Air Toxics Program Manager's Perspective on Ambient Monitoring

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Overview of the Air Toxic Program

- Technology-based Standards
- Residual Risk and Technology Review
- Urban Air Toxics
- Air Toxics Accomplishments
- Monitoring and the Air Toxics Program

Key Points

- Technology-based standards vs. risk-based standards
  - Prior to the 1990 Amendments, we were not very successful with risk-based standards
  - Congress struggled with this issue in the 1990 Amendments
    - Amendments are structured to require technology-based standards first, and then strengthening later, considering risks
  - Recent Court decisions spoke to some of these issues
  - We are still struggling with this issue
- This program has been the subject of numerous assessments from OMB, the Inspector General, and the General Accountability Office
  - Much of the criticism is linked to data and lack of monitoring information
- Ambient monitoring data can be helpful in directing where the Agency should focus its efforts and in addressing these assessment criticisms

Technology-based Rules

- Maximum Achievable Control Technology (MACT) standards required for major sources of hazardous air pollutants
  - MACT for existing sources must be at least as stringent as the average emission limitations achieved by the best performing 12 percent sources in that category (or best 5 sources if there are less than 30 sources in the category)
  - MACT for new sources must be based on the single best performing source
- Applies to 187 listed hazardous air pollutants
- Completed all MACT standards in February 2004
- Total includes 96 standards covering 174 source categories
- MACT Standards are implemented via delegations to the States
  - States receive matching Federal grant funds to carry out HAP implementation and characterization responsibilities

Technology-based Rules

- **CAA Section 129 Applies to waste combustion**
- List of 9 pollutants: PM (total and fine), opacity, SO2, HCl, NOx, Co, Pb, Hg, Cd, dioxins and dibenzofurans
- 5 source categories listed in the Act:
  - Large municipal waste combustors (MWC)
  - Small MWC
  - Commercial and industrial solid waste incinerators (CISWI)
  - Hazardous and infectious medical waste incinerators (HIMWI) and
  - Other solid waste incinerators (OSWI)
    - We identified the categories within OSWI
- Points to CAA section 111 NSPS and emissions guidelines, although standards must be as stringent as MACT
- Existing source standards are implemented and enforced through State/Federal plans

Risk and Technology Review

- CAA requires residual risk and technology reviews for MACT standards and Section 129 rules)

- Approach so far
  - Only performed reviews to meet Court deadlines
  - First 8 reviews show MACT standards generally did a good job
    - Two MACT standards posed low risks
    - Three MACT standards did not pose low risks but ample margin of safety was met without requiring additional controls
    - Three MACT standards required additional controls
  - Each individual MACT required significant Agency resources and only three reduced risk
    - Site-specific source, emissions data gathering and assessment most resource-intensive parts

Risk and Technology Review

Is There A Better Way?

- Risk & Technology Review (RTR-Phase I)
  - The first eight Residual Risk assessments and Technology reviews

- Risk & Technology Review (RTR-Phase II)
  - Combine the remaining MACT standards requiring residual risk and technology reviews into groups, enabling us to
    - More closely meet statutory dates (without schedule suits, if possible)
    - Raise and resolve programmatic issues in bundles
    - Minimize resources by using available data and focusing attention on high-risk sources
    - Provide better consistency in our analysis and decisions

Risk and Technology Review

- Our process for RTR Phase II:
  - Bin Standards into 3 groups
  - Extract MACT category information from latest emissions inventory (2002 NEI) for the 33 MACT standards with compliance dates of 2002 and earlier
  - Model each MACT category to obtain inhalation risks, including cancer risk and incidence, population cancer risk, non-cancer effects (chronic and acute), key HAP drivers
  - Perform screening level multipathway analysis if necessary
  - Public review of inventory and some risk results to get public comments, and, as appropriate, obtain better source data (ANPRM)

Risk and Technology Review

- ## Our process for RTR Phase II (continued):
  - Update inventory based on public comments (ANPRM)
  - Remodel the categories based on the reviewed data
    - Identify "no action" for low-risk source categories
    - Identify categories with significant persistent, bioaccumulative emissions; for refined multipathway analysis
    - Evaluate effectiveness and cost of additional risk reduction options for the remaining source categories
  - Make acceptability and ample margin of safety determinations for each source category
  - Propose, address public comments, and take final action on the group of MACT categories (NPRM)

Risk and Technology Review

- Status of RTR Phase II
  - We are currently working on RTR Phase II. RTR Phase II consists of Groups 1, 2 and 3
  - Group 1 consists of 4 MACTs that we consider to be low risk
    - We are very close to publishing the Group 1 NPRM, hopefully this month (September 2007)
  - Group 2 consists of 12 MACTs
    - We published the Group 2 ANPRM on March 29, 2007 with a 90 comment period
    - Plan to propose 6 MACTs (Group 2A) by the end of the 2007 calendar year
    - Plan to propose remaining 6 MACTs (Group 2B) by Summer 2008
    - Published the NPRM for Petroleum Refineries on September 4, 2007
  - Group 3 consists of 18 MACTs
    - We are in the process of preparing a Group 3 ANPRM and expect to publish in Federal Register before the end of the 2007 calendar year

Clean Air Act Section 112(k)

- Reduce emissions from hazardous air pollutants (HAP) from area sources which may individually, or in aggregate, present significant risks in urban areas

- EPA shall prepare a comprehensive national strategy for urban air toxics

- Encourage and support areawide strategies developed by State and local air pollution control agencies

