

AIR & WATER POLLUTION



U.S. DEPARTMENT
OF COMMERCE

National Bureau
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AIR AND WATER POLLUTION MEASUREMENT PROGRAMS AT THE NATIONAL BUREAU OF STANDARDS

Introduction. Measuring the concentration and the chemical and physical properties of pollutants in air and water provides us with a better understanding of the extent and effects of pollution. Without accurate measurement, scientists cannot correctly relate health effects to levels of pollution, engineers cannot correctly assess the effectiveness of control techniques, regulatory agencies cannot correctly relate levels of pollution emissions with ambient air and water quality, and the government cannot correctly make policy decisions concerning compromises among the conflicting demands of environmental protection, energy conservation, and economic health.

Although an element of uncertainty will always be present in understanding our environment, the purpose of the National Bureau of Standards' air and water pollution measurement program is to minimize the uncertainty associated with quantifying the extent and effects of pollution. NBS attempts to provide the basis for determining accuracy and for achieving greater accuracy in pollution measurement by developing improved methods, measurement standards including Standard Reference Materials, and accurate technical information.

The NBS role in environmental measurement is derived from the Bureau's basic statutory responsibility for the accuracy and compatibility of measurements made throughout the Nation. The Clean Air Act of 1970 and the Water Pollution Control Act Amendments of 1972 direct the Administrator of the Environmental Protection Agency to cooperate with and encourage cooperative activities by all Federal departments and agencies having functions relating to the prevention and control of air and water pollution. This is to assure the utilization in the Federal pollution control program of all appropriate and available facilities and resources within the Federal Government. NBS serves as an objective third party at the interface between the regulatory agencies and the regulated industries in the areas of pollution.

At the Bureau, the air and water pollution programs are coordinated by the Office of Air and Water Measurement.

Air. Specific activities in the Air Pollution Measurement Program include:

- Research leading to development of Standard Reference Materials (SRM's) or other means for ensuring the accuracy of air measurement methods in the hands of the user. NBS currently makes available 25 standards for such gaseous pollutants as sulfur dioxide, nitrogen dioxide, nitric oxide, and carbon monoxide. Other available standards include coal and coal fly ash, both certified for lead content, and residual fuel oil certified for sulfur content.
- Development of laboratory methods with improved accuracy sensitivity, and specificity for air pollution measurements. In some instances, these new methods have been adopted by instrument manufacturers for field use. A fluorescence analyzer for sulfur dioxide is one such instrument. A piezoelectric detector for mercury is another which is currently under development.
- Generation, evaluation, compilation, and dissemination of data and technical information needed to relate the substances emitted from sources of pollution to those found in the atmosphere after chemical reactions have occurred. For example, NBS has evaluated, compiled, and published the reaction rates of key

chemical reactions responsible for production of toxic pollutants in the well-known California-type smog and for the upper atmosphere reactions of fluorocarbons which may pose a hazard to the stratospheric ozone layer.

Water. Specific activities in the Water Pollution Measurement Program include:

- Evaluation of the accuracy of methods for measuring water velocity and flow in open and closed channels. In order to assess the rate of discharge of water pollutants into the environment, both the concentration of pollutants and the water flow rate are needed. NBS has published a guidebook on methods for the measurement of water flow which includes sources of error for commonly used measurement methods.
- Development of radioactivity standards and conducting inter-laboratory comparisons of radioactivity measurements.
- Development of Standard Reference Materials for evaluating the accuracy of instruments and methods for measuring the concentration of pollutants in water

and sediments. NBS has issued an SRM of mercury in water at a concentration of one part per billion and is currently working on two new standards—an industrial river sediment certified for its trace element composition and a water solution of sixteen trace elements in the concentration range of two to five hundred parts per billion.

- Measurement, evaluation, and compilation of physical and chemical properties of known pollutants. NBS scientists have identified pathways in which trace elements such as mercury and cadmium can be chemically

altered from their inorganic form to their more biologically active organic form. NBS scientists have also developed methods for accurately measuring and predicting partition coefficients of organic compounds between air and water. These partition coefficients are needed for describing the fate and effects of oil spills in the ocean.

Additional information may be obtained from the Office of Air and Water Measurement, National Bureau of Standards, Washington, DC 20234; telephone (301) 921-3775.



Researcher is shown taking water samples for tin and mercury analysis.

NBS Standards Reference Materials are used to analyze automotive emissions.



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