2002 National Air Toxic Assessment (NATA)

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What is NATA?

- **Characterization of air toxics across the nation**
  - Nationwide assessment with *census tract*[1] resolution for 177 HAPs (plus diesel PM)
  - Emissions, modeled ambient concentrations and estimated *inhalation exposures* from *outdoor sources*
  - *Cancer and noncancer* risk estimates for the 133 HAPs with health data based on *chronic exposures*

- **Tools for State/Local/Tribal Agencies (and EPA) to prioritize pollutants, emission sources and locations of interest**
  - Provides a starting point for local-scale assessments
  - Focuses community efforts
  - Informs monitoring programs

1 Census block data available for point sources

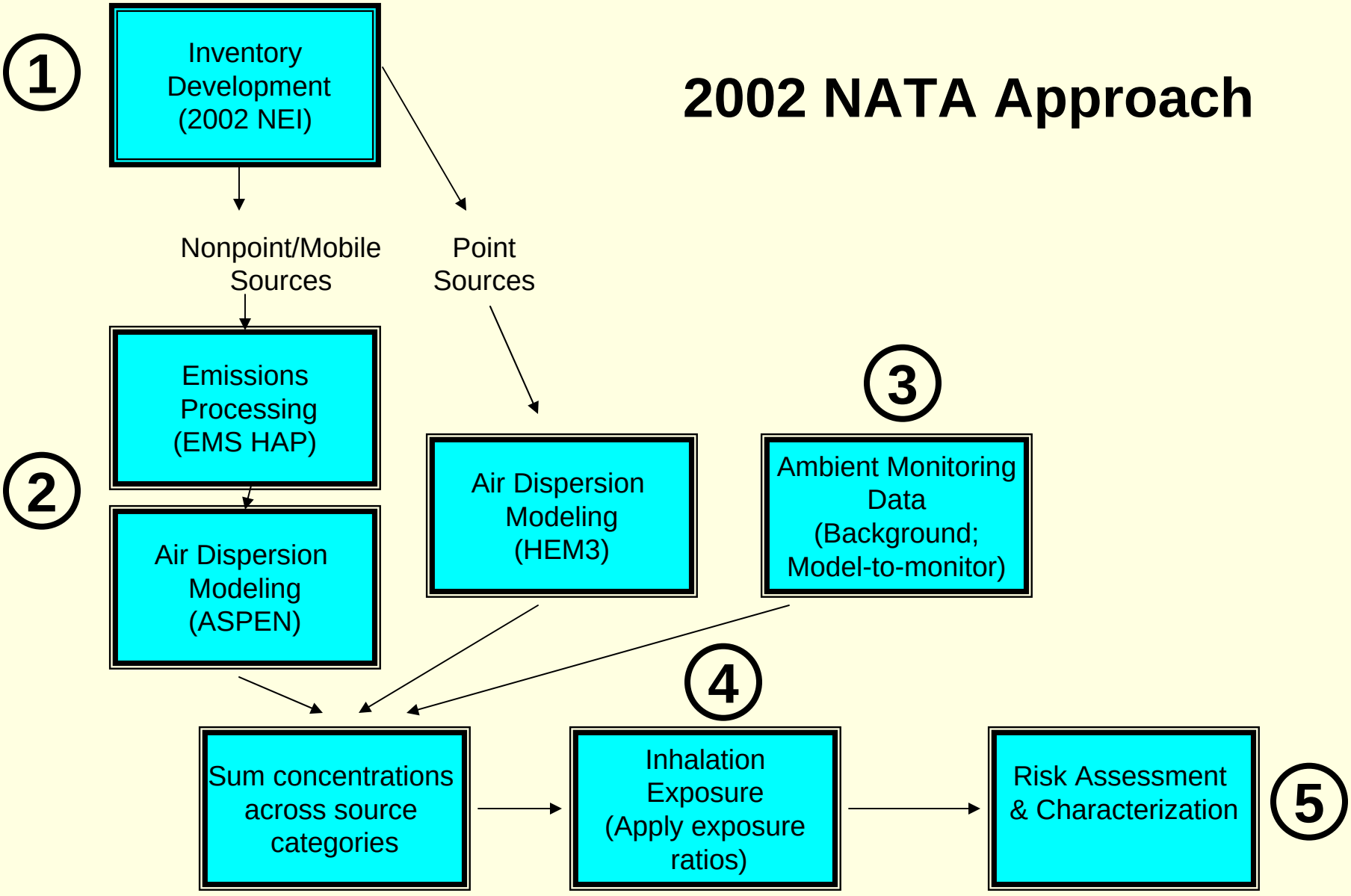
NATA History

- 1996 NATA
  - Based on 1996 NTI
  - Release May 2002 (6 year lag)
  - **33 HAPs**
- 1999 NATA
  - Based on 1999 NEI
  - Released Feb 2006 (7 year lag)
  - **177 HAPs**
- 2002 NATA
  - Based on 2002 NEI
  - Expected Public Release in 2009
  - **177 HAPs**
- 2005 NATA
  - Based on 2005 NEI
  - No current time frame for analysis and release
  - Transition to NAPA approach
- 2008 NAPA
  - New modeling framework
  - Goal: Integrated O3 and PM and HAPs
  - Expected Release 2011

Who uses NATA?