EPA's National Integrated Air Toxics Strategy

July 19, 1999

AIR TOXICS EMISSIONS

EPA's Strategy for Reducing
Health Risks in Urban Areas

National Air Toxics Emissions

Fires
7%

Non-road
Mobile
16%

Major
Stationary
20%

On-road
Mobile
27%
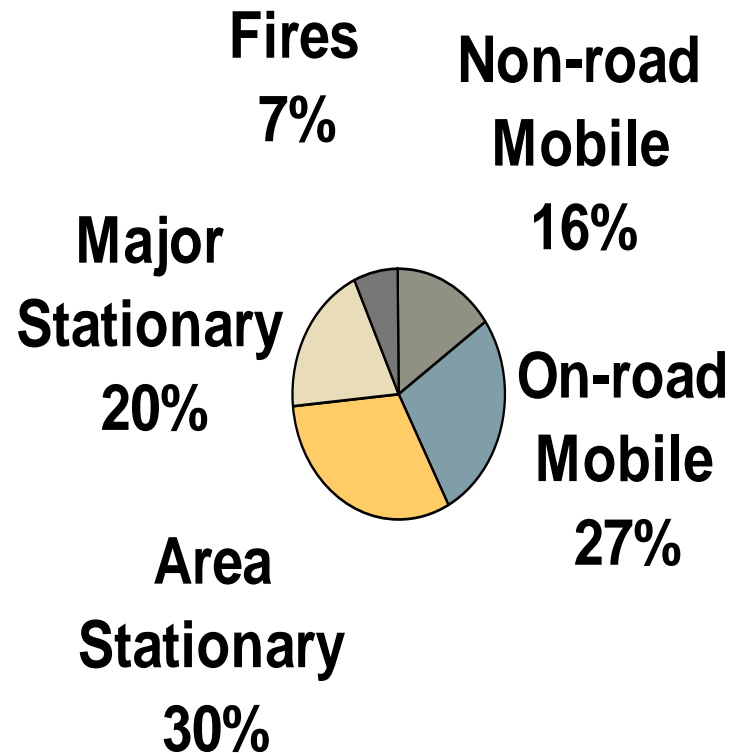
Area
Stationary
30%

4.7 Million Tons (2002)

National Integrated Air Toxics Strategy

- **Focuses on reducing human health threats of air toxics in urban areas**
- **Allows EPA to better address cumulative public health risks and adverse environmental impacts**
- **Requirements of the Strategy**
  - Identify not less than 30 hazardous air pollutants which, as the result of emissions from area sources, present the greatest threat to public health in the largest number of urban areas
  - Reduce by 75% the incidence of cancer attributable to HAP exposure
  - Substantially reduce noncancer health risks
  - Address and prevent disproportionate impacts of air toxics hazards, especially on sensitive populations
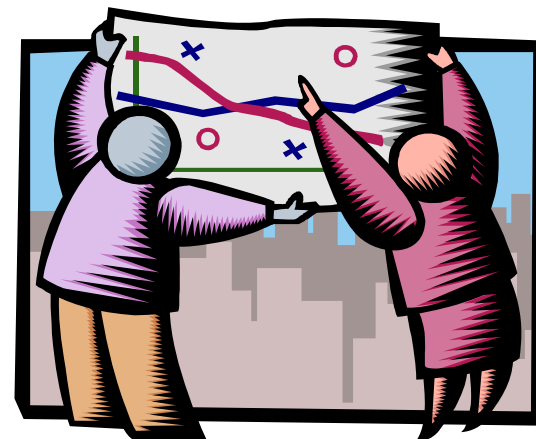
Integrated Framework

Includes activities under multiple CAA authorities to reduce air toxics emissions from all sources in urban areas
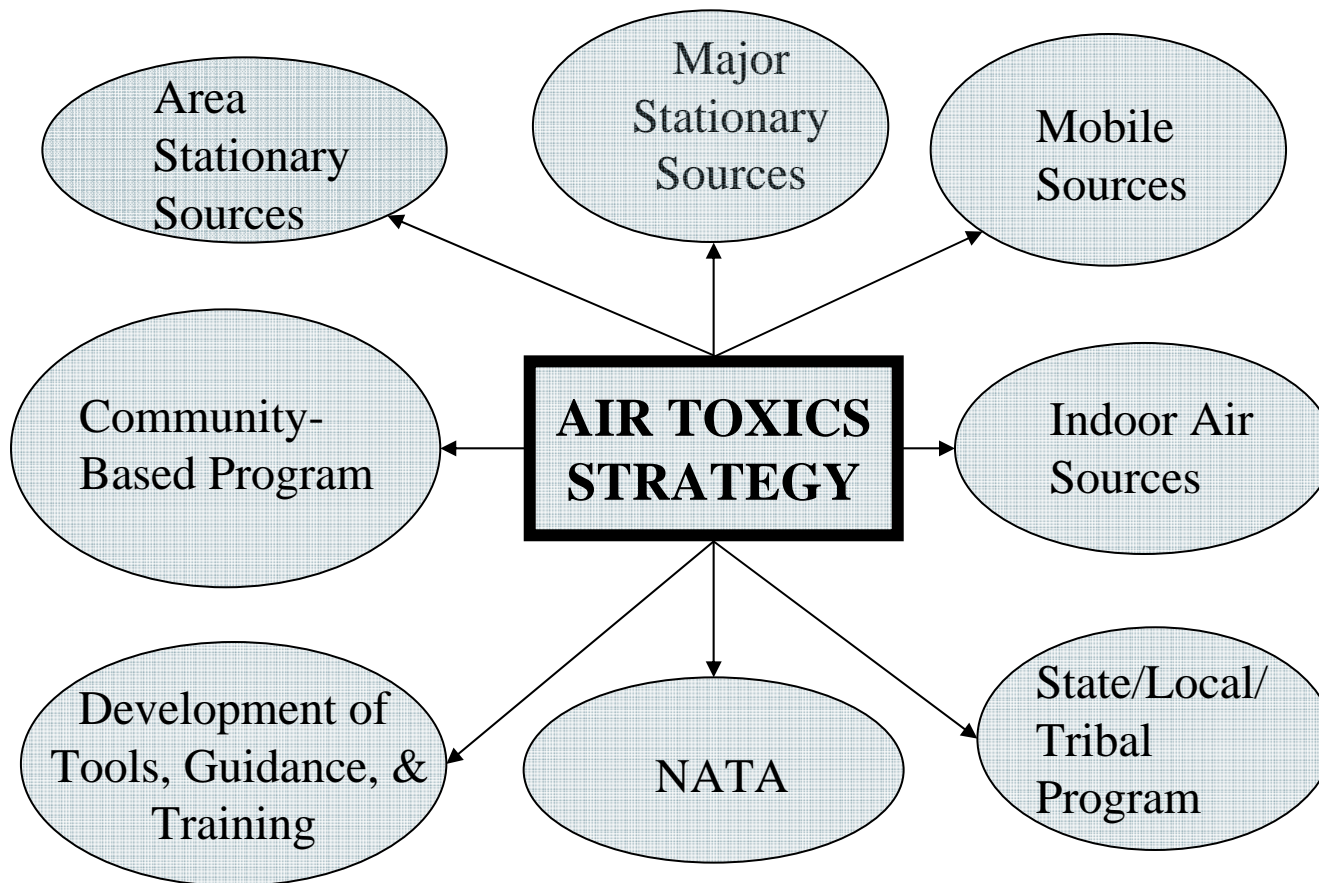
# Activities of the Strategy

- **Reductions through regulatory actions and related projects**
  - Area Source Program
  - Residual Risk Program
  - Mobile Source Program
  - Indoor Air Program

- **Expand knowledge about air toxics emissions and risks**
  - National Air Toxics Assessment (NATA)
  - Community Air Toxics Monitoring Grants

- **Encourage and support area-wide strategies developed by State and local pollution control agencies**

