May 31, 2002

NATIONAL-SCALE AIR TOXICS ASSESSMENT FOR 1996: ESTIMATED EMISSIONS, CONCENTRATIONS AND RISK

TECHNICAL FACT SHEET

TODAY'S ACTION

- The Environmental Protection Agency (EPA) today made available its technical modeling analysis of the health risk estimates for 33 toxic air pollutants nationwide. Toxic air pollutants, or air toxics, are those pollutants known or suspected of causing cancer or other serious health problems, such as birth defects.

- The analysis represents the final phase of EPA's National-Scale Air Toxics Assessment for 1996. It presents nationwide estimates of exposure and risks to health associated with 32 urban air toxics plus a qualitative assessment for diesel particulate matter.

- These estimated risks are associated only with breathing the pollutants, not from other methods of exposure. For example, the greatest risks associated with mercury emissions come from eating contaminated fish. Those kinds of risks are not reflected in this national-scale assessment.

- In this assessment, EPA analyzed heavy metals, such as mercury and lead; volatile chemicals, such as benzene; combustion byproducts, such as acrolein; and solvents, including carbon tetrachloride and methylene chloride. (See the end of this fact sheet for a complete list.)

- In the first phase of the assessment, released in August 2000, EPA estimated emissions from industries and other facilities in 1996 and estimated concentrations in the outdoor air. Note that the assessment made available today contains some revised emission estimates and 1996 estimated concentrations based on input from scientific peer review.

- The national-scale assessment is intended to provide State, local and Tribal agencies and others with a better understanding of the risks from inhalation exposure to toxic air pollutants from outdoor sources. It will help EPA and States prioritize data and research needs to better assess risk in the future, and will provide a baseline to help measure future trends. EPA collaborated with State, local and Tribal agencies to develop the information that is contained in the assessment.

- This assessment represents an important step towards characterizing air toxics nationwide, however it is important to note that it is <u>not</u> designed to characterize or compare risks at local levels. The results of the national-scale assessment are most meaningful when viewed at the state or national level; for smaller geographic areas, the assessment becomes less certain. For analysis of air toxics in these smaller areas, EPA, state, local and Tribal agencies rely on other tools such as monitoring and local-scale assessments to evaluate potential hot spots using more refined and localized data.

- This assessment has been subjected to a detailed scientific peer review. EPA has incorporated into this assessment comments received during this review

- Given its broad scope, this assessment is subject to a number of limitations and uncertainties. Generally, the limitations and uncertainties relate to assumptions that simplify our national air models, and assumptions needed to cover gaps in the large database used as model input. In addition, the assessment does not reflect significant reductions in air toxics that have occurred since 1996 or those anticipated to occur in the future.

- EPA plans to develop new national-scale assessments as inventory data from subsequent years become available to help measure the nation's progress in reducing public health risk from air toxics. The next such analysis will focus on 1999 data and will be released by the end of 2003.

ABOUT THE AIR TOXICS ASSESSMENT

- The National-Scale Assessment comprises four steps, all of which focus on 1996 air toxics data:

1. **National inventory of air toxics emissions** from sources in the contiguous 48 states, 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. (Note: This step was completed and released to the public in 2000, and has been revised based on comments received during the scientific peer review.)

2. **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. (Note: This step was completed and released to the public in 2000, and has been revised based on comments received during the scientific peer review.)

3. **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 is a key step in determining potential health risk.

4. **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.

ABOUT THE RESULTS

! This nationwide risk characterization considers the risk of cancer and other serious health effects from breathing these air toxics, in both urban and rural areas. This information will help EPA identify pollutants and industrial source categories of greatest potential concern, and to set priorities for the collection of additional information to improve future assessments. This national-scale assessment is not designed to be used as the basis for regulatory action.

! EPA risk assessments, including this one, combine an exposure estimate (How much do people inhale?) and a dose-response estimate (At what exposure do health effects occur?) The exposure estimates in this assessment are "best" estimates, without protective assumptions (e.g., exposure model used average behavior patterns rather than high-exposure behaviors)--although the assessment does tend to underestimate the concentrations of pollutants in the air. For some hazardous air pollutants, the dose-response estimates are "conservative." This means that EPA has included a built-in margin of safety in considering at what exposure (dose) the health effect (response) occurs. For these pollutants, our estimates of risk from cancer are considered "upper bound." For a few important hazardous air pollutants (such as benzene), the cancer risk estimates are based on the statistical best fit to human data, and are therefore somewhat less conservative than estimates based on statistical upper confidence limits developed from animal data. Because the EPA estimated exposures to typical individuals in each census tract, the risk estimates can be best interpreted as upper estimates of risk to typical individuals (if we assume that exposures are not underestimated). Therefore, most individuals are likely to have actual risks that are either equal to or less than the risks estimated by this study, but some individuals may have actual risks that are greater

! In general, the results show the following:

< Estimated inhalation exposures to 24 of the 32 pollutants represent either noteworthy carcinogenic risk or the potential for chronic noncancer health effects when viewed on a national scale or across broad regions of the country. These 24 are highlighted with an asterisk on the list of pollutants at the end of this fact sheet. Note that, due to the limitations and uncertainty is the assessment, the other 8 pollutants may still pose risks not captured in this assessment (e.g., more localized problems, or risk from other ways of exposure, like eating fish).

< Three air toxics (chromium, benzene, and formaldehyde) appear to pose the greatest nationwide carcinogenic risk. One air toxic, acrolein, is estimated to pose the highest potential on a nationwide basis for significant chronic noncancer effects.

