

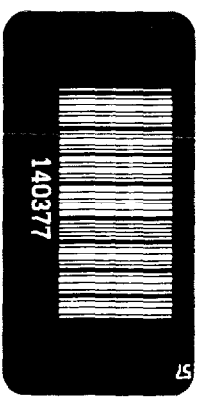
GAO

United States General Accounting Office
Briefing Report to Congressional
Requesters

January 1990

STANDARDS AND TECHNOLOGY

Update of Information About Fee Increases for Measurement Services



GAO RECEIVED 90 63BR

**Resources, Community, and
Economic Development Division**

B-235260

January 12, 1990

The Honorable Robert A. Roe
Chairman, Committee on Science,
Space, and Technology
House of Representatives

The Honorable Robert S. Walker
Ranking Minority Member, Committee on
Science, Space, and Technology
House of Representatives

On August 4, 1989, you requested that we update the analysis in our June 1989 report, Standards and Technology: Impact of Fee Increases on Measurement Services (GAO/RCED-89-135), to provide information on the impact of proposed price increases on sales of standard reference materials and calibration services by the National Institute of Standards and Technology (NIST) in the Department of Commerce. As agreed with your offices, we are providing (1) fiscal year 1989 sales and revenue data for NIST measurement services, (2) information about NIST's efforts to monitor the effects of price increases for measurement services on small and medium-sized firms, and (3) NIST's process for evaluating proposals for new measurement services.

In summary, NIST's data showed that between fiscal years 1987 and 1989 (1) the number of standard reference materials sold increased by about 11 percent, while the real average price¹ remained constant, and (2) the number of calibration tests performed decreased by 2 percent, while the real average price increased by 9 percent. We could not determine how much impact price alone had on the demand for measurement services. However, NIST sales and revenue data do not suggest a substantial effect on demand. Moreover, the Directors of the Office of Standard Reference Materials and the Office of Physical Measurement Services said that factors other than price generally have affected the demand for measurement services more than price has. NIST has begun to track sales to samples of customers, including small and medium-sized businesses. Both offices consider criteria such as public health and safety effects, possible substitutes, and financial feasibility in evaluating proposals to develop new measurement services funded by the surcharge revenue.

¹We analyzed NIST's average price for measurement services in real dollars to account for inflation.

Background

Standard reference materials and calibration services assist businesses and research laboratories in precisely measuring the chemical and physical properties of materials. Standard reference materials are certified for certain chemical properties, such as the composition of steel, or physical properties, such as the thickness or weight of coatings. They can be used for calibrating an instrument, assessing a measurement method, or assigning values to materials. Calibration services generally include checking, adjusting, or characterizing particular instruments, devices, or sets of standards on a one-time-per-request basis.

In fiscal year 1988, NIST began a 5-year program of annually raising standard reference material and calibration service prices to increase its development surcharge fee to 40 percent of the production cost for each service. (See table 1.1 in section 1.) NIST uses this surcharge to supplement funds available for developing new measurement services. For standard reference materials, because a development surcharge was instituted in fiscal year 1983, NIST is increasing the surcharge by 5 percent of production costs annually. For calibration services, because a development surcharge had not been previously instituted, NIST is increasing the surcharge by 8 percent annually.

In March 1989 NIST increased the development surcharge for standard reference materials from 20 percent to 25 percent of the production cost, which on average represented only about 39 percent of NIST's total price. As a result, the surcharge for standard reference materials, which sold for an average price of \$151 in fiscal year 1989, increased by \$4 to \$15. In February 1989 NIST increased the development surcharge for calibration services from 8 percent to 16 percent of the production cost, which on average represented about 79 percent of NIST's total price. As a result, the surcharge for a calibration test, which sold for an average price of \$510 in fiscal year 1989, increased by \$32 to \$64.

Measurement Services Data for Fiscal Years 1988 and 1989

NIST data and measurement services officials indicated that the development surcharge fee increases have not substantially affected the demand for standard reference materials or calibration services. Between fiscal years 1987 and 1989, the number of standard reference materials sold increased 11 percent, from 40,848 to 45,286, while the real average price remained constant. The number of standard reference materials sold increased by 9 percent in fiscal year 1988 and by 2 percent in fiscal year 1989, while the real average price remained constant each fiscal year despite the higher development surcharge. (Table 1.2 shows service levels and income for standard reference materials,

1978-89. Figure 1.1 shows changes in real average price per unit sold and units sold for the same period.)

