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REPORT BY THE

Comptroller General

OF THE UNITED STATES

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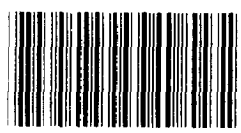
National Bureau Of Standards-- Information And Observations On Its Administration

This report provides information and observations on more important aspects of how the National Bureau of Standards is administered. It also explains some complexities of a major scientific organization.

The Senate Committee on Commerce, Science and Transportation and its Subcommittee on Science, Technology and Space were concerned about persistent reports of a decline in the Bureau's scientific capabilities and its ability to adequately respond to specific congressional assignments.

The committees saw the need for a critical review of the Bureau's organic act and for possibly updating this statute in light of the Bureau's evolving role as a national laboratory.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-114821

To the Chairman, Senate Committee
on Commerce, Science and
Transportation and the
Chairman, Senate Subcommittee on
Science, Technology and Space

Pursuant to the Senate Committee on Commerce, Science and Transportation and its Subcommittee on Science, Technology and Space October 13, 1977, joint request, we reviewed the National Bureau of Standards fulfillment of its responsibilities under 13 public laws. Our findings were communicated to your offices in a briefing held on January 13, 1978.

The second phase of the joint request asked us to monitor National Bureau of Standards activities. As agreed with your offices, this report provides information and observations on the more important areas of Bureau administration. The use of National Bureau of Standards computer resources as it relates to these areas will be the subject of a separate General Accounting Office report.

We met with Bureau officials and obtained their oral comments on the report. Their specific comments have been included in the report where appropriate.

As arranged with your offices, we will make this report available to other interested parties without delay.

Comptroller General
of the United States

REPORT OF THE COMPTROLLER GENERAL TO THE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND THE SUBCOMMITTEE ON SCIENCE, TECHNOLOGY AND SPACE UNITED STATES SENATE

NATIONAL BUREAU OF STANDARDS--INFORMATION AND OBSERVATIONS ON ITS ADMINISTRATION

D I G E S T

The Senate Committee on Commerce, Science and Transportation and its Subcommittee on Science, Technology and Space expressed concerns about persistent reports of a decline in the National Bureau of Standards scientific capabilities and its ability to adequately respond to specific congressional assignments.

As agreed with the committees, this report provides information and some observations on the more important areas of how the Bureau is administered.

GAO is not recommending any specific actions for the Bureau to take at this time because of (1) the recent major Bureau reorganization (April 1978), (2) a major reprograming of ongoing research planned for fiscal years 1979 and 1980, and (3) other actions the Bureau has taken or plans to take to resolve problems identified in this report.

PROJECTS AND PROGRAMS--REVIEW AND APPROVAL

For fiscal years 1976-78, the National Bureau of Standards requested $46.6 million to undertake new work. The Department of Commerce approved $9.6 million. This was then reduced to $2.5 million by the Office of Management and Budget. For fiscal year 1979, Commerce and the Office of Management and Budget looked more favorably on the Bureau's budget request and the Bureau received more funds than originally requested.

Tear Sheet. Upon removal, the report cover date should be noted hereon.

The Office of Management and Budget has not allowed the Bureau to use its appropriations to do work that another Federal agency (lead agency) has the primary responsibility for even though specific legislation requires that the Bureau perform the work or it could be performed under the Bureau's organic act. The Office of Management and Budget's position is that the lead agency concept was established to ensure single agency accountability to the President and the Congress. This has contributed to reducing the Bureau's budget requests. (See pp. 8 and 9.) The Congress is aware of this problem and has taken action on it. (See p. 10.)

In 1978, about 40 percent ($55.1 million) of the Bureau's work was for and funded by other agencies. While the agencies provide the money, the Bureau must perform the work within personnel ceilings established by Commerce and the Office of Management and Budget. (See p. 11.) In addition, the Bureau is called on to perform work mandated by the Congress and Commerce. This has resulted in reprograming other Bureau work and reassigning staff. (See pp. 11 and 12.)

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Some of the Bureau's research apparently was not of high enough priority because it has proposed a major reprograming beginning in fiscal year 1979 to reduce or terminate many existing projects to accommodate higher priority work. (See p. 17.)

LONG-RANGE PLANNING

The National Bureau of Standards recently implemented long-range planning. There have been no sustained efforts to provide an overall conceptual framework relating the Bureau's many programs to each other and to its major mission, or to relate that mission to the needs of the Nation's scientific, governmental, and industrial communities.

In response to an Office of Management and Budget directive and an appropriation to do so, the Bureau established a central planning organization effective October 1, 1978. Also, the Bureau directed its major organizational units to develop long-range (5-year) plans which should mesh with the central planning organization's efforts and the major reprograming.

The effect of these actions probably will not be known until about October 1979. (See pp. 15 to 17.)

BUDGETING AND ACCOUNTING

The development and submission of the National Bureau of Standards budget and the accounting for funds have been adequate. The method used to distribute certain overhead costs, however, may result in an inequitable distribution of expenses. (See ch. 4.)

EQUIPMENT ACQUISITION AND MANAGEMENT

Officials and employees have expressed some concern about the shortage of modern (state-of-the-art) laboratory equipment. According to Bureau officials, the lack of such equipment sometimes has resulted in redirecting research, reducing researchers' morale and willingness to undertake new research, and delaying work underway. The alleged shortage of modern equipment has not been quantified. The Bureau has not been determining equipment needs in advance and budgeting for them in recent years.

Pooling and loaning equipment is not widely used at the Bureau. Its personnel did not favor either pooling or loaning equipment because of perceived problems with maintenance, calibration, and equipment availability. (See pp. 29 to 35.)

Tear Sheet

PERSONNEL MATTERS

The number of National Bureau of Standards scientists has not changed significantly during the past 5 years, but the number of technicians decreased by 25 percent. The turnover rate for scientists declined from 7.8 percent in 1975 to 4.7 percent in 1978. The average age of the scientists has been increasing at about 1/2 year per year (from 40.7 in 1971 to 43.7 in 1977). The impact of this could be felt when many scientists become eligible for retirement at about the same time.

Some concern had been expressed in the past that staff morale was weakening. Due to the relatively low turnover rate of scientific personnel accompanied by an increasing average age, it would appear that the Bureau has a stable scientific community. This, when coupled with the Bureau's reputation for high quality research, would indicate a relatively satisfied research staff. (See p. 41.)

EVALUATION OF BUREAU EFFORTS BY OUTSIDE ORGANIZATIONS

Evaluation panels established by the National Research Council periodically evaluate the National Bureau of Standards functions and operations, including the importance and relative priority of projects, quality of staff, equipment needs, finances, and the relation of programs to Bureau missions. The panels usually report annually to the Bureau Director and the Statutory Visiting Committee. (See pp. 46 and 47.)

The committee meets and reports annually on the efficiency of the Bureau's scientific work and the condition of its equipment. In 1977, the committee pointed out that the Bureau had critical problems and was on the brink of serious trouble. One problem cited was that the Bureau was administered by an Acting Director

for over 2 years (a Director was finally appointed in February 1978). The committee stated that the personal action of the Secretary of Commerce was needed. In its 1978 report, the committee informed the Secretary that recovery was underway and expressed its belief that a "most" constructive new policy had emerged during the year with close understanding among top Commerce leadership, White House offices, and the Bureau Director. (See pp. 48 and 49.)

GAO OBSERVATIONS

GAO made the following observations:

--A solution is needed to the National Bureau of Standards problem caused by the Office of Management and Budget not allowing the Bureau to use its appropriations to perform work which is the primary responsibility of another Federal agency (lead agency). (See pp. 8 and 9.)

--Because of (1) the recent major Bureau reorganization (April 1978), (2) the numerous requirements contained in legislation passed since 1965 which affect the Bureau, and (3) functional changes, including data processing applications, the Bureau may have to revise its accounting system. If so, the Bureau should consider submitting the revised system to GAO for approval.

--Improvements appear necessary in applying the Bureau's complex three-tiered overhead costs to projects. (See pp. 24 to 27.)

--The Bureau has difficulty planning or budgeting adequately for needed equipment because it has not established procedures to monitor the need for new equipment, its condition or use. (See pp. 30 to 34.)

--Scientists, who generally are paid more than technicians, are being required to

perform work formerly done by the technicians. This results in increased cost and reduced time available for scientists to perform work at a higher scientific level. (See p. 39.)

The Director, National Bureau of Standards, should consider the matters discussed in this report to bring about improvements.

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Pursuant to an October 1978 request from the Senate Committee on Commerce, Science and Transportation, GAO will monitor Bureau actions in the above areas and report on its findings in the fall of 1979.

AGENCY COMMENTS

In commenting orally on the report, the National Bureau of Standards generally concurred with GAO's observations. Specific comments have been included where appropriate.

Contents

ABBREVIATIONS

GAO	General Accounting Office
NBS	National Bureau of Standards
OMB	Office of Management and Budget
OTA	Office of Technology Assessment

CHAPTER 1

INTRODUCTION

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The National Bureau of Standards (NBS) was established by the Congress on March 3, 1901 (c. 872, 31 Stat. 1449). This basic or organic act initially placed NBS in the Treasury Department, but in 1903 transferred it to the Department of Commerce.

The organic act, which has been amended numerous times, assigns the following functions to NBS:

--Developing, maintaining, and disseminating standards of physical measurements.

--Determining physical materials properties and physical constants.

--Developing test methods for materials, mechanisms, and structures.

--Establishing standard practices in cooperation with Government agencies and the private sector.

--Providing advisory services to Government agencies.

NBS headquarters is located on a 576-acre site in Gaithersburg, Maryland. This site has 27 buildings, including 7 general purpose laboratories, a nuclear reactor used in various research programs, a fire research facility, a building for sound measurements, and other buildings devoted to special research needs. In Boulder, Colorado, NBS shares a 205-acre site with two other Commerce organizations. Boulder is where NBS work on time and frequency, cryogenics, and electromagnetic measurements is performed. NBS also operates two radio stations that broadcast time and frequency information--one in Colorado and the other in Hawaii.

NBS was administered by an Acting Director from July 1975 to February 1978, when he was appointed Director.

A major NBS reorganization became effective in April 1978. The current organization, the previous organization, and a crosswalk between the old and new organizations are shown in appendixes I through III, respectively. Currently, there are three major organizational units responsible for the NBS scientific and technical programs--National

Engineering Laboratory, National Measurement Laboratory, and the Institute for Computer Sciences and Technology. The goals of these units are shown in appendix IV.

NBS has two major administrative organizations. The Associate Director for Programs, Budget, and Finance is responsible for planning, developing, and evaluating NBS-wide programs; developing and carrying out policies on programmatic, budgetary, and financial matters; and developing and executing the budget. Most other NBS-wide administrative functions are the responsibility of the Director of Administrative and Information Systems. The staffing and expenses for the administrative and support organizations for fiscal year 1978 are shown in appendix V.

During fiscal year 1978, about 40 percent ($55.1 million) of the work NBS performed was for and funded by other Federal agencies. As shown in appendix VI, NBS appropriations in constant dollars, using 1965 as the base year, decreased by $400,000 between fiscal years 1974 and 1978. During this period other agency funds made available to NBS increased by about $2.8 million in constant dollars. The estimated funding and staff years for NBS projects by selected key words are shown in appendix VII.

In early fiscal year 1978, NBS had 3,061 full-time permanent employees of which 2,608 were at Gaithersburg and 453 at Boulder. The scientific staff consisted of:

Number	Degree level
626	Ph. D.
298	Masters
434	Bachelors

Changes in NBS staffing for the 5-year period 1974-78 are shown in appendix VIII.

In fiscal year 1978, over one-third (1,070) of the total NBS staff was directly engaged in carrying out administrative and management functions at the NBS-wide level. Some staffs assigned to the Laboratories/Institute were also carrying out administrative and management functions for their respective major operating organizations.

SCOPE OF REVIEW

Our review was made pursuant to a joint request dated October 13, 1977 (see app. IX) from the Senate Committee on Commerce, Science and Transportation and its Subcommittee on Science, Technology and Space. On January 13, 1978, we briefed the committees' offices on the first phase of the request which dealt with how NBS fulfilled its responsibilities under 13 specific public laws.

The second phase of the committees' request asked that we monitor NBS activities more extensively in the future. We were informed that the committees' interest would best be served if we furnished information and observations on NBS administration, including such areas as (1) review and approval of projects and programs, including priorities, (2) adequacy of budgeting and accounting, (3) program planning, (4) adequacy of equipment to carry out NBS responsibilities, (5) personnel (staffing), and (6) evaluations of NBS efforts by outside organizations. This report discusses these areas. NBS computer resource use as it relates to these areas will be the subject of a separate report.

We performed our work at the NBS headquarters and main laboratories in Gaithersburg and at its Boulder laboratories. We interviewed key NBS officials and program managers and visited selected laboratories and other NBS facilities. We reviewed in some detail NBS program planning, budgeting, accounting, and other administrative procedures to determine the effectiveness of management decisions. We also studied the NBS basic organic act and other specific acts which directly affect NBS operations.

We coordinated our work with the Office of Technology Assessment (OTA) in connection with its then ongoing study assessing national laboratories. We discussed pertinent matters included in the report with officials in the Office of Management and Budget (OMB) and the National Research Council, National Academy of Sciences.

In accordance with discussions with the committees' offices we obtained oral comments from NBS on this report. NBS officials generally concurred with our observations.

CHAPTER 2

PROJECTS AND PROGRAMS--REVIEW AND APPROVAL

NBS work is classified as either initiatives--projects or programs being undertaken for the first time or expansion of existing programs--or ongoing work called base programs, which includes work being performed for other agencies. As of September 1, 1978, there were about 1,400 ongoing research projects.

Initiatives originate primarily from NBS scientific and management staff ideas and are reviewed and approved by a Laboratory/Institute. The Program Office, under the Associate Director for Program, Budget and Finance, then reviews the initiatives, and presents them to the NBS Executive Board, which ranks them to select those to be included in the budget request to Commerce.

INITIATIVES REVIEW

The Program Office is staffed with program analysts who are scientists and engineers selected from within NBS for 1- to 2-year tours.

Although written procedures have not been issued for program analysts to use in reviewing initiatives or other work, the initiatives must meet certain specified criteria, such as:

--Problem significance. (Economic or commercial importance, social value, scientific value, urgency.)

--Match to NBS mission. (How the proposal fits the NBS mission.)

--Quality of work plan. (How the work is to be done.)

--Institutional health and competence building. (Enhancement of NBS role or capability.)

--Demand intensity. (The perceived importance of the problem.)

--Delivery mechanisms. (A statement of existing or proposed delivery mechanisms.)

In addition to these criteria, the program analysts said they use personal judgment and draw on their own extensive backgrounds in reviewing initiatives.

The program analysts' evaluations of initiatives often result in suggestions to the Laboratories/Institute staffs to combine smaller initiatives or to otherwise improve them. The staffs generally accept these suggestions.

Staff presentations

After the Laboratories/Institute staffs make the needed revisions, the staffs orally present the initiatives to the NBS Executive Board. The Executive Board, chaired by the NBS Director, consists of the NBS Deputy Director, the Directors of the National Engineering Laboratory; the National Measurement Laboratory, NBS/Boulder Laboratories, Office of Administrative and Information Systems, and the Institute for Computer Sciences and Technology; and the Associate Director for Programs, Budget, and Finance. The Executive Board rates the initiatives on the extent that they meet each of the above six criteria.

