NATIONAL-SCALE AIR TOXICS ASSESSMENT FOR 1999

On February 22, 2006, the Environmental Protection Agency (EPA) made available an updated assessment of the nationwide health risk estimates for air toxics. The assessment is a state-of-the-science national-scale screening tool to help regulatory agencies and communities as they assess their air toxic priorities. Toxic air pollutants, or air toxics, are those pollutants known or suspected of causing cancer or other serious health problems, such as birth defects. This latest assessment covers 177 of the Clean Air Act's list of 187 air toxics, plus diesel particulate matter (diesel PM). For 133 of these air toxics (those with health data based on chronic exposure) the assessment includes estimates of cancer and/or non-cancer health effects, including non-cancer health effects for diesel PM. This updated assessment also includes heavy metals, such as lead; volatile chemicals, such as benzene; combustion byproducts, such as acrolein; and solvents, including perchloroethylene and methylene chloride. [Five important air pollutants are not included in the list of air toxics because the Clean Air Act addresses them separately as "criteria pollutants:" particulate matter (PM), nitrogen oxides (NOx), sulfur oxides (SOx), ozone, and carbon monoxide (lead is both a criteria pollutant and an air toxic).]

The assessment expands on EPA's first national-scale assessment (for calendar year 1996, published in 2002) by:

- using a more complete emissions inventory (1999 vs. 1996) including almost double the number of emission sources,
- incorporating risk assessments for all the air toxics with health data based on chronic exposure (133 vs. 32), and
- using the latest information on health effects.

EPA developed the national-scale assessment primarily as a tool for state, local and tribal agencies and others to prioritize pollutants, emissions sources, and locations of interest for further investigation. For example, community-based assessments have relied on the previous national-scale assessment to prioritize data and research needs to better assess local risk from outdoor emissions of air toxics. EPA collaborated with state, local, and tribal agencies to develop the information that is contained in the assessment.

EPA also uses the results of these assessments to set priorities for improving emissions inventories and to help direct priorities in expanding EPA's air toxics monitoring network. All of this will enable air toxics programs at the national, state, and local level to more effectively target risk reduction activities.

The National-Scale Assessment comprises four steps, all of which focus on 1999 air toxics data:

- National inventory of air toxics emissions from sources in the U.S. plus Puerto Rico and the Virgin Islands. The types of emissions sources in the inventory include large sources, such as waste incinerators and factories, and smaller sources, such as dry cleaners, small manufacturers, and wildfires. Also included in the inventory are emissions from highway and non-road mobile sources, such as cars, trucks, and boats.
- Estimates of average concentrations of toxics in the outdoor air. These estimates are developed using a computer model that analyzes a number of factors, including total

emissions, the number of emissions sources in a particular area, weather patterns, and pollution source characteristics.

- Estimates of population exposures based on estimated outdoor concentrations and on a model that looks at the amount of an air toxic a person is likely to inhale in a year's time. The average concentration of a pollutant that people breathe is known as an exposure concentration. Estimating exposure, assuming 1999 levels over the course of a lifetime, is a key step in determining potential health risk.
- Characterization of potential public health risks including both cancer and other adverse health effects, using available information on air toxics health effects, current EPA risk assessment and risk characterization guidelines, and estimated population exposures to outdoor sources of air toxics.

In general, the results show the following:

From a national perspective, benzene is the most significant air toxic for which cancer risk could be estimated, contributing 25 percent of the average individual cancer risk identified in this assessment. Based on EPA's national emissions inventory, the key sources for benzene are onroad (49%) and nonroad mobile sources (19%), and open burning, prescribed fires, and wildfires (14%). Residential heating from wood combustion accounts for approximately 6% of the total benzene emissions. EPA projects that onroad and nonroad mobile source benzene emissions will decrease by about 60% between 1999 and 2020 as a result of motor vehicle standards, fuel controls, standards for nonroad engines and equipment, and motor vehicle inspection and maintenance programs. Most of these programs reduce benzene simultaneously with other volatile organic compounds.

Although EPA greatly expanded the number of air toxics assessed since the 1996 assessment (an additional 145 air toxics), the 1999 assessment confirmed the 32 air toxics it focused on in the 1996 assessment (what EPA calls "urban air toxics") as primary risk drivers. These are the same pollutants for which, based partly on the 1996 assessment results, EPA is focusing its air toxics monitoring network development. These are also the same pollutants on which EPA bases selection and prioritization of area sources of air toxics to regulate.

