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ABSTRACT

The National Science Foundation and the National Institute of Health's policies and procedures for awarding funds through grants for scientific research to colleges and universities for purchasing research equipment are reviewed. Both agencies rely mainly on the researchers to request only necessary equipment. Research evaluation systems, peer review, budget cuts, and site visits are also used to regulate equipment requests and each of these methods is described. Officials at six universities were interviewed, and the equipment management techniques of Boston University, Harvard University, Brandeis University, Brown University, Yale University, and the Massachusetts Institute of Technology are discussed. Iowa State University's Research Equipment Assistance Program is also described. The requirements of the Office of Management and Budget as detailed in circular A-110 are discussed and recommendations for changes are made including: (1) minimum federal requirements for grantees to follow to avoid unnecessary equipment purchases; and (2) special procedures to periodically check grantees' compliance with the requirements. (BH)

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REPORT BY THE

Comptroller General

OF THE UNITED STATES

Minimum Requirements Are Needed For Colleges And Universities To Justify Research Equipment Purchases

The National Science Foundation and the National Institutes of Health are primary sources of research grant funds used by colleges and universities to purchase scientific equipment. Both agencies' officials rely mainly on the institutions' researchers to request only equipment necessary to carry out the proposed research. However, they do not know how the institutions eliminate unnecessary equipment requests. Information from seven universities showed a wide variance in the procedures used to justify new equipment purchases.

Institutions should at least have equipment records to use when reviewing researchers' requests for equipment. The Office of Management and Budget, in providing uniform grant administration requirements, should establish (1) minimum requirements for colleges and universities to follow to assure that equipment purchases are necessary and (2) procedures for periodically reviewing grantees' compliance with the requirements.

This study was requested by the Chairman, Committee on Science and Technology, House of Representatives.

HRD-78-52
MAY 11, 1978

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

B-133183

The Honorable Olin E. Teague
Chairman, Committee on Science
and Technology
House of Representatives

Dear Mr. Chairman:

In accordance with your September 15, 1976, request and subsequent discussions with our representatives, we reviewed the National Science Foundation's and the National Institutes of Health's 1/ policies and procedures for awarding funds to colleges and universities for purchasing research equipment. Our review was limited to equipment financed through grants for scientific research, which is the primary method used by these agencies to support equipment purchases.

We interviewed officials at six universities 2/ to determine their equipment management practices. We also reviewed Iowa State University's Research Equipment Assistance Program, a centralized equipment management system, to see if it promoted sharing of equipment.

We obtained the views of Office of Management and Budget, National Science Foundation, and National Institutes of Health officials on our findings and recommendations. We also submitted summaries of report sections on universities' operations to their officials for comment. Agency and university officials' comments are considered in the report. Our findings are summarized below and discussed in more detail in the appendix.

1/The National Science Foundation is an independent Federal agency. The National Institutes of Health are organizationally responsible to the Public Health Service, which is a major component of the Department of Health, Education, and Welfare.

2/Harvard, Yale, Brown, and Brandeis Universities, the Boston University (Medical Center), and the Massachusetts Institute of Technology.

AGENCY FUNDING FOR RESEARCH EQUIPMENT

The Foundation and the National Institutes of Health provide about 65 percent of the Federal grant funds awarded to colleges and universities to conduct scientific research, and appear to be the primary sources of grant funds for research equipment. In fiscal year 1976 the Foundation granted about $505 million in research funds, while the National Institutes of Health provided about $1.2 billion. The Foundation's budget for equipment has increased about 50 percent since fiscal year 1976--from $56 million in 1976 to $84 million in 1978. The National Institutes of Health's expenditures for equipment went up about 25 percent between 1976 and 1977--from $47 million to $59 million. During these periods, equipment expenses rose from 11 percent to 13 percent of total grant expenses for the Foundation, and from 5.3 percent to 5.6 percent for the National Institutes of Health. Both agencies pass equipment title to nonprofit institutions at time of purchase.