Program Office analysis

Using the Executive Board ratings, the program analysts list the most highly ranked initiatives, point out alternatives, strengths, and weaknesses in initiatives to the Board and recommend which should be included in the preliminary budget presentation to Commerce. The initiative review process for fiscal year 1980 is shown in appendix X. Generally, the same process has been used in past years. We were told that factors other than the NBS criteria, such as budget ceilings and what is politically acceptable, are also considered before initiatives are included in the preliminary budget request.

The number of initiatives approved by the Laboratories/Institute and presented to the NBS Executive Board each year is generally much higher than what goes to Commerce for approval. For example, for fiscal year 1980, 22 initiatives were presented to the Executive Board but only 9 were approved and included in the preliminary budget request. Although the board has approved some proposed Boulder laboratories' initiatives, none have survived the full budget process in the past 5 years. The number of initiatives NBS has started over the past several years has been small because its appropriation has remained relatively constant. The new work that has been started has sometimes resulted in terminating ongoing work.

A comparison of the funds NBS requested for initiatives for fiscal years 1976-79, the actions taken by Commerce and OMB, and amounts appropriated for the initiatives, based on NBS records, follows.

Fiscal year	Budget request to Commerce	Budget request to OMB	OMB cut	Budget request to the Congress	Appropriations for initiatives
			(millions)		
1979	$10.7	$31.6	$13.0	$18.6	a/$11.3
1978	19.8	2.5	1.4	1.1	b/ 1.9
1977	12.9	4.2	4.2	0.0	0.0
1976	13.9	2.9	2.4	c/1.4	1.1

a/The Senate and House Appropriations Conference Committee disallowed $7.3 million from the budget request consisting of about $6.5 million in work to be done under the Brooks Act and reductions in work planned in the areas of nondestructive evaluation, competency building, and cooperative technology. The appropriation request included a negation amount of about $1.9 million for air/water pollution measurements which NBS will request from the Environmental Protection Agency.

b/Includes a supplemental appropriation of $900,000 for the recycled oil program.

c/Includes about $900,000 OMB added for appliance labeling, efficiency standards, and computer related work.

According to program analysts, OMB and Commerce have not acted favorably on NBS-proposed new work in the past. An OMB official said that there was no attempt to hold the NBS budget down and that the work proposed was judged on its merits. He acknowledged, however, that general economic conditions are sometimes a factor in cutting Federal agency budgets. In its September 1977 report to the Secretary of Commerce, the Statutory Visiting Committee (an outside organization which evaluates NBS activities) stated that one of the key reasons for NBS problems was:

"That those at OMB responsible for NBS have non-technical backgrounds with little understanding of the relevance of this highly scientific work and how it should be managed."

Commerce has recently taken more interest in NBS. For fiscal year 1979, Commerce increased the NBS budget request by $20.9 million--$18.1 million for work in the the computer science area under the Brooks Act (Public Law 89-306), $1.6 million for the recycled oil program, and $1.2 million for resource recovery and conservation. NBS fiscal year 1980 budget request, as approved by Commerce and forwarded to OMB, contains more new work than any previous NBS budget.

Initiatives refused by Commerce and OMB because of the "lead agency" concept

According to NBS officials, the lead agency concept OMB uses has caused problems in getting certain initiatives approved. Under this concept, OMB generally has not allowed NBS to use its appropriations to fund work that another Federal agency (lead agency) has the primary responsibility to do.

An OMB official said that the lead agency concept was established to ensure single agency accountability to the President and the Congress. An agency that has lead responsibility should be looked at for overall guidance on what needs to be done in its area of responsibility. Work proposed by other agencies must fit in with what the lead agency wants. Otherwise, according to the official, it is harder to manage Government programs.

An OTA March 1978 report assessing national laboratories 1/ states that even in cases where the Congress has mandated an activity, sometimes without authorizing funds, NBS has had to approach the lead agency for the needed funding or reprogram existing research so that the legislative mandates could be met. The report also states that although bureaucratic efficiency may be enhanced by such a practice, the potential impact on future national needs can be significant.

OTA's report concluded that the lead agency concept does not allow NBS, the Nation's center for measurement

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1/"The National Bureau of Standards: A Case Study Within the National Laboratories Assessment."

science and standards, to anticipate measurement needs in such areas as energy, environment, or health, or to initiate long-range work unless asked to do so by a lead agency. The report concludes that this runs counter to the organic act's provision that NBS shall maintain and develop national standards of measurements and provide means for making such measurements in scientific investigations. NBS officials feel that OMB should follow up with the lead agency to see that the agency funds the work. Because this is not done, the work is not usually performed. An OMB official said that he has tried to follow up; however, if the lead agency does not believe the work proposed by another agency should be done, generally OMB must agree with the lead agency because it is the primary responsible Federal agency.

Commerce, in anticipation of OMB cuts based on the lead agency concept, cuts NBS initiatives. Our review of NBS initiatives and base programs (ongoing work) adversely affected by the lead agency concept between fiscal year 1976 and fiscal year 1979 showed that Commerce cut eight initiatives and OMB cut two initiatives and one base program because of the lead agency concept. (See app. XI.)

A recent example of the problem with the lead agency concept concerned pollution control. OMB cut NBS environmental measurements for air and water base programs and initiatives for fiscal year 1979. Also, OMB cut NBS resource recovery program (an initiative mandated by law) for fiscal year 1979. A House of Representatives bill authorizing funds for the Environmental Protection Agency for fiscal year 1979 (H.R. 11302) included $3 million for the NBS environmental measurements program and $2 million for the NBS resource recovery program. Funds for these programs were not requested. The March 17, 1978, report on the bill states that the House Committee on Science and Technology found that NBS has had a targeted program related to environmental measurement as part of its traditional mission, and that the committee rejected OMB's recommendation that this program be funded by Environmental Protection Agency appropriations rather than by direct appropriation to NBS on the grounds that the environment is the Agency's responsibility.

As a result of the committee's stand on the lead agency concept, NBS is optimistic that OMB will approve this kind of work in the future. An OMB official said, however, that OMB had not changed its position on this matter.

BASE PROGRAMS REVIEW

As previously mentioned, NBS had about 1,400 research projects underway as of September 1978. Generally, these projects--excluding those being done for other agencies--are reviewed annually through staff presentations of base programs to the Executive Board. According to the program analysts, base program reviews are very general and give the Executive Board an overview of how projects fit into the overall program and budget. The Executive Board rates each program, which may include several projects, according to specified criteria. Written feedback on each program, based on the presentations, is provided to the staff. Appendix VII shows the general subject areas ("key words") addressed by NBS projects, and the estimated number of projects, type and amount of funding, and staff years related to each subject area for fiscal year 1978.

Program managers in the Laboratories/Institute generally monitor NBS work. On October 1, 1978, a new Resource Planning and Monitoring System was implemented. This is an automated system under which the estimated 1,400 ongoing projects will be aggregated into about 250 to 300 "tasks." This system will also collect program, budget, and fiscal information for each task; such information was not collected on projects in the past. NBS officials believe the new system will eliminate much detailed information previously provided but not needed by upper level management.

WORK PERFORMED FOR OTHER AGENCIES

The NBS organic act, as amended, authorizes the Secretary of Commerce to undertake certain functions including (1) cooperation with other governmental agencies and private organizations in establishing standard practices incorporated in codes and specifications and (2) advisory service to Government agencies on scientific and technical problems.

During fiscal year 1978, about 40 percent ($55.1 million) of NBS work was performed for and funded by other Federal agencies. Before the April 1978 NBS reorganization, the percent of other agency work varied among the Institutes, with the Institute for Applied Technology (now part of the National Engineering Laboratory) having the highest percentage.

Generally, other agency work originates with the signing of an agreement or memorandum of understanding between NBS and the other agency. The other agency staff usually contacts the NBS division or center that will do the work and develops the agreement. NBS officials told us that the principal problem NBS had with other agency work is the lack of staffing. The other agency may provide funding but not staff. OTA's March 1978 report assessing national laboratories points out that some programs have been assigned to NBS by Commerce or mandated by the Congress despite the Congress failure to always provide funds and NBS lack of capabilities to perform the proposed work. In most cases, personnel slots have not been provided to allow staff expansion for the new work. (See p. 39.) As a result, NBS has had to reprogram work and reassign staff.

The OTA report states that such reprograming has not always been detrimental, and may have helped eliminate outmoded or inappropriate activities. The report states, however, that there clearly has been some negative impact on core mission programs in measurement sciences and standards, traceable mainly to the fact that only a limited staff is available to perform all the required functions. According to its program analysts, NBS refuses significant amounts of other agency work because it lacks staff--information as to how much was refused was not available.

Although work done for other agencies comprises almost one-half NBS work, the Executive Board does not review or set priorities for work to be performed for other agencies. The Executive Board only reviews and sets priorities for in-house work to be funded by NBS appropriations.

VIEWS ON PROJECT APPROVAL PROCESS

Program analysts and others have expressed concern about the project approval process NBS used. In some instances, the scientific staff spent much time preparing for their oral presentations to the Executive Board by rehearsing the presentations three or four times. Concern for the presentations' quality may have been due to the scientific staff's belief that the presentation was very important in getting the Executive Board to approve an initiative. Also, getting an initiative approved was very competitive. NBS officials said that too much competition existed among the former Institutes, before the recent reorganization, and that an undesirable rivalry developed between the Institutes because of the competitive rating

process used to approve initiatives and set priorities for base programs. This rating process is still being used under the new organizational structure.

Information furnished us indicated that more than a small amount of the research was not of the highest priority and that some NBS efforts were duplicated. An NBS official said that the reorganization would lessen the likelihood of duplication.

Within the past year NBS has identified and eliminated some obsolete work. In its report assessing national laboratories, OTA points out that other agency work has not always been detrimental to NBS in-house research and may have helped eliminate obsolete or inappropriate activities. We believe that NBS should have taken corrective action sooner since over the past few years it received only limited funds for initiatives--in fiscal year 1977 no funds were received for initiatives.

OBSERVATIONS

OMB has not allowed NBS to use its appropriations to perform work which is another Federal agency's responsibility under OMB's lead agency concept, even though the work is mandated by specific legislation or can be performed under the NBS organic act. The Congress is aware of this problem and has taken some actions on it.

Apparently, NBS has recognized that some of its research is not of the highest priority even though NBS has not identified the Nation's highest priority needs. Although some reprograming had taken place in the past, major reprograming of NBS research is planned for fiscal years 1979 and 1980. The NBS Statutory Visiting Committee's 1978 report to the Secretary of Commerce (see app. XV) states that NBS plans "to reduce or terminate a wide range of existing projects in order to accommodate higher priority budget increases." In view of these actions, and the establishment of a central Planning Office in fiscal year 1979 (see p. 15), which is to be responsible for identifying important research areas, we believe that NBS should be given a reasonable time to implement these actions before evaluating their effectiveness.

CHAPTER 3

PROGRAM PLANNING

In the past, NBS planning activity was closely keyed to preparing the annual budget. No sustained effort existed to provide an overall conceptual framework that either related NBS many programs to each other and to its major mission or related that mission to economic development--the principal objective of Commerce. NBS has had an interest in developing long-range planning and analysis, but the complexity of doing this has discouraged such efforts.

IMPEDIMENTS TO LONG-RANGE PLANNING

Because its statutory mission is broad and multifaceted, and NBS serves many user groups in different ways, no single method has been developed to measure the social or economic impact or effectiveness of NBS efforts. NBS research benefits are difficult to measure because they affect many parts of society and the economy. Also, in recent years rational internal priority setting has been hampered by the Congress assigning various new tasks to NBS. For example, between 1965 and 1975 NBS acquired responsibilities under 13 public laws although, in most instances, NBS was not the primary mission agency. Although these assignments were related to the NBS mission, the political urgency associated with them overrode more objective bases for setting priorities. Further, Commerce has not been consistent as to what the NBS role should be. All of these have had an adverse impact on NBS developing long-range planning and analysis.

OTA's March 1978 report states that even the mandates that seem to be well suited to NBS capabilities and mission pose problems:

> "* * * deriving primarily from the fact that they are externally imposed, without consideration of NBS internally-defined priorities and without sufficient resources to cover their costs. The allocation of tasks and the allocation of resources (funds and personnel slots) seem to proceed along different tracks, with different sets of actors, different priorities, and few interrelationships between them. The new tasks are often burdensome because NBS is unable to carry them out without sacrificing part of its existing program. * * * Many would argue that Congress should define the role for NBS, and that reordering of priorities is

called for, if all programs cannot be met. This would not be denied, even by the Bureau. The difficulty is that NBS also has a charge to maintain its competences so that future needs of the Nation, as expressed by Congressional directives, can be met. Perhaps a more cooperative approach in developing Congressional program initiatives might help the Bureau acquire resources commensurate with the scale of its new assignments and still maintain its level of expertise for future work."

ESTABLISHING LONG-RANGE PLANNING

According to an NBS official, OMB felt that no consistency existed in the work NBS had been proposing in its budget requests. An OMB official said that NBS had an "amalgam" of projects and OMB did not believe that all the projects were related. OMB directed NBS to:

--More systematically identify and analyze the needs of the scientific, government, and industry users of NBS services.

--Set priorities for NBS programs considering (1) expected economic benefits arising from filling user needs and (2) other appropriate criteria.

--Design a long-range program plan.

OMB included about $850,000 in NBS fiscal year 1979 budget to carry out these activities.

Responding to the OMB directive, NBS established a central Planning Office on October 1, 1978. At the time of our review, the office's functions had not been formally identified; however, NBS envisions that it will provide advice and leadership to NBS planning and be "impact oriented." The Planning Office is responsible for identifying and quantifying the research which NBS should be doing. According to NBS documents (see app. XII), the Planning Office will:

--Forecast world and national trends that may affect NBS.

--Assess social trends and public attitudes that may affect NBS.

--Develop a plan for analyzing technologies and services needed to meet the requirements of the competitive market structure.

--Perform economic and benefit analyses of technologies, services, or trends which affect NBS.

NBS expects to contract out most of the analyses identifying social and economic benefits and impacts. The fiscal year 1979 budget justifications show that, overall, about 70 percent ($597,000) of the $850,000 budgeted for the Planning Office will be for contract services.

Each year, an NBS scientific staff of four, to be selected on a rotational basis from the Laboratories/Institute, will assist a Planning Office staff of six. These rotating staff members will carry the Planning Office ideas back to the Laboratories/Institute to help insure that their long-range plans agree with Planning Office thinking.

LABORATORIES/INSTITUTE LONG-RANGE PLANNING

For the first time, NBS has directed its major operating units--the two Laboratories and the Institute--to develop 5-year (long-range) plans. The Institute has already developed an ad hoc long-range plan (March 1978) due to a congressional mandate. At the time of our review, the Laboratories were developing their long-range plans. These plans are not related to OMB's requirement that NBS design a long-range program plan.

The Laboratories and the Institute have a planning office responsible for developing Laboratory/Institute-wide plans. Although NBS has no written planning procedures and Commerce has not provided planning criteria, the Laboratories were developing long-range plans.

Each center in the Laboratories will develop a long-range plan for the programs it has or wants to start. Within each center, division chiefs will develop plans which will constitute the center's plan. The Laboratories' planning offices will synthesize the plans into one plan for each Laboratory. The first long-range plans, which will cover fiscal years 1979-83, were scheduled to be submitted to the NBS Director by December 15, 1978.