In this assessment, the potential cancer risk from diesel exhaust emissions is not addressed in the same fashion as other pollutants. This is because data are not sufficient to develop a quantitative estimate of carcinogenic potency for this pollutant [District's Note: The California OEHHA has developed a risk number for diesel particulate: Inhalation Unit Risk 3.0E-04]. However, EPA has concluded that diesel exhaust is among the substances that the national-scale assessment suggests pose the greatest relative risk. First, several human epidemiology studies link increased lung cancer associated with diesel exhaust. Furthermore, exposures in several of these epidemiology studies are in the same range as ambient exposures throughout the United States.

In addition to the potential for lung cancer risk, there is a significant potential for diesel exhaust to pose noncancer health effects as well, based on the contribution of diesel particulate matter to ambient levels of fine particles. Exposure to fine particles has been linked to significant public health impacts, including respiratory and cardiovascular effects, as well as premature mortality. These effects are not specifically presented in the national-scale assessment analysis but are considered in setting and implementing EPA's National Ambient Air Quality Standards for PM-2.5. In addition, the national-scale assessment results show population exposures above the level EPA has designated for noncancer respiratory hazard (called a "reference

concentration" which is based on specific noncancer effects found in several animal studies, which showed adverse changes in lungs such as inflammation and lesions).

In 2002, EPA released the results of its first National-Scale Air Toxics Assessment of 33 air pollutants (a subset of 32 air toxics on the Clean Air Act's list of 187 air toxics plus diesel particulate matter (diesel PM)). That assessment included estimates of 1996 emissions, ambient concentrations, exposure concentration and risk. The new National-Scale Air Toxics Assessment is based on more recent data (1999), relies on an improved emissions inventory, and includes 177 air toxics plus diesel PM (note: the assessment does not estimate cancer risks for diesel PM, only exposures and noncancer risks). The 1999 national-scale assessment is based on 1999 emissions data because emissions inventories from that year are the most complete and available to date. However, the 1999 data do not reflect pollution reductions that have taken effect since 1999, including those from federal, state, and local regulations or from industry initiatives or facility closures.