Between fiscal years 1987 and 1989, calibration tests performed decreased 2 percent, from 13,059 to 12,809, while the real average price increased by 9 percent. In fiscal year 1988, the number of tests performed increased by 3 percent and the real average price increased by 6 percent, indicating that factors other than price also affected the demand for calibrations. In fiscal year 1989, the real average price increased by 4 percent, while the number of tests performed decreased by 5 percent. (Table 1.3 shows service levels and income for calibration services, 1978-89. Figure 1.2 shows changes in real average price per test and tests performed, 1984-89.)

The Chief of Physical Measurement Services at NIST attributed the decline in tests performed in fiscal year 1989 to a decrease in spending in the defense and aerospace industries. Defense contractors are required by Military Standard 45662A to have their instruments calibrated by, or directly traceable to, NIST. Staff at the Physical Measurement Services Office estimated that between 50 and 60 percent of NIST's calibration business comes from firms in or related to the defense industry.

NIST's Efforts to Monitor the Effect of the Price Increases on Demand

Both the Office of Standard Reference Materials and the Office of Physical Measurement Services are monitoring the effects of measurement service prices on small and medium-sized businesses. Starting with fiscal year 1987 data, NIST has tracked standard reference material sales to a sample of 99 users, including large businesses; small businesses; federal agencies; state and local governments; and institutions, including hospitals and universities (see table 2.1). However, while overall standard reference materials sales increased from 44,484 units sold in fiscal year 1988 to 45,286 in fiscal year 1989, sales to the 99 selected organizations declined from 7,313 to 6,410.

Similarly, beginning with fiscal year 1987 data, NIST has monitored sales of calibration services by tagging each invoice as being for a Fortune 500 company or other large business, an intermediate or small business, the Department of Defense, another federal agency, state and local government, or an institution (see table 2.2). These data indicated that while calibration tests declined for Fortune 500 businesses, federal agencies, and state and local governments in fiscal year 1989, tests increased for all other businesses and institutions.

Both the Standard Reference Materials and Physical Measurement Services staff regularly have attended trade shows and conventions relating to measurement services to interact with customers and respond to any concerns about costs and the need for new services.

NIST's Process for Determining Which Measurement Services to Develop

NIST uses the development surcharge revenue to develop new measurement services. In fiscal year 1989, the Standard Reference Materials staff evaluated between 200 and 300 proposals from users for new standard reference materials on the basis of such criteria as national concern, outside support, potential monetary return, and resource availability. In fiscal year 1989, NIST certified about 60 new standard reference materials, including about 40 that were developed with development surcharge revenue. Similarly, the Office of Physical Measurement Services staff proposed 44 new services in fiscal year 1989. Each proposal was first evaluated by staff from 12 major calibration areas and then ranked on the basis of documented requests or requirements studies, major driving forces, industries affected, number of customers anticipated, urgency, lack of viable alternatives, and available resources. NIST plans to upgrade or develop about 16 calibration services using development surcharge revenue collected in fiscal year 1989.

Scope and Methodology

NIST officials provided us with information and statistics on the prices, service levels, and program income for standard reference materials and calibration services for fiscal years 1979 through 1989. We updated our previous information on the relationship between price changes and changes in service levels. To compare prices over time, we adjusted the average price for inflation by (1) adjusting yearly income to its 1982 equivalent by dividing it by the producer price index for intermediate materials, supplies, and components and (2) dividing the adjusted income by units of standard reference materials sold or the number of calibration tests performed, as appropriate.

Because data were not readily available to measure the impact of various factors that affect demand, we could not determine how much impact, if any, price changes alone had on the demand for NIST standard reference materials and calibration services between fiscal years 1979 and 1989. We also did not survey NIST's customers to obtain their views on the impact of these pricing policies.