IMPACT OF PLANNING OFFICE EFFORTS ON LABORATORIES/INSTITUTE LONG-RANGE PLANS AND PROPOSED MAJOR REPROGRAMING

The central Planning Office will identify areas that it believes NBS should be researching. The office will consider social trends, public attitudes, and national and international trends which may significantly affect NBS.

The Office will not complete identifying research areas until October 1979. Accordingly, the long-range plans that the Laboratories/Institute will have developed may have to be changed after the Planning Office completes its analysis. An NBS official said that the Laboratories/Institute plans are based on the assumption that NBS will continue to do generally that research which it is now doing.

An NBS official said that the major reprograming effort planned for the next 2 fiscal years will tie in well with the Planning Office efforts because the new research addressed by the reprograming is the kind of work NBS anticipates doing in the future--electronics and materials (corrosion) research, which were chosen because of congressional interest.

OBSERVATIONS

NBS has not previously had long-range planning on an NBS-wide basis and, at the time of our review, it was not always performing the highest priority research. Actions taken to strengthen the planning function and to perform more high priority research included (1) establishing a Planning Office on October 1, 1978, and (2) a proposal to the Secretary of Commerce for a major reprograming of ongoing research. These efforts must be implemented before an evaluation can be made.

CHAPTER 4

BUDGETING AND ACCOUNTING PROCEDURES

NBS budget development and submission was adequate. At the request of the House and Senate Appropriations Committees, a percent of the NBS appropriation will no longer be set aside as part of the Secretary's Reserve. Using a working capital fund has provided NBS an operating flexibility and a viable accounting for its receipts and disbursements. However, improvements appear to be needed in applying the NBS complex, three-tiered overhead costs to projects which NBS planned to review. NBS has had problems reconciling its storeroom inventories but has taken action which, if properly implemented, could alleviate most of the problems.

BUDGETING FOR FUNDS

In developing its fiscal year 1980 appropriation request, NBS scientific and administrative staffs proposed initiatives to their respective Laboratories/Institute. The initiatives selected by the Laboratories/Institute were sent to the Program Office for review of the proposals for problem significance, match to NBS mission, quality of work plan, enhancement of the role and capability of NBS, demand intensity, and delivery mechanism.

The Budget Office, also in the Office of the Associate Director for Programs, Budget, and Finance, reviewed the initiative proposals for reasonableness of accompanying cost estimates, particularly those that were capital-intensive or were connected with NBS administrative programs.

After the Program and Budget Offices completed their reviews of the initiatives, the Associate Director for Programs, Budget, and Finance informed the Director, NBS, of those that appeared to meet NBS criteria. The initiatives were reviewed and priorities set by the Director and Executive Board since more were proposed than could be included in the budget request. The initiatives were then sent to Commerce's Assistant Secretary for Science and Technology for his decision as to which initiatives should be included in the budget. The Budget Office made a detailed cost estimate of those selected.

The Budget Office (1) computed the adjustments to the base programs for increased costs, such as for pay, travel, and utilities, (2) estimated and allocated the percent of projected bureau overhead applicable to proposed line items, and (3) computed an "inflation factor" on equipment purchases for the estimated difference between accumulated

depreciation charges and replacement costs. The office also converted the scientifically worded narrative justifications into lay terms for initiatives and base programs. The revised text was reviewed by the Program Office, Laboratories/ Institute Directors, and the NBS Director.

Personnel from the office of Commerce's Assistant Secretary for Administration reviewed the initiatives and base program adjustments included in the NBS proposed fiscal year 1980 budget justifications and made recommendations to that Assistant Secretary. The Assistant Secretary for Science and Technology could appeal the proposed changes to the Assistant Secretary for Administration and the Secretary of Commerce.

The NBS proposals would have been adjusted to recognize the effects of OMB's allowance for the overall Commerce budget.

Use of Reserve funds questioned

In January 1978, the Surveys and Investigations Staff of the House Appropriations Committee reported that for fiscal years 1972-78, some funds appropriated for NBS programs were not available for intended purposes; the operating appropriations of Commerce's constituent agencies, including NBS, were assessed about 1 percent each of those years to fund the Secretary of Commerce's Reserve. The Surveys and Investigations Staff concluded that the Reserve moneys were used on some projects not meeting the Commerce criteria for Reserve-funded projects; that is, the projects (1) were not necessarily of an emergency nature, (2) augmented certain existing programs with funds from various programs without congressional approval, or (3) were used to initiate some programs before the requested notification to the House and Senate Appropriations Committees.

The money assessed for the Secretary's Reserve was not to be spent without the Secretary's prior approval; however, any money not designated for projects by the fourth quarter of the fiscal year was released to the Commerce constituent organizations to be spent on their regular programs.

As a result of the report, the House and Senate Appropriations Committees recommended appropriating $2 million for fiscal year 1979 to the Secretary's special intiatives fund, so that the Secretary need not fund the Reserve by assessing the operating funds of Commerce's constituent agencies. The committees recommended correspondingly reducing the funds requested for those agencies, including $300,000 on NBS funds.

The Surveys and Investigations Staff also reviewed the use of the NBS Director's Reserve which was funded by assessing about 1 percent of the NBS appropriation, unobligated carryover, and unused balances from the Secretary's Reserve. The staff concluded that the Reserve's objective appeared to be to seek new programs that would perpetuate NBS existence rather than meet unanticipated demands. In fiscal years 1976, 1977, and 1978, about $940,000, $1,374,000, and $1,600,000, respectively, were allocated to various NBS projects from the Director's Reserve. The House and Senate Appropriations Committees took no action on this Reserve.

ACCOUNTING FOR FUNDS--THE WORKING CAPITAL FUND

Most funds received and expenses paid by NBS are handled through the working capital fund.

During fiscal year 1950, NBS decided that fiscal control of its programs would be improved by developing new fiscal management, cost determination, and reporting methods for each project undertaken. A team from the General Accounting Office and the Office of the Secretary of Commerce and the NBS staff members studied the problems and concluded that a wholly reimbursable revolving fund, together with an integrated industrial-type cost accounting system would provide a mechanism for effectively managing NBS operations.

The working capital fund was established for financing NBS operations beginning July 1, 1950. The Comptroller General approved the design of the NBS accounting system in February 1953. Initial capitalization consisted of an appropriation of up to $3 million and NBS receivables, inventories, and other assets, including the value of buildings, lands, and other facilities.

The fund assumed the outstanding liabilities. To provide needed operating capital, additional sums have been appropriated over the years. As of September 30, 1978, the working capital fund was capitalized at $167.7 million, consisting of $24.8 million from appropriated funds and $142.9 million from donated capital, including land, buildings, and other facilities.

In fiscal year 1978, the working capital fund included the National Technical Information Service (excluded as of October 1, 1978) and the National Telecommunications and Information Administration accounts. Accordingly, the amounts cited also include these organizations' assets and liabilities.

Funding sources for the working capital fund include:

--Direct appropriations.

--Advances and reimbursements from other Government agencies and from nongovernment organizations.

--Gifts and bequests.

Charges to users may be made on the basis of actual costs or on a fixed price basis. Work of a nonroutine nature, either for NBS or for others, is charged at actual cost. Repetitive tests and calibrations are charged on the basis of predetermined fees.

Each distinct job NBS undertakes, either for others or itself or for overhead purposes, is identified by a cost center 1/ for accumulating costs and for program management. Each cost center is assigned to an organizational unit and is identified with a specific source of financing.

All direct costs incurred in performing a job are recorded in a designated cost center. Direct costs include such items as salaries, including fringe benefits, travel, materials, supplies, contractual services, and certain equipment. The charge to cost centers for salaries include, in addition to the employee's actual hourly rate of compensation, a factor for leave the employee earned while working on that job. Since an employee will often work on more than one job during a given period, charging for leave on an accrual basis provides an equitable solution. As of September 30, 1978, about $7.5 million was estimated to be leave payable and funds had been accumulated for $6.4 million of it.

Costs such as general administration, program direction, staff services, housekeeping services, utilities, and grounds and buildings maintenance are distributed as overhead charges on a predetermined basis. (See pp. 24 to 27.)

Each year, the Office of the Comptroller estimates the amount of working capital fund cash that will be available to acquire and hold the following assets. When an asset is used, the working capital fund is reimbursed by the benefiting cost center through charges for depreciation.

1/Cost centers are not organizational units but are the lowest levels for accumulating cost data for accounting purposes.

1. General purpose equipment. Equipment (scientific and other) having general utility, costing $300 or more, and having a long enough projected useful life for the cost to be recovered through depreciation charges to the benefiting cost centers. Equipment costing less than $300 and special equipment (equipment generally usable only on a special or single project) are charged in full to the job when the equipment is acquired.

2. Standard reference materials. Materials certified as to physical characteristics or composition whose production costs are financed by the fund. The materials are kept under inventory control until they are sold and the fund is reimbursed. The book inventory value of finished standard reference materials was about $4.3 million at September 30, 1978.

3. Supplies. Thousands of different electrical, electronic, chemical, hardware supplies and materials, and office supply items. The items are purchased with working capital funds and carried as assets of the fund until used and charged to a requisitioning project. At September 30, 1978, the book value of this inventory was about $0.8 million.

Buildings are not acquired as investments of the working capital fund. They are acquired through the appropriation process and were not subject to depreciation until fiscal year 1979. NBS land and buildings were valued at about $123 million at September 30, 1978.

Reimbursements to the working capital fund in excess of costs are recorded as earned net income, or profits, and are deposited into the U.S. Treasury. Profits cannot be retained in the working capital fund under present authority except that they may be used first to restore any prior year losses. Profits or losses arise principally from charging fixed prices for certain services, and from over or under application of overhead rates. The working capital fund had a loss of $317,151 and a gain of $1,120,133 for fiscal years 1977 and 1978, respectively, and a cumulative loss of $6,861 through September 30, 1978.

The working capital fund gives NBS desirable fiscal operating flexibility.

OVERHEAD

NBS three overhead levels--bureau, Laboratories/ Institute, and center--may be causing an inequitable distribution of overhead costs to projects. Fiscal year 1978

overhead costs were about $46.1 million, or 35 percent, of total funds available to NBS.

Bureau overhead is applied on a predetermined percent to all labor costs including Laboratories/Institute and center overhead labor and the individual scientific/technical projects. Laboratories/Institute overhead is applied to the respective centers' overhead and project labor. Center overhead is applied to all scientific/technical project labor costs within the center.

Each overhead level must estimate the total labor cost over which its overhead will be distributed and its overhead costs in order to arrive at a predetermined percentage to be charged to the cost centers bi-weekly. The percentages may be adjusted for proposed changes and variations in actual costs from prior estimates.

Bureau overhead

The bureau overhead rate during fiscal year 1978 was 47.5 percent compared to 39 percent in early fiscal year 1973. Appendix XIII lists the bureau overhead rates for fiscal years 1973-78 and includes NBS explanation for the changes.

Bureau overhead costs include the following:

--Salaries and other operating costs of the Office of the Director; Office of the Associate Director for Programs, Budget, and Finance; and most of the administrative and support functions under the Office of the Director of Administrative and Information Systems, including computer systems design and the Boulder administrative offices.

--All NBS utilities.

--NBS plant maintenance.

--Library operations.

--General editorial and printing costs for NBS publications.

Laboratories/Institute overhead

At September 30, 1978, the following rates were charged:

	Percent
National Engineering Laboratory	4.5
National Measurement Laboratory	6.0
Institute for Computer Sciences and Technology	17.0

The labor bases of the Laboratories were nine times larger than that of the Institute; this contributed to the higher Institute overhead rate.

Examples of costs chargeable to Laboratories/Institute overhead cost centers follow:

--Laboratories/Institute office staff salaries and personnel benefits and other expenses essential to office operations--supplies, materials, travel, etc.

--Salaries and personnel benefits of other employees detailed temporarily to Laboratories/Institute office tasks.

--Special in-house or contract Laboratories/Institute-wide program studies.

--Special other expenses, such as pooled general use equipment assigned to the Laboratories/Institute and used by all the centers or divisions within the Laboratories/Institute.

--Selected training costs of employees attending broad program training at the request of the Laboratories/Institute directors.

--Moving or reorganization costs resulting from the move of several offices ordered by the Laboratories/Institute directors to consolidate operations, to provide space for new programs, or to improve overall Laboratories/Institute efficiency.

Center overhead

The centers' overhead rates at September 30, 1978, varied significantly--from 23.7 percent to 48 percent. This wide range can be partly attributed to (1) the various sizes of the centers' labor bases and (2) the NBS Administrative Manual which permits center administrators considerable flexibility in determining what may be charged to overhead.

Center overhead costs can include the following:

--Center and division administration which cannot be readily identified with a cost center or group of project cost centers.

--Other center expenses, such as stationery supplies, equipment use charges, and depreciation on equipment assigned a center and its divisions.

--Salary and travel costs for attending meetings not directly related to individual cost centers.

Depreciation (and the equipment use charge on fully depreciated equipment still in use) is charged to center overhead for all equipment assigned to a center and its divisions and is distributed as part of the overhead applied to direct labor. Distributing depreciation charges on the basis of direct labor costs could cause an inequitable distribution of center overhead costs. For example, if two projects within a center have equal labor costs, they will be charged the same amounts for depreciation expense regardless of the amount of general purpose equipment being used on their projects. An NBS official told us that NBS planned to review the equity of the three-tier overhead rate system beginning in December 1978.

PROBLEMS WITH SUPPLY INVENTORY RECONCILIATIONS

In fiscal year 1978, seven Gaithersburg cost centers were responsible for electronics, noncapital equipment, cryogenics gases, metals, garage (gasoline and parts), and two general supplies inventories. NBS improved its storeroom inventory recordkeeping in 1978, but the effect of its actions will not be known until August or September 1979 because the changes made to improve the reporting system and reconciliations were in effect for only part of fiscal year 1978.

According to an NBS official, NBS made the changes after it had to decrease the book inventory values about $67,500 in fiscal year 1977 to agree with the physical count for all cost centers, except the garage, because its adjusting entry could not be agreed on. The reasons for the difference were unknown and the amount of adjustment needed was not certain due to (1) an inadequate reporting system, (2) lack of regular reconciliations of records to counteract the reporting system's deficiencies, and (3) uncertainties over whether the recording of transactions was cut off on the same dates

the physical inventories were taken. The August 1978 physical inventories for five of the seven cost centers resulted in increasing the book inventories about $9,800 to agree with the physical count. The cryogenics gases and garage inventory adjustments had not been agreed upon as of the end of fiscal year 1978.

According to officials, the differences in physical and book inventory values under the old system could have been due to one or more of the following causes:

--The computerized recordkeeping system was not programed to provide a printout of the issues by quantity. Thus, storeroom personnel could not readily pinpoint errors when reconciling the inventory records with the accounting records.

--Recording storeroom receipts of goods at actual cost in the accounting records and on a moving average cost each time a particular item was received in the storeroom records could provide some inventory cost differences.

--Loss due to issuance, such as a loss from cutting a piece of metal from a longer piece.

--Undetected theft.

We believe NBS should continue implementing its plans to bring inventories under adequate control so that discrepancies can be pinpointed and adjustments for unexplained differences in book and physical inventory values can be minimized.

OBSERVATIONS

In providing accounting services for the National Telecommunications and Information Administration, NBS accounts have been improperly commingled with those of the agency.

Because of (1) the recent major NBS reorganization (April 1978), (2) the numerous requirements contained in legislation passed since 1965 affecting NBS, and (3) functional changes, including data processing applications, the NBS accounting system should be resubmitted to GAO for approval.

