

Congress responded in 1901 by passing the Organic Act which established the Bureau as the central point within the Federal Government for the construction, custody and comparison of measurement standards, and the determination of physical constants and the properties of materials, when such data were of great importance to scientific or manufacturing interests and were not to be obtained of sufficient accuracy elsewhere.

The first and most urgent task of the National Bureau of Standards in 1901 was to establish its own working standards so that it could begin to provide calibration services to science and industry. The prototype meter bar and kilogram had been in the custody of the Treasury Department's Office of Standard Weights and Measures. The office and the two standards were transferred to the new Bureau and work was begun on developing multiples and submultiples of these two primary standards.

A few electrical standards were obtained from the national standards laboratory of Germany, and the Bureau immediately embarked upon what was to become a long and difficult program—ranging over a time span of almost 50 years—before suitable standards for the basic electrical units were assured.

Other agencies of Government were quick to recognize the exceptional scientific and technical competence of the staff being assembled at the Bureau in those early years, and were eager to draw upon their talents. For example, when the Bureau was established, there were no other government scientific laboratories in the fields of physics and engineering. Soon, the Bureau began to test and evaluate materials other agencies were using. This gradually led to the development of methods of testing and standard purchase specifications, an activity in which we continue to have some involvement to this day.

Private industry was equally interested in standardization. In 1904, at the request of the American Chemical Society, work was begun on standards of purity for chemical reagents. A year later, the American Foundrymen's Association turned over to the Bureau a project on the standardization of four types of cast iron. These were reanalyzed by chemists at the Bureau, and in industrial and commercial laboratories. They were then issued as National Bureau of Standards standard samples. This program has grown, until today, there are more than 600 standard reference materials issued by the Bureau, including metals, ores, chemicals, spectroscopic standards, isotopic standards, and radioactivity standards. The demand by science and industry for new standard reference materials is so great it seems unlikely the list will be completed in the near future.

DECADES OF EVOLUTION AND ADAPTATION

During the first two decades of its existence, the Bureau was, in many respects, carrying on an industrial research program. Typical investigations involved: lubricating oils, automotive engineering, studies of refrigerants, electrolysis, corrosion, determination of critical points of steels, properties of ceramics, lime, metals, protective coatings, rubber, textiles, paper, and optical glass. In many of these areas, industry rapidly recognized the value of the Bureau's pioneering research and organized its own research programs. As this occurred, the Bureau would gradually withdraw from the field, except insofar as the remaining problems involved compatibility of physical measurement.

The second two decades might loosely be described as a period when the Bureau became involved in standards of practice and performance, codes and specifications. This trend had been accelerated by the industrial problems connected with the First World War. Typical of these activities were programs on screw thread standardization, development of the National Electrical Safety Code, and Commercial Standards and Simplified Practice Recommendations.

The two world wars offer a striking comparison of the general level of science and technology, and the way NBS programs were utilized to meet urgent national needs. In the first war the Bureau aided in the development of a method for manufacturing precision gauge blocks, production of high quality optical glass, and sound-ranging devices to locate artillery. The problems were essentially of an industrial nature, and the facilities and competence of the Bureau were utilized accordingly.

World War II made different demands upon science and industry, and the Bureau's role was thus of a different nature. The Bureau contributed to the development of methods for the purification of reactor materials in the Manhattan project, the radio proximity fuze, the BAT guided missile, and the prediction of radio weather for long-range military communication. Here, the Bureau's