PROCEDURES FOR REVIEWING EQUIPMENT REQUESTS

The Foundation and the National Institutes of Health rely mainly on the researcher to request only necessary equipment. The agencies also use their research proposal evaluation systems, including peer review, budget cuts (differences between amounts requested and amounts awarded), and site visits to help eliminate unnecessary equipment requests. When equipment is involved, peer reviewers mainly check to see whether equipment is necessary for the proposed experiments. Budget cuts reduce project funding in salaries, supplies, equipment, or some other area. Site visits are usually limited to very expensive proposals because of scarce agency resources.

Both agencies expect the researcher and/or the department head to determine equipment availability in the department before requesting new equipment. Agency officials said they do not know how colleges and universities eliminate unnecessary research equipment requests. Officials at six universities said they rely heavily on the researchers' personal knowledge of available equipment when determining the need for new equipment. Boston and Harvard Universities rely exclusively on the researchers' personal knowledge of equipment availability. Brandeis supplements this with the department head's review based only on personal knowledge.

Brown, Yale, and the Massachusetts Institute of Technology had inventory records that researchers could use in making their determinations. Records at Yale were departmental only; records at the other two were universitywide. Department heads at the Massachusetts Institute of Technology and Yale screen equipment requests in research proposals against department inventory records; Brown's department heads do not review equipment requests.

At the time of our visits, Boston, Brandeis, and Harvard Universities did not maintain inventory records, but Brandeis was establishing equipment management procedures. Yale and the Massachusetts Institute of Technology were conducting physical inventories. Brown had not done so in recent years and did not plan to.

The Foundation and the National Institutes of Health both required institutions to maintain property records and periodically conduct physical inventories. These requirements, had they been complied with, could have helped institution officials determine equipment needs. Foundation and National Institutes of Health officials acknowledged that their agencies were not staffed to monitor institutions' compliance and did not know if they had complied. They said their program officers and grants management staff are not responsible for knowing institutions' procedures or compliance with agency requirements. The officials also believed that, practically speaking, monitoring compliance was an auditing responsibility.

Inadequate college and university research equipment management has been a longstanding problem. The Department of Health, Education, and Welfare's Audit Agency issued reports in 1968 and 1971 showing that colleges and universities needed to establish or improve inventory records and equipment screening procedures. We reported identical problems in 1973 concerning the National Institutes of Health, 1/ whose officials later said that our recommendations for improved equipment management were not implemented because the Office of Management and Budget was working on uniform grant administration requirements.

1/"Better Management Needed of Health Research Equipment by NIH Grantees," (July 17, 1973, B-164031(2)).

OFFICE OF MANAGEMENT AND BUDGET CIRCULAR A-110

In July 1976, the Office of Management and Budget published Circular A-110 which established grant administration requirements applicable to colleges, universities, and other nonprofit organizations. Previous agency grant administration requirements are superseded upon implementing the circular. The Foundation implemented the circular on October 1, 1977. The Department of Health, Education, and Welfare (which includes the National Institutes of Health) expects to issue implementing instructions in 1978. The circular requires agencies (that have the statutory authority) to unconditionally vest title to equipment purchased with grant funds in the institution, without further obligation or accountability to the Federal Government, unless it would not be in the Government's interest. The Foundation's instructions and the Department of Health, Education, and Welfare's draft instructions (March 1978) provide for continuing to pass title to equipment to the institution at time of purchase. Therefore, in accordance with the circular's provisions, grantees will no longer be required to maintain inventory or other controls over equipment. The circular does require institutions to have a system to prevent unnecessary equipment purchases. However, neither the circular nor the agencies' implementing instructions state how this requirement should be met.

EQUIPMENT MANAGEMENT FACILITATES SHARING

The Iowa State University's Research Equipment Assistance Program 1/ provides an equipment locator service to its researchers, other university staff, and students. Between January 1 and June 30, 1977, the program received about 1,150 inquiries for equipment and answered about 80 percent, by locating the equipment requested by the inquirers. Faculty members using the program said it had facilitated research and teaching efforts and prevented unnecessary equipment purchases.