- EPA
  - Support for standard setting
    - MSAT Rule used NATA for current and projected risk levels
    - Risk and Technology Review
    - Area source rulemaking
  - Air Toxics monitoring
    - NATTS Priority HAPs/Site locations
    - Support Urban monitoring efforts
  - Toxic to Criteria Program
    - Overlay “Hot Spots” with nonattainment areas (e.g. Detroit)
    - Evaluate the toxic components of PM
- States
  - Many State Air Toxic Program sets priorities using NATA
  - Identify gaps in emissions inventories and encourages inventory improvements
- Communities
  - Serves as a starting point
  - Information and priority setting

2002 NATA Approach



① NATA Emission Inventory

- 2002 National Emission Inventory
  - Point Sources –
    - Version 3.0 (April 2007)
    - Include updates to 34 source categories as part of Risk and Technology Review (RTR) developed by Sector Policies and Programs Division (SPPD) of OAQPS
    - lead NAAQS updates
    - HWI changes
    - Airports updated
  - Nonpoint Sources –
    - Version 3.0 (April 2007)
  - Onroad Mobile Sources –
    - Version 3.0 (April 2007)
    - Upgrades to onroad sector to be consistent with MSAT rule
  - Nonroad Mobile Sources -
    - Version 3.0 (April 2007)

2002 NATA

Area Source Bins for nonpoint inventory

- Agricultural Field Burning
- Asphalt Paving and Roofing
- Autobody Refinishing Paint Shops
- Chromium Electroplating
- Commercial Cooking
- Dry Cleaning Facilities: Perchloroethylene
- Gasoline Distribution (Stage I)
- Halogenated Solvent Cleaners
- Industrial/Commercial/ Institutional Boilers & Process Heaters
- Landfills
- Natural Gas Transmission & Storage
- Oil & Natural Gas Production
- Open Burning - Forest and Wildfires
- Open Burning - Prescribed, Managed, Slash
- Open Burning - Other
- Other
- Pesticide Application
- Petroleum Product Storage, Transportation and Marketing
- Publicly Owned Treatment Works (POTWs)
- Residential Heating - nonwood
- Residential Heating - wood
- Solvent Use: Consumer and Commercial Products Usage
- Solvent Use: Nonconsumer/Noncommercial
- Solvent Use: Paint Stripping Operations
- Stationary Reciprocating Internal Combustion Engines
- Swimming Pools

2002 NATA

Mobile Source Bins for nonpoint inventory

- Onroad gasoline
- Onroad diesel
- Nonroad SI Bond Rule
- Other Nonroad (includes CNG and gasoline)
- Nonroad Diesel
- Diesel Pleasure Craft
- Locomotive
- Commercial Marine Vessel Diesel
- Commercial Marine Vessel Residual Fuel
- Aircraft (model as point source)

② NATA - Ambient Concentrations Model

- Point Sources
  - HEM3 (AERMOD)
    - 60,000 facilities modeled nationwide
      - 131,000 sources (point/area)
      - 291 pollutants
    - Ambient impacts at census block resolution
      - 8.2 million census blocks
    - Model Options:
      - Annual Average
      - Air toxic option
      - Terrain Elevation
      - 200 meteorology stations (single year) processed with AERMET
      - Surface features representative of airport location

② NATA - Ambient Concentrations Model

- Mobile/Nonpoint Source
  - EMSHAP / ASPEN Model
    - Utilizes ISCLT2
    - Simple treatment of secondary formation of HAPs
      - first-order reactive decay
    - STAR meteorological data set
    - Census tract receptors
      - 66,000 census tracts nationwide
    - 27 area source bins
    - 9 mobile source bins