Assessing Our Accomplishments

- **Are moving forward with regulatory obligations and focusing on how to reduce risks in urban areas**
    - 70 listed source categories
        - 27 issued to date
        - Remaining to be issued by 6/2009
    - Exploring alternative and flexible approaches
    - Combining rules for multiple source categories
    - Working with stakeholders
    - Developing tools to assist communities and local-level concerns

- **Primary focus has not been on addressing community-level problems and cumulative risk**
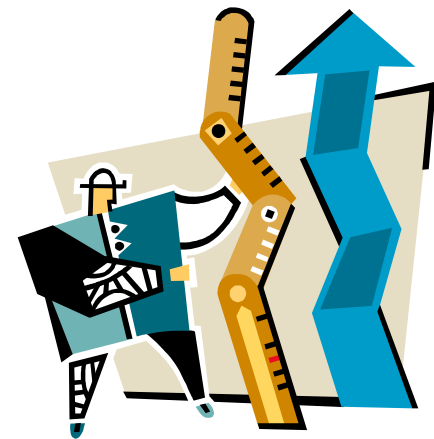
More Focus on a Comprehensive Approach

- **OAQPS reorganization**

- **Air Quality Management Subcommittee is recommending more of a multi-pollutant and holistic sector-based approach**

- **Community Action for Renewed Environments (CARE)**

- **Memorandum of Understanding with the CDC**
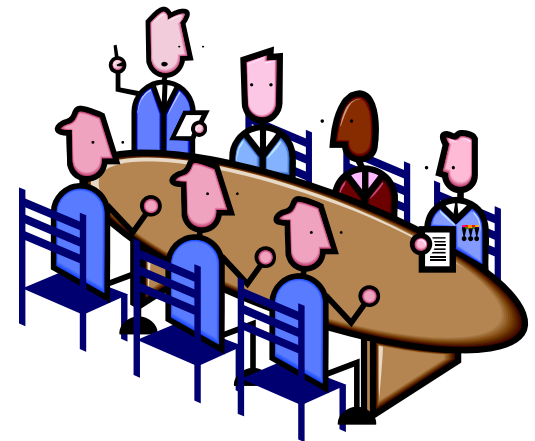
Community-based Program

- Support community level assessments and reduction strategies
  - Over $2.1 million given out in past 4 years
  - Funded over 40 projects

- Technical support and tools
  - Community Projects Database
  - Healthy Air: Community & Business Leaders Guide
  - Community-based Air Toxics Website
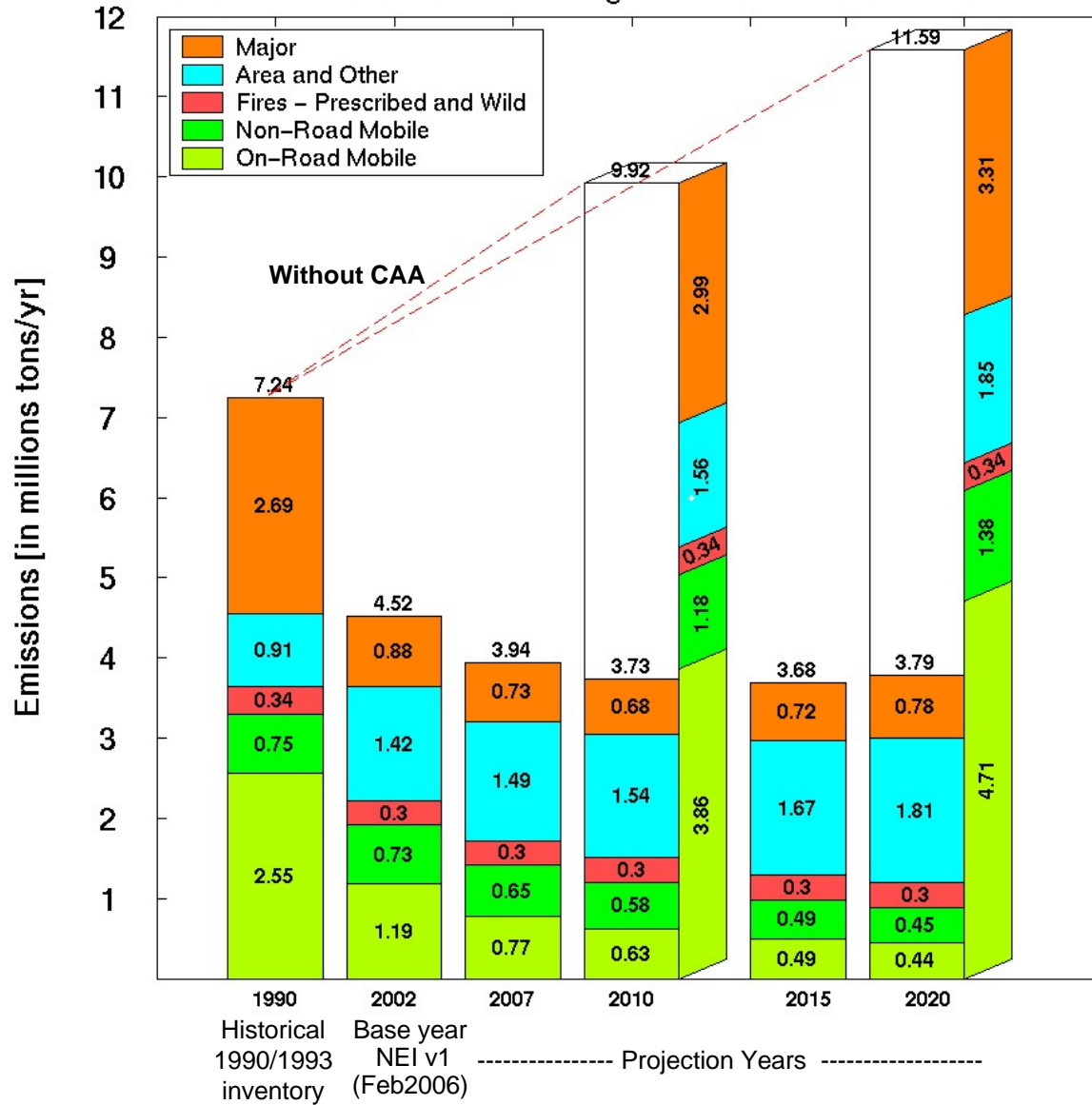
Community-based Program *(con't)*

- ## Outreach Efforts
  - Campaign on Autobody Shops
    - National effort to encourage early reduction and best management practices through community efforts
  - Woodstove Changeout Program

- ## Recognition Programs
  - CAAAC Clean Air Excellence Award
    - For outstanding community programs
  - Regional community awards

WHAT HAS THE AIR TOXICS PROGRAM ACCOMPLISHED?

