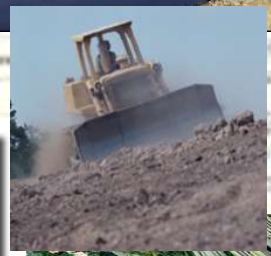


# *Health Risk Assessment*


## *Leland Villalvazo*

## *Supervising AQS*

## *Technical Services Department*

# What is a Health Risk Assessment (HRA)?

- Scientific evaluation of the probability of harm, resulting from exposure to hazardous materials.
- Means a detailed / comprehensive analysis to evaluate and predict the dispersion of hazardous substances in the environment and the potential for exposure of human populations and to assess and quantify both the individual and population wide health risks associated with those levels of exposure.

$$\chi = \frac{QKVD}{2\pi u_s \sigma_y \sigma_z} \exp\left[-0.5\left(\frac{y}{\sigma_y}\right)^2\right] \quad 1\text{-}1$$

# What are the components of an HRA?

**Hazard Identification**

**Exposure Assessment**

**Dose-Response Assessment**

**Risk Characterization**

# What are the components of an HRA?

## Hazard Identification

- Review key research to identify any potential health problems that a chemical can cause
  - Determine which pollutants to evaluate
- http://www.arb.ca.gov/toxics/healthval/healthval.htm
- "*Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values*"

# What are the components of an HRA?

Continued

# Exposure Assessment

- Determine the amount, duration, and pattern of exposure to the chemical
  - Amount = Lb of pollutant
  - Duration = 70yr, 30yr, 9yr
  - Pattern = continuous or intermittent exposure and by which routes
    - Routes = eating, drinking water and other liquids, breathing, or skin contact etc.

# What are the components of an HRA?

Continued

## Dose-Response Assessment

- Estimates how much of a chemical it would take to cause varying degrees of health effects that could lead to illnesses.
- Scientists evaluate the information obtained during the hazard identification step to estimate the amount of a chemical that is likely to result in a particular health effect in humans.
  - Short-term non-carcinogenic Acute (1-24 hours)
  - Long-term non-carcinogenic Chronic (24 hours - 1 year)
  - Long-term Carcinogenic (Cancer Risk)

# What are the components of an HRA?

Continued

# Dose-Response Assessment

*"The dose makes the poison."*

# What are the components of an HRA?

Continued

## Risk Characterization

- Assess the risk for chemicals to cause cancer or other illnesses in the general population.
- Scientists analyze the information developed during the exposure and dose-response assessments to describe the resulting health risks that are expected to occur in the exposed population. This information is presented in different ways for cancer and non-cancer health effects.

# What are the components of an HRA?

Continued

# Risk Characterization

- Risk is expressed as:
  - Carcinogenic Risk (Cancer) = maximum number of new cases of cancer projected to occur in a population of one million people due to exposure to the cancer-causing substance over a 70-year lifetime
  - Non-Carcinogenic Risk (Acute or Chronic Hazard Indices) = Comparing the actual level of exposure to a chemical to the level of exposure that is not expected to cause any adverse effects, even in the most susceptible people.

# How is an HRA used?

- Government agencies rely on risk assessments to help them determine which potential hazards are the most significant. Risk assessments can also guide regulators in abating environmental hazards.
- Members of the public who learn the basics of risk assessment can improve their understanding of both real and perceived environmental hazards, and they can work more effectively with decision makers on solutions to environmental problems.
- Risk managers weigh the benefits and costs of various alternatives for reducing exposure to chemicals.

# How does the District use HRAs?

- Permitting – to ensure that a facility's risk, from permitted units, doesn't exceed the District's significance level. (Potential emissions)
- CEQA – to evaluate all sources of emissions from a proposed project and provide comments to the applicant and lead agency on the projects estimated risk. (Potential emissions)
- Air Toxic "Hot Spots" Information and Assessment Act (AB2588) - to evaluate those facilities that have been determined to be of concern. (Actual Emissions)

# How is an HRA performed (Permitting)?

- An HRA is performed on a project basis and facility wide.
  - Project (unit(s) to be permitted)
    - To determine if Toxic Best Available Control Technology (TBACT) will be required for any unit being permitted.
  - Facility Wide (all projects assessed)
    - To determine if the sum of all risk is below District Significance Levels

# How is an HRA performed (Permitting)?
Continued

- Process
  - Perform a Prioritization (a toxicity based score) – District Database
  - Dispersion Modeling – ISCST3 / AERMOD (December 9, 2006)
  - Risk Analysis – CARB HARP
  - Risk Management – HRA Memo

# How is an HRA performed (Permitting)?
Continued

- District ‘s Significance Levels
  - Project
    - Project prioritization >1.0 HRA Required
    - Cancer Risk >=10.0 in one million
    - Acute and Chronic Indices >=1.0 After talking W/ OEHHA
  - Facility
    - Sum of facility’s prioritization >1.0 HRA Required
    - Cancer Risk >=10.0 in one million
    - Acute and Chronic Indices >=1.0 After talking W/ OEHHA

# How is an HRA performed (CEQA)?

- The District does not perform CEQA type HRAs directly, but provides assistance to consultants and or interested parties. The HRA should follow guidance provide for HRAs performed for AB25588.
  - Type of assistance:
    - Review HRA protocols
    - The plan used to perform the HRA
    - Provide guidance
    - Review modeling inputs files
    - Trouble shooting problems
    - Source types
    - Modeling results

# How is an HRA performed (CEQA)?
## Continued

- Type of assistance:
  - Reviewing other none standard methods
  - Creating modeling tools
    - » Bus Risk
    - » Road Risk
    - » GDF Risk
    - » Fast Food
    - » Truck Idling
    - » TRU's
    - » Truck Travel
    - » Diesel IC Engines

# How is an HRA performed (AB2588)?

- HRAs performed to comply with requirements of AB2588 must follow guidance provided by the Office of Environmental Health Hazard Assessment (OEHHA) and those provide by the District.

# How is an HRA performed (AB2588)?
## Continued

- AB2588 Process
  - Plan
    - Process Description
    - What Sources and Processes
    - What Toxic Pollutants
    - Methods to Calculate Emissions
  - Report
    - Reporting Forms
    - Actual Process Rates and Emissions
    - Sample Calculates
    - Source Tests
    - Receptor Distances

# How is an HRA performed (AB2588)?
## Continued

- Prioritization
  - Unit to Receptor Assessment (Score)
  - Prior Score >= 10 requires HRA
- HRA
  - Review HRA Protocol
  - Review HRA Report
    - » Check Inputs
    - » Rerun HRA
  - Submit to OEHHA for Review
  - Finalize HRA
    - » Cancer Risk >=10 in one million requires Public Notice
    - » Acute or Chronic Indices greater than 1.0 must consult OEHHA before requiring Public Notice.

# How is an HRA performed (AB2588)?
## Continued

- Risk Reduction Audit Plan (RRAP)
  - Cancer Score Greater than 50 in one million requires RRAP
    - » Must reduce risk to acceptable levels
  - Acute or Chronic Indices greater than 5.0 requires RRAP
    - » Must reduce risk to acceptable levels


COPYRIGHT
FOTOSEARCH