③ NATA - Ambient Monitoring Data

- Background concentrations added to model results
  - Representative of long range transport
  - Non-inventoried sources (including natural)
  - Determined for 33 HAPs (spatial variability for 29 HAPs)
- Background approach
  - Determined “clean” wind sectors using ambient network for pollutants with multiple monitors and above monitoring thresholds (14 HAPs)
  - For pollutant with little monitoring data utilized the NEI and an Inverse distance relationship weighting technique (15 HAPs)
  - Based on literature search of long term monitoring networks (4 HAPs)
- Model-to-monitor comparison
  - Compared tract concentrations to ambient monitor
  - Most gaseous compounds with a factor of 2
  - TSP metals under predicted
  - PM2.5 metals mainly with a factor of 2

Master Pollutant Background List

1996, 1999, 2002	1999, 2002	2002
benzene	1,3-butadiene	lead
tetrachloroethylene	acetaldehyde	manganese
dichloromethane	1,1,2,2-tetrachloroethane	chromium (PM2.5)
formaldehyde	1,2-dichloropropane	arsenic
chloroform	vinyl chloride	toluene
carbon tetrachloride		acrolein
1,2-dichloroethane		ethylene oxide
hexachlorobutadiene		naphthalene
trichloroethylene		benzidine
1,2-dibromoethane		1,2-dibromo-3-chloropropane
bis(2-ethylhexyl) phthalate		1,3-dichloropropene
bromoform		benzyl chloride
hexachloroethane		beryllium
chlordane		cadmium
carbon disulfide		acrylonitrile
methyl bromide		1,1,2-trichloethane
methyl chloride		
methyl chloroform		
phosgene		
xylenes		
mercury		
polychlorinated biphenyls		
lindane		
diesel PM		

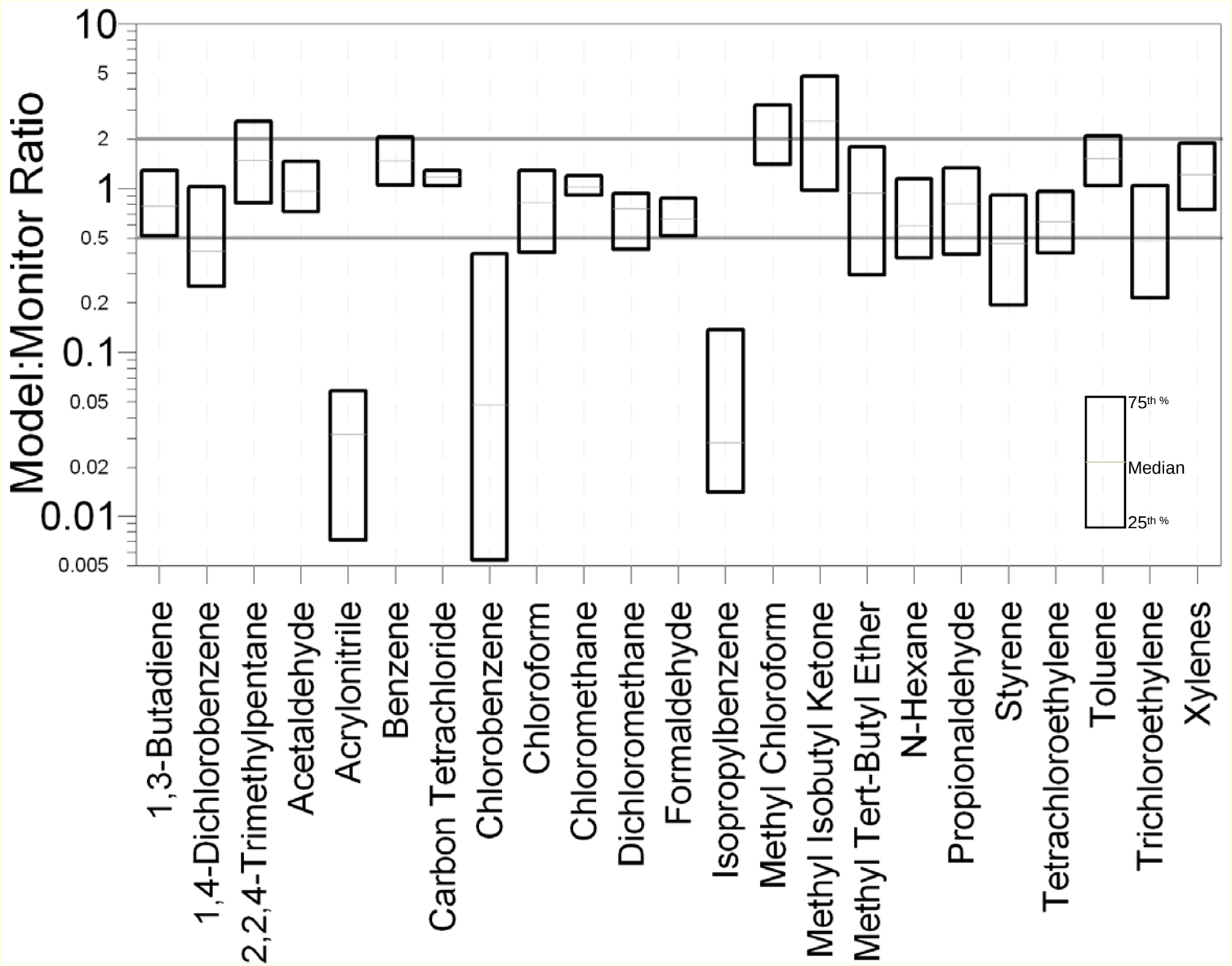
Black = spatially varying estimates available in 2002 (and possibly 1999)