U.S. Contributions of Source Categories to Total Emissions for all HAPs

Emissions [in millions tons/yr]

Legend:
- Major
- Area and Other
- Fires – Prescribed and Wild
- Non–Road Mobile
- On–Road Mobile

Without CAA

1990 (Historical 1990/1993 inventory) — 7.24
- Major: 2.69
- Area and Other: 0.91
- Fires: 0.34
- Non–Road Mobile: 0.75
- On–Road Mobile: 2.55

2002 (Base year NEI v1 (Feb2006)) — 4.52
- Major: 0.88
- Area and Other: 1.42
- Fires: 0.3
- Non–Road Mobile: 0.73
- On–Road Mobile: 1.19

2007 — 3.94
- Major: 0.73
- Area and Other: 1.49
- Fires: 0.3
- Non–Road Mobile: 0.65
- On–Road Mobile: 0.77

2010 — 3.73 / 9.92
- Major: 0.68 / 2.99
- Area and Other: 1.54 / 1.56
- Fires: 0.3 / 0.34
- Non–Road Mobile: 0.58 / 1.18
- On–Road Mobile: 0.63 / 3.86

2015 — 3.68
- Major: 0.72
- Area and Other: 1.67
- Fires: 0.3
- Non–Road Mobile: 0.49
- On–Road Mobile: 0.49

2020 — 3.79 / 11.59
- Major: 0.78 / 3.31
- Area and Other: 1.81 / 1.85
- Fires: 0.3 / 0.34
- Non–Road Mobile: 0.45 / 1.38
- On–Road Mobile: 0.44 / 4.71

---------------- Projection Years ------------------

After 2010, stationary source emissions are based only on economic growth. They do not account for reductions from ongoing toxics programs such as the urban air toxics program, residual risk standards and area source program, which are expected to further reduce toxics. In addition, mobile source reductions are based on programs currently in place. Programs currently under development will result in even further reductions.

Projected emissions account for estimated activity growth and reductions resulting from MACT program, CAIR and Mobile source rules of the 1990's.

Key Findings:
- CAA has been very effective in reducing overall tonnage of air toxics
- In absence of CAA, total emissions would be more than twice those projected in 2020

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PREDICTED RISK CHANGES - BASED ON 1999 NATA

- The **average cancer risk** for 1999 is **48 in a million**
  - Comparable to 1996 NATA of 55 in a million
  - **Benzene** is most significant carcinogen
  - Majority of country predicted to have risk between 1 and 25 in a million
  - Most urban locations greater than 25 in a million
  - Transportation corridors and some locations greater than 50 in a million risk
  - Just a few counties greater than 100 in a million risk

- The **average noncancer risk** for 1999 is **6.4** (hazard index for respiratory)
  - Comparable to 1996 NATA of 5.2
  - **Acrolein** a majority of this risk
  - Over 40% of counties hazard index greater than 1
  - Just a few counties hazard index greater than greater than 10
  - High values in Florida and Idaho from forest fires (they are using different emission factors

- **Highest risk counties coincide with locations where criteria pollutant issues are significant**

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**1999 NATA – National-Scale Assessment
Predicted County Level Carcinogenic Risk**
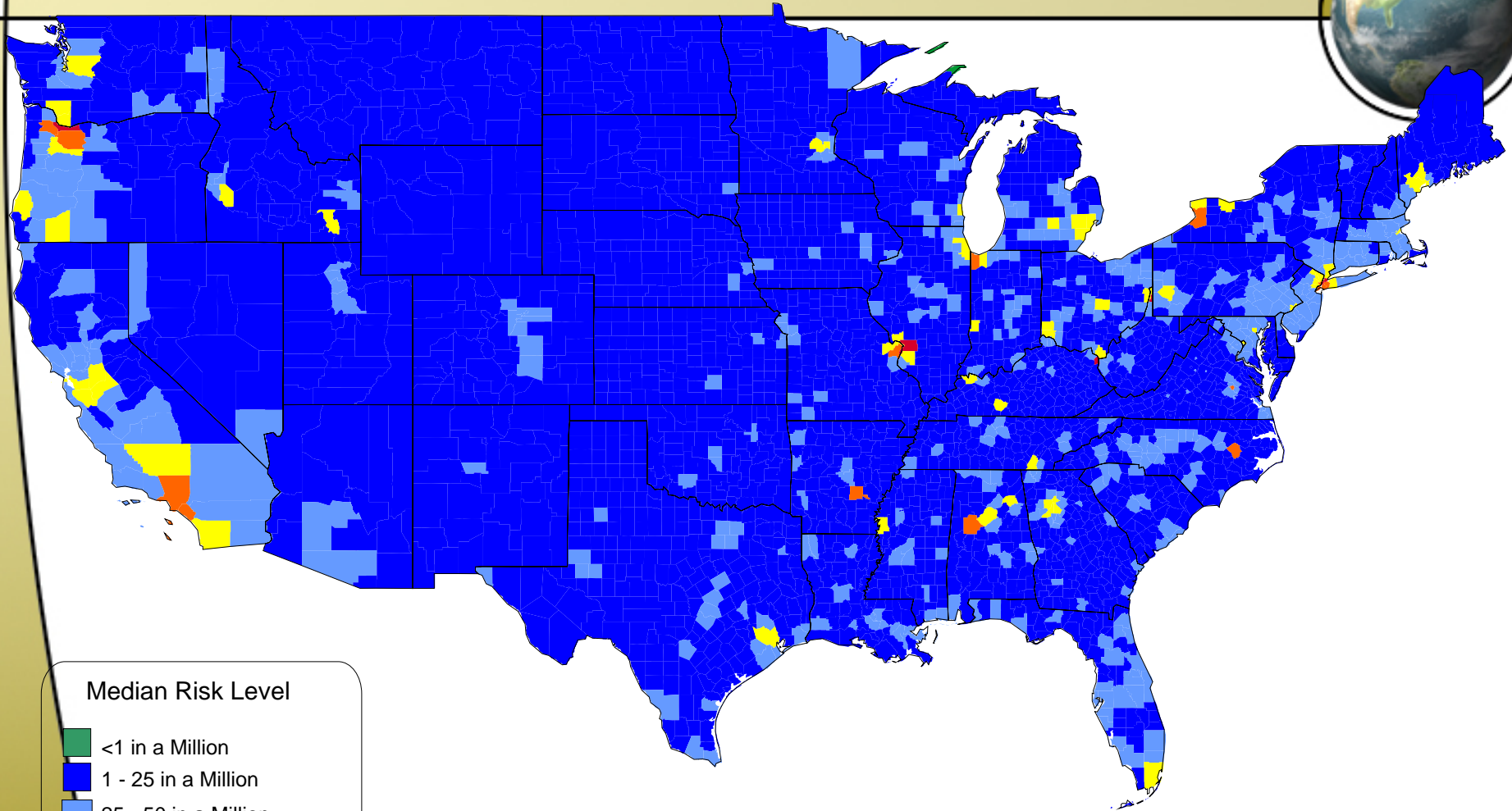
Median Risk Level