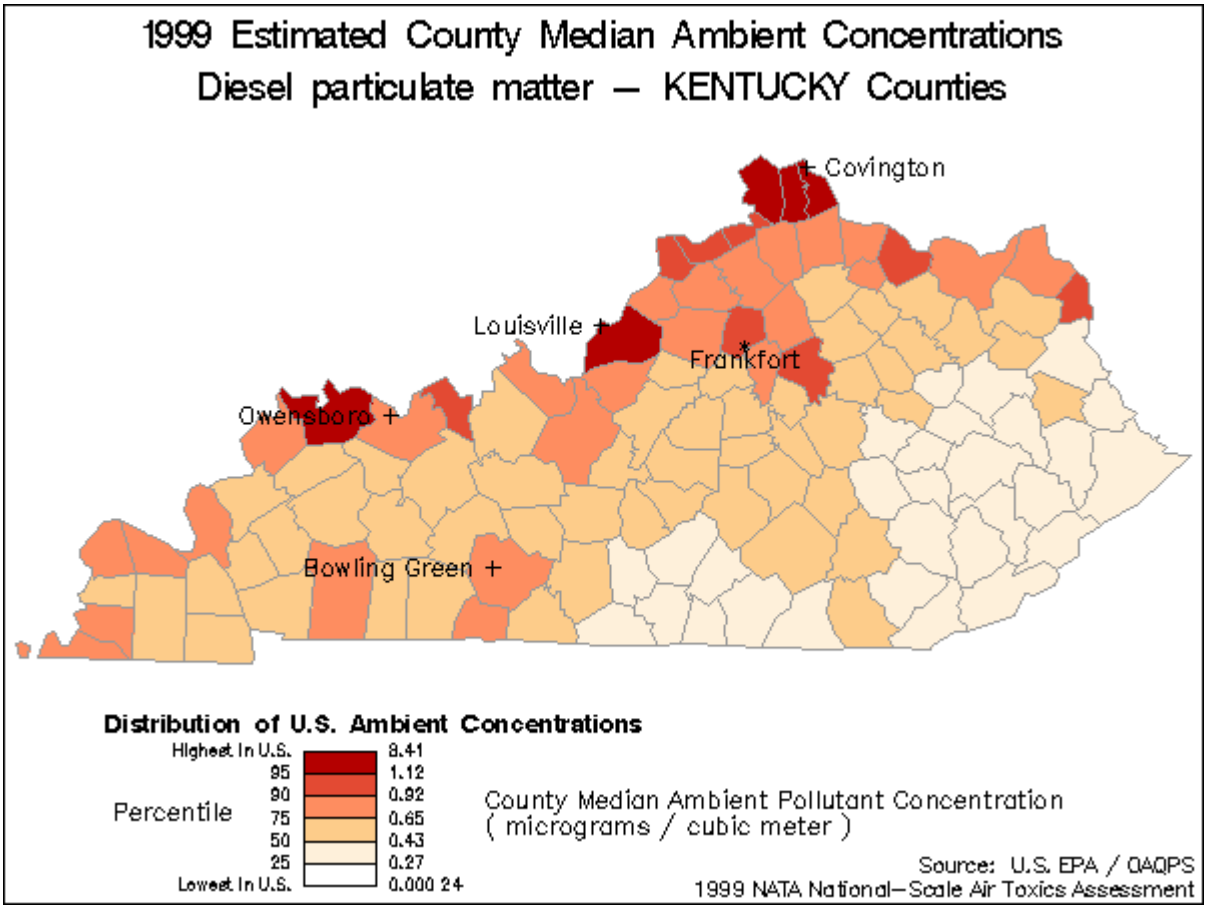
In addition, many motor vehicle and fuel emission control programs of the past have reduced air toxics and will continue to provide significant emission reductions in the future. EPA estimates that existing programs will result in over an 80 percent reduction in emissions of gaseous air toxics from highway mobile sources between 1990 and 2030 despite large increases in vehicle miles traveled. By 2020, EPA expects to see on-highway diesel PM emission reductions of 94 percent from 1990 levels. EPA's most recent program to reduce air toxics emissions is the Clean Air Nonroad Diesel Rule. As a result of this rule and other nonroad standards, nonroad diesel PM emissions in 2020 will be reduced by over 85% from year 2000 levels. EPA estimates that gaseous air toxics emissions from nonroad equipment will be reduced over 50% between 1990 and 2030, despite significant increases in activity. EPA is also assisting states, communities and citizens in identifying and implementing voluntary programs, such as diesel retrofits and Clean School Bus USA to achieve additional reductions.