Blue = spatially varying estimates in 1999, not spatially variable in 2002

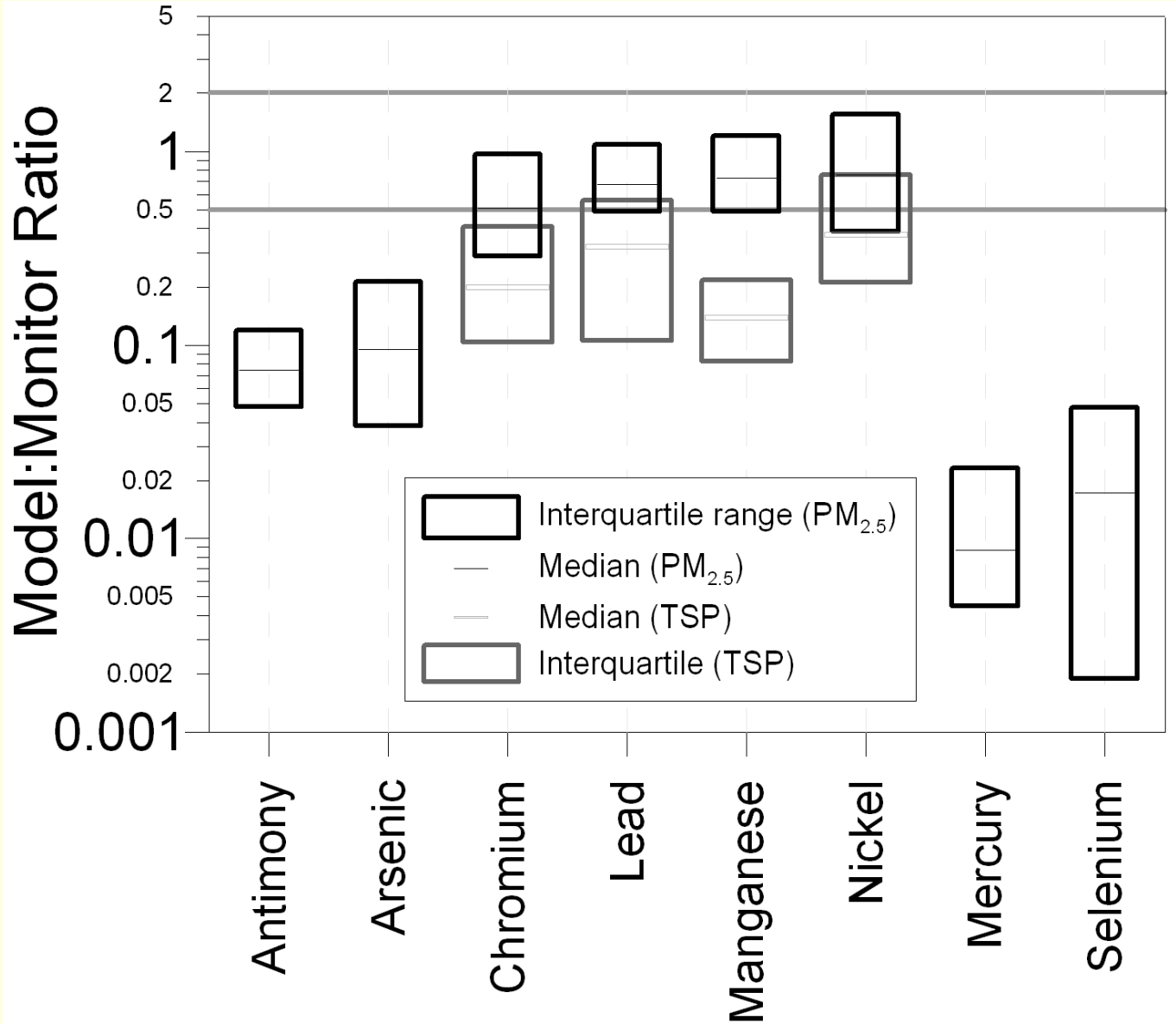
Green = No spatial variability estimates provided (lower and upper limits for some of 2002)

