several years and will soon be issued by a private publisher. This handbook provides baseline reference information to assist researchers and industrial hygienists in selecting the appropriate method for measuring energy-related toxins.

Instrumentation under development will provide simple and passive methods of monitoring worker exposure to hydrogen fluoride, more sensitive measurement of worker and skin contamination and work area surface contamination by PAHs, and a nondestructive method of measuring formaldehyde emissions. These monitoring techniques address the critical health-related measurement needs associated with these toxic chemicals.

History The Industrial Hygiene Measurement Science and Instrumentation Program was initiated to develop new or improved measurement tools and techniques to address a broad range of health protection problems. Since its inception in the late 1940's, the program has focused on concerns associated with chemical toxins related to atomic energy defense activities.

With the creation of ERDA, then DOE, and with broader missions to cover all energy and conservation measures, increased emphasis has been placed on chemicals related to energy development. These include PAHs, which are inherent in synthetic fuel production; hydrogen fluoride, an important chemical in DOE uranium enrichment activities; trace elements, which include respiratory and inhalable toxic metal particulates and vapors; and formaldehyde, a potential carcinogen found in materials used for building energy conservation.

Benefits The major benefit of this measurement science and instrumentation research is improved information aimed at protecting the health of industrial workers and the public. Advanced instruments are used to develop new and improved data to identify health hazards. The use of overly conservative and expensive health protection measures or, conversely, underestimation of the risks of human exposure to chemical pollutants is thereby avoided.

1. *The survey of instrumentation for environmental monitoring.* This handbook was compiled by LBL to assist users in efficiently selecting appropriate instrumentation. It is based on responses by over 4000 users, including state and Federal environmental agencies, analytical laboratories, instrument manufacturers, and technical libraries. Separate volumes have been published on air, water, and radiation monitoring methods, with each volume organized by pollutant. There are three major sections under each pollutant. The first section discusses the reasons for monitoring the properties of the pollutant, information on health and environmental effects, and regulatory standards and requirements. The second section describes, compares, and contrasts the principles used by the commercially available instrumentation methods. The third section presents a one-page summary for each of the commercially available instruments. The water volume, with a current circulation of 4000 copies, has been purchased by most of the water pollution control agencies in the United States. The volumes on radiation and water have been published and marketed by John Wiley and Sons.
2. *Monitoring of PAH compounds.* The Spill Spotter and the passive vapor dosimeter provide the capability to monitor routinely and cost-effectively PAHs in the workplace. The Spill Spotter is a device that illuminates PAHs with light of a specific color, causing them to fluoresce. The instrument then measures the fluorescent light emitted. The instrument is a hand-held optics unit similar in size to a small video camera and is connected to a small electronics module. Easily changed excitation and emission filters provide selective detection of classes of organic compounds. This instrument also permits discrimination between organic and inorganic compounds. The Spill Spotter is simpler and safer to use and provides quantitative results comparable to existing methods. Its development was recognized by an IR-100 Award in 1980.

   The vapor dosimeter is a passive air sampler that can be worn conveniently by the worker as a lapel badge or used as an area monitor. It is a unique device designed to measure the overall exposure to PAH compounds with three or more rings and can measure dosages as low as parts per billion. The dosage is read by placing the badge in an optical analyzer using the room temperature phosphorescence technique. The passive vapor dosimeter is faster, simpler to use, and less expensive than existing instrumentation. An IR-100 Award in 1981 recognized its invention.
3. *Hydrogen fluoride passive dosimeter.* A hydrogen fluoride passive dosimeter was developed by ABCOR, Inc., under contract to DOE. This monitor is used for industrial health monitoring at the ABCOR enrichment facility. Uranium hexafluoride breaks down into uranyl fluoride and hydrogen fluoride when it comes into contact with water vapor in the air. This dosimeter detects the hydrogen fluoride reaction product and has advantages over the existing methods for measuring hydrogen fluoride. It is small and simpler to use, and it can be worn on the lapel. In addition, it requires no pumps, impingers, sampling tubes, or calibration. The collection element can be analyzed quickly and easily with a fluoride-selective ion electrode. Further, it can be used either as a personal or an area monitor.
4. *Portable elemental survey meter.* The portable elemental survey meter was developed under a DOE contract by Columbia Scientific Instruments for rapid,