< In addition, four air toxics (arsenic, 1,3-butadiene, coke oven emissions, and polycyclic organic matter) appear to pose carcinogenic health threats in some regions. Five air toxics (acetaldehyde,

arsenic, 1,3-butadiene, formaldehyde, and manganese) have a potential to pose significant chronic noncancer effects in some regions.

- In this assessment, the potential risk from diesel exhaust emissions is not addressed in the same fashion as other pollutants. This is because existing health data are not sufficient to develop a numerical estimate of cancer potency for this pollutant. However, exposure to diesel exhaust is widespread and EPA has concluded that diesel exhaust is a likely human carcinogen and ranks with the other substances that the national-scale assessment suggests pose the greatest relative risk.

HOW WILL EPA USE THE RESULTS?

- To determine where additional air quality monitoring may be appropriate and which pollutants should be monitored.

- To better assess the relative contributions to air toxics concentrations and risks of different types of emissions sources, such as mobile sources (e.g., cars, trucks, boats), major industrial sources (e.g., large waste incinerators and factories), and smaller sources (e.g., dry cleaners, and small manufacturers).

- To set priorities for collecting additional air toxics data and research to improve estimates of air toxics concentrations and their potential public health impacts.

BACKGROUND

- In 1998, EPA released the findings of its Cumulative Exposure Project, which estimated 1990 outdoor levels of 148 air toxics nationwide. The assessment released today uses the same computer model as that project, but takes a more detailed look at 33 of the pollutants of greatest concern in urban areas. The national-scale assessment is based on more recent data (1996), relies on an improved emissions inventory and includes a step that the Cumulative Exposure Project did not -- estimating national risk through computer modeling of inhalation exposure based on the concentrations of pollutants people breathe.

- The national-scale assessment is based on 1996 emissions data. EPA used 1996 data because emissions inventories from that year are the most complete and available to date. However, the 1996 data do not reflect pollution reductions that have taken effect since 1996, including those from federal, state and local regulations or from industry initiatives or facility closures.

- The Clean Air Act requires EPA to regulate emissions of 188 toxic air pollutants. As of April 2002, EPA has issued 53 standards for 89 different types of major industrial sources of air toxics, such as chemical plants, oil refineries, aerospace manufacturers and steel mills. The agency also has issued regulations for eight categories of smaller sources of air toxics, such as dry cleaners, commercial

sterilizers, secondary lead smelters and chromium electroplating facilities. The requirements in many of these regulations took effect between 1996 and 2002.

- Together, these standards are projected to reduce annual emissions of air toxics by over 1.5 million tons from 1990 levels when fully implemented.

- In addition, EPA has issued a suite of motor vehicle and fuels regulations, including tailpipe emission standards for cars, SUVs, mini-vans, pickup trucks and heavy trucks and buses; standards for cleaner-burning gasoline; a national low-emission vehicle program; and standards for low-sulfur gasoline and diesel fuel. By the year 2020, these requirements are expected to reduce emissions of a number of air toxics (benzene, formaldehyde, acetaldehyde and 1,3-butadiene) from highway motor vehicles by about 75 percent and diesel particulate matter by over 90% from 1990 levels. In addition, the Agency is developing a regulation to control emissions from diesel-powered nonroad engines. Finally, EPA is assisting states, communities and citizens in identifying and implementing voluntary programs, such as diesel retrofits, to achieve additional reductions.

- Although the national-scale assessment looks only at outdoor sources of air toxics, EPA also is concerned about the risks to the public from air toxics indoors. Indoor air toxics come from many sources, including the use of consumer and commercial products, the off-gassing of building materials and furnishings, the use of appliances such as stoves, heaters and fireplaces, and activities such as cooking, cleaning and cigarette smoking. EPA plans to include an indoor emissions component in future national-scale assessments.

- Even though this assessment focuses on exposure to outdoor pollution, it is important to note that EPA has developed programs that have reduced indoor air toxics. And through its "Tools for Schools" program, 9,200 schools have reduced air toxics exposure for 4.8 million children.

TOXICS INCLUDED IN THE ASSESSMENT

1. acetaldehyde *
2. acrolein *
3. acrylonitrile *
4. arsenic compounds *
5. benzene *
6. beryllium compounds *
7. 1, 3-butadiene *
8. cadmium compounds *
9. carbon tetrachloride *
10. chloroform *
11. chromium compounds *
12. coke oven emissions *
13. 1, 3-dichloropropene *
14. diesel particulate matter *
15. ethylene dibromide *
16. ethylene dichloride *
17. ethylene oxide *
18. formaldehyde *
19. hexachlorobenzene
20. hydrazine *
21. lead compounds
22. manganese compounds *
23. mercury compounds
24. methylene chloride

25. nickel compounds
26. perchloroethylene *
27. polychlorinated biphenyls (PCBs)
28. polycyclic organic matter (POM) *
29. propylene dichloride
30. quinoline *
31. 1, 1, 2, 2-tetrachloroethane *
32. trichloroethylene *
33. vinyl chloride

* Noteworthy estimated cancer risk or the potential for chronic adverse health effects other than cancer when viewed at the national scale or across broad regions of the country. This only considers inhalation (breathing the pollutants) from outdoor sources.

FOR MORE INFORMATION

- The National-Scale Air Toxics Assessment website is available at http://www.epa.gov/ttn/atw/nata . Because of its scope, this assessment is subject to a number of limitations, and results should be used cautiously. For details see the "Limitations, Variability and Uncertainty" button on the assessment Website.

- For more information about the National-Scale Air Toxics Assessment, contact the following people at EPA's Office of Air Quality Planning & Standards: Dave Guinnup (guinnup.dave@epa.gov), (919) 541-5368, and Ellen Wildermann (wildermann.ellen@epa.gov), (919) 541-5408).