Red = calculated from NEI

2002 NATA Model-to-Monitor Comparison



2002 NATA Model-to-Monitor Comparison



④ NATA - Exposure Model

- Exposure component to account for human activity data
  - People spend 90% of their time indoors not at a census tract/block centroid !
  - Accounts for work/school/commuting…
- Utilizing “Exposure Ratios” developed from 1999 NATA HAPEM runs
  - Apply pollutant specific exposure ratios to ambient predictions at census tract and pollutant level
  - Allows us to retain individual facility and category contributions and yet apply human activity to ambient concentrations

⑤ NATA- Risk Characterization

- Risk summaries in both tabular formats at census tract level
  - 2002 Website will NOT have any maps
  - Work with GIS folks to export to KML format for use in Google Earth
  - Working with ORD to use 2002 NATA in a “map” like format and link with emissions data (NATA Explorer)
- Risk results at census block and detailed source sectors (area/mobile) will not be made available to public, available to S/LT on request
- Utilizes most current health data available for 133 HAPs from OAQPS website (06/12/07)

When will the data be Released?

- Point source modeling – Complete
- Area/Mobile source modeling – Complete
- Exposure and Risk Characterization – Complete
- S/L/T and Regional Preview –
  - Informal preview started in May 2008
  - Formal Preview later in October 2008
- Public Release – Early 2009
- Additional Features (point contribution, census blocks, source sectors..)
  - Will not initially be available to public
  - Will be provided to SLT as requested

