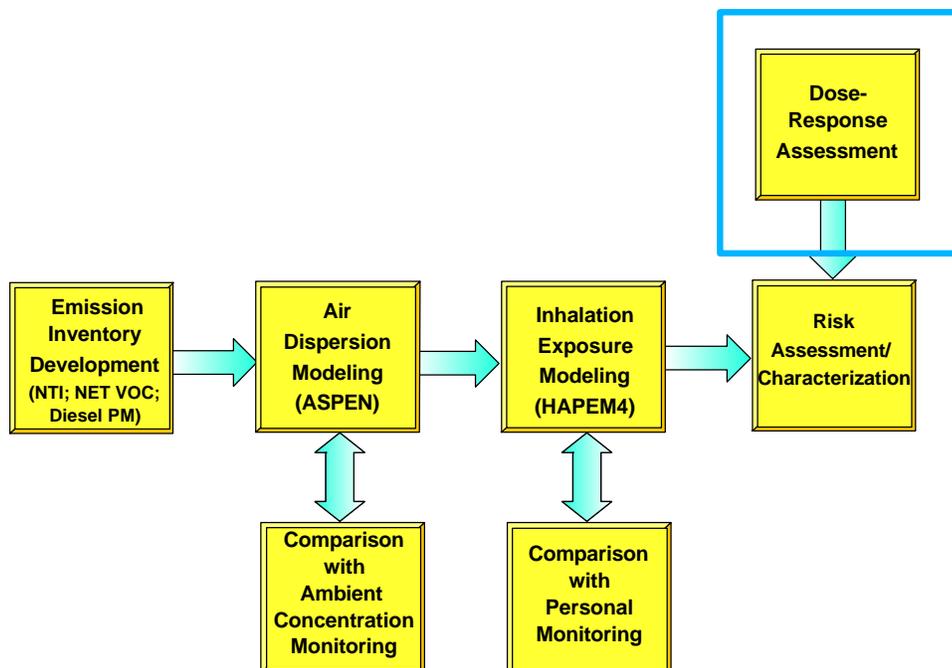


US EPA ARCHIVE DOCUMENT

The National Air Toxics Assessment Dose-Response Assessment

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How Does the Dose-Response Assessment Fit into the National Scale Assessment?



Introduction

- Two sequential analyses
 - Hazard identification
 - ◆ Adverse effects
 - ◆ Relevant concentrations
 - ◆ Effectively done during selection of urban HAPs
 - Dose-response assessment
 - ◆ Relationship between *average annual* exposure and adverse health effects

Carcinogens

- Hazard identification
 - Proposed guidelines: descriptive paragraph
 - 1986 guidelines: WOE ranging from A to E
 - ◆ A: carcinogenic
 - ◆ B: probably carcinogenic
 - ◆ C: possibly carcinogenic
 - ◆ D: not classifiable
 - ◆ E: evidence of non-carcinogenicity
 - Few substances yet assessed under proposed guidelines; use 1986 guidelines here

Carcinogens (*continued*)

- Dose-response assessment
 - Metric: unit risk estimate (URE)
 - ◆ Risk per ug/m³ exposure for lifetime

Non-Carcinogens

- Hazard identification
 - Assess literature, evaluate strengths/ weaknesses of data
 - Determine adverse effects and sensitive species
 - Select *critical effect*
 - ◆ Therefore assessment will be protective of other effects
- Dose-response assessment
 - Metric: reference concentration (mg/m³)
 - ◆ *A continuous inhalation exposure to the human population that is likely to be without an appreciable risk of deleterious effects during a lifetime*
 - ◆ *uncertainty spanning an order of magnitude*
 - ◆ *includes sensitive subgroups*

Dose-Response Information in National-Scale Assessment

- Desirable qualities for DR information in the national-scale assessment:
 - Sound science
 - ◆ Independent external peer review
 - Current knowledge

Dose-Response Information in National-Scale Assessment

- Sources having those qualities:
 - EPA IRIS
 - ◆ Does not cover all substances
 - ◆ Currently lags behind advances
 - ATSDR
 - ◆ Non-cancer assessments only
 - California EPA
 - ◆ UREs and RELs for "hot spots" program
 - ◆ Reviewed by peers and public
- Sources used in priority order above

Dose-Response Information in National-Scale Assessment

- 29 pollutants WOE A, B, or C
 - 20 IRIS UREs
 - 5 Cal EPA UREs
 - 2 peer-reviewed IRIS draft UREs
 - 2 UREs converted from oral potency slopes
- 27 pollutants with RfC or eq.
 - 10 IRIS RfCs
 - 6 ATSDR MRLs
 - 10 Cal EPA RELs
 - 1 NAAQS

Uncertainties: Chemical Speciation

- Assumed same species profile in all tracts for:
 - Chromium -- 34% of total Cr is Cr+6
 - Nickel -- 65% of total Ni is insoluble, 100% of insoluble Ni is crystalline
 - POM
 - ◆ Total -- potency is 5% of pure B[a]P
 - ◆ 7-PAH -- potency is 18% of pure B[a]P

Uncertainties: Carcinogens

- B and C substances assumed carcinogenic
- UREs based on linear extrapolation
- Interspecies extrapolation
- Most UREs were statistical UCLs; some were best-fit
- Oral CPSs for 2 substances (quinoline and propylene dichloride) converted to inhalation

Uncertainties: Non-Carcinogens

- Uncertainty factors applied to human equivalent concentration:
 - Range: 1-10
 - Interspecies
 - Intraspecies
 - Subchronic Y chronic
 - LOAEL Y NOAEL
 - Database
- Acute effects outside this assessment
- Usually no special consideration for children

Background: IRIS Schedule -- CAA HAPs Completed Since 1995

- Vinyl chloride
- 1,3-Dichloropropene
- Benzene
- EGBE
- Acetonitrile
- Naphthalene
- Chromium
- Beryllium
- MDI
- 1,1-Dichloroethylene
- Cumene
- PCBs

Background: IRIS Schedule -- CAA HAPs Expected Before 2003

- | | |
|-----------------------------|------------------------------|
| ■ Acetaldehyde | ■ Methylene chloride |
| ■ Acrolein | ■ MIBK |
| ■ Antimony | ■ MTBE |
| ■ Benzo[a]pyrene | ■ Nickel |
| ■ 1,3-Butadiene | ■ Nitrobenzene |
| ■ Cadmium | ■ Phenol |
| ■ Carbon tetrachloride | ■ Phosgene |
| ■ Chloroethane | ■ Quinoline |
| ■ Chloroform | ■ Pentachlorophenol |
| ■ Chloroprene | ■ PCBs (noncancer) |
| ■ DEHP | ■ Refractory ceramic fibers |
| ■ 1,4-Dichlorobenzene | ■ Silica (crystalline) |
| ■ Diesel emissions | ■ Styrene |
| ■ Ethylbenzene | ■ Tetrachloroethylene (perc) |
| ■ Ethylene dibromide | ■ 2,3,7,8-TCDD |
| ■ Ethylene dichloride | ■ Toxaphene |
| ■ Ethylene oxide | ■ Trichloroethylene |
| ■ Formaldehyde | ■ Vinyl acetate |
| ■ Hexachlorocyclopentadiene | ■ Xylenes |
| ■ Methyl chloride | ■ Zinc |
| ■ Methyl mercury | |