

**MWD**

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

March 12, 1993

To: Board of Directors (Engineering & Operations Committee--Information)
 (Special Committee on Water Quality and
 Environmental Compliance--Information)
From: General Manager
Subject: Summary of Productivity and Innovation within the Water
 Quality Division

Report

The Water Quality Division (WQD) has increased productivity, improved Quality Assurance (QA) performance, and promoted innovation to reduce and control costs. This has been done concurrent with an expanded workload due to many new Federal and State regulations for contaminants in drinking water.

In 1986, the U.S. Congress passed amendments to the Safe Drinking Water Act (SDWA) which mandated that U.S. Environmental Protection Agency set more standards on drinking water. The total number of mandated federally regulated contaminants has increased by 400 percent since 1986, and will continue to increase by 25 new Maximum Contaminant Levels (MCLs) every three years in accordance with the 1986 SDWA Amendment mandates (see Figure 1).

The number of samples collected and analyzed for different constituents has multiplied since 1978 and is projected to multiply through the year 2001 (see Figure 2). In response to the increase in Chemistry and Microbiology analysis needs, the number of constituents analyzed per lab analyst has increased (see Figure 3). From 1986 to 1992, the number of constituents analyzed per lab analyst increased from about 3,800 per analyst per year to about 6,600 per analyst per year. During that same period from 1986 to 1992, WQD total staffing increased from 56 to 80 permanent staff (about half of the staff within the division perform analyses directly).

If 1986 productivity levels had not improved, 79 analysts would have been necessary in 1993 instead of the actual number of 40 (see Figure 4). Automation, instrumentation "economies of scale," and training have enabled the lab analyst to meet the increasing demands to test more samples for more constituents. It is anticipated that additional improvements in automation, computer information management, and instrumentation technology will enable the additional

productivity gains projected by the year 2001. Labor costs make up 65 percent of the total cost for analysis of chemical and microbial parameters (see Figure 5).

The percent of measurements within internal QA limits has gradually improved since 1989 (see Figure 6). In 1992, more than 97 percent of the analyses performed in the Inter-laboratory QA program were within the established limits. The Interlaboratory QA program ensures quality at Metropolitan's central water quality laboratory, as well as at each individual filtration plant laboratory. As Figure 6 indicates, both the QA trend (upward) and the degree of sample variation (smaller swings) have improved since 1989.

In order to provide maximum value for every dollar expended, WQD has continued innovative programs to reduce and control cost. Examples of cost reduction through innovations are listed below and shown in Figure 7:

- o **Laboratory Information Management (LIMS).** Implementation of a PC-based system in place of a planned mainframe-based system at the WQ lab. Originally priced at \$1.5 million, cost was reduced to \$356K, a savings of \$1.1 million.
- o **Gene Probe Technology (Viruses).** Conversion to gene probe analysis for enteric viruses from conventional tissue culture techniques, reduced cost to approximately \$25 per sample from \$650 per sample (turnaround time also was reduced from 14 days to 36 hours).
- o **PEROXONE Development.** The use of the PEROXONE process can reduce capital cost for a full-scale ozone retrofit up to \$175 million by reducing the required ozone dosage by using hydrogen peroxide.
- o **Use of Universities Instead of Consultants.** Emphasis on using graduate students at universities instead of consulting engineers has resulted in a savings when comparing the approximately \$25 hourly cost of graduate students to usage of consultants at roughly \$80 per hour.
- o **Use of Cooperative Education Students.** The use of cooperative work/study students (paid about

\$12 per hour) saves approximately \$30 per hour due to their lower classification and the unburdened payroll that results from their part-time status, compared to permanent staff in the Laboratory Technologist classification.

- o **Use of Outside Funding Sources.** American Water Works Association Research Foundation (AWWARF) has contributed \$720,000 to Metropolitan for services performed over the past several years on three applied research projects. Also, American Water Works Association (AWWA) has provided \$227,000 to Metropolitan to fund Metropolitan's Management of a Technical Advisory Workgroup. In all cases, Metropolitan benefitted directly from the results of these efforts.