2002 NATA Results

- National Scale

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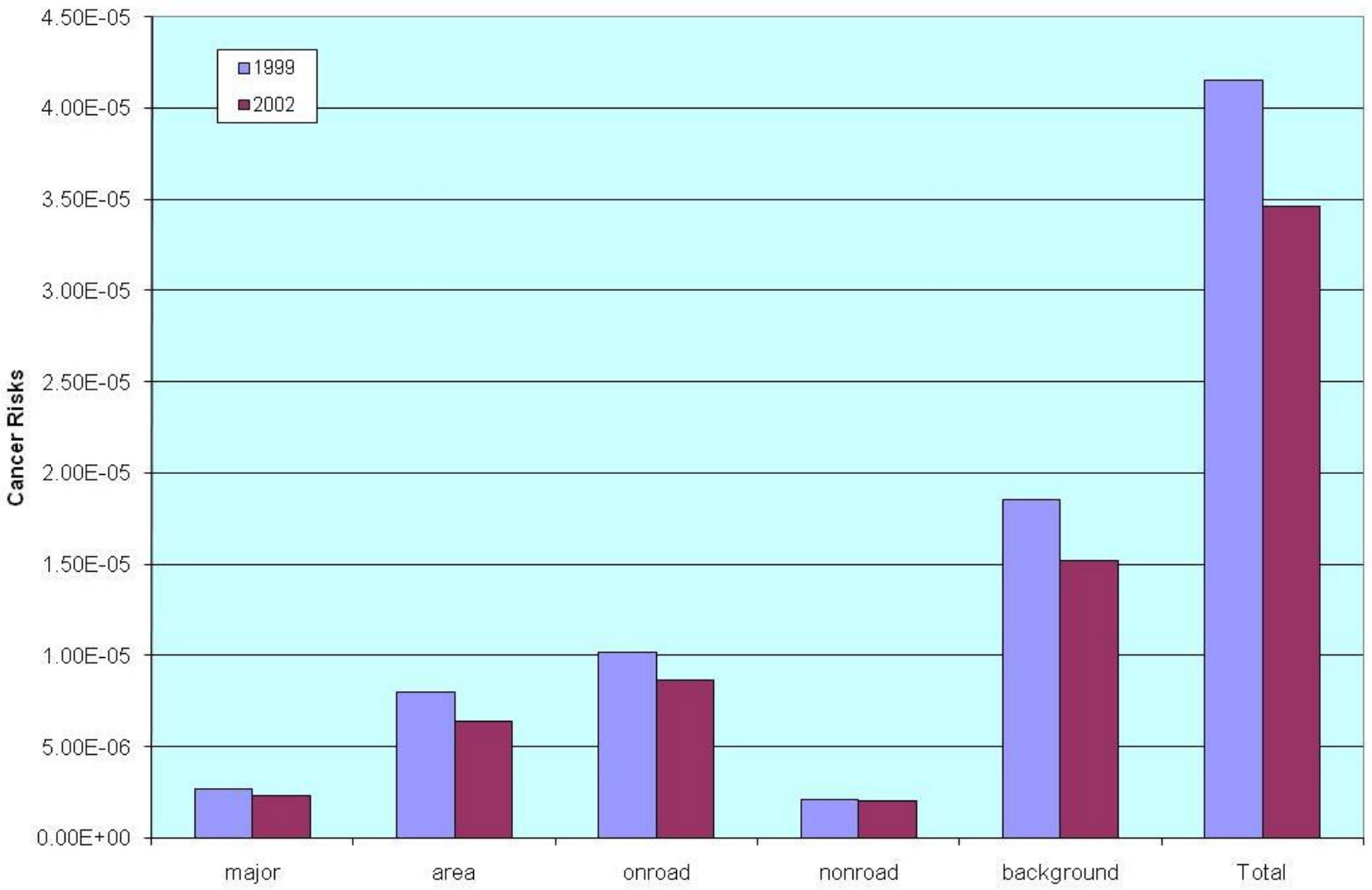
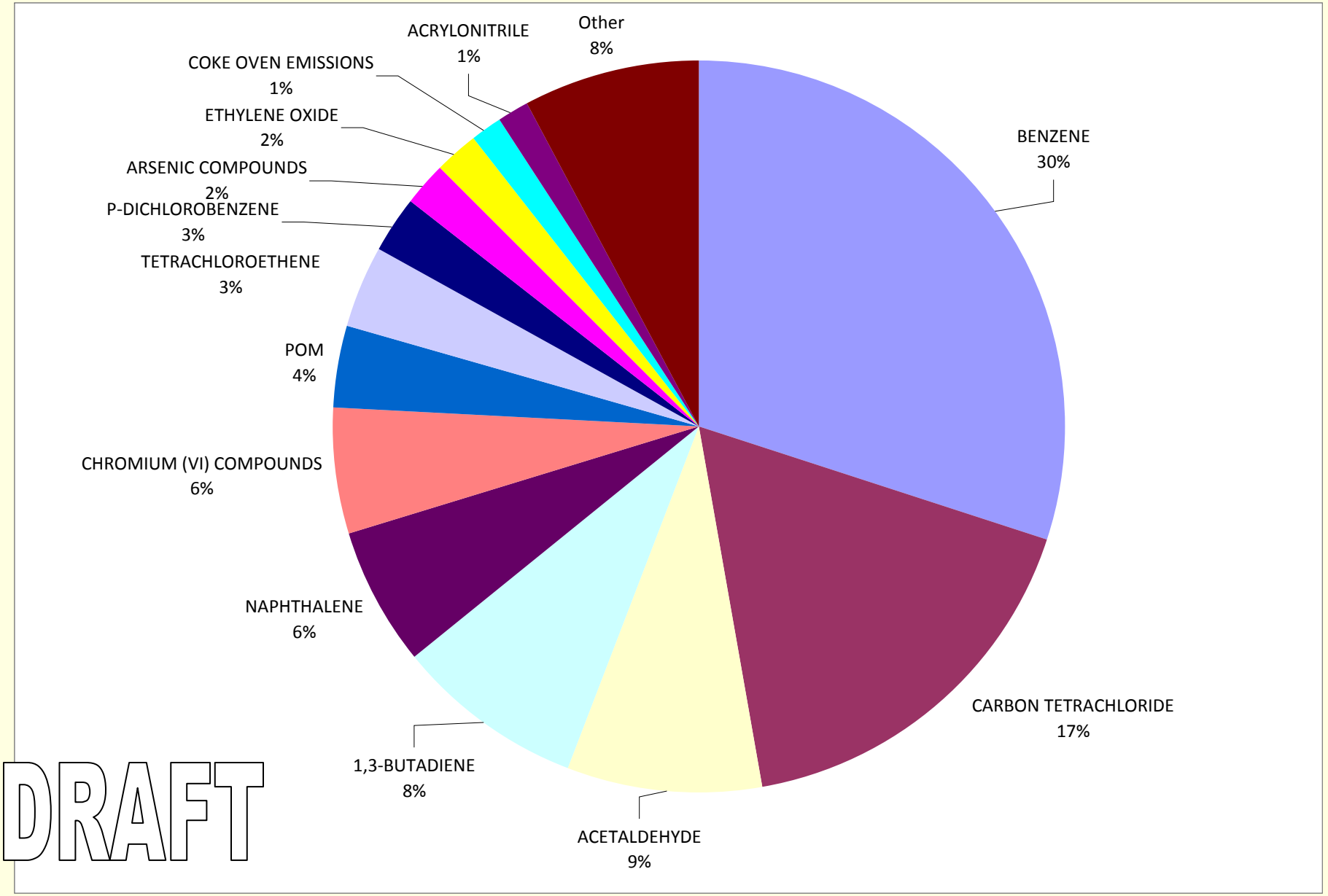