- <1 in a Million
- 1 - 25 in a Million
- 25 - 50 in a Million
- 50 - 75 in a Million
- 75 - 100 in a Million
- >100 in a Million

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1999 NATA - National Scale Assessment
Predicted County Level Noncancer (Respiratory) Risk

Median Risk Level
Hazard Index

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 30
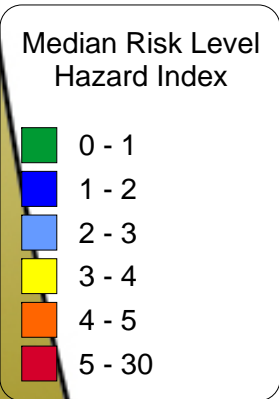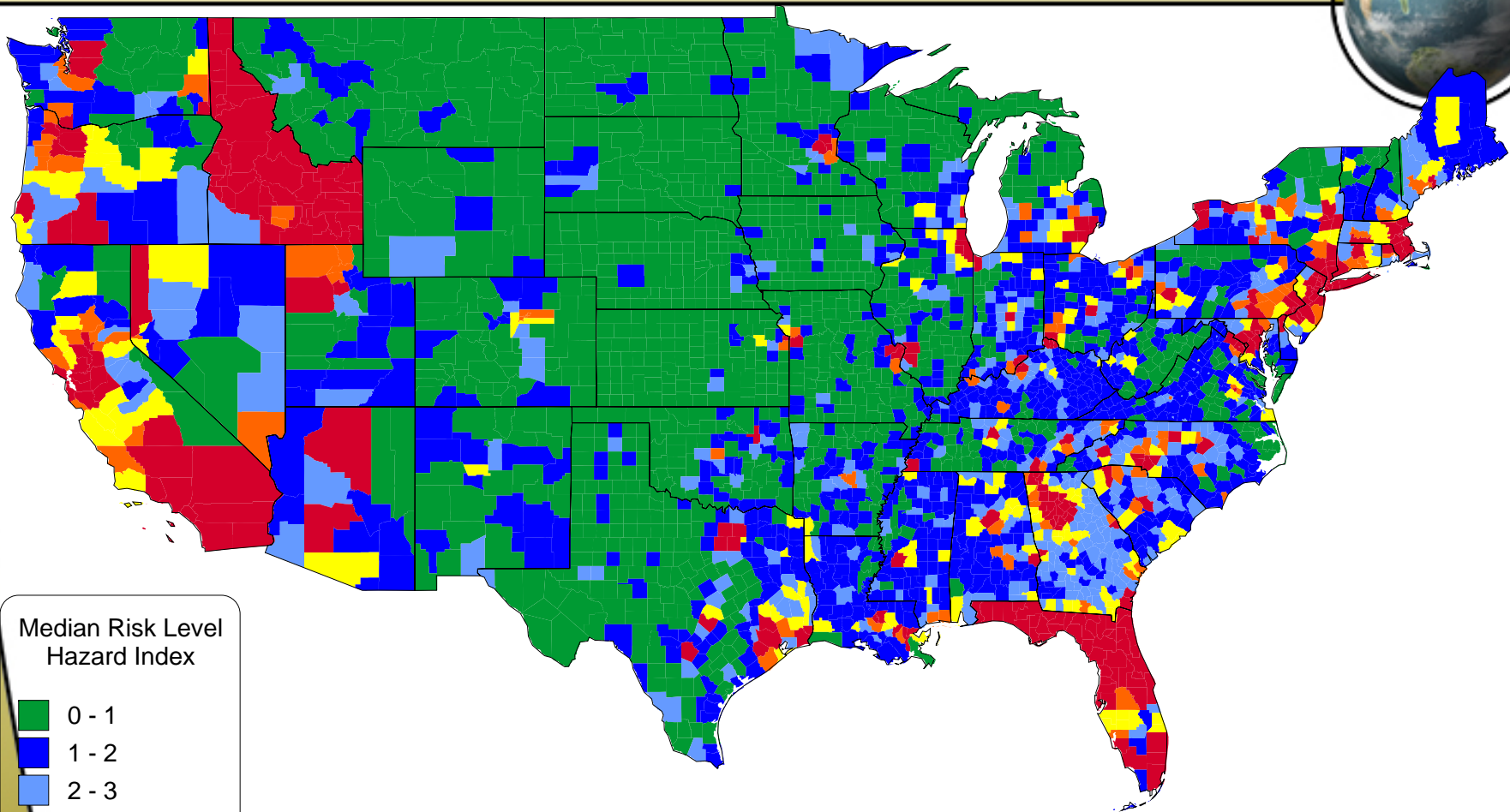
Note: Idaho Risk Levels are suspect due to inventory issues related to fires

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- Cancer
  - **National drivers** [1]
    - Benzene
  - **Regional drivers** [2]
    - Arsenic compounds
    - Benzidine
    - 1,3-Butadiene
    - Cadmium compounds
    - Carbon Tetrachloride
    - Chromium 6
    - Coke oven
    - Ethylene oxide
    - Hydrazine
    - Naphthalene
    - Perchloroethylene
    - POM