Board Committee Assignments

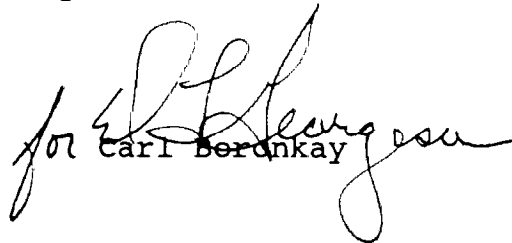
This letter is referred for information to:

The Engineering and Operations Committee because of its authority to review work performance pursuant to Administrative Code Section 2431 (c); and

The Special Committee on Water Quality and Environmental Compliance because of its authority to study and advise on compliance requirements pursuant to Administrative Code Section 2551 (a) and (b).

Recommendation

For Information only.

for Carl Beronkay 

ZBH:MDB:wt

Attachments

FIGURE 1
TOTAL NUMBER OF FEDERALLY REGULATED CONTAMINANTS

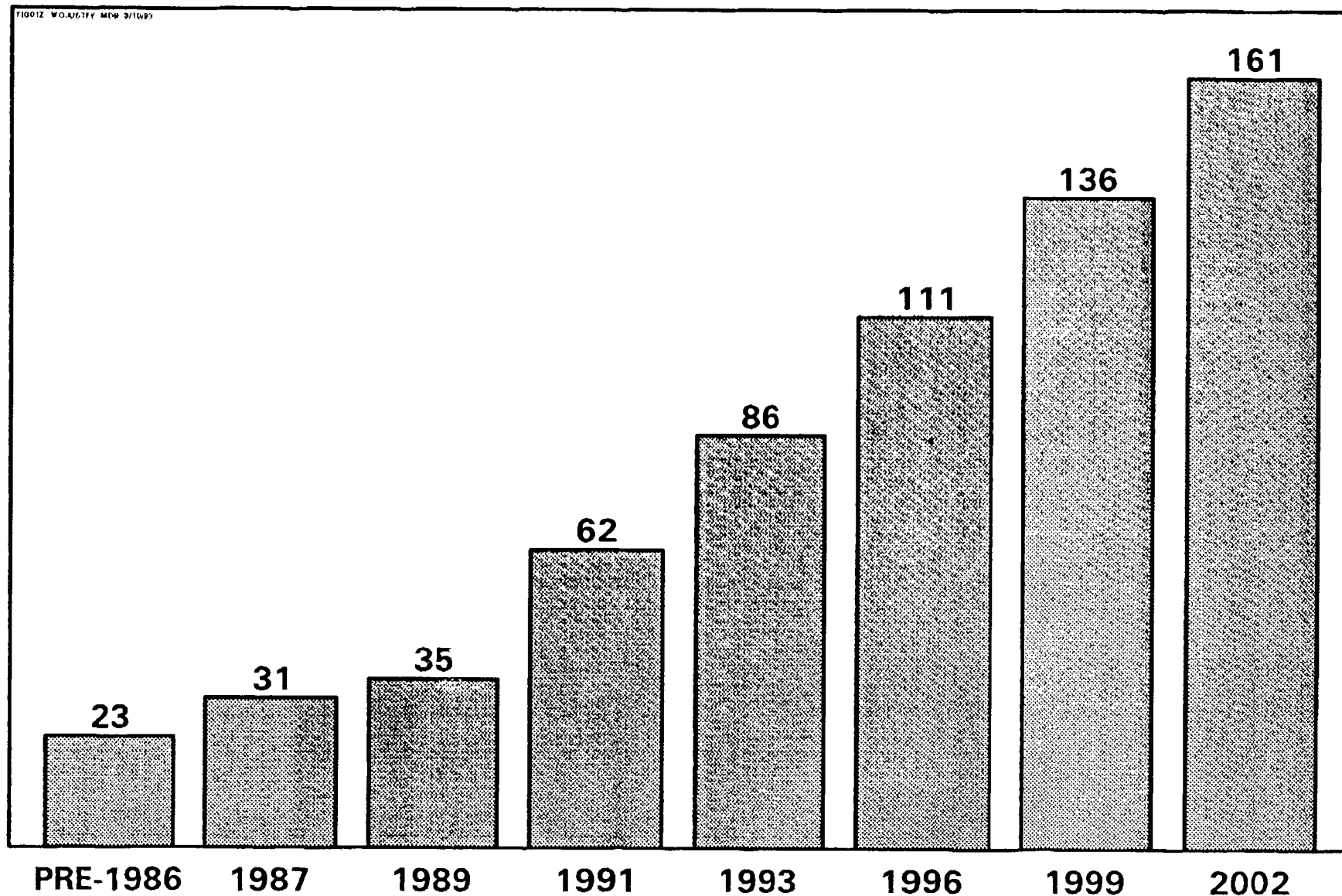


FIGURE 2
INCREASES IN NUMBER OF CONSTITUENTS ANALYZED
ANNUALLY, DRIVEN BY NEW REGULATIONS

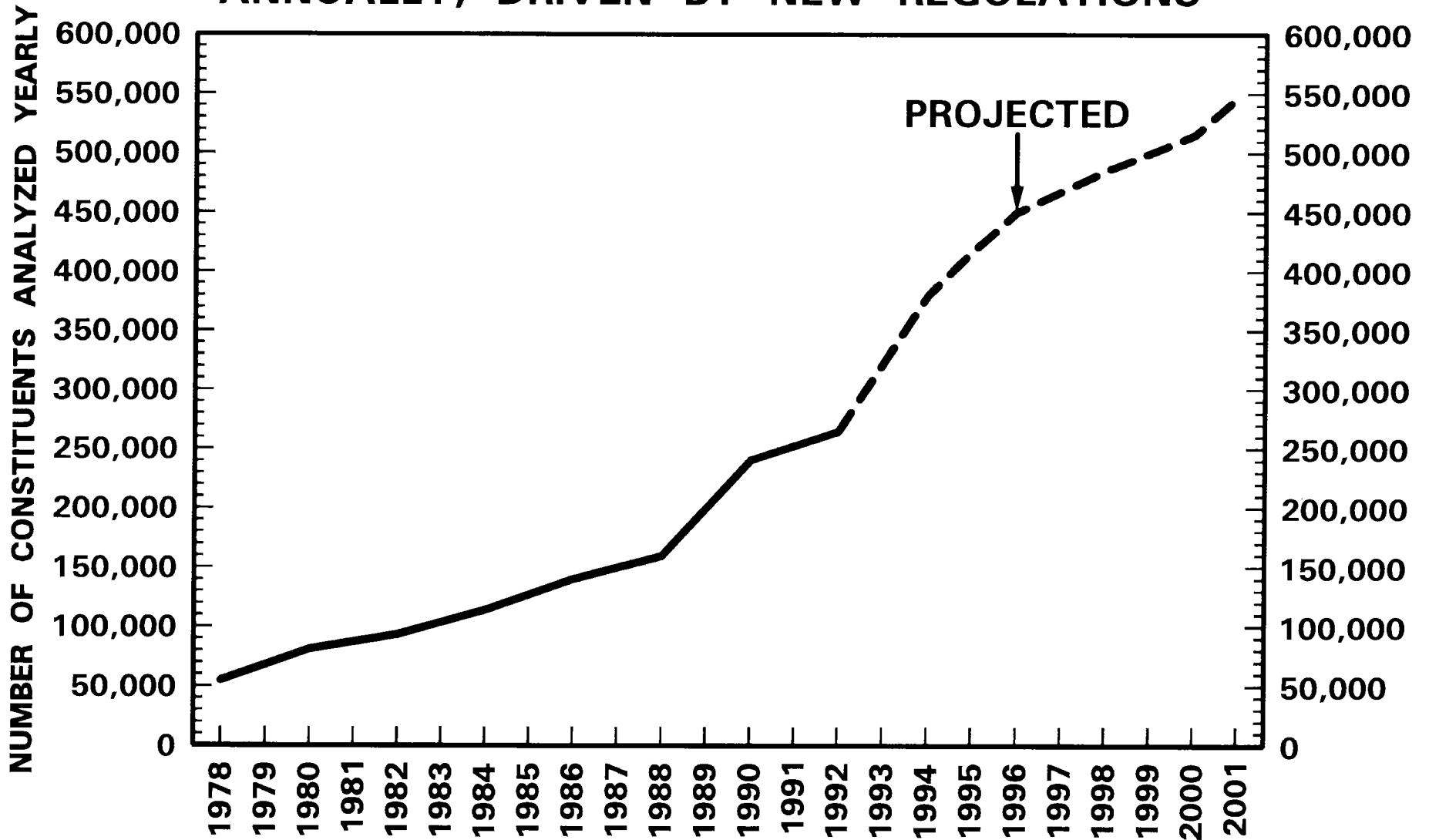


FIGURE 3
PRODUCTIVITY INCREASES AT THE
WATER QUALITY LABORATORY

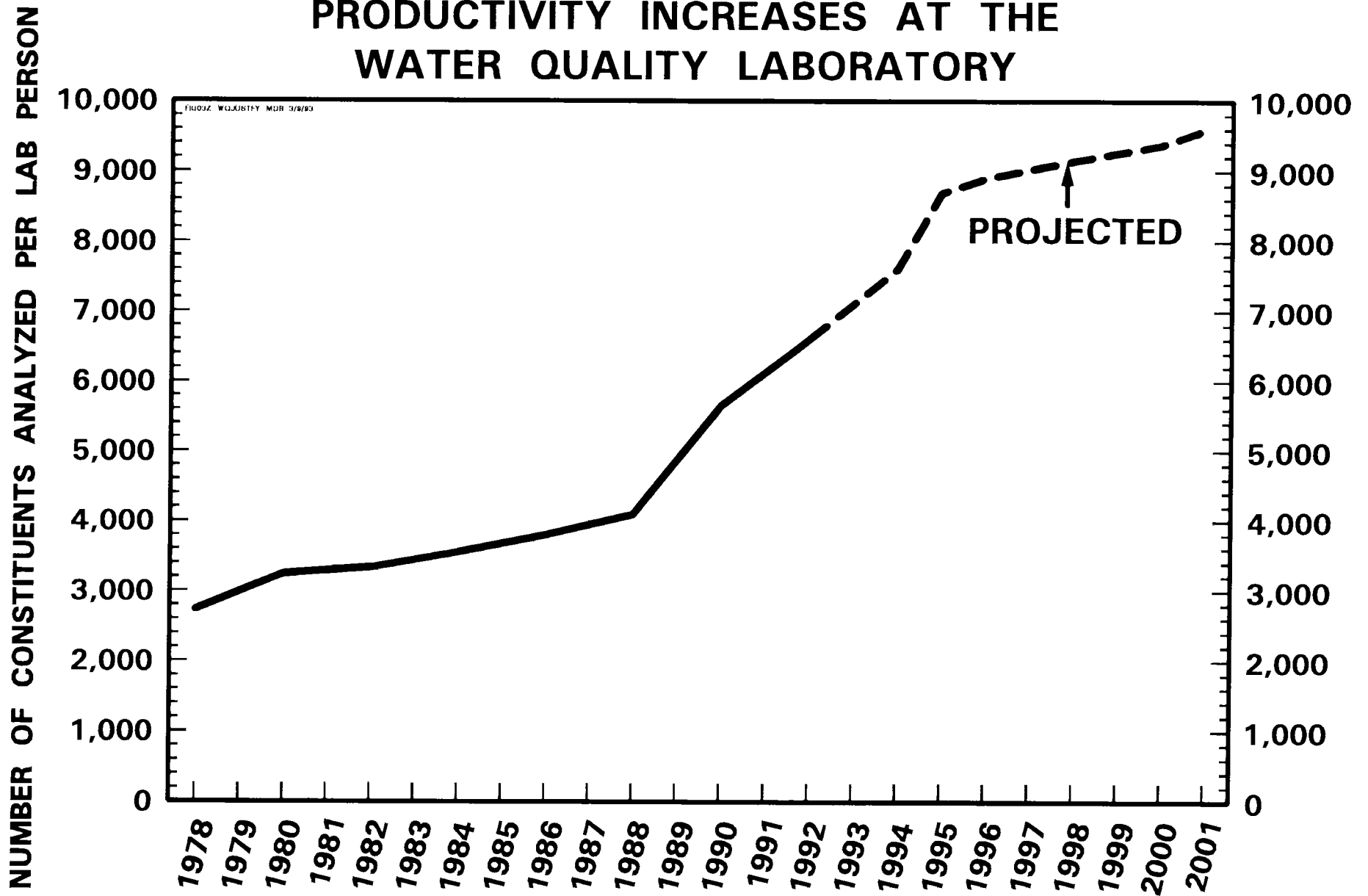