Improvements appear necessary in applying the NBS complex three-tiered overhead costs to projects.

CHAPTER 5

EQUIPMENT ACQUISITION AND MANAGEMENT

NBS officials and employees have expressed some concern about the shortage of modern (state-of-the-art) laboratory equipment. Sometimes the lack of such equipment has resulted in redirecting research, reducing researchers' morale and willingness to undertake new areas of research, and delaying the work.

As of September 30, 1978, the NBS equipment inventory was valued at about $91.4 million (at cost).

SHORTAGE OF MODERN (STATE-OF-THE-ART) EQUIPMENT

Quantifying the alleged shortage of state-of-the-art laboratory equipment is difficult for two reasons. First, criteria has not been developed to establish what constitutes adequate equipment, particularly for a laboratory such as NBS, which performs extremely diverse work. Second, no policy statement has been made, by NBS or others, as to whether all laboratories at NBS should perform research at the state-of-the-art level. If such research is to be performed, laboratory equipment should also be at that level. NBS employees were reluctant or unable to furnish information on what effect the lack of state-of-the-art equipment is having. The general opinion was that with such equipment the work could be done faster and more accurately.

NBS employees pointed out that sometimes a lack of such equipment in basic research has resulted in redirecting efforts. Since the output of basic research is not known beforehand, it is difficult to determine the effect of not doing the research other than the failure to follow up on ideas. In applied research, lack of state-of-the-art equipment generally results in delaying work since the direction of research is predetermined by the requestor. Some of the needed equipment would be used to do things already being done but in a quicker, more efficient, and more accurate manner.

Division chiefs and center directors we interviewed suggested other effects of laboratory equipment shortages. These included a lower morale among researchers and reduced willingness to undertake new research because of the expectation that adequate equipment would not be available. These effects could not be documented.

In April 1978 the National Measurement Laboratory sent a questionnaire to its division chiefs to determine the status of scientific instrumentation in the Laboratory. In their responses, the division chiefs indicated that for all the individual laboratories within the Laboratory to be brought up to the state-of-the-art level, approximately $116 million in new equipment would be required over a 5-year period.

FUNDING, REQUESTING, AND ACQUIRING GENERAL PURPOSE AND SPECIAL EQUIPMENT

Funding

Equipment acquisition is funded by:

--Allocating depreciation charges accumulated in the NBS working capital fund. The depreciation charges are paid by the using organization to the fund based on the cost and estimated life of equipment purchased with funds from the working capital fund (including funds appropriated to compensate for inflation).

--Using directly appropriated funds for purchasing equipment.

--Allocating funds directly appropriated for the NBS equipment modernization program. (See pp. 33 and 34.)

--Using other agency funds transferred to NBS to support other agency-requested research and development projects. Title for such equipment can be with NBS or the other agency.

In addition, equipment can be acquired by available working capital fund cash, gift, surplus from other agencies, construction, rentals, or lease-purchase.

The primary funding source for general purpose equipment is the NBS working capital fund which is supplemented by the equipment modernization fund provided through direct appropriation. The equipment modernization fund is scheduled for termination in fiscal year 1981. In fiscal years 1977 and 1978, $5,628,000 and $6,338,000, respectively, were allocated for general purpose equipment, of which $2,085,000, for each of the years, was from the equipment modernization fund.

Requesting equipment

Requests for scientific equipment are initiated by the researchers needing the equipment. Annually, NBS division chiefs set priorities for the equipment needed in their divisions, including a justification and an estimated cost for each piece of equipment. The priority lists are submitted, through center and Laboratories/Institute Directors who consolidate and set new priorities for the equipment on the basis of needs, to the Program Office. Using a formula, the office allocates available funds from the working capital fund and the equipment modernization fund to the Laboratories/Institute. The formula considers the amount of base programing in a unit and the relative priority of programs.

Except for equipment requests for new initiatives, NBS does not identify which pieces of equipment will be funded or the cost when establishing the budget request for modernization and replacement money for general purpose equipment. After estimates are established on the moneys available from the working capital fund depreciation charges, and the equipment modernization fund, NBS officials select the equipment to be purchased from priority lists submitted by the Laboratories/Institute. The amount of money available from these sources dictates what equipment is to be purchased, which may or may not be the highest priority equipment. For example, equipment may be purchased as a result of decisions to continue or conclude a lower priority project or to build scientific competency in selected areas.

In fiscal year 1978, for the first time, NBS computed an inflation factor to apply to depreciation charges and included it in its budget request; a lump sum appropriation was recommended by the House and Senate Appropriations Committees. NBS has not computed an inflation factor for the $15 million equipment modernization fund requests. We were told that NBS did not consider it politically prudent to request an inflation factor adjustment for this fund. Although the methodology had been approved by Commerce, NBS has not validated the index used in computing the inflation factor to see if it really matches the inflation encountered in equipment purchases.

A comparison of amounts requested by the Laboratories/Institute and amounts allocated for general purpose equipment by the Executive Board for fiscal years 1964-78 follows.

Fiscal year	Amount requested	Amount allocated	Percent allocated
	(thousands)		
1964	$ 6,847	$2,472	36
1965	3,336	2,381	71
1966	4,297	2,510	58
1967	3,568	2,100	59
1968	4,404	1,975	45
1969	3,477	1,480	43
1970	3,062	1,600	52
1971	4,637	2,028	44
1972	3,472	1,864	54
1973	6,862	1,700	25
1974	6,610	3,302	50
1975	9,601	4,304	45
1976	9,387	4,685	50
1977	11,474	5,628	49
1978	15,305	6,338	41

According to division chiefs and center directors, several methods are used in attempting to acquire laboratory equipment outside of the general purpose equipment allocation.

1. Leasing equipment. Payment is made from operating funds instead of from general purpose equipment allocation. This results in a trade-off between personnel and equipment funding.

2. Trading unused equipment for equipment needed. NBS researchers often retain unused equipment rather than excessing it in hopes that the unused items may be traded.

3. Borrowing equipment from other NBS researchers on the same staff or division at NBS. While the division chiefs are aware of the equipment inventory listing maintained by the NBS property management office, they make little use of it and normally borrow equipment only within their own division where they and their staffs know what equipment is available and what condition it is in. The division chiefs told us that, generally, they do not borrow equipment from other divisions because (1) of the physical distances involved, (2) of their need for equipment suitable for the work being done, and (3) the inventory listing does not include the equipment's condition.

In our opinion, the reasons given do not justify the decision to not borrow equipment from the other divisions, and top management should issue policy instructions to encourage borrowing equipment both within and between divisions.

4. Using large specialized pieces of equipment available at other Government and university laboratories in the Washington area. Most of these laboratories allow NBS scientists to use equipment not available at NBS if they will not tie the equipment up for long periods.

In addition, divisions will sometimes jointly purchase equipment from general purpose equipment funds, trade "other objects" funds from one division for equipment funds from another division, or include the cost of small equipment in requests for higher priority equipment.

EQUIPMENT MODERNIZATION PROGRAM

In August 1971, NBS issued a study entitled "Equipment Needs of National Bureau of Standards." This study concluded that much of NBS equipment was obsolete or inadequate, and proposed a 5-year plan for state-of-the-art equipment acquisition. The plan called for a total investment of approximately $40 million. The necessary funds would be obtained from a $15 million increase in the plant and facilities appropriation over the 5-year period, a $15 million appropriation to the working capital fund for equipment purchases over the 5-year period, and $10 million derived from user depreciation charges paid to the working capital fund. This would have resulted in an equipment modernization program of about $8 million a year over a 5-year period.

Funds for the equipment modernization program did not become available until fiscal year 1974. Of the $40 million recommended, $24.2 million had been made available through fiscal year 1978 from:

Source	Amount (millions)
Depreciation charges	$13.3
Equipment modernization appropriations	9.5
Investment of available working capital fund cash	1.0
Appropriations to offset inflation factor	0.4

NBS has not requested any appropriated funds for the planned $3 million annual increase in the plant and facilities appropriation ($15 million over the 5-year plan).

In November 1978, NBS began planning a study to determine whether or not a strong case could be made for extending the modernization program beyond fiscal year 1981. A report on the study was scheduled for January 1979.

EQUIPMENT CONTROL

Generally, NBS procedures are adequate to maintain physical control of equipment valued at about $91.4 million (at cost). Regarding minicomputers, these controls were bypassed making it difficult to confirm how many minicomputers NBS owned. The breakdown occurred because of (1) a decision to withhold entry of minicomputers purchased under a large order into the inventory system until all those included in the order were received and (2) the researchers' option to classify minicomputers as either automatic data processing equipment or scientific equipment. NBS employees estimated that there could be 100 to 120 minicomputers (valued between $4 million to $6 million) but could identify only 63 in the inventory listing. (This matter will be discussed more fully in our soon to be issued report "National Bureau of Standards Needs Better Management of Its Computer Resources to Improve Program Effectiveness," CED-79-39.)

Accounting personnel do not participate in taking the physical inventory of equipment as required by Commerce property management regulations and as recommended in a 1975 Commerce internal audit report. Responding to the report, NBS stated that the Accounting Division was now participating in such inventories. At the time of our review, however, this was not being done.

NEED FOR BETTER USE OF PROPERTY

NBS has not established a formal method to monitor the use of laboratory equipment. Therefore, NBS has been unable to ensure that unused equipment is excessed.

Divisions are encouraged to establish equipment pools at the division level as a convenience to the staff and a method for increasing equipment use. Equipment pooling is used at the NBS Boulder facilities, but not at Gaithersburg. Procedures have been developed to loan equipment between laboratories on a NBS-wide basis; however, this has usually been limited to laboratories within a division. NBS personnel interviewed at Gaithersburg did not favor either pooling

or loaning equipment because of perceived problems with maintenance, calibration, and equipment availability. We believe that pooling and loaning of equipment could reduce, to some extent, the effect of equipment shortages.

DISCLOSURES OF EQUIPMENT PURCHASES COULD BE IMPROVED

NBS disclosures to the Congress on use of the working capital fund to purchase equipment could be improved. In the past NBS has prepared and made available to the Congress lists of equipment funded with the previous year's equipment modernization appropriation, but has not done so for equipment funded by repayments to the working capital fund.

In its fiscal year 1978 budget justifications, NBS told the House and Senate Appropriations Committees that it was raising its self-imposed upper limit for financing equipment from the working capital fund to $350,000. However, the total funds allocated in 1978 for two self-financed projects exceeded that limit.

Due to potential interruption of radio station WWVB service if key obsolete and worn out components failed, the NBS Executive Board decided in March 1977 that a proposal to automate and replace the station's transmitters and related equipment should be funded in fiscal year 1978 by the working capital fund instead of requesting a fiscal year 1979 appropriation. The proposal's total estimated cost was $520,000 when approved.

Also, in 1978 NBS allocated $450,000 for a nuclear magnetic resonance facility. The proposal for that facility had been turned down by Commerce as a fiscal year 1978 budget initiative. While the proposal indicated that several pieces of equipment were involved, no cost breakdown was available.

As a result of using this funding method, NBS (1) used a relatively large portion of the general equipment funds allocated in fiscal year 1978 for just two projects, (2) exceeded its self-imposed limit for capitalizing equipment, and (3) did not afford Commerce, OMB, and the Congress an opportunity to exercise their oversight responsibilities.

OBSERVATIONS

We found a general consensus that a shortage of modern (state-of-the-art) laboratory equipment exists at NBS. While the shortage could not be quantified, it was

apparent that the NBS scientific staff sees it as a problem. NBS does not have the information readily available to determine whether its scientific equipment is meeting its needs. Procedures have not been established for monitoring the need for new equipment or the condition or use being made of equipment available. Without such information, it is difficult for NBS to adequately plan or budget for needed equipment.

NBS has not complied with the Commerce property regulations and Commerce's internal audit recommendation that accounting personnel participate in planning and performing physical inventories of equipment even though Commerce was informed that NBS was doing so.

NBS has not validated the index used in computing the inflation factor for the $15 million equipment modernization fund requests.

In funding the automation of radio station WWVB and the nuclear magnetic resonance facility from the working capital fund, NBS did not afford Commerce, OMB, and the Congress an opportunity to exercise their oversight responsibilities.

CHAPTER 6

EMPLOYMENT OF NBS PERSONNEL AND RELATED MATTERS

The number of NBS scientists has been about the same for the past 5 years. The turnover rate has declined and the average age of the scientists has been increasing at about 1/2 year per year during this period. During the same 5 years, however, the technical staff decreased 25 percent and had a turnover rate more than twice that of the scientific staff.

In its 1977 report (see app. XVI) to the Secretary of Commerce, the Statutory Visiting Committee expressed some concern over the NBS staff's weakening morale. We found no evidence of serious morale problems; this is supported by the low (and declining) turnover rate and the increasing age of the NBS scientific staff.

PERTINENT PERSONNEL STATISTICS

The following table shows the number of full-time permanent employees at June 30 for the latest 5-year period. (See app. VIII.)

Employee classification	1974	1975	1976	1977	1978	5-year change
Professional	1418	1403	1404	1407	1416	-2
Technical	381	373	346	303	286	-95
Administrative/ clerical	861	877	865	823	822	-39
Wageboard	497	493	503	527	508	+11
Total	3157	3146	3118	3060	3032	-125

The full-time permanent staff was augmented by the employment of part-time and intermittent/temporary employees as follows:

Employee classification	1974	1975	1976	1977	1978	5-year change
Professional	137	154	144	138	128	-9
Technical	32	27	35	34	25	-7
Administrative/ clerical	127	127	136	162	177	+50
Wageboard	20	33	31	61	95	+75
Total	316	341	346	395	425	+109

NBS does not convert the time worked by its part-time and intermittent/temporary employees to equivalent staff years by class of employee. Accordingly, the total effort expended by these employees on a staff-year basis, as a measure of their contribution to carrying out NBS projects and programs, was not available.

As shown in the previous tables, there has not been a significant change in the NBS professional scientific staff. The major change occurred among the full-time permanent technical employees--reduced by 95 in the 5-year period, which may cause problems for NBS. Scientists (who are generally paid more than technicians) are being required to perform work formerly done by the technicians. This results in increased cost and reduced time available for scientists to perform work of a higher scientific level.

The turnover (separations) percent of full-time permanent employees has been rather low and there has been a net decline over the past 5 years as shown below:

Employee classification	1974	1975	1976	1977	1978
Professional	6.0	7.8	4.9	5.5	4.7
Technical	11.1	5.3	7.0	11.8	9.6
Administrative/ clerical	16.3	12.5	11.5	11.7	11.4
Wageboard	10.5	7.7	9.5	12.4	7.8
Total staff	10.2	8.8	7.7	9.0	7.5

NBS staffing ceilings are set by Commerce based on overall Commerce ceilings established by OMB. Ceilings are established for full-time permanent personnel and for part-time and temporary personnel. At the end of the fiscal year, NBS furnishes a report on its compliance with the established ceilings to Commerce and OMB.