- NonCancer
  - **National drivers** [3]
    - Acrolein
  - **Regional drivers** [4]
    - Antimony
    - Arsenic Compounds
    - 1,3-Butadiene
    - Cadmium compounds
    - Chlorine
    - Chromium 6
    - Diesel PM
    - Formaldehyde
    - Hexamethylene 1-6-diisocyanate
    - Hydrazine
    - Hydrochloric acid
    - Maleic anhydride
    - Manganese compounds
    - Nickel compounds
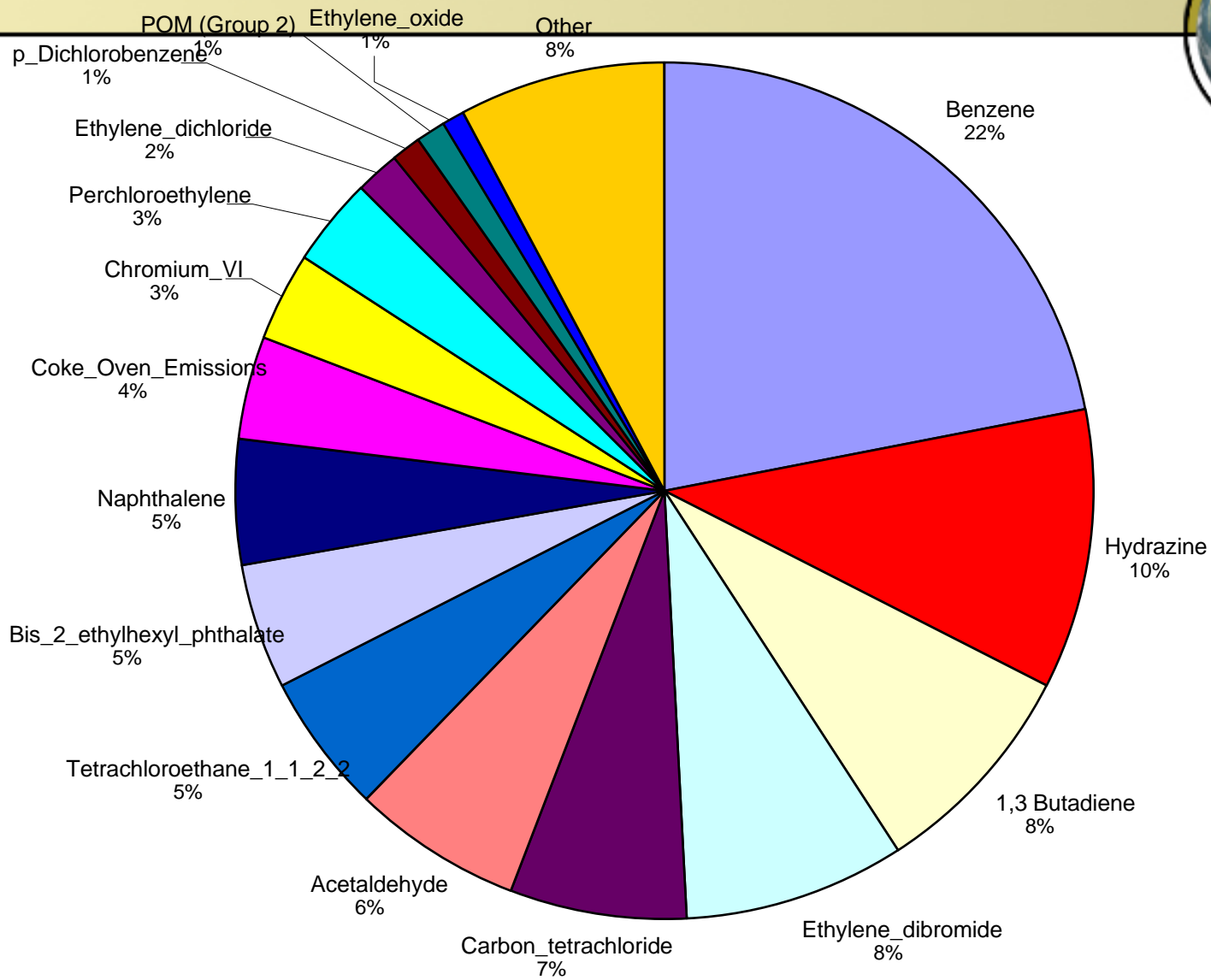   - 2,4-Toluene Diisocyanate
    - Triethylamine

[1] At least 25 million people exposed to risk > 10 in 1 million

[2] At least 1 million people exposed to risk > 10 in 1 million OR At least 10,000 people exposed to risk > 100 in 1 million
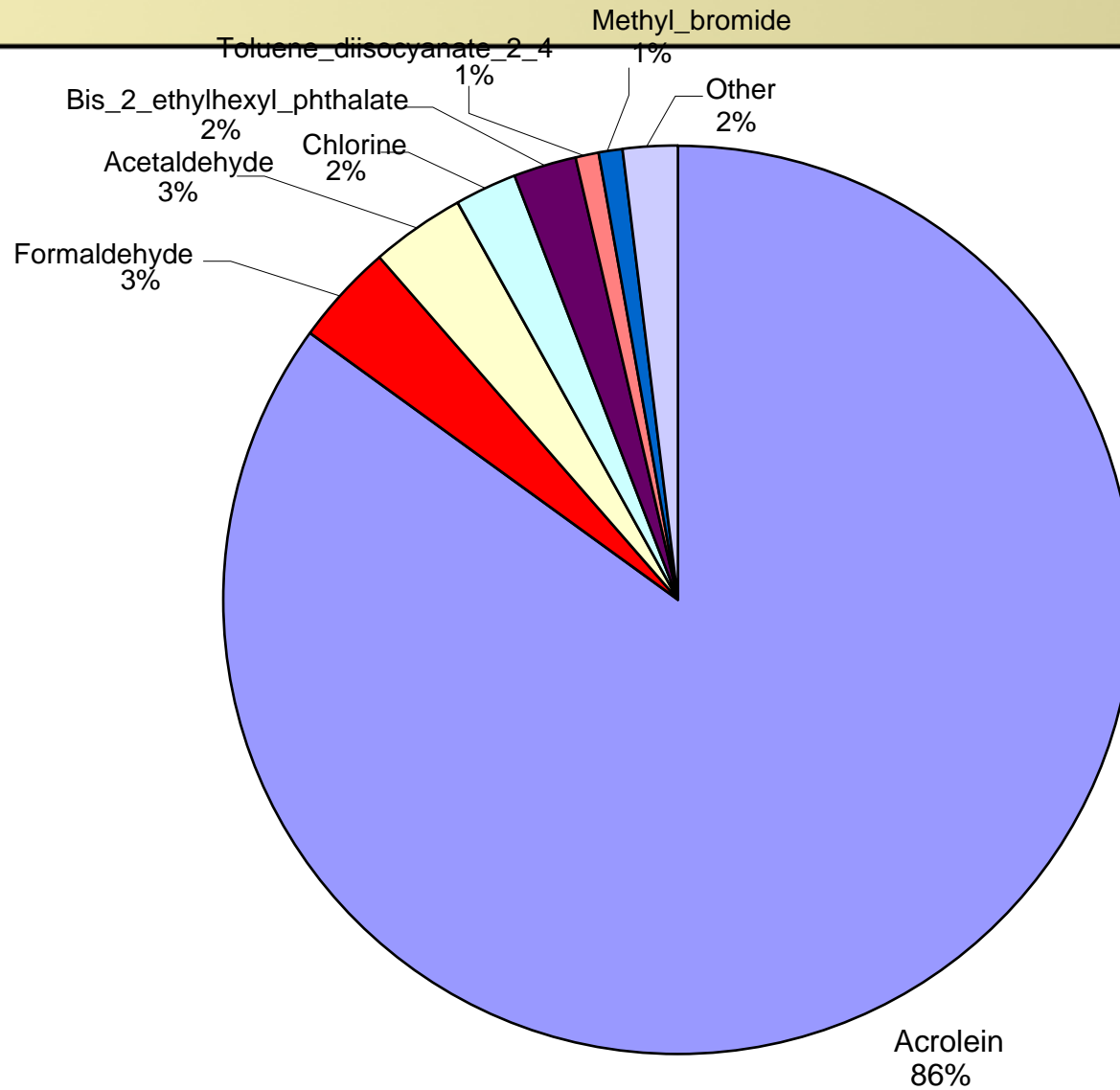
[3] At least 25 million people exposed to a hazard quotient (HQ) > 1.0