We conducted our review in September and October 1989. We discussed the report's contents with responsible agency officials and incorporated their views where appropriate.

As agreed with your offices, we are sending copies of this briefing report to the Secretary of Commerce and other interested parties. Copies also will be made available to others upon request. Major contributors to this briefing report are listed in appendix I. If I can be of further assistance, please contact me at (202) 275-5525.



John M. Ols, Jr.
Director, Housing and Community
Development Issues

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Abbreviations

GAO	General Accounting Office
NIST	National Institute of Standards and Technology

NIST Measurement Services: Service Levels and Income

Table 1.1: Current and Projected Revenue From Proposed Development Fee Increases

Standard Reference Materials	Fiscal Years				
	1988	1989	1990	1991	1992
Production cost (million \$) ^a	\$2.3	\$2.6	\$2.7	\$2.7	\$2.7
Development surcharge (percentage of production costs) ^b	15/20	20/25	25/30	30/35	35/40
Development surcharge funds (thousand \$)	\$463	\$600	\$780	\$910	\$1,050
Calibrations					
Production cost (million \$) ^a	\$5.5	\$5.3	\$5.3	\$5.3	\$5.3
Development surcharge (percentage of production costs) ^b	0/8	8/16	16/24	24/32	32/40
Development surcharge funds (thousand \$)	\$250	\$570	\$1,180	\$1,590	\$2,010

^aNIST provided actual production cost data for fiscal years 1988 and 1989 and projected data for fiscal years 1990, 1991, and 1992.

^bThe fiscal year 1988 development surcharge took effect in December 1987. The fiscal year 1989 development surcharge took effect in March 1989 for standard reference materials and February 1989 for calibration services. Beginning in fiscal year 1990, NIST plans to implement fee increases at the beginning of the calendar year.

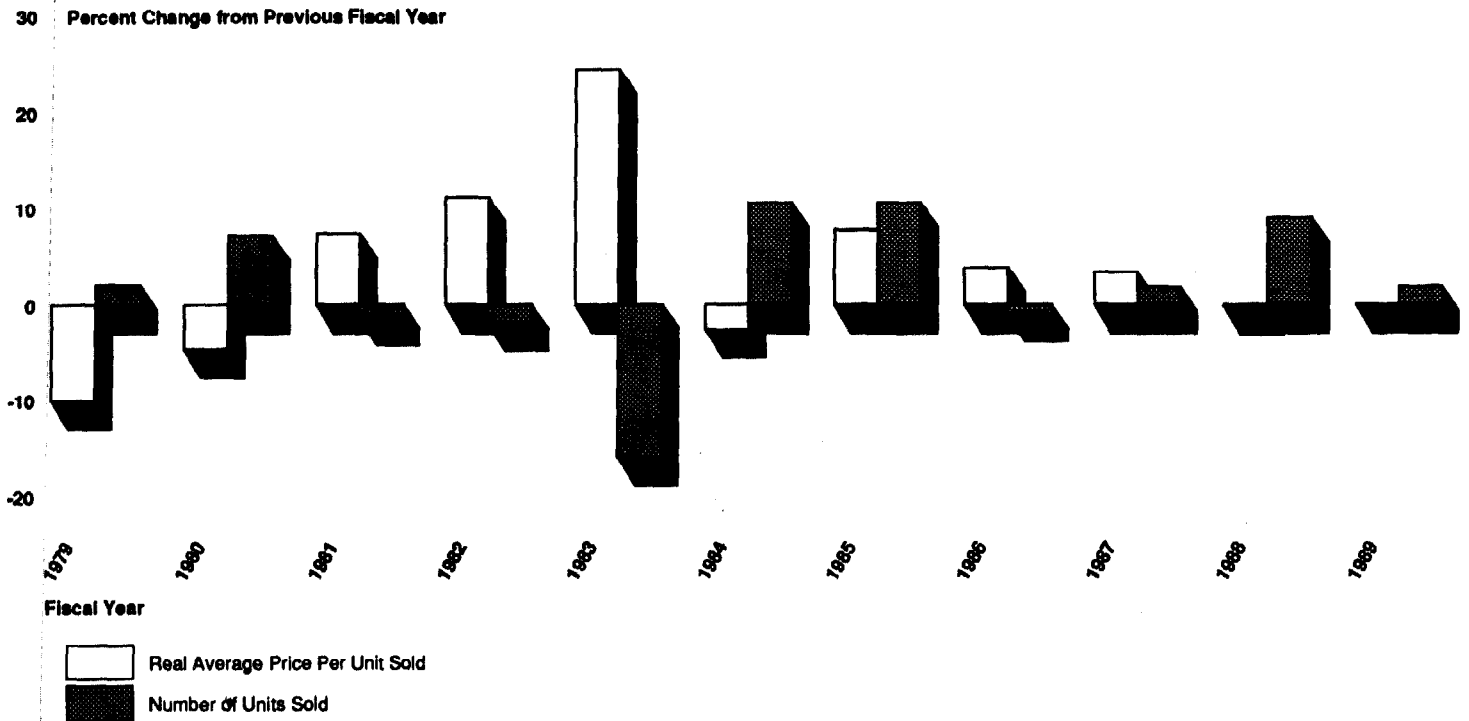
Source: Prepared by GAO from NIST data.