The NBS staffing ceilings at June 30 for the last 5 years follow:

	Number of employees		Change from prior year		Exempted from ceiling	
Year	Full-time	Other	Full-time	Other	Full-time	Other
1974	3121	366	-	-	33	109
1975	3139	426	+18	+60	10	130
1976	3097	412	-42	-14	25	100
1977	3065	482	-32	+70	23	99
1978	3121	512	+56	+30	5	111

INCREASING AGE OF SCIENTISTS

The average age of the NBS scientific staff has been increasing at an average rate of 1/2 year per year. The average age in 1971 was 40.7 years and in 1977 it was 43.7 years. The change by age group between December 1971 and December 1977 is shown in the following table:

Age group	Number of employees 1971	1977	Percent of change
Under 30	131	84	-35.8
30 - 39	473	419	-11.4
40 - 49	486	514	+ 5.8
50 - 59	269	326	+21.1
60 - 69	43	75	+74.4
Total	1402	1418	

The increasing age is due to the low turnover of scientific professionals, the success NBS has had in recruiting senior scientists, and the lack of success in recruiting younger scientists with new degrees. NBS attributes the latter to the higher salaries commercial laboratories offer graduating scientists. These factors, coupled with the relatively stable NBS personnel ceilings, result in an ageing staff.

NBS view is that the only impact of the scientists' increasing age is that a large number will become eligible for retirement at about the same time. NBS program managers would prefer a larger turnover in order to increase the flow of new ideas. According to NBS officials, it would be difficult to show that the increasing age has had significant effects on productivity or innovativeness.

EMPLOYEE MORALE

In its 1977 annual report (see app. XVI) to the Secretary of Commerce, the Statutory Visiting Committee expressed concern over the NBS staff's weakening morale. The committee attributed this to:

"a) The laissez faire attitude and the low priority that the Department of Commerce has given the NBS.

"b) That those at OMB responsible for NBS have non-technical backgrounds with little understanding

of the relevance of this highly scientific work or how it should be managed.

"c) That new congressional assignments continue to be given without additional resources."

NBS division and center directors admitted the possibility of low morale among the NBS scientific personnel. These officials cited lack of equipment and adequate computer support, too much administrative work, too little flexibility, and inadequate staffing as the reasons for possible low morale.

Because of the relatively low turnover rate for scientific personnel accompanied by an increasing average age, it would appear that NBS has a stable scientific community. This, when coupled with the NBS reputation for high quality research work output, would indicate a relatively satisfied research staff.

NBS officials believed that morale is an individual matter and that some scientists may have low morale for any reason cited or for other reasons, including personal problems or that research is not held in as high esteem as it has been in the past. The officials felt that, generally, morale at NBS is not low, as evidenced by the quality of NBS research.

VISITING SCIENTISTS AND RESEARCH FELLOWS PROGRAMS

NBS facilities are available to scientific investigators and to qualified individuals, including students and graduates, to work on NBS programs or areas of interest to NBS. The following programs are currently in effect at NBS.

1. National Research Council/National Academy of Sciences/National Academy of Engineering Postdoctoral Research Associateships. Postdoctoral Research Associateships are designed to provide the opportunity for advanced training for young investigators of unusual ability and promise through participation in NBS basic research programs.

   Postdoctoral Research Associateships are open to U.S. citizens who have completed training equivalent to a Ph. D. or Sc. D. degree in a field of science of interest to NBS. Associates

under this program receive a temporary appointment as a Federal employee at GS-11 (now $19,263 per annum) or higher for a 1-year period which may be extended to 2 years when it is determined that the extension will benefit both the associate and NBS. About 40 Postdoctoral Research Associateships are awarded each year.

2. Foreign Trainee Program. This program is open to noncitizens having suitable technical or professional qualifications and who are sponsored by their country or by an international organization. They must be cleared by the State Department.

   Such trainees are not employees of the Federal Government, and compensation and incidental expenses are the responsibility of the trainee or his sponsor. Trainees must agree to conform to Commerce and NBS administrative requirements. NBS accepts approximately 20 foreign trainees each year.

3. Guest Workers. NBS facilities are available for limited periods of time to certain qualified persons to pursue individual scientific or technical projects under conditions determined by NBS--only if the objectives of their proposed work will sufficiently benefit NBS objectives.

   Each guest worker must sign an agreement waiving claim to compensation, releasing the Government from all liability, accepting accountability for loss of or damage to Government property, and agreeing to conform to Commerce and NBS administrative requirements. In October 1978 there were 98 guest workers at NBS.

4. Research Associates. Under this program, researchers sponsored by industrial, professional, trade or other organizations, may use NBS facilities and special competencies, under NBS guidance and supervision, to conduct research of clear mutual interest and potential benefit to the industry involved, the national economy, and the public.

   The sponsor provides all compensation and expenses for research associates. Each associate signs an agreement outlining the work to be performed and agreeing to abide by all NBS policies and regulations. Usually, there are about 80 associates at NBS.

5. Visiting Fellow Program. This program of the Joint Institute for Laboratory Astrophysics (a joint NBS and University of Colorado program) is open to citizens and noncitizens from academia, industry, and government with expertise in atomic, molecular, laser, optical, chemical, or astrophysics disciplines. Fellows receive a faculty appointment from the University of Colorado, with all faculty privileges, and are paid by the University with grant money from NBS. Appointments are for 6 months to 1 year. Approximately 10 fellows are selected each year.

6. Cooperative Program in Physics. This program is for "distinguished scientists of a junior level" (postdoctorate). Citizens and noncitizens with a recent Ph. D. in fields useful to the Joint Institute for Laboratory Astrophysics are eligible.

   They are paid by the University of Colorado with contract funds furnished by the NBS Quantum Physics Division. Approximately six to eight co-ops are selected each year by the Joint Institute for Laboratory Astrophysics.

7. Summer Faculty. These are positions of a scientific, professional, or analytical nature to be filled by bona fide faculty members of an accredited college or university who are qualified for the position. Employment is not to exceed 130 working days a year. Approximately 12 summer faculty members are appointed each year.

8. Co-op Program. This program designed for graduate students is to enrich the educational process by providing work experience to students and to give agencies assistance in recruiting for long term needs.

   Appointments are noncompetitive with conversion to permanent employee upon completion of degree. Appointments are for 30 months while completing a masters degree and 42 months while completing a Ph. D.

   This was a new program and had not yet been used by NBS at the time of our review.

TRAINING

Training is provided to NBS personnel through classes given at NBS and at schools in the Washington, D.C., area as well as through other Federal agencies, such as Commerce, General Services Administration, and the Civil Service Commission. In addition to this training, longer term training is available to scientists through periods of research at other laboratories either in this country or overseas. During the period October 1, 1977, to March 31, 1978, the cost of short term training for NBS Gaithersburg personnel was about $320,000, of which about 40 percent was for training the scientific and engineering staff. Similar training is available to Boulder personnel.

OBSERVATIONS

The NBS scientific staff can best be characterized as stable with low turnover and increasing age. Problems may develop as a result of the decreasing number of technicians if scientific personnel have to perform the work formerly done by technicians.

The concern over the NBS staff's weakening morale, expressed by the Statutory Visiting Committee in its 1977 report, did not appear to be a serious problem at the time of our review.

CHAPTER 7

EVALUATION OF NBS EFFORTS BY OUTSIDE ORGANIZATIONS

EVALUATION PANELS

Since 1959 the National Research Council, under a contract between the National Academy of Sciences and NBS, has continually evaluated NBS functions and operations. In discharging this responsibility, the National Research Council selects and appoints members to a series of evaluation panels. Members usually serve for 3 years but never longer than 6 years. Generally, the names of potential panel members are selected from suggestions made by former or current panel members and from suggestions made by NBS personnel. The latter method has been criticized because of the partiality which could be shown to NBS.

In fiscal year 1978, there were 6 major panels and 24 subpanels consisting of over 290 appointees. The members serve without compensation but are reimbursed for travel expenses incurred in attending panel meetings. The April 1978 NBS reorganization necessitated a restructuring of the evaluation panels--the number of major panels was reduced from 6 to 3 and the subpanels from 24 to 18. As of early September 1978, the National Research Council had not completed assigning panel and subpanel members for fiscal year 1979 and subsequent years.

The Council, in appointing members to the panels, attempts to get about 50 to 55 percent of the members from industry and the remaining members from government and academia. Usually, the Council is successful in attaining this objective or takes action to correct an imbalance.

Successfully evaluating the total technical effort of NBS depends largely on selecting capable people who have the expertise necessary to cover all NBS activities. The scientific disciplines of the members encompass almost all physical science fields.

The panels and subpanels are responsible for reviewing and evaluating the NBS technical functions and operations. They consider the importance and relative priority of projects, quality of staff, equipment needs, finances, and the programs' relation to the NBS mission. They provide for continuing contact between the scientists and engineers of the academic and industrial communities and the NBS staff.

Some panels examine broad technical policy and program areas and review and coordinate the work of a number of subpanels, which evaluate specific program areas assigned to designated NBS organizations. The other panels look at activities that cut across NBS organizational boundaries.

Guidance and general oversight to the panels are provided by the Steering Committee, comprised of the chairmen of the panels for each major NBS organizational unit and some additional members-at-large.

Specifically, the Steering Committee reviews and coordinates panel efforts, identifies major problem areas in the technical programs, and draws attention to issues that are common to several organizational units. The Steering Committee is responsible for identifying problems and issues that, in its opinion, should be called to the attention of the Statutory Visiting Committee, which makes an annual report to the Secretary of Commerce.

In most instances, each panel meets at least once a year for a 2-day session and issues a report on its observations. After a review by the National Research Council, the report is circulated to the panel members and the Steering Committee for their review and final issuance.

Each panel's findings are communicated to NBS through meetings with the Director, NBS, and through its formal reports. Although NBS has taken actions on some of the panels' recommendations, no procedures have been established for the panels to follow up on the recommendations made in the reports. Generally, subsequent reports do not include comments on prior recommendations. We inquired as to what effect, if any, there was on the panel members when NBS took no action on the panel's recommendations. We were informed that this was not a problem to panel members nor did the members complain or discuss the lack of NBS actions.

STATUTORY VISITING COMMITTEE

The NBS organic act provides for the Secretary of Commerce to appoint a five member Statutory Visiting Committee. The committee is required to visit NBS at least once a year and report to the Secretary on the efficiency of the NBS scientific work and the condition of its equipment. Committee members are prominent individuals from industry and academia. (See app. XIV.)

Members are appointed for a 5-year period and appointments are arranged so that one member will retire each year. Usually, the member who is in his last year of service is the committee chairman for that year. The members are not compensated for their services but are reimbursed for actual expenses incurred in attending committee meetings.

During the committee's annual meeting, Commerce and NBS officials discuss NBS program highlights, budget proposals, enacted and pending legislation affecting NBS operations, and other matters which have or could have significant effects on NBS operations. The evaluation panels' Executive Committee reports to the Statutory Visiting Committee on the individual panels' reviews made during the year. After discussing the reports, the committee conducts a planning session for reporting to the Secretary of Commerce.

The committee makes an oral presentation in a meeting with the Secretary. The written report is in the form of a letter to the Secretary signed by the Chairman of the committee.

The 1977 committee report pointed out that NBS had critical problems and was bordering on serious trouble. The committee was principally concerned about the

--persistent retrenchment that had taken place threatening to bring NBS to a mediocrity that was unacceptable;

--shocking gaps that existed in NBS ability to carry out its basic assignments;

--new assignments without funding or personnel that had forced NBS leadership into defensive management;

--confusing inconsistencies in the management direction from Commerce and OMB;

--"acting" status of the NBS Director and the Director of one of the then Institutes; and

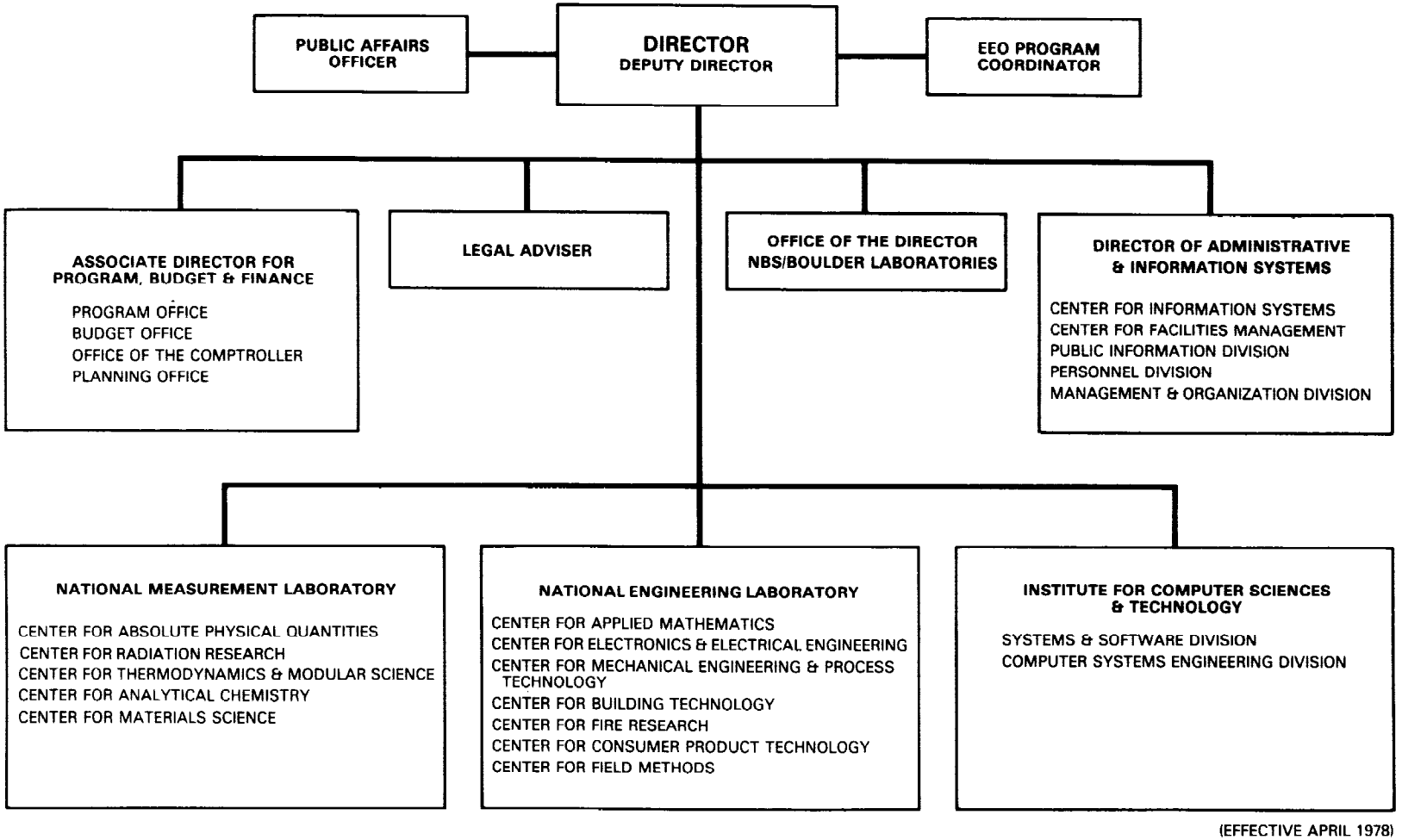
--weakening staff morale and individual concerns for lack of consistent direction and support.

The committee stated that the Secretary's personal action and interest were needed.

In its 1978 report, the committee informed the Secretary that recovery was underway and that (1) a positive attitude "pervades" NBS, (2) the NBS reorganization (April

1978) was beneficial and well managed, and (3) continual reevaluation of programs and priorities was necessary for good management. The committee expressed a belief "that a most constructive new policy environment" had emerged in the past year, with close understanding between top Commerce leadership, the White House offices, and the NBS Director. Copies of the committee's reports for 1976-78 are presented in appendixes XV through XVII.