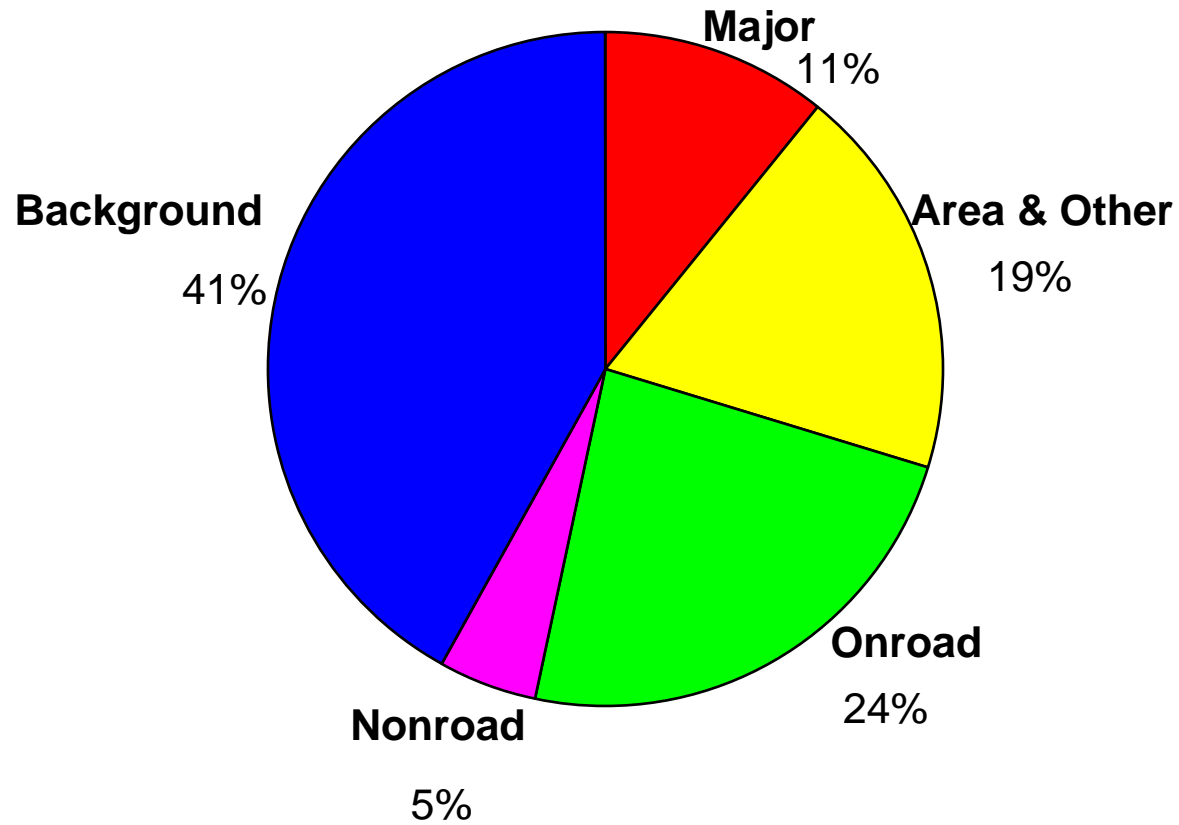[4] At least 10,000 people exposed to HQ >1

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1999 NATA - Pollutant Contribution to Average Cancer Risk (48 in a million)

- POM (Group 2) 1%
- p_Dichlorobenzene 1%
- Ethylene_dichloride 2%
- Perchloroethylene 3%
- Chromium_VI 3%
- Coke_Oven_Emissions 4%
- Naphthalene 5%
- Bis_2_ethylhexyl_phthalate 5%
- Tetrachloroethane_1_1_2_2 5%
- Acetaldehyde 6%
- Carbon_tetrachloride 7%
- Ethylene_dibromide 8%
- 1,3 Butadiene 8%
- Hydrazine 10%
- Benzene 22%
- Other 8%
- Ethylene_oxide 1%

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1999 NATA - Pollutant Contribution to Average Noncancer Risk (HI=6.4)