Section 1
 NIST Measurement Services: Service Levels
 and Income

Table 1.2: Service Levels and Income for Standard Reference Materials

Fiscal year	Units sold	Total income (millions)
1978	37,387	\$2.5
1979	38,139	2.6
1980	40,847	3.0
1981	40,304	3.5
1982	39,523	3.8
1983	33,199	4.0
1984	36,674	4.4
1985	40,518	5.2
1986	40,149	5.2
1987	40,848	5.6
1988	44,484	6.4
1989	45,286	6.8

Figure 1.1: Changes in Real Average Price Per Unit and Units Sold for Standard Reference Materials



Source: Prepared by GAO from NIST data.

**Section 1
NIST Measurement Services: Service Levels
and Income**

Table 1.3: Service Levels and Income for Calibration Services

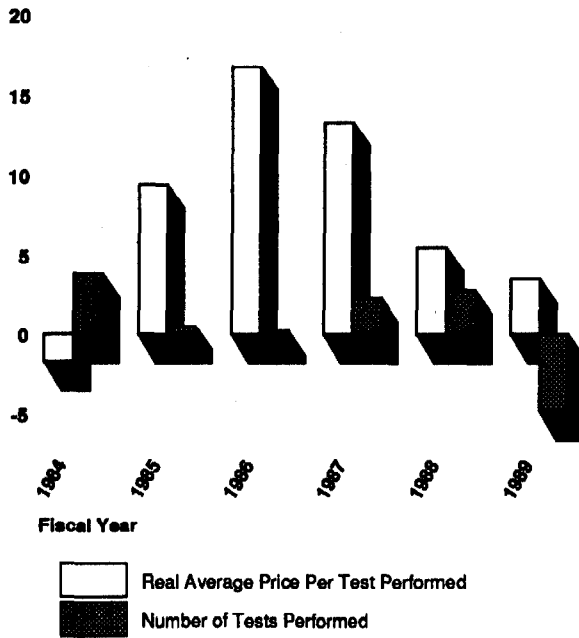
Dollars in millions

Fiscal year	Tests performed	Items calibrated	Total income
1978	a	6,191	\$1.8
1979	a	6,924	2.1
1980	a	6,887	2.3
1981	a	7,506	2.5
1982	a	6,828	3.1
1983	12,209	8,087	3.6
1984	12,672	6,880	3.8
1985	12,737	5,779	4.1
1986	12,767	5,023	4.7
1987	13,059	5,611	5.5
1988	13,425	5,902	6.3
1989	12,809	5,327	6.5

^aNIST did not maintain records on the number of tests performed prior to fiscal year 1983.

Figure 1.2: Changes in Real Average Price Per Test and Tests Performed for Calibration Services

25 Percent Change From Previous Year



Source: Prepared by GAO from NIST data.