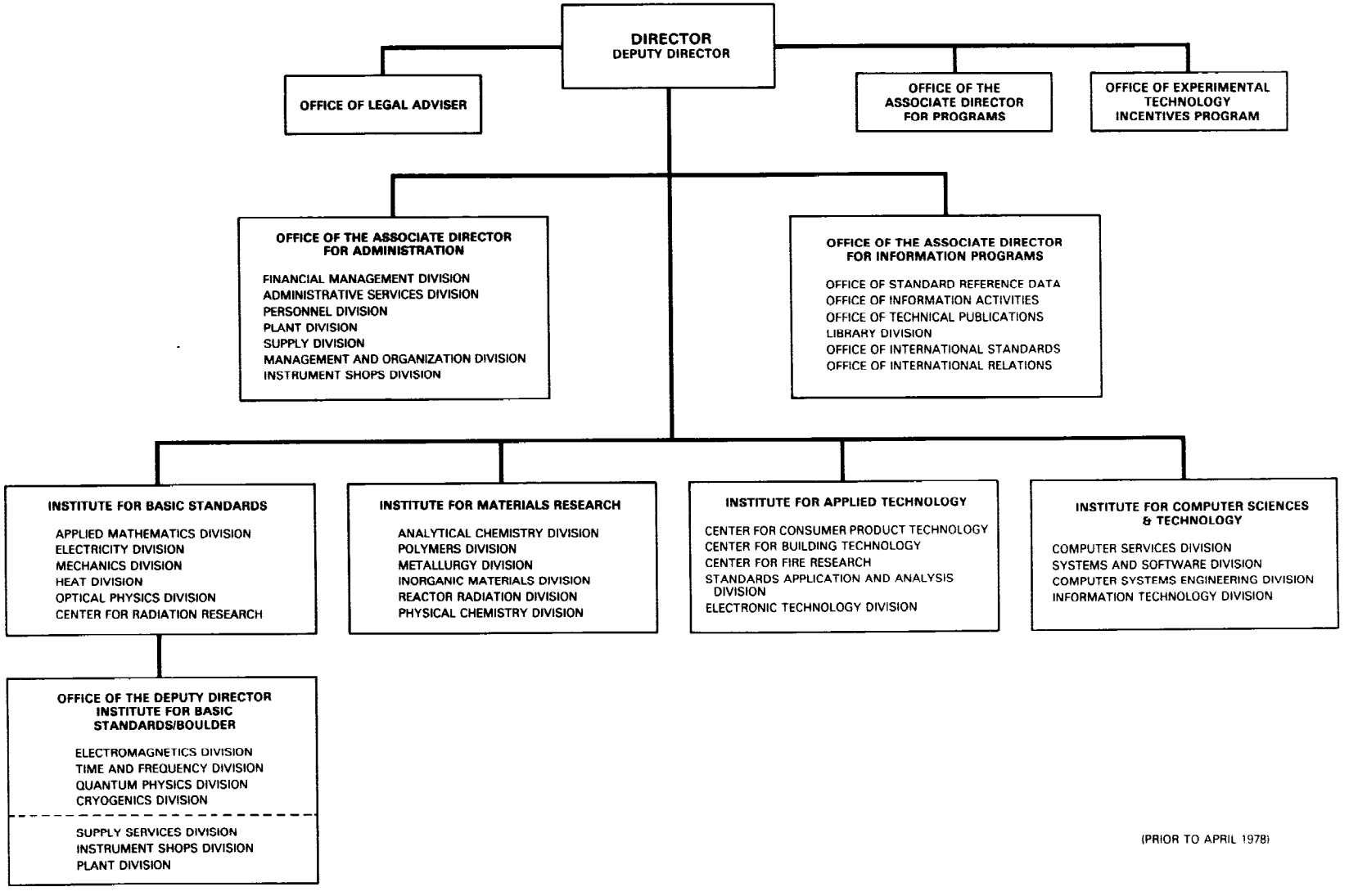
U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS



(EFFECTIVE APRIL 1978)

APPENDIX I

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

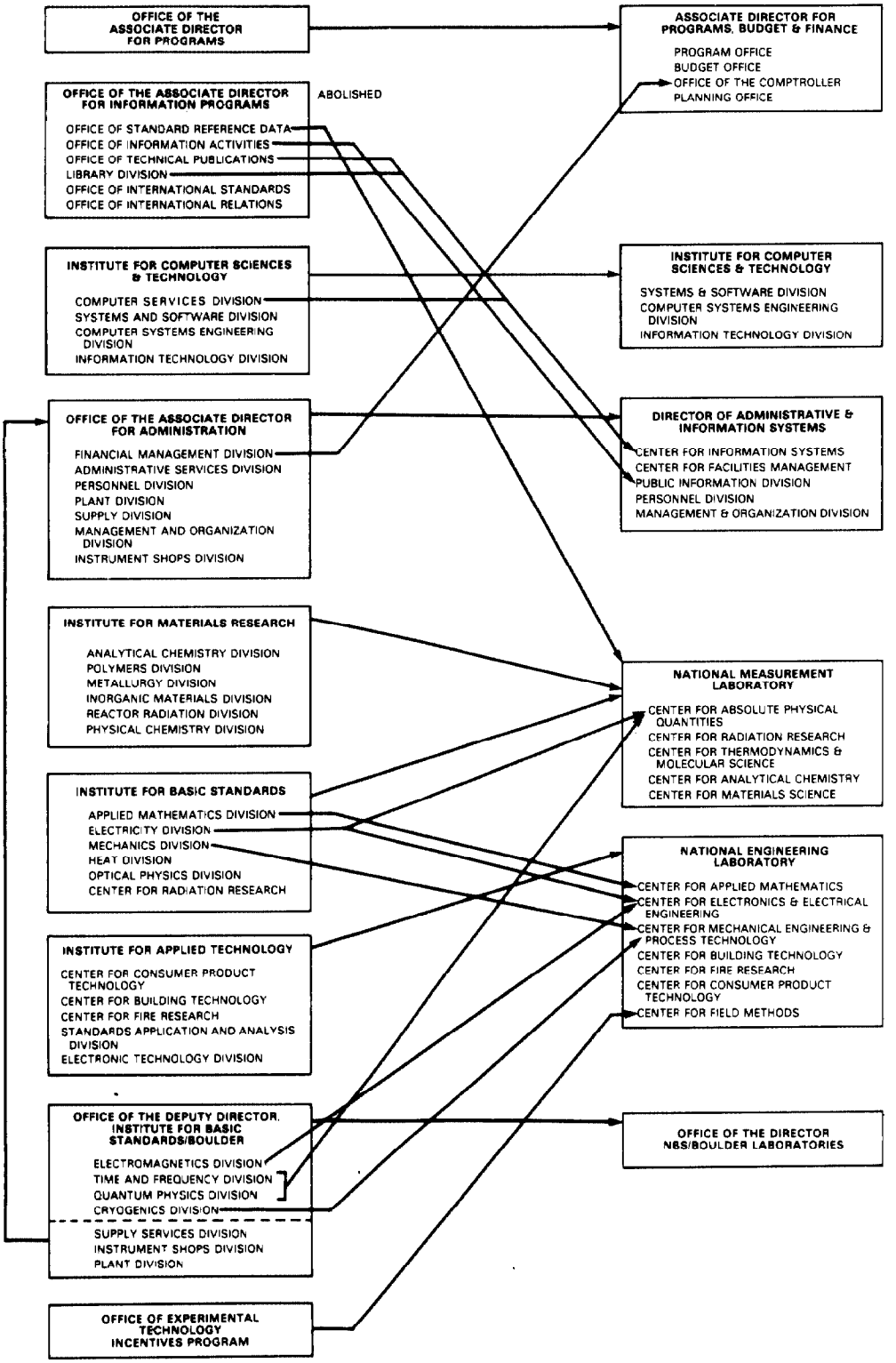


(PRIOR TO APRIL 1978)

APPENDIX II

APPENDIX III

ORGANIZATIONAL CROSSWALK



APPENDIX IV

LABORATORY AND INSTITUTE GOALS

National Measurement Laboratory. To provide the national system of physical and chemical measurement; coordinating the system with measurement systems of other nations and furnishing essential services leading to accurate and uniform physical and chemical measurement throughout the Nation's scientific community, industry, and commerce. Conduct materials research leading to improved methods of measurement, standards, and data on the properties of materials needed by industry, commerce, educational institutions, and Government; provide advisory and research services to other Government agencies; and develop, produce, and distribute standard reference materials.

National Engineering Laboratory. To provide technical services to promote the development and use of technology and to facilitate technological innovation in industry and Government; to cooperate with public and private organizations in the development of technological standards and test methods; and to provide technical advice and services to Government agencies upon request. Conduct research in support of the specific objectives of these activities; monitor NBS engineering standards activities; and provide liaison between NBS and national and international engineering standards bodies.

Institute for Computer Sciences and Technology. To develop and recommend uniform Federal automatic data processing standards; provide automatic data processing scientific and technological advisory services to Federal agencies; and undertake necessary research in computer science and technology.

APPENDIX V

ADMINISTRATIVE AND SUPPORT ORGANIZATIONS

FUNCTIONS AND FISCAL YEAR 1978

STAFFING AND EXPENSES

Organization	Number of staff	Amount (thousands)
Office of the Director:	33	$ 1,341
Determine NBS policies and direct the development and execution of its programs.		
Director's Office	6	229
Office of the Legal Advisor	7	237
Office of Congressional Affairs	3	77
Equal Employment Opportunity Program	1	48
Special Activities	7	483
Associate Director for International Affairs	9	267
Office of the Associate Director for Programs, Budget, and Finance:	110	2,773
Plans, develops, and evaluates NBS-level programs and formulates and carries out policies and strategies for programmatic, budgetary, and financial matters; serves as the Director's staff for NBS-level programmatic, budget formulation and execution, and finance matters; analyzes resource and program proposals and investment levels.		
Associate Director's Office	7	270
Program Office	9	337
Budget Office	21	756
Office of the Comptroller	68	1,258
Planning Office	5	152
Office of the Director of Administrative and Information Systems:	925	29,501
Directs the management of NBS-wide facilities and information and administrative systems including information and office services, procurement, NBS-wide computing, personnel, and management consulting services; health, safety, and security functions; physical plant and facilities.		
Director's Office	4	151
Public Information Division	23	716
Personnel Division	63	1,431
Management and Organization Division	12	375
Center for Information Systems	1	59
Computing Systems Design Division	22	737
Library Division	25	830
Office Management Division	88	2,308
Technical Information and Publications Division	26	1,413
Center for Facilities Management	6	155
Plant Division (Gaithersburg)	180	9,194
Plant Division (Boulder)	81	2,283
Instrument Shops Division (Gaithersburg)	25	737
Instrument Shops Division (Boulder)	14	432
Facilities Services Division	240	5,528
Occupational Health and Safety Division	25	856
Boulder Executive Office	39	1,376
Supply Services Division (Boulder)	51	920
Office of the Director, NBS/Boulder Laboratories	2	84
Responsible for monitoring execution of the Boulder programs of the National Measurement Laboratory and the National Engineering Laboratory; provides program oversight; monitors use of resources; administers facilities; manages support services; and represents the NBS Director in various matters.		
Total	a/1,070	a/$33,699

a/ Excludes three staff members and expenses of about $105,000 for the Computer Systems Engineering Division in the Institute for Computer Sciences and Technology. Also, the Computer Services Division in the Office of Administrative and Information Systems is not listed because it had no staff and expended only about $300 during fiscal year 1978.

NBS FUNDING AND POSITION CEILINGS

FISCAL YEARS 1974 THROUGH 1978

Year	Index (note a)	Appropriations Current	Appropriations Constant	Other agency funding Current	Other agency funding Constant	Other reimbursable (note b) Current	Other reimbursable (note b) Constant	Total funds Current	Total funds Constant	FTP position ceiling
		(dollars in millions)								
1974	194.8	$59.8	$30.7	$37.9	$19.5	$5.4	$2.8	$103.1	c/$52.9	3121
1975	209.7	60.6	28.9	43.2	20.6	5.8	2.8	109.6	52.3	3139
1976	222.1	61.7	27.8	43.4	19.5	6.4	2.9	111.5	50.2	3097
1977	245.7	68.9	28.0	48.8	19.9	6.2	2.5	123.9	50.4	3065
1978	d/247.4	74.9	30.3	55.1	22.3	7.9	3.2	137.9	c/55.7	3127

a/ Derived from statistics from the Bureau of Economic Analysis, U.S. Department of Commerce. Implicit Price Deflator for Federal Government Employee Compensation based on 1965 dollars.
b/ Includes fee-supported services such as calibrations, tests, and sales of Standards Reference Materials for all customers, including other Federal agencies.
c/ Subtotal may not add to total due to rounding.
d/ Based on second quarter index--the most recent.

APPENDIX VI

NBS PROJECTS BY SELECTED KEY WORDS

Key words	NBS appropriations			Funds from other agencies			Total		
	Number of projects	Estimated staff years	Estimated amounts (thousands)	Number of projects	Estimated staff years	Estimated amounts (thousands)	Number of projects	Estimated staff years	Estimated amounts (thousands)
Communications	21	37	$ 2,684	28	30	$ 2,181	49	67	$ 4,865
Computer utilization	33	66	4,523	35	28	1,826	68	94	6,349
Consumer information	18	27	1,595	19	24	1,644	37	51	3,239
Education	10	14	858	8	8	585	18	22	1,443
Energy crisis	82	148	8,966	133	257	18,349	215	405	27,315
Environment	80	161	9,239	66	81	5,017	146	242	14,256
Equity	8	29	1,660	7	4	401	15	33	2,061
Health	24	57	3,481	39	47	3,202	63	104	6,683
Housing and construction	57	45	2,945	83	120	8,031	140	165	10,976
Materials	109	238	15,061	111	160	10,896	220	398	25,957
Metrology	86	194	11,524	59	89	5,007	145	283	16,531
National security	9	16	1,197	46	49	4,435	55	65	5,632
Nutrition	1	1	46	1	2	100	2	3	146
Productivity	19	42	2,303	13	13	1,074	32	55	3,377
Reference data	58	118	6,254	22	23	1,365	80	141	7,619
Reference material	39	65	4,311	21	37	2,269	60	102	6,580
Regulation	45	80	4,690	43	60	4,197	88	140	8,887
Safety	40	72	4,534	81	118	7,522	121	190	12,056

NBS Note: Any particular project may be counted under several key words or none. The choice of key words has no official standing with respect to a project's programmatic position. In most cases, the estimates are as of the beginning of fiscal year 1978; they do not represent actual budget or expenses. The estimates apply to the total project and do not necessarily reflect the amount of effort related to the key word.