FIGURE 4
ESTIMATED 1993 STAFF REQUIREMENTS IF
PRODUCTIVITY HAD NOT BEEN IMPROVED

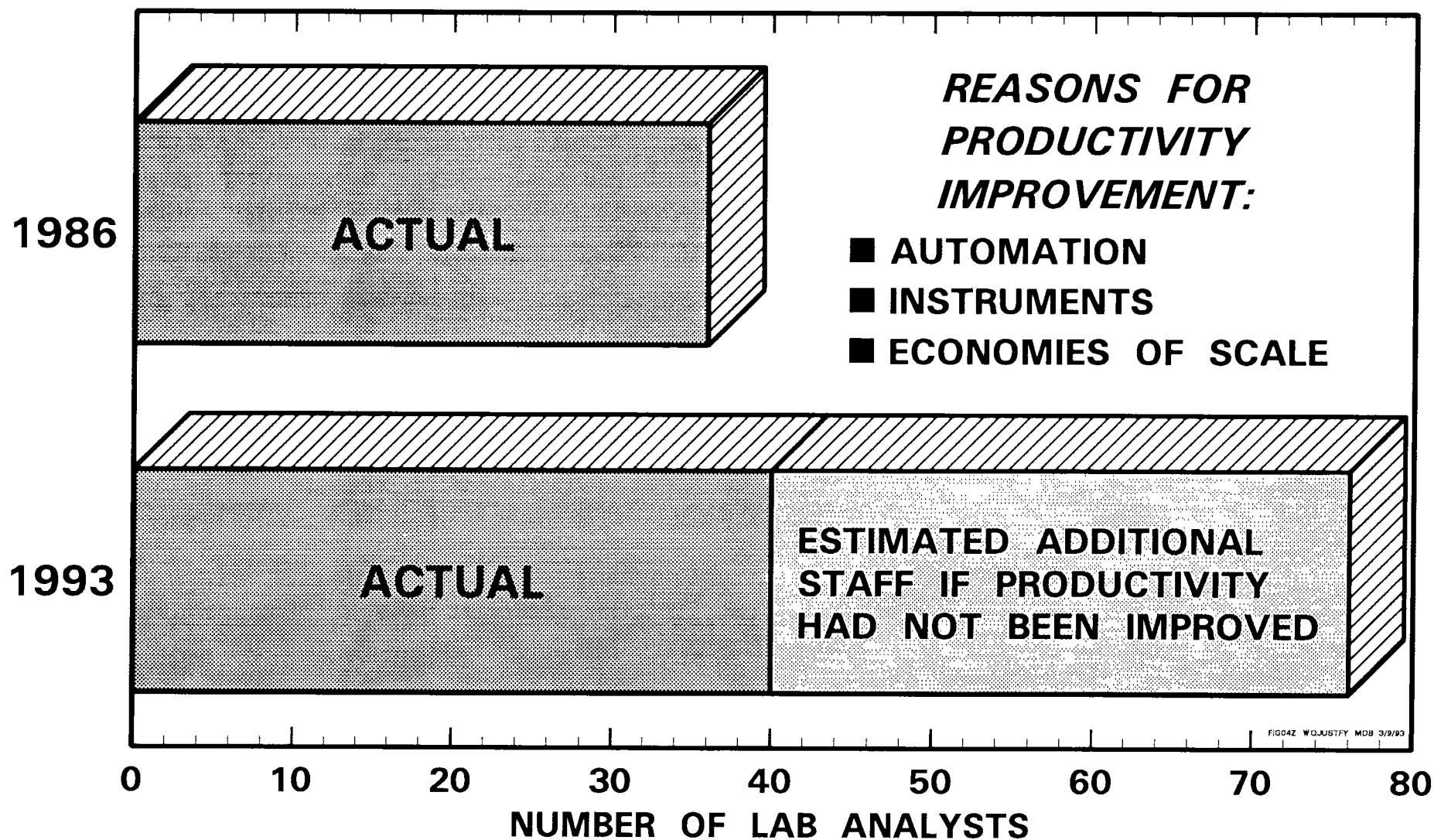


FIGURE 5

COSTS TO MEASURE A WATER QUALITY CONSTITUENT

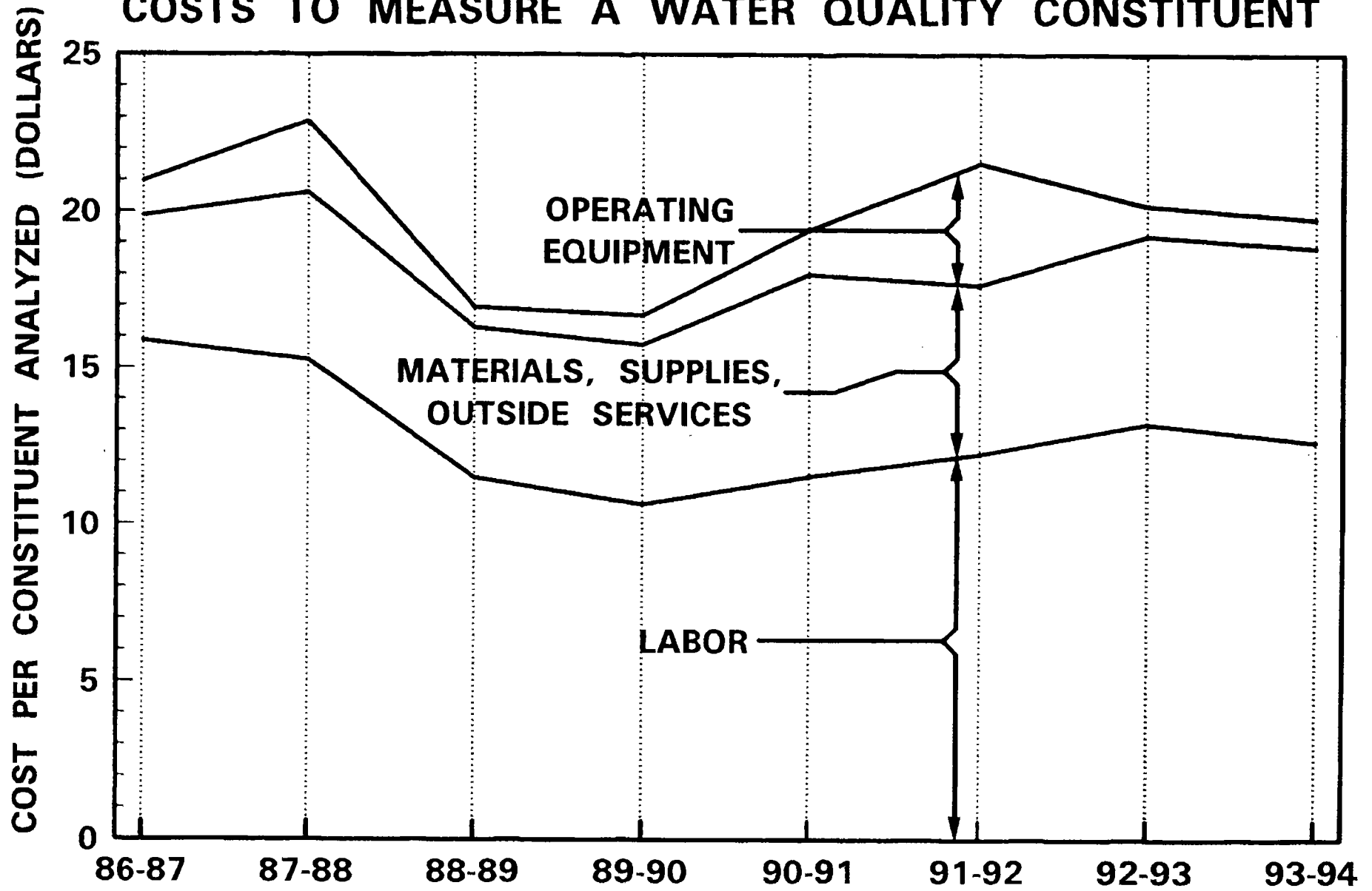


FIGURE 6
QUALITY OF INTERNAL MEASUREMENTS IS