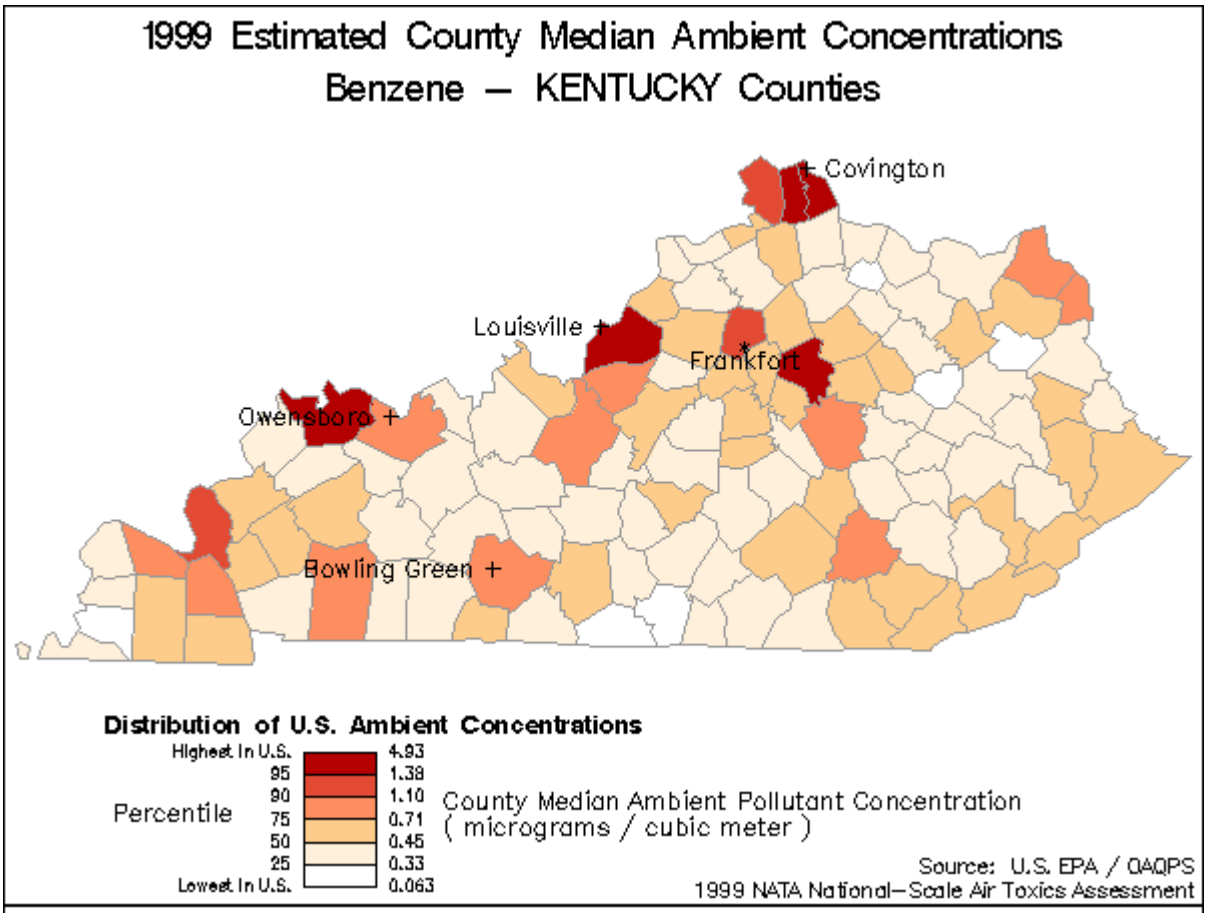
The 2006 assessment provides a snapshot of air quality and the risks that would result if 1999 emissions levels remained unchanged. It does not reflect reductions in air toxics that have occurred since 1999 or those anticipated to occur in the future. The risks estimated in the assessment are associated with breathing the pollutants -- it does not address other methods of exposure such as eating or drinking. For the majority of air toxics, most exposure comes from breathing. For some air toxics, a separate assessment of other exposures is important. For example, the majority of the risk associated with PCBs emissions into the atmosphere come from ingestion rather than breathing contaminated air. Those kinds of risks are not reflected in the national-scale assessment.