APPENDIX VII

APPENDIX VIII

NBS PERSONNEL STATISTICS

1974-78

Year (note a)	Full-time permanent	Part-time	Intermittent	Ceiling (note a) FTP	Ceiling (note a) OTP (note b)	Percent of FTP turnover
1974						
Professional	1418	42	95			6.0
Technical	381	5	27			11.1
Admin/clerical	861	73	54			16.3
Wageboard	497	4	16			10.5
Total	3157	124	192	3121	366	10.2
Ceiling exempt employees				33	109	
1975						
Professional	1403	48	106			7.8
Technical	373	5	22			5.3
Admin/clerical	877	85	42			12.5
Wageboard	493	20	13			7.7
Total	3146	158	183	3139	426	8.8
Ceiling exempt employees				10	130	
1976						
Professional	1404	48	96			4.9
Technical	346	9	26			7.0
Admin/clerical	865	95	41			11.5
Wageboard	503	22	9			9.5
Total	3118	174	172	3097	412	7.7
Ceiling exempt employees				25	100	
1977						
Professional	1407	59	79			5.5
Technical	303	15	19			11.8
Admin/clerical	823	113	49			11.7
Wageboard	527	46	15			12.4
Total	3060	233	162	3065	482	9.0
Ceiling exempt employees				23	99	
1978						
Professional	1416	59	69			4.7
Technical	286	10	15			9.6
Admin/clerical	822	128	49			11.4
Wageboard	508	77	18			7.8
Total	3032	274	151	3121	512	7.5
Ceiling exempt employees				5	111	

a/ At June 30
b/ OTP--other than full-time permanent

APPENDIX IX

WARREN G. MAGNUSON, WASH., CHAIRMAN
HOWARD W. CANNON, NEV.
RUSSELL B. LONG, LA.
ERNEST F. HOLLINGS, S.C.
DANIEL K. INOUYE, HAWAII
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ROBERT P. GRIFFIN, MICH.
TED STEVENS, ALASKA
BARRY GOLDWATER, ARIZ.
BOB PACKWOOD, OREG.
HARRISON H. SCHMITT, N. MEX.
JOHN C. DANFORTH, MO.

United States Senate

COMMITTEE ON COMMERCE, SCIENCE,
AND TRANSPORTATION
WASHINGTON, D.C. 20510

October 13, 1977

Mr. Elmer B. Staats
Comptroller General of the United States
General Accounting Office
441 G Street, N. W.
Washington, D. C. 20548

Dear Mr. Staats:

The Committee on Commerce, Science and Transportation is concerned about persistent reports of a decline in the scientific capabilities of the National Bureau of Standards, as well as the apparent inability of NBS to respond fully to specific congressional assignments. As a result, the Committee anticipates holding a series of oversight hearings on the Bureau beginning early in 1978. The purpose of this letter is to request the assistance of the General Accounting Office in preparing for these hearings, as well as to request more extensive GAO monitoring of NBS activities in the future.

With respect to the hearings, the Committee would appreciate a three-month GAO review of how NBS has responded to the specific assignments contained in the following public laws:

1. Standard Reference Data Act (15 USC 290).

2. Noise Control Act of 1972 (42 USC 4907).

3. Fair Packaging and Labeling Act (15 USC 1454d).

4. Brooks Act (5 USC 630-630g-1).

5. Resource Conservation and Recovery Act of 1976 (P.L. 94-580).

6. Fire Prevention and Control Act of 1974 (15 USC 2201).

7. Federal Nonnuclear Energy Research and Development Act (42 USC 5901).

8. Solar Heating and Cooling Demonstration Act of 1974 (42 USC 5501).

APPENDIX IX

9. Energy Policy and Conservation Act of 1975 (P.L. 94-163).

10. Energy Conservation and Production Act of 1976 (P.L. 94-385).

11. Metric Conversion Act of 1975 (P.L. 94-168).

12. Consumer Product Safety Act of 1972 (15 USC 2056).

13. Privacy Act of 1974 (5 USC 552a).

Of particular interest to the Committee is the extent to which these assignments have been carried out, the degree to which NBS has diverted resources from other Bureau activities, and the effect of such diversions on other NBS missions.

In the longer run, the Committee sees the need for a critical review of the NBS organic act and the possibility of updating this statute in light of NBS' evolving role as a national laboratory. GAO findings on this subject would provide a focus for Committee hearings later in 1978.

The Committee staff assigned to the oversight of NBS include Drs. John Stewart, Allan Hoffman and Steven Flajser. Once your staff has had an opportunity to consider this request, it would be helpful to meet with the Committee staff to establish a more precise understanding of GAO's role in this oversight activity.

Your assistance to the Committee is very much appreciated.

Sincerely,

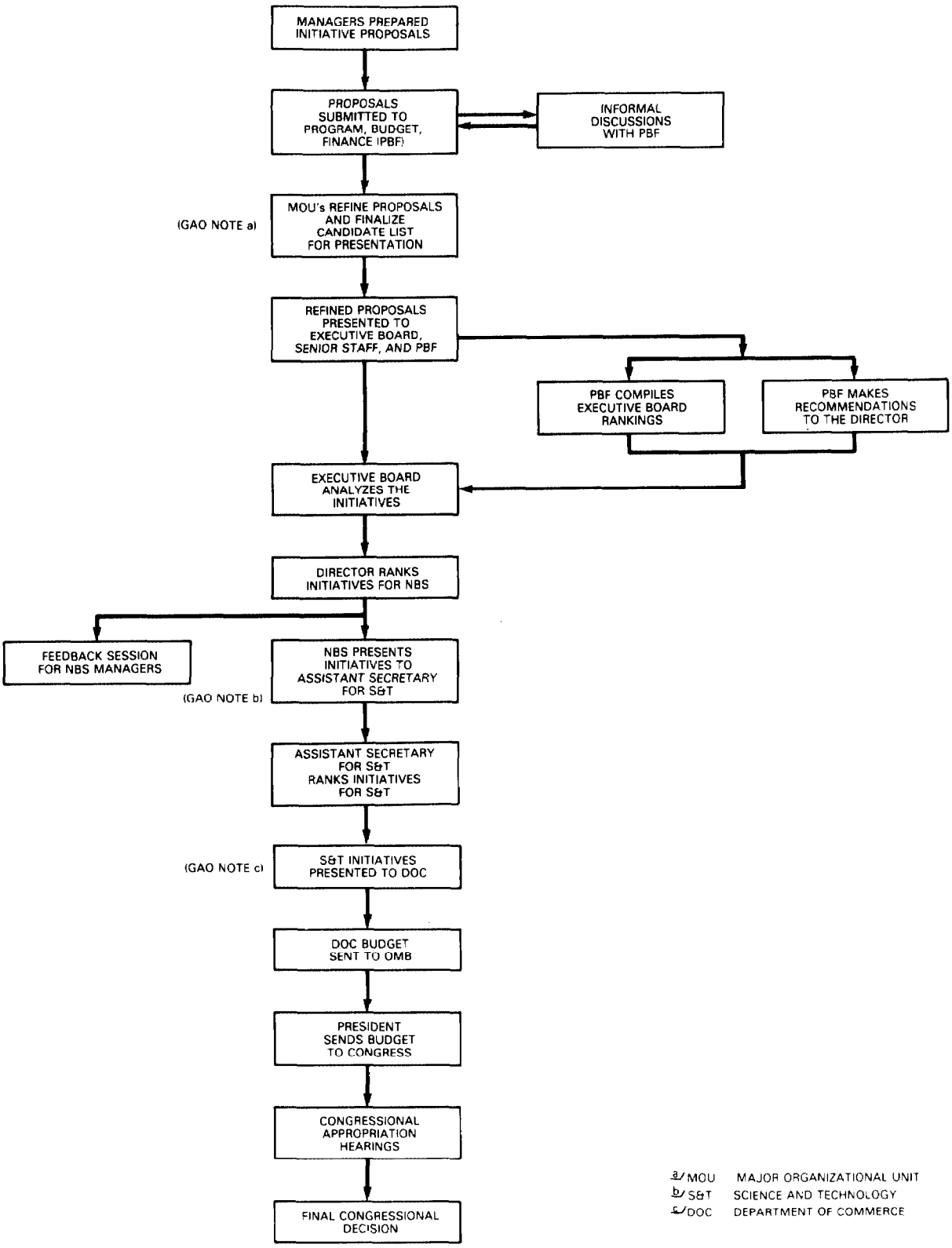
Warren G. Magnuson

WARREN G. MAGNUSON
Chairman
Committee on Commerce, Science
and Transportation

Adlai E. Stevenson

ADLAI E. STEVENSON
Chairman
Subcommittee on Science, Technology
and Space

FISCAL YEAR 1980 INITIATIVE REVIEW PROCESS



[a] MOU MAJOR ORGANIZATIONAL UNIT
[b] S&T SCIENCE AND TECHNOLOGY
[c] DOC DEPARTMENT OF COMMERCE

APPENDIX XI

NBS PROGRAMS ADVERSELY AFFECTED BY THE LEAD AGENCY CONCEPT

Program year	Program	Initiatives	Base program	Lead agency	Rejected by
1979	Environmental measurements for air and water	x	x	a/EPA	OMB
	Resource recovery program	x		EPA	OMB
1978	Air pollution	x		EPA	Commerce
	Water pollution	x		EPA	Commerce
	Product energy conservation		x	b/DOE	OMB
	Ultraviolet radiation standards	x		(c)	Commerce
	Electromagnetic interference measurements (as related to exports in the automotive industry)	x		d/DOT	Commerce
	Nuclear materials safeguards	x		e/NRC	Commerce
1977	Nuclear materials safeguards	x		NRC	Commerce
	Water pollution	x		EPA	Commerce
1976	Materials performance in extreme environments	x		DOE	Commerce

a/The Environmental Protection Agency.

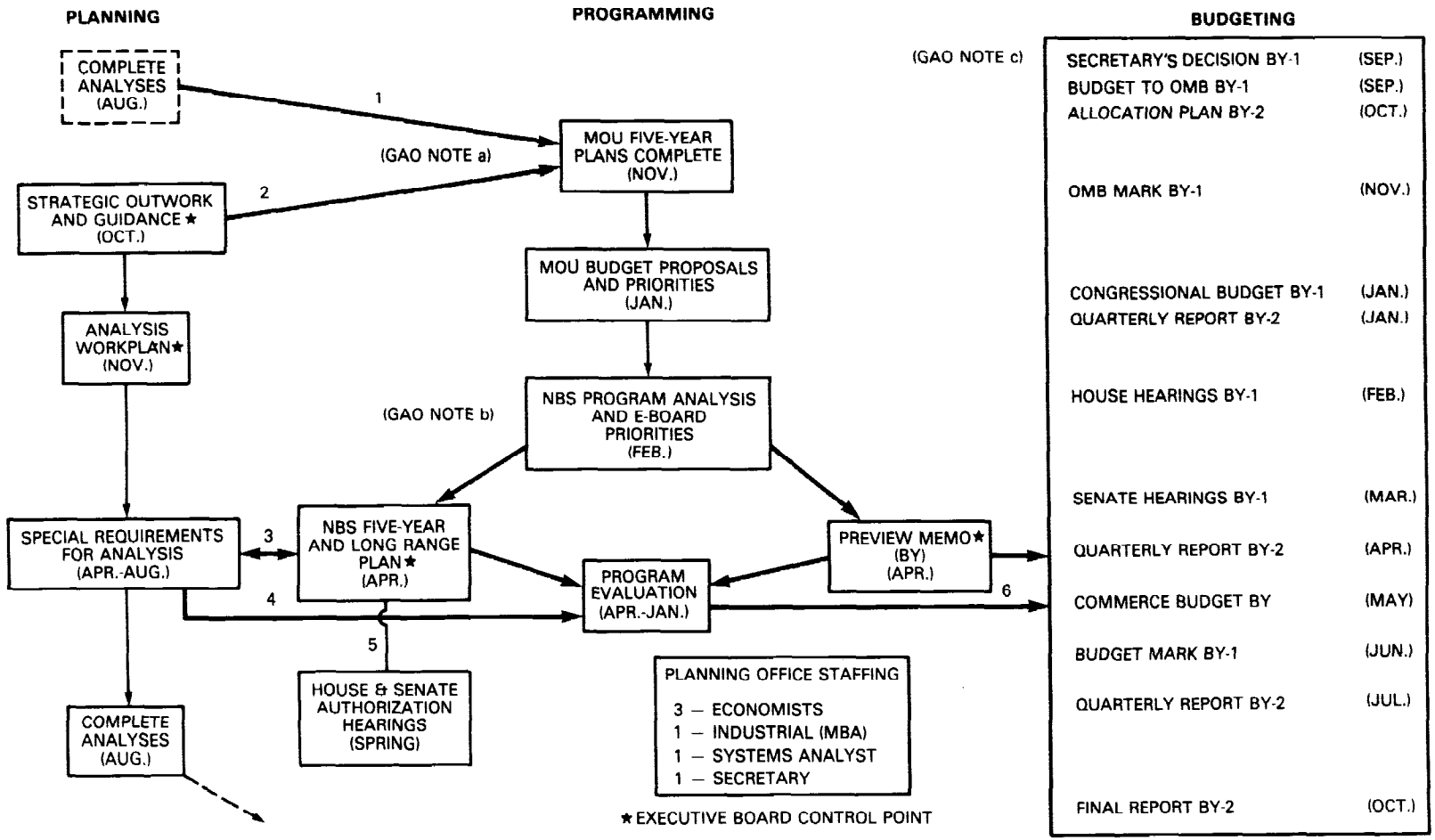
b/Department of Energy.

c/Numerous agencies were cited as having responsibilities in this area including the National Oceanic and Atmospheric Administration, EPA, and the Bureau of Radiological Health.

d/Department of Transportation.

e/Nuclear Regulatory Commission.

ROLE OF NBS CENTRAL PLANNING OFFICE



[a]/MOU — MAJOR ORGANIZATIONAL UNIT (THE TWO LABORATORIES AND THE INSTITUTE)

[b]/E-BOARD — EXECUTIVE BOARD

[c]/BY — BUDGET YEAR

APPENDIX XII

APPENDIX XIII

CHANGES IN NBS BUREAU OVERHEAD RATES

Date	Rate of overhead (percent)	Percent change	NBS reasons for change
June 29, 1972	39.0	--	
February 18, 1973	37.5	-1.5	Reduction in overhead costs and increase in technical labor base resulting from pay raise
April 1, 1973	36.0	-1.5	Revision downward of certain overhead costs
July 1, 1973	41.0	+5.0	All telephone costs charged to bureau overhead instead of institute and division overhead
July 1, 1974	44.0	+3.0	Increased operating costs and changed methods of financing some services
February 2, 1975	43.5	-0.5	Increase in technical labor base due to pay raise
July 1, 1975	47.0	+3.5	Increases in the cost of utilities, printing, postage, labor, and other items
February 1, 1976	45.0	-2.0	Technical labor base increase due to pay raise, lower utility costs
October 1, 1976	47.5	+2.5	Anticipated increased utility costs
January 2, 1977	48.0	+0.5	Fund advanced systems work of the computer services division
April 10, 1977	44.2	-3.8	Increase in the technical labor base due to pay raise
October 1, 1977	47.5	+3.3	Anticipated increase in utility costs

APPENDIX XIV

MEMBERS OF THE

STATUTORY VISITING COMMITTEE

1975-1978

	1975	1976	1977	1978
Dr. Arthur M. Bueche Vice-President Research & Development General Electric Co.	x	-	-	-
Dr. John Truxal Dean, College of Engineering State Univ. of N.Y. - Stony Brook	x	x	-	-
Charles E. Peck Vice-President - Construction Group Owens-Corning Fiberglass Corp.	x	x	x	-
Dr. Edwin A. Gee Senior Vice-President E.I. duPont de Nemours Co.	x	x	x	x
Dr. Robert H. Dicke Department of Physics Princeton University	x	x	x	x
Dr. Dale Compton Vice-President - Research Ford Motor Co.	-	x	x	x
Mr. William Carey American Assn. for Advancement of Science	-	-	x	x
Dr. William Linvill Chairman-Department of Engineering - Economics Systems Stanford University	-	-	-	x

APPENDIX XV

Princeton University DEPARTMENT OF PHYSICS: JOSEPH HENRY LABORATORIES
JADWIN HALL
POST OFFICE BOX 708
PRINCETON, NEW JERSEY 08540

July 25, 1978

Honorable Juanita M. Kreps
Department of Commerce
Washington, D.C. 20230

Dear Secretary Kreps:

One year ago at this time, the Statutory Visiting Committee for the National Bureau of Standards expressed to you in the strongest terms its profound concerns for the erosion of the Bureau's scientific competence and its capability to carry out its responsibilities effectively. The Committee asked you to give personal attention and support to strengthening the resources of NBS.