Methyl_bromide
1%

Toluene_diisocyanate_2_4
1%

Bis_2_ethylhexyl_phthalate
2%

Chlorine
2%

Other
2%

Acetaldehyde
3%

Formaldehyde
3%

Acrolein
86%

1999 NATA Cancer Risk
Source Sector Contributions

Major 11%

Area & Other 19%

Background 41%

Onroad 24%

Nonroad 5%

Average Risk: 48 in a Million

1999 NATA Noncancer Respiratory Risk Source Sector Contributions

Background 3%

Major 3%

Nonroad 16%

Area & Other 22%

Onroad 56%

Average Hazard Index = 6.4

Benzene found very good agreement

Metals appear to be underpredicted by NATA

Model overprediction

1.0=Agreement

Model underprediction

75th percentile

Median

25th percentile

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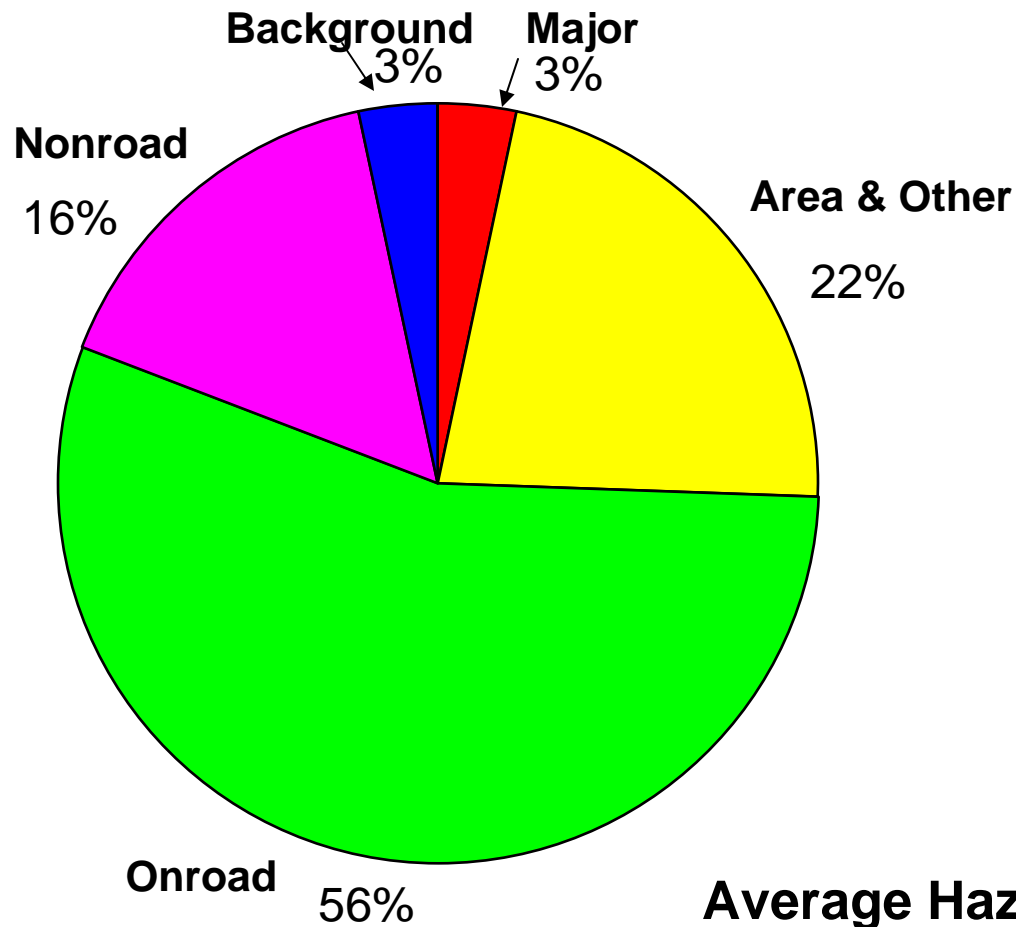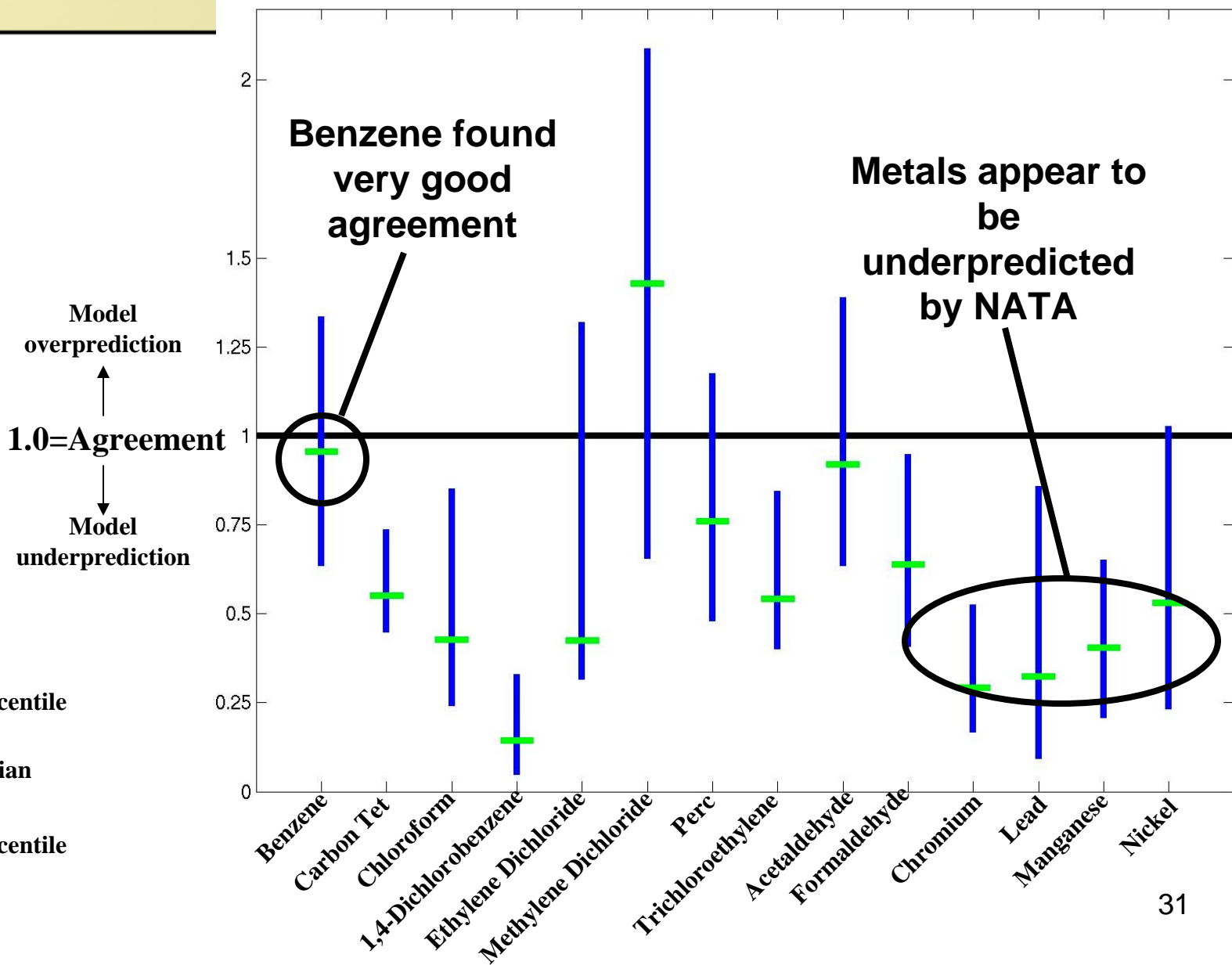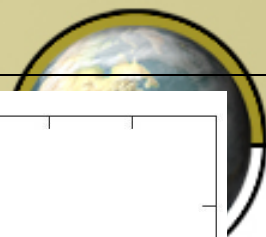
MONITORING AND THE AIR TOXIC PROGRAM

MONITORING

- National Air Toxics Trends Sites (NATTS)
  - Accountability
    - Trends
    - GPRA
    - Air Toxic PARTs
  - Evaluate emissions reduction programs (MACT, RR, Area, MSAT)
  - Ambient background levels for national scale analyses (NATA)
  - Ground truth models
    - Compare RTR model results with ambient data

MONITORING (continued)

- ## Local Scale Monitoring Grants
  - Define source signatures
    - Ambient levels surrounding key source categories
    - Used to develop emission factors
    - Support HAP listing/delisting efforts
  - Identify inventory gaps
  - Evaluate source category emissions reduction programs (MACT, RR, Voluntary Programs)
  - Ambient background levels
  - Ground truth assessments
  - Support exposure and risk assessments

MONITORING (continued)

- Further method development for key HAPs
- Detection limits at or below health benchmark values
- Easy and timely data access
- Continuous data measurement
- Support for exposure studies