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National-Scale Air Toxics Assessment
Limitations in the 1996 National-Scale Air Toxics Assessment: Uncertainty

Uncertainty: ***With what confidence can these results be accepted?***

Note that a more refined analysis of uncertainty is underway and should be available here in the summer of 2002.

Overall Confidence (considers all exposure components which include emissions, ambient concentration and exposure estimates)

Confidence in Cancer Risk Estimates

Confidence in Noncancer Risk Estimates

Overall Confidence

To determine overall confidence, EPA considered the sources of uncertainty associated with the first three steps of the assessment (estimates of emissions, ambient concentrations, and exposure concentrations.)

Table A: Composite Judgements to Determine Overall Certainty

Confidence in Emissions Inventory + ASPEN Ambient Modeling Results	Confidence in HAPEM Exposure Modeling Results		
	lower	medium	higher
lower	Arsenic Compounds Beryllium Compounds Cadmium Compounds Mercury Compounds Nickel Compounds	Chromium Compounds Hexachlorobenzene Manganese Compounds PCBs	Lead Compounds
	Acetaldehyde Acrolein Hydrazine Polycyclic Organic matter (POM) Quinoline 7-PAH 1,3-Dichloropropene	Chloroform Diesel PM Ethylene Dibromide Ethylene Dichloride 1,1,2,2,-Tetrachloroethane	Formaldehyde Perchloroethylene 1,3-Butadiene
higher	Coke Oven Emissions Propylene Dichloride Vinyl Chloride	Acrylonitrile Carbon Tetrachloride Ethylene Oxide Methylene Chloride Trichloroethylene	Benzene

Overall confidence based on the composite judgements listed in Table A. above can be summarized as follows for a typical individual in a census tract:

Lower (orange in Table A.) for Arsenic Compounds; Beryllium Compounds; Cadmium Compounds; Mercury Compounds; Nickel Compounds, Chromium Compounds; Hexachlorobenzene(HCB) ; Manganese Compounds; PCBs; Lead Compounds; Acetaldehyde; Acrolein; Hydrazine; Polycyclic Organic Matter (POM); Quinoline; 7-PAH; and 1,3-Dichloropropene.

Medium (yellow in Table A.) for Chloroform; Diesel PM; Ethylene Dibromide; Ethylene Dichloride; 1,1,2,2-Tetrachloroethane; Formaldehyde; Perchloroethylene; 1,3-Butadiene; Coke Oven Emissions; Propylene Dichloride; and Vinyl Chloride.

Higher (green in Table A.) for Acrylonitrile; Carbon Tetrachloride; Ethylene Oxide; Methylene Chloride; Trichloroethylene; and Benzene.

See more details about the determination of overall confidence based on the certainty rank associated with emissions, ambient concentration, and exposure estimates.

Confidence in Cancer Risk Estimates

Confidence in estimates of cancer risk for a typical individual in a census tract:

- **Lower** for Acetaldehyde; Arsenic Compounds; Beryllium Compounds; Cadmium Compounds; Carbon Tetrachloride; Chloroform; Chromium Compounds; Ethylene Dibromide; Ethylene Dichloride; Ethylene Oxide; Hexachlorobenzene(HCB); Hydrazine; Lead Compounds; Methylene Chloride; Nickel Compounds; Perchloroethylene; PCBs; Polycyclic Organic Matter(POM); 7-PAH; Propylene Dichloride; Quinoline; Trichloroethylene; 1,1,2,2-Tetrachloroethane; and 1,3-Dichloropropene.
- **Medium** for Acrylonitrile; Coke Oven Emissions; Formaldehyde; Vinyl Chloride; and 1,3 Butadiene.
- **Higher** for Benzene.

Confidence in Noncancer Risk Estimates

Confidence in estimates of noncancer risk for a typical individual in a census tract:

- *Lower* for Acetaldehyde; Acrolein; Arsenic Compounds; Beryllium Compounds; Cadmium Compounds; Carbon Tetrachloride; Chromium Compounds; Ethylene Dichloride; Ethylene Oxide; Hexachlorobenzene(HCB); Hydrazine; Lead Compounds; Manganese Compounds; Mercury Compounds; Methylene Chloride; Nickel Compounds, 1,3-Butadiene; and 1,3-Dichloropropene.
- *Medium* for Acrylonitrile; Benzene; Chloroform; Ethylene Dibromide; Formaldehyde; Perchloroethylene; Propylene Dichloride; Vinyl Chloride; and 1,2-Dichloropropene.

- *Higher* for Trichloroethylene.

It is important to bear two things in mind. First, the above judgments refer to the relative confidence between two air toxics compounds. A judgment of "Higher" means the confidence is higher for this compound than for compounds assigned a "Medium" or "Lower." Second, the confidence depends on the geographic scale considered. As larger geographic areas are considered, and the exposure or risk is averaged over census tracts in that region, the confidence in estimates of these averages generally will increase. The above confidence ratings apply to the nationwide estimates and not to smaller scales (e.g., State or county-level).

In addition, EPA conducted an uncertainty analysis to determine the uncertainty in the risk to an individual living in a census tract. That analysis indicated that the uncertainty is at least of a factor of 5 (if 68% confidence intervals are considered) or 25 (if 95% confidence intervals are considered). This means the risk to an individual could be a factor of 5 to 25 above or below the values reported in the national-scale assessment for a census tract. This uncertainty, however, will vary between parts of a county. For example, estimates of exposure and risk will have a larger uncertainty in parts of a county with complicated terrain (e.g. hills) than in parts of the county with flat terrain, since the dispersion models are more accurate in flat terrain.

To learn more about these results, please select from any of the items below:

More Details About the "Overall Confidence" Rankings
What are the components of uncertainty?
Which components of uncertainty did the national-scale assessment include?
How was the uncertainty analysis conducted?

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EPA | OAR | OAQPS | ATW Comments?(natacom2@epa.gov)