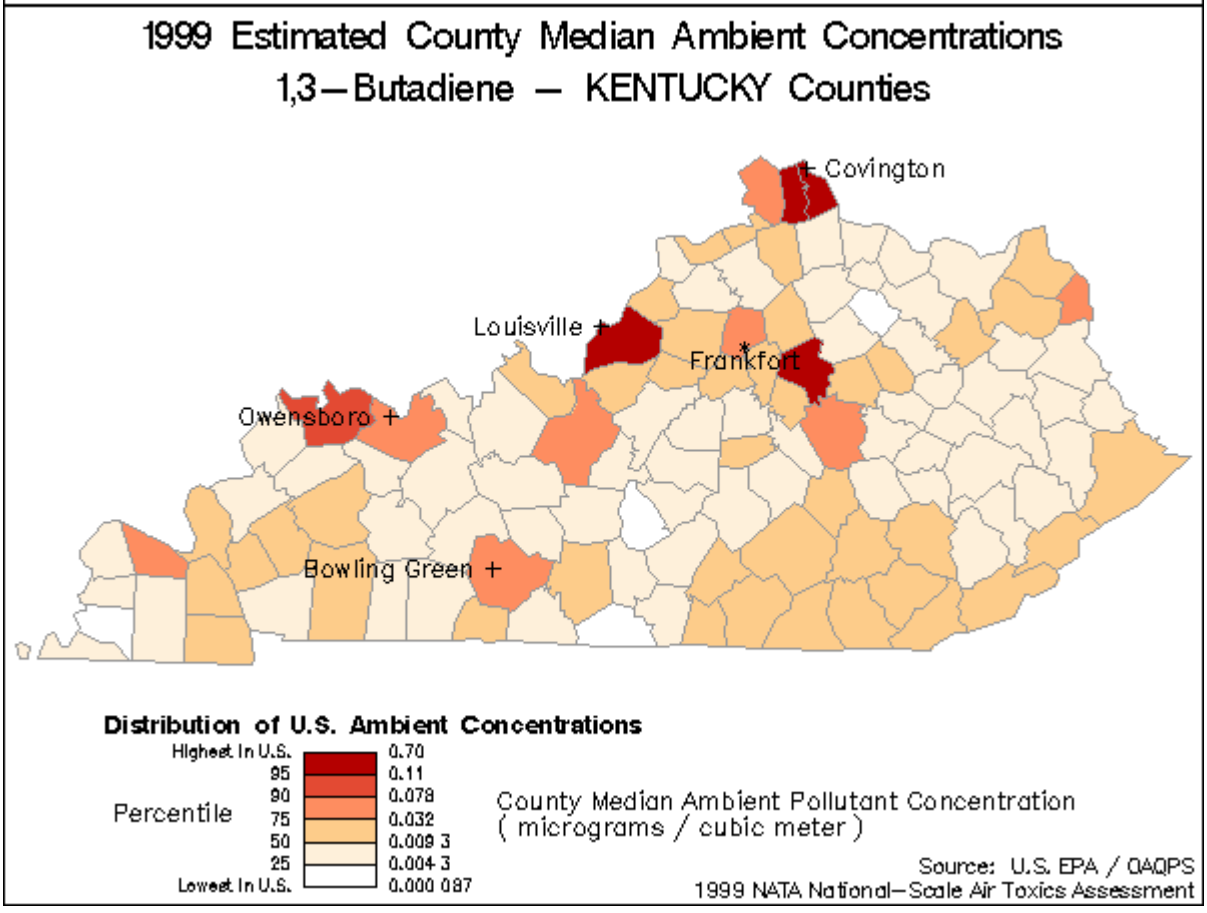
Because of improvements in EPA's methodology, it is not meaningful to compare the 1999 and 1996 national-scale assessments. Any change in emissions, ambient concentrations, or risks may be due to either improvement in methodology or to real changes.

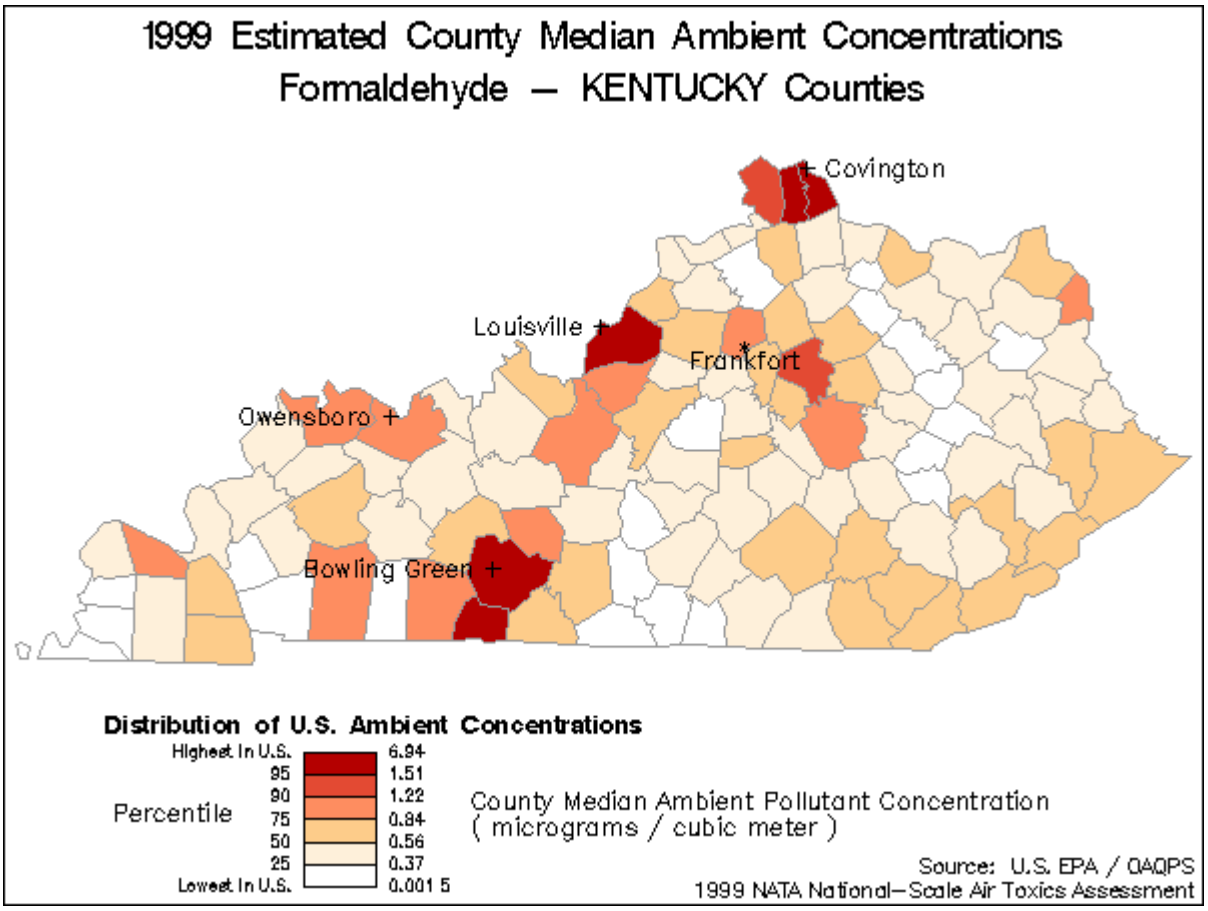
EPA plans to develop new national-scale assessments as inventory data from subsequent years become available. The next such analysis will focus on 2002 emissions inventory data which EPA is in the process of compiling. It expects to release the 2002 national-scale assessment by the end of 2006.