IMPROVING THROUGH TECHNOLOGY AND TRAINING

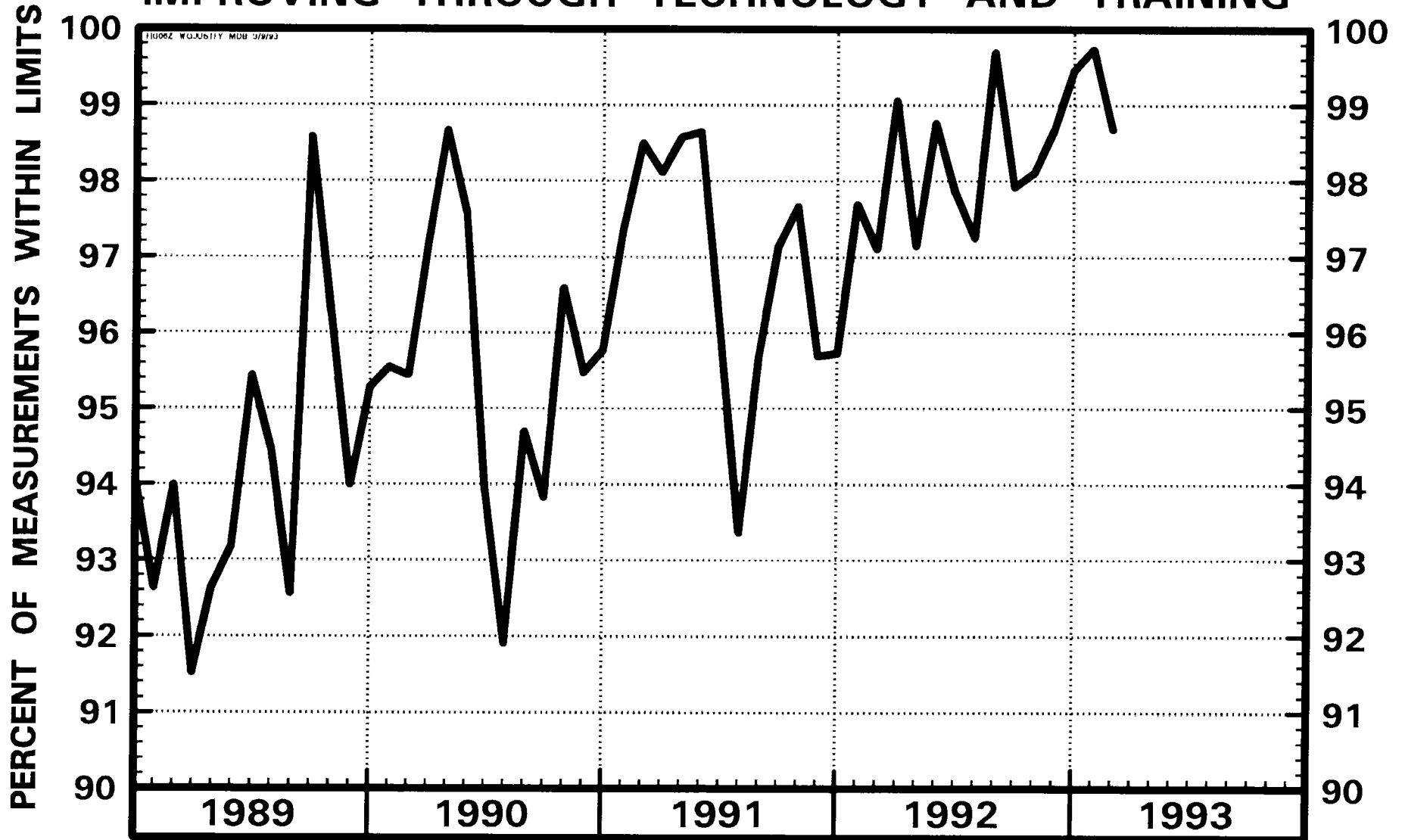


FIGURE 7
EXAMPLES OF COST REDUCTION
THROUGH INNOVATION

- **LIMs USE OF PC-BASED SYSTEM--\$1.1 M COST REDUCTION**
- **GENE PROBE TECHNOLOGY (VIRUSES)--FROM \$650 TO \$25 PER SAMPLE**
- **PEROXONE DEVELOPMENT--\$175 M CAPITAL SAVINGS**
- **USE OF UNIVERSITIES INSTEAD OF CONSULTANTS--FROM \$80/HOUR TO \$25/HOUR**
- **USE OF COOPERATIVE EDUCATION STUDENTS--1/2 TO 1/3 HOURLY COST**
- **USE OF OUTSIDE FUNDING SOURCES--\$720,000 FROM AWWARF, \$227,000 FROM AWWA**
- **USE OF FIRST-LINE SUPERVISORS AS ANALYSTS**