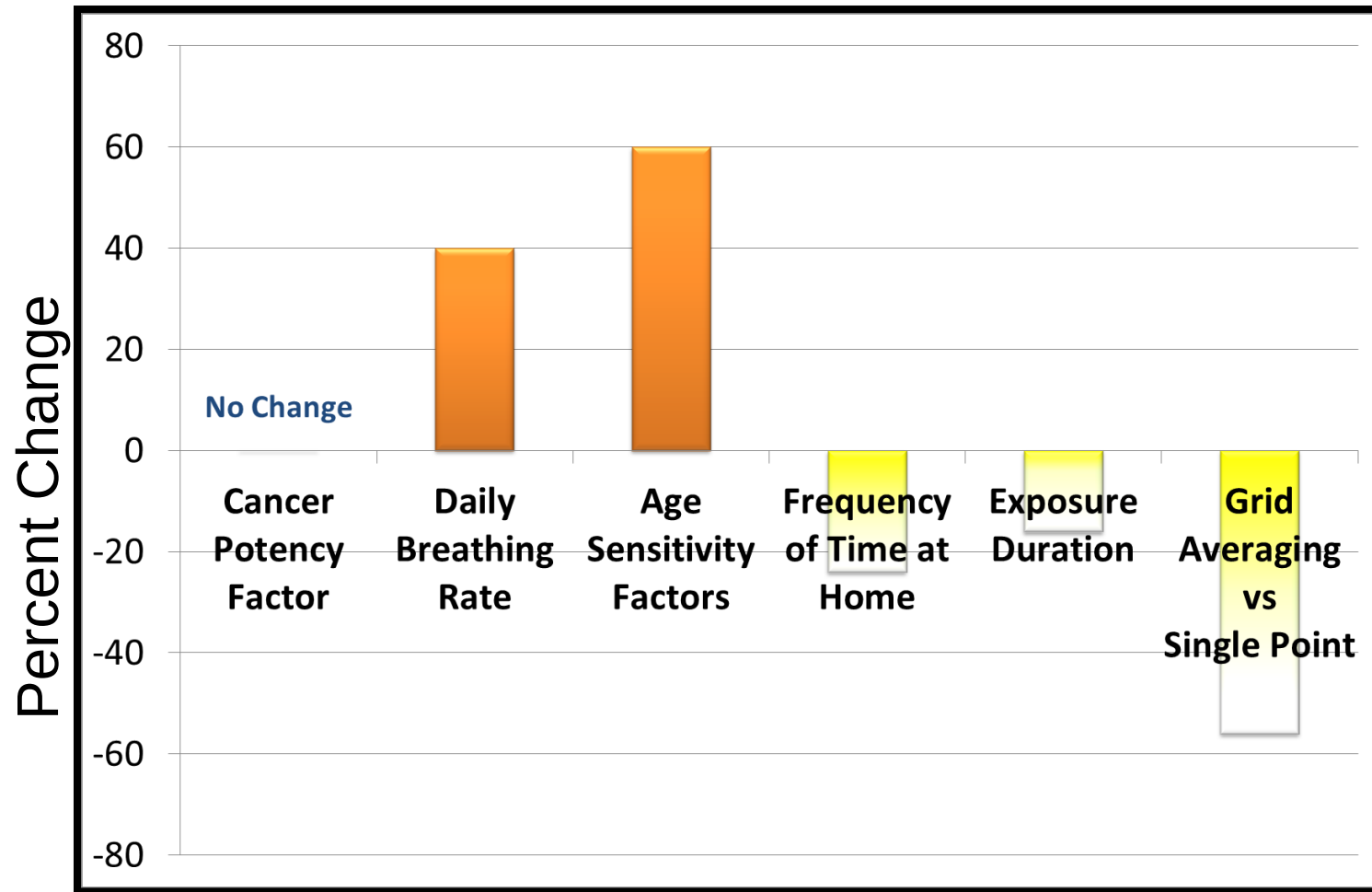
# Guidance Manual Changes that Increase Cancer Risk Estimates

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<br>(Residents) | Using new<br>Breathing Rate<br>and ASFs |
|-----------------------------------------------------------------|----------------------------------|-----------------------------------------|
| Residential Individual<br>(e.g., Permitting,<br>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