Measurement Services Sales by Customer Category

Table 2.1: Units Sold to Selected Standard Reference Materials Customers

Dollars in thousands						
Customer	Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989	
	Units	Dollars	Units	Dollars	Units	Dollars
Large Business						
3M	184	\$17	257	\$14	287	\$29
Abbott	228	30	252	33	153	36
Anheuser-Busch	1	0.1	3	3	4	0.5
Armco	767	64	764	73	596	58
AT&T	63	13	54	16	55	19
Carpenter	129	12	72	7	38	3.9
Chevron	165	19	149	16	167	21
Chrysler	35	11	56	30	9	3.7
Ciba-Geigy	420	63	228	36	276	45
Eastman Kodak	616	100	361	68	332	48
EG&G	99	15	76	13	158	19
E.I. Dupont	269	41	484	67	256	44
Exxon	117	15	116	15	117	16
Fisher Scientific	294	26	279	28	298	30
Ford Motor	75	20	21	10	47	12
General Electric	209	32	147	27	175	32
IBM	123	38	227	44	187	33
LTV	283	29	509	52	359	34
Martin Marietta	351	51	330	48	281	47
Monsanto	167	23	212	36	94	12
Rockwell International	179	26	187	23	114	18
Teledyne	205	22	276	29	204	23
Union Carbide	92	14	123	46	48	15
UTC (Pratt & Whitney)	86	10	161	23	177	29
Westinghouse	133	14	202	23	249	42
Subtotal	5,290	\$705.1	5,546	\$780	4,681	\$670.1
Average	211.6	\$28.2	221.8	\$31.2	187.2	\$26.8
Small Business						
Allentown Cement	11	\$1	10	\$0.9	7	\$0.6
American Dade	69	7.8	283	27	62	7.7
Angstrom	5	0.6	0	0	0	0
Baird	114	13.4	92	13.1	229	32
Cetus	1	0.1	1	0.2	4	2.2
Genentech	4	0.7	1	0.4	5	1.1
Ground Water Tech Co.	30	1.9	0	0	0	0

(continued)

**Section 2
Measurement Services Sales by
Customer Category**

Customer	Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989	
	Units	Dollars	Units	Dollars	Units	Dollars
Hach	11	\$1.1	9	\$0.8	8	\$0.8
Jim Smith Coal	30	2.7	16	1.6	2	0.2
KeveX	8	1.4	0	0	3	0.4
Lynchburg Foundry	61	8.4	28	4.3	38	5.9
Magna-Gage	103	16.8	85	18.4	58	13
Microscan	1	0.3	0	0	0	0
Missouri Portland Cement	78	6.6	25	2.5	60	6.1
Nova Biomedical	37	2.7	36	3.4	51	5.8
Passive Vision	1	0.9	0	0	0	0
Public Service Testing Lab	3	0.4	2	0.2	1	0.4
Spectro	47	5.6	62	8.9	96	13.1
Thermo Jarrell Ash	150	16.1	41	5.7	41	5.1
X-ray Supply	10	1.8	3	0.6	2	0.5
Subtotal	774	\$90.3	694	\$88	667	\$94.9
Average	38.7	\$4.5	34.7	\$4.4	33.4	\$4.7

Federal Government

David Taylor Naval Ship R & D Center	8	\$1.8	6	\$0.5	0	\$0
Dept. of Agriculture	65	9.4	97	12.1	81	10.6
Dept. of Justice	8	1	58	4.2	11	1.9
Dept. of Transportation	4	0.4	8	0.7	51	6
Knolls Atomic Power	71	10.5	24	3.4	5	0.8
National Aeronautics & Space Administration	31	4.8	80	20.1	11	4.4
National Institutes of Health	8	1.1	17	3.6	15	3.5
National Oceanic and Atmospheric Admin.	7	4.7	11	5	7	3.6
Environmental Protection Agency	43	7	60	23.3	96	22.5
U.S. Geological Survey	54	7.2	128	13.6	83	10.3
Subtotal	299	\$47.9	489	\$86.5	360	\$63.6
Average	29.9	\$4.8	48.9	\$8.6	36	\$6.4

State and Local Government

Alabama	11	\$0.9	2	\$0.2	17	\$1.7
California	15	3.3	59	12.8	26	9.1

(continued)