1999-2002 NATA Comparison
Cancer Risks
4.50E-05
4.00E-05
3.50E-05
3.00E-05
2.50E-05
2.00E-05
1.50E-05
1.00E-05
5.00E-06
0.00E+00
1999
2002
major
area
onroad
nonroad
background
Total

2002 NATA Pollutant Drivers



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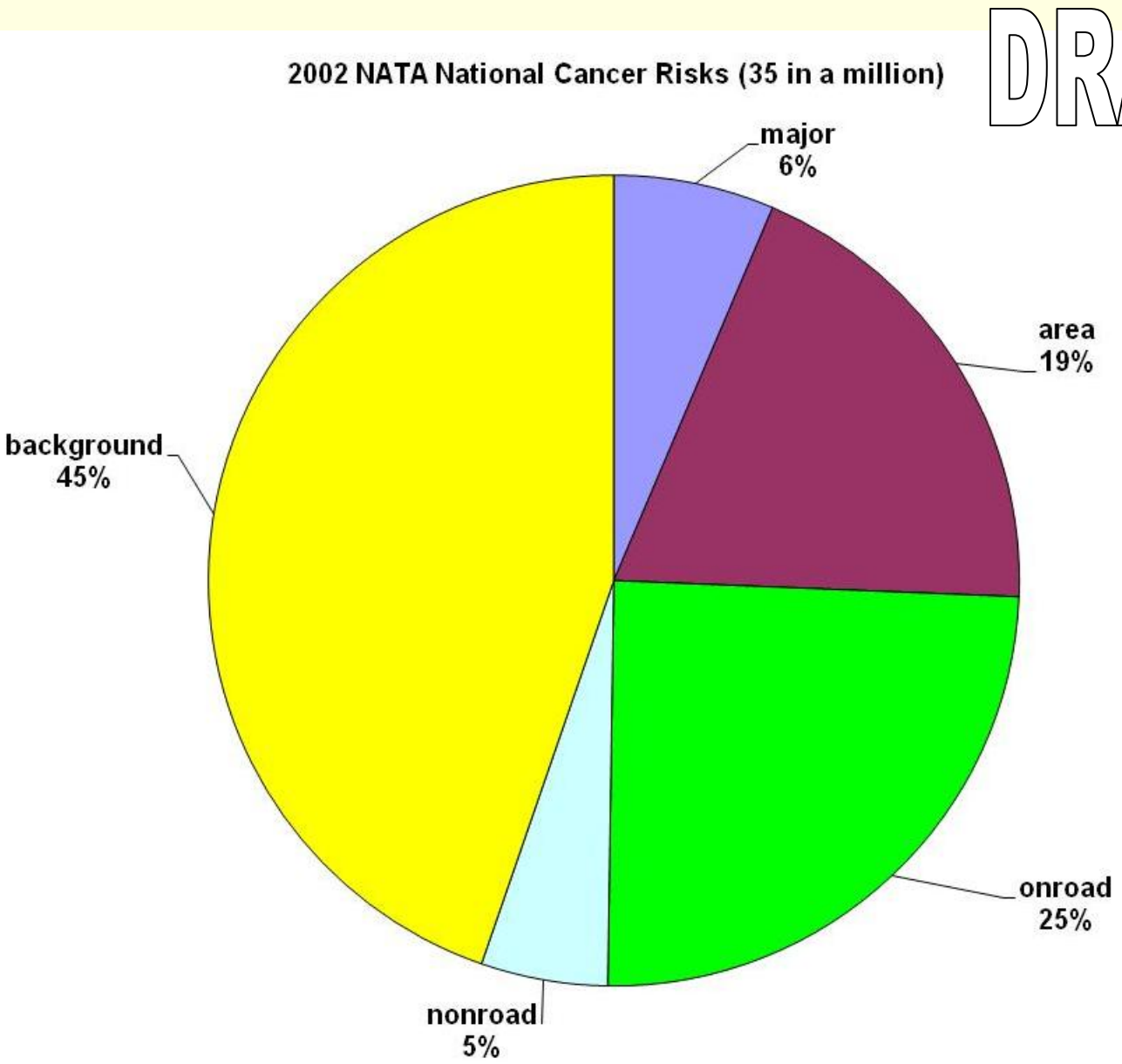
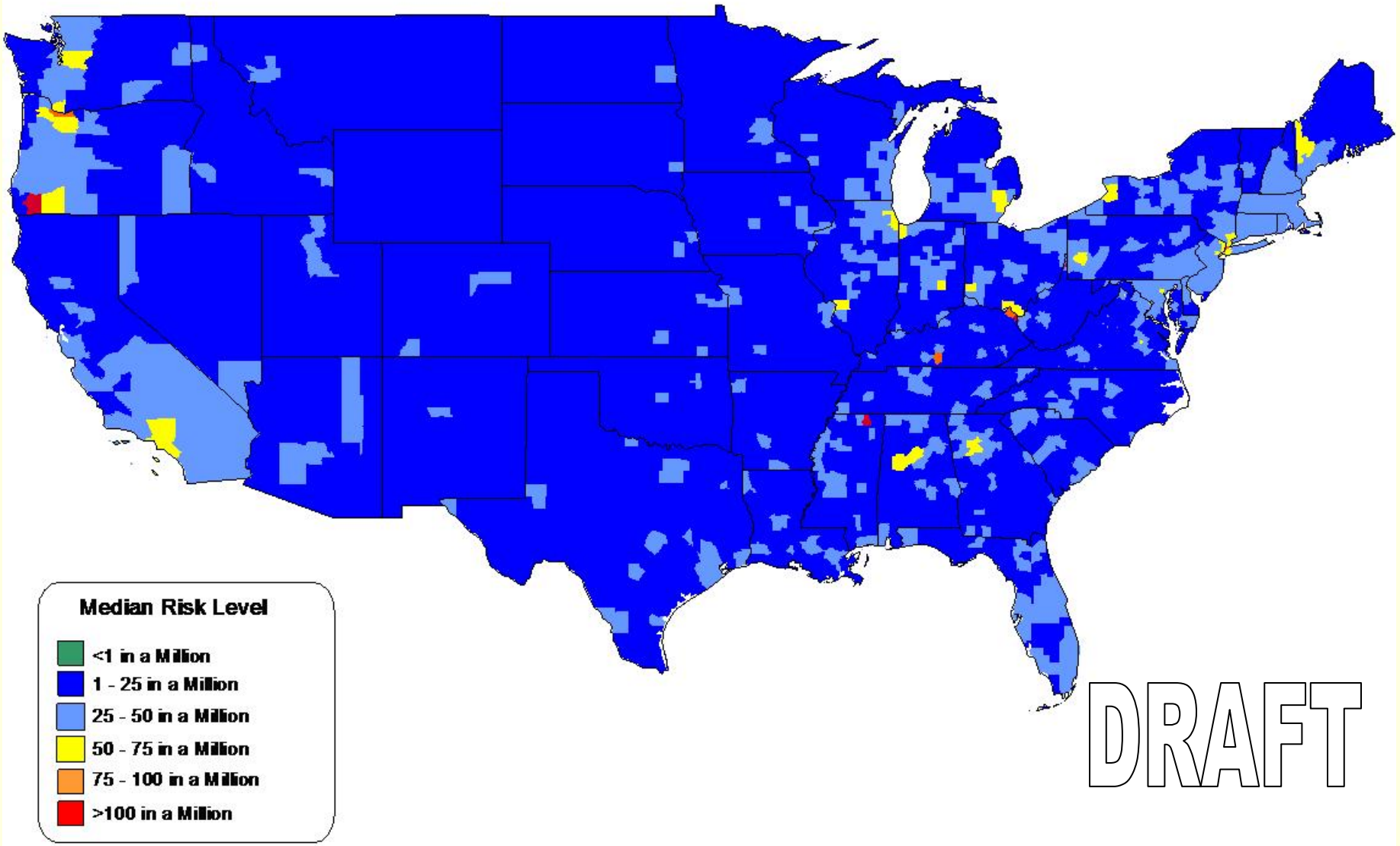
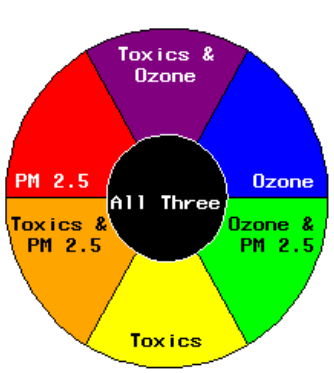

2002 NATA National Cancer Risks (35 in a million)
major
6%
area
19%
onroad
25%
nonroad
5%
background
45%

2002 NATA - National Scale Assessment
Predicted County Level Carcinogenic Risk



HAPs and Criteria Pollutant Impact Locations



Counties with ozone and/or PM2.5 concentrations above the NAAQS for 2003-2005 and counties in top 25% of modeled risk estimates from NATA 2002 data.

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