Your response was what we hoped it would be. One year later, recovery is under way and a positive attitude pervades NBS. While the Congress has not yet completed its action on the 1979 budget requests, it appears quite certain that the Bureau will receive a very substantial increase in its appropriations. It is now possible for the Director of NBS to look forward and not backward, and to be confident of the strong and continuing understanding and support of the Secretary, the Under Secretary and the cognizant Assistant Secretaries. The Visiting Committee can do no less than express its appreciation to all of you.

On June 27, 1978, the Visiting Committee met with the NAS Evaluation Panel Chairmen to review the state of the Bureau's basic and applied science programs. With only a few reservations, the panels found the quality of the Bureau's performance to be very good indeed, notwithstanding the incidental disturbance occasioned by a general reorganization and despite our concerns already expressed to you last year. The Visiting Committee's opinion is that NBS is on the threshold of a lively and creative period of growth and national service, and that the reorganization has been beneficial and well-managed. At the same time, the Visiting Committee notes that careful continuing attention will be necessary, in the allocation of resources, to assure that external demands upon the skills of NBS do not slow the restoration of strength in the basic scientific programs of the Bureau. This observation is especially germane in view of contemplated major reprogramming actions, the effects of which have not been assessed by the Evaluation Panels.

Related to this fundamental concern the Visiting Committee wishes to make four important points, which comprise our 1978 report to you.

First, the 1979 budget recommendations give NBS a good start on the road back to excellence. But one budget cycle will not suffice for more than a start. If the commitment to increased investment is not continued in 1980 and for at least five succeeding years, the Bureau will fall short of the goals and objectives of the Administration.

Second, the Visiting Committee places its highest priority upon the continuation of "competence building" at the NBS as the single most strategic approach to public investment in scientific excellence. We urge your support in the 1980 budget cycle for a substantial increase in this category of budget allocation. We believe that "competence building" should be, at least, a five-year program in the Bureau. Damage incurred in a large institution over many years cannot be corrected in a shorter time than that.

Third, we strongly endorse the new directions represented by the proposed budget increases for 1980, because they will position NBS to make a timely start in areas of advancing technologies which will strengthen U.S. industry in the world markets. In particular, we cite the very large-scale integrated circuits and materials durability programs.

Fourth, the Visiting Committee is fully aware of the President's 1980 budget policies. In scaling the Bureau's budget estimates for the 1980 budget, in terms of realism, the managers of NBS have undertaken a bold initiative to reduce or terminate a wide range of existing projects in order to accommodate higher priority budget increases. Voluntary reprogramming on so substantial a scale is, in our opinion, a very powerful sign of the high quality of managerial leadership at the Bureau. Indeed, the two-year strategy evidenced in their pending reprogramming request is an integral part of their managerial approach. It must be emphasized that reprogramming on this scale is a two-edged sword, and if this reprogramming cannot be spread over a two-year period, there inevitably will be major layoffs and costly internal disruptions, and the consequences to the Bureau's productivity and morale would be adverse in the extreme.

Continual reevaluation of programs and priorities is necessary for good management. Particular adroitness in management is called for because of the unique nature of this national institution:

a. Competence building in science a is long-term process, and it must be sheltered from the yearly budget shock to be kept strong and viable.

b. To keep up with the new science applications such as very large-scale integrated circuits, surface science, and laser chemistry, new programs must be added.

c. To live within the tight budget constraints, these new programs can be added only if existing programs which are still viable but of lower priority are phased out in an orderly and gradual way.

APPENDIX XV

d. This continual shift process must be carried out without destroying the spirit and drive of the scientific staff of NBS which is its most important resource.

Mindful of the destructive effect of past reprogramming, the Committee ascertained that: (1) the reprogramming was not to eliminate unsatisfactory or marginal work but rather to permit the replacement of lowest-ranked tasks of the Bureau by new initiatives; (2) that the internal review procedures used to identify lowest-ranked programs were thorough; and (3) that the reprogramming represents a painful tradeoff process which must be watched closely lest it adversely affect the ability of the Bureau to accomplish its primary mission. The Committee reiterates that this proposed reprogramming will not serve to correct the previously lost competence of the Bureau in measurement science. The "competence building" program is the primary hope for strengthening the research capability of the Bureau.

One further comment on the matter of reprogramming: it is very doubtful, in our view, that the orderly pursuit of scientific investigation can be achieved if reprogramming is attempted on such a large scale repeatedly and especially at short intervals. The current reprogramming actions should be seen for what they are: an unusual and extraordinary managerial effort to present a supportable budget increase within the policy constraints of the 1980 budget. Because NBS has to be seen as an effective institution and not a collection of programs, we wish to be very clear: the 1980 budget increase and the 1979-80 reprogramming strategy comprise a unified package. If the increases are disallowed wholly or in large part, the reprogramming proposal should be withdrawn.

In conclusion, the Visiting Committee believes that a most constructive new policy environment has emerged in the past year, with close and growing understanding between the top leadership of the Department, the White House offices, and the head of NBS. For your part in this achievement, the Visiting Committee is most grateful.

Sincerely,

Robert H. Dicke

Acting Chairman
NBS Visiting Committee

APPENDIX XVI

OWENS-CORNING FIBERGLAS CORPORATION FIBERGLAS TOWER TOLEDO, OHIO 43659 (419) 248 8000

C. E. PECK
Group Vice President
Building Materials Group

September 15, 1977

The Honorable Juanita Kreps
Secretary of Commerce
Washington, D. C. 20230

Dear Madame Secretary:

In keeping with the statutory requirement of an annual written report from the Visiting Committee of the National Bureau of Standards, the following is a record of our September 6, 1977, discussion.

The Visiting Committee of the National Bureau of Standards appreciates that you rearranged your schedule to meet with us. NBS has critical problems, and we feel the personal support and direction of the Secretary of Commerce is very important. We are pleased to have had the opportunity to present these concerns to Dr. Harman, and that he took the time to sit in with us during our meeting with you.

NBS is on the brink of serious trouble. The persistent retrenchment that has taken place threatens to bring NBS to a mediocrity that is unacceptable. We recognize that your administration has inherited, not created, these problems. However, it will have to be your strong leadership that effects a change.

Shocking gaps exist in NBS' ability to carry out its basic assignments, even without supplemental assignments. New assignments thrust on the Bureau without funding or personnel have forced NBS leadership into defensive management, whereby long-range programs are sacrificed to salvage short-term objectives. The declining quality of work is reaching a critical state. One study indicates that basic research in constant dollars may have dwindled to half the level of ten years ago. Fifteen new laws since 1965 have given NBS assignments, yet the NBS overall budget in constant dollars has not increased.

There are confusing inconsistencies in the management direction NBS has received from the Department of Commerce and from OMB. Perhaps you are familiar with these illustrations:

a) The shortfall in response to the Brooks Act.

b) The energy-efficient household products assignment from Congress, for which OMB approved personnel and effort levels at NBS, told NBS the assignment would have to be funded by FEA, then withdrew those funds from FEA.

c) The Resource Conservation & Recovery Act of 1976, whereby Congress gave NBS only two years to develop guidelines for specifications for waste-recovered materials, yet OMB denied NBS funds.

NBS has had four different directors in ten years. The present head has been in an "acting" status for two years. The Director of the Institute for Applied Technology has been in an "acting" status for a full year. Recently, the Director of the Institute for Computer Science resigned. "Temporary" management cannot do a strong job.

Perhaps the most important signal of trouble is the effect on the talented people who make NBS a strong institution. Weakening morale and individual concerns for lack of consistent direction and support are plain. Effects are apparent also in the difficulty NBS has in attracting the very best graduating scientists.

We believe that some key reasons for these problems are:

a) The laissez faire attitude and the low priority that the Department of Commerce has given the NBS.

b) That those at OMB responsible for NBS have non-technical backgrounds with little understanding of the relevance of this highly scientific work or how it should be managed.

c) That new Congressional assignments continue to be given without additional resources.

Despite the problems, NBS is doing a lot of very good work. Adversity has not yet broken morale. It is not too late for good management and firm support to allow NBS to retain its strong reputation for excellent work.

We feel the solutions are clear.

- Either the Department and the Secretary herself should intervene strenuously to obtain more resources, or

- The Department should halt new assignments and advise Congress that the work cannot be done. Such communication should not be left to the NBS director, but handled directly by the Department.

The Visiting Committee strongly recommends the following:

a) Relief in the 1979 budget should be the first step.

b) Confirmation of Dr. Ernest Ambler as permanent NBS Director, and approval of his recommendations for IAT and CST Institute Directors. We are pleased to learn from Dr. Jordan Baruch that the Department has forwarded the recommendation of Dr. Ambler to the White House. We hope approvals can be expedited.

c) A moratorium on new statutory assignments not directly funded by Congress.

d) Open discussions with Congress on:

1) The Brooks Act shortfall.

2) Energy Conservation assignments.

3) Resource Recovery assignments.

Although NBS is in serious trouble, a few simple but strong management actions can avoid crisis. We believe that your personal interest and support in these actions can quickly maintain NBS as the world's finest standards and measurement laboratory. As individuals, or as a group, we volunteer our services in any way that might be useful.

Sincerely,

C. E. Cook

Chairman
NBS Visiting Committee

CEP:dja

cc: Dr. Ernest Ambler
Dr. Jordan J. Baruch
Ms. Elaine Bunten
Members of the NBS Visiting Committee

APPENDIX XVII

State University of New York
at Stony Brook
Stony Brook, New York 11794

College of Engineering and Applied Sciences

Program on Technology and Society
telephone: (516) 246-8418/8420

StonyBrook

August 2, 1976

The Honorable Elliot Richardson
Secretary of Commerce
Washington, D.C. 20230

Dear Mr. Secretary:

I am pleased to submit this annual report of the Visiting Committee of the National Bureau of Standards. As dictated by statutory requirement the report addresses the efficiency of the scientific work and the condition of the equipment of the Bureau. The substance of this report was communicated to you orally at our meeting on June 10, 1976.

The Committee made two formal visits to the Bureau during the last year--once to NBS Gaithersburg, and once to NBS Boulder. We have heard and read reports on the Bureau's work, visited the laboratories, reviewed the reports of the NAS Panels which evaluate the Bureau's work, and have had many discussions with top Bureau officials and the Department's Assistant Secretary for Science and Technology. The Visiting Committee is much impressed with the Bureau's performance in the past year, especially with its planning and its responsiveness to areas of national need. The Acting Director, Dr. Ambler, has done a fine job and the Committee is pleased to note Dr. Ambler's nomination to be the permanent Director.

With respect to the condition of the Bureau's equipment, the Committee is happy to see the progress that has been made toward alleviating the Bureau's equipment deficits. In 1971, the Committee became alarmed at the state of the Bureau's equipment and proposed a $15 million program to bring the equipment up to date. This equipment modernization program, which is now about one-third completed, is having a significant impact on the productivity of the Bureau staff. Continuation of this vital program is essential if the Bureau is to perform its assigned functions which require that it be a preeminent scientific and technical laboratory.

The quality and vitality of the Bureau's technical work has been carefully evaluated by the 250 outstanding scientists and engineers from business, industry, universities, and Government who make up the NAS Evaluation Panels for the Bureau. Chaired by Dr. William O. Baker, President of Bell Telephone Laboratories, they perform an invaluable and unique service. The Panels give the Bureau high marks; they are exceedingly enthusiastic about the excellence and relevance of the Bureau's work and about the stature of NBS and its accomplishments.

APPENDIX XVII

As examples of the outstanding nature of the Bureau's work the Committee would like to draw your attention to programs in:

* Energy Conservation: The Bureau has developed a consensus standard for building energy conservation which will not only save energy, but will also lower building costs. In addition, NBS has provided the basis for energy efficiency labeling of appliances and has worked closely with business and industry on energy conservation methods. The Bureau's more basic scientific examination of energy conservation technology is essential to provide the technical basis for the promulgation of adequate and equitable standards in this area.

* Precision Measurement of Length and Time: NBS physicists at the Boulder laboratories have extended the fundamental limits for the precision measurement of length of time. These experiments allow orders of magnitude improvement in these basic measurements which are among the most important in modern scientific inquiry.

* Standard Reference Materials and Evaluated Data: These two functions and the Bureau's accomplishments with respect to them are exceedingly important to engineering and industry. The Bureau has, for example, played an invaluable role as a third-party arbiter in the development and implementation of new measurement methods for the regulation of pollutants and aerosols.

The Visiting Committee is concerned, however, as it looks at trends in demands for Bureau services and anticipates the problems which the Bureau inevitably faces. As the Committee reflects on its interactions with the Bureau over the last ten years, the Committee notes that NBS has become the subject of more and more Congressional actions. A series of acts (e.g., Brooks Act of 1965, Privacy Act of 1974, Consumer Product Safety Act of 1972, and the Energy Policy and Conservation Act of 1975) have substantially broadened the Bureau's mission. These and other acts along with executive assignments have added new responsibilities, but have not increased Bureau Resources. Three problems associated with these new responsibilities and limited resources are of particular concern to the Committee:

* The Bureau's record for excellence and its stature in the scientific and technical community lead to expectations which may not be fulfilled. For example, in computer science and technology, the Bureau's resources are extremely limited, yet NBS is expected to provide standards for computer peripherals and computer privacy--areas in which the Government's stakes are high and the industrial investment is enormous.

* Secondly, and related to the first point, the Bureau is spread quite thin to do the work currently assigned.

APPENDIX XVII

* and finally, and probably of more importance, the Committee is concerned about the Bureau's ability to maintain basic competence in the face of these additional demands without additional resources. This concern was perhaps best expressed by Dr. Dale Compton of Ford Motor Company when he said that in any major laboratory with severe budget constraints, the applied work almost always forces out the longer-term work, and the longer-term work is the basis for the excellence and credibility which leads the Congress and others to go to the National Bureau of Standards.

In summary, the Committee's opinion of the Bureau's work is high--it is the outstanding Federal laboratory. However, the Committee foresees a danger in the Bureau's attempting to respond to additional responsibilities unless those new assignments are accompanied by appropriate resources.

In closing, Mr. Secretary, your concern for providing a sound technical basis for decisionmakers and decisionmaking has given us much food for thought. In the past the Bureau has contributed in various degrees and manners to policymaking in Government, particularly in providing or evaluating technical inputs. As decisions become more technically based, the Bureau will undoubtedly become more involved.

It has been a pleasure serving you and, in so doing, serving the Bureau and the Country. We look forward to future service to the Department of Commerce and to the National Bureau of Standards.

Sincerely,

John G. Truxal

John G. Truxal
Chairman
NBS Visiting Committee

Enclosure

(06601)

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