**Section 2
Measurement Services Sales by
Customer Category**

Customer	Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989	
	Units	Dollars	Units	Dollars	Units	Dollars
Connecticut	10	2.2	17	3.2	9	1.9
Florida	8	1	24	5.8	84	12.4
Illinois	13	2.6	23	4.6	20	3.5
New Mexico	13	4.3	7	2.4	11	2.7
New York	54	8.4	38	6.8	38	14.1
North Carolina	11	1.3	10	1.6	12	1.1
Oklahoma	14	1.3	3	0.4	33	6.5
Wisconsin	8	1.3	2	0.8	0	0
County of Los Angeles	8	3.4	9	1.2	2	1
County of Westchester	2	0.3	1	0.2	0	0
County of San Diego	2	0.5	6	4.1	6	2
Dallas County	1	0.1	1	0.1	1	0.1
Montgomery County	0	0	0	0	0	0
Austin	6	0.6	8	1.3	4	0.7
Jacksonville	10	4.1	10	2.7	3	0.4
Los Angeles	17	2.6	43	4.7	11	1.6
New York City	25	4.2	31	5.4	32	3.5
Philadelphia	18	2.7	5	0.5	7	0.7
Subtotal	246	\$45.1	299	\$58.8	316	\$63
Average	12.3	\$2.2	14.9	\$2.9	15.8	\$3.2

Institutions

American Red Cross	11	\$2.1	0	\$0	0	\$0
College of American Pathology	4	0.8	0	0	4	0.6
Getty Conservation Institute	5	0.6	0	0	0	0
Guggenheim Foundation	5	0.5	0	0	0	0
Mayo Foundation	21	4.1	21	4.3	26	6.1
Arthur D. Little	30	2.1	45	3.2	27	2.2
Battelle	141	17.9	76	14.7	119	17.9
Gulf South Research Institute	13	0.9	15	1	5	0.4
Midwest Research Institute	5	2.2	40	5.8	35	5.1
Western Research Institute	9	1	1	0.2	26	3.6
Hartford Hospital	28	3	9	1.7	12	1.9
Maine Medical Center	4	0.6	0	0	0	0
New England Deaconess Hospital	3	0.3	8	1.1	2	0.2

(continued)

**Section 2
Measurement Services Sales by
Customer Category**

Customer	Fiscal Year 1987		Fiscal Year 1988		Fiscal Year 1989	
	Units	Dollars	Units	Dollars	Units	Dollars
Rush Presbyterian Hospital	1	\$0.2	2	\$0.3	2	\$0.3
Baylor University	7	0.6	0	0	4	0.6
Brigham Young University	10	1	0	0	1	0.3
Cornell University	4	0.7	9	2.1	19	3.1
Harvard University	9	1.5	1	0.2	3	0.8
Kent State University	1	0.1	0	0	0	0
Louisiana State University	15	1.4	3	0.4	3	0.5
Massachusetts Institute of Technology	8	1.3	15	1.9	21	7.8
Michigan State University	22	2.6	11	1.9	21	2.9
Purdue University	13	1.2	12	1.4	33	6.3
Johns Hopkins University	3	0.5	17	4.8	23	3.6
Subtotal	372	\$47.2	285	\$45	386	\$64.2
Average	15.5	\$2	11.9	\$1.9	16.1	\$2.7
Grand total	6,981	\$935.6	7,313	\$1,058.3	6,410	\$955.8
Overall average	70.5	\$9.5	73.9	\$10.7	64.8	\$9.7

Source: Office of Standard Reference Materials, NIST.

Table 2.2: Tests Performed by Calibration Customer Category

	Fiscal Years		
	1987	1988	1989 ^a
All	13,060	13,425	13,068
Fortune 500 businesses	4,439	3,702	3,198
All other businesses	6,278	6,909	7,213
Department of Defense	1,503	2,000	1,527
Other federal agencies	208	364	234
State and local governments	145	103	102
Institutions ^b	232	182	254

^aYear-end projection as of September 1, 1989.

^bIncludes hospitals, universities, and other nonprofit organizations.

Source: Office of Physical Measurement Services, NIST.

Major Contributors to This Briefing Report

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