Compiled from EPA, http://www.epa.gov/ttn/atw/nata1999/;
http://www.epa.gov/ttn/atw/nata1999/natafinalfact.html


1999 Estimated County Median Ambient Concentrations
Diesel particulate matter – KENTUCKY Counties
Covington
Louisville
Frankfort
Owensboro
Bowling Green
Distribution of U.S. Ambient Concentrations
Higheet In U.S.
95
90
75
50
25
Lowest In U.S.
Percentile
8.41
1.12
0.92
0.65
0.43
0.27
0.000 24
County Median Ambient Pollutant Concentration
(micrograms / cubic meter)
Source: U.S. EPA / OAQPS
1999 NATA National–Scale Air Toxics Assessment


1999 Estimated County Median Ambient Concentrations
Benzene — KENTUCKY Counties
Covington
Louisville
Frankfort
Owensboro
Bowling Green
Distribution of U.S. Ambient Concentrations
Highest In U.S.
95
90
75
50
25
Lowest In U.S.
Percentile
4.93
1.38
1.10
0.71
0.45
0.33
0.063
County Median Ambient Pollutant Concentration
(micrograms / cubic meter)
Source: U.S. EPA / OAQPS
1999 NATA National-Scale Air Toxics Assessment


1999 Estimated County Median Ambient Concentrations
1,3-Butadiene — KENTUCKY Counties
Covington
Louisville
Frankfort
Owensboro
Bowling Green
Distribution of U.S. Ambient Concentrations
Highest In U.S.
95
90
75
50
25
Lowest In U.S.
Percentile
0.70
0.11
0.078
0.032
0.009 3
0.004 3
0.000 087
County Median Ambient Pollutant Concentration
(micrograms / cubic meter)
Source: U.S. EPA / OAQPS
1999 NATA National-Scale Air Toxics Assessment


1999 Estimated County Median Ambient Concentrations
Formaldehyde — KENTUCKY Counties
Covington
Louisville
Frankfort
Owensboro
Bowling Green
Distribution of U.S. Ambient Concentrations
Highest In U.S.
95
90
75
50
25
Lowest In U.S.
Percentile
6.94
1.51
1.22
0.84
0.56
0.37
0.001 5
County Median Ambient Pollutant Concentration
(micrograms / cubic meter)
Source: U.S. EPA / OAQPS
1999 NATA National-Scale Air Toxics Assessment