1/Financial assistance was provided by the National Science Foundation in a grant awarded in February 1974.

CONCLUSIONS

Information from seven universities showed a wide variance in the procedures used to justify new equipment purchases, ranging from Iowa State University's centralized equipment management system to three other universities' total reliance on a researcher's and/or department head's personal knowledge of available equipment. Federal requirements for grantees to follow to avoid unnecessary equipment purchases are needed. An equipment inventory listing with sufficient descriptive data which is periodically updated should be available for grantee use. Also, agencies should, through their normal audit procedures, insure that grantees' compliance with the minimum requirements is periodically checked.

AGENCY COMMENTS AND OUR EVALUATION

We proposed that the Director, Office of Management and Budget, revise Circular A-110 to provide (1) minimum requirements for grantees to follow to avoid unnecessary equipment purchases and (2) procedures to periodically check grantees' compliance with the requirements. In commenting on our proposed recommendations, the Office of Management and Budget advised us on March 10, 1978, that the existing provisions of Circular A-110 and proposed revisions to Circular A-21 (cost principles for educational institutions) appeared to satisfy our recommendation regarding minimum requirements. However, the Office of Management and Budget said that in subsequent revisions, attempts will be made to clarify the circulars, placing greater emphasis on avoiding unnecessary equipment purchases.

We do not agree with the Office of Management and Budget's position that the provisions of these circulars appear to satisfy our recommendation. Although the Office of Management and Budget referred to circular provisions that include property record requirements, these requirements are not applicable to grantee-owned equipment. Both the Foundation and the National Institutes of Health pass title to Federally-financed equipment to the institutions at the time of purchase.

Regarding our second recommendation, the Office of Management and Budget plans to show our report to cognizant Federal agencies responsible for auditing colleges and universities receiving Federal funds, and remind them of the

importance of reviewing college and university procedures to avoid unnecessary equipment purchases. We do not believe this action is sufficient. The Office of Management and Budget's proposed action will not satisfy our recommendation that "procedures for periodically checking compliance" be established. Improper management of equipment is a longstanding problem. Federal agencies should be required to insure that cognizant audit agencies consider grantees' compliance with the equipment management controls we are recommending, and that deficiencies are corrected.

Foundation and National Institutes of Health officials generally agreed with our conclusions and recommendations, and expressed a willingness to work with the Office of Management and Budget to implement our recommendations. The Foundation's Director has issued a staff memorandum emphasizing the importance of reviewing equipment during site visits at grantee institutions and when scheduling audits of the institutions. The Director also issued a notice to grantee institutions advising them to examine and strengthen their equipment management procedures.

RECOMMENDATIONS

We recommend that the Director of the Office of Management and Budget, in conjunction with Federal agencies awarding research grants to nonprofit institutions, develop for inclusion in Circular A-110:

--Minimum requirements for grantees to follow to avoid unnecessary equipment purchases.

--Procedures to periodically check grantees' compliance with the requirements.

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As you know, Section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

B-133183

As arranged with your representatives, our office will release the report today. We are sending copies of the report to the Director, Office of Management and Budget; Director, National Science Foundation; Director, National Institutes of Health; the Secretary of Health, Education, and Welfare; the universities included in our review; and other interested parties. We are available to discuss our findings and to provide any further assistance you might need in studying research equipment management.

Sincerely yours,

Comptroller General
of the United States

MINIMUM REQUIREMENTS ARE NEEDED FOR COLLEGES AND UNIVERSITIES TO JUSTIFY RESEARCH EQUIPMENT PURCHASES

INTRODUCTION

On September 15, 1976, the Chairman of the House Committee on Science and Technology requested that we review the National Science Foundation's policies and procedures for awarding funds to colleges and universities for purchasing research equipment. The Chairman was concerned with whether institutions were avoiding unnecessary purchases of new research equipment by using equipment already available. He referred to our 1973 report "Better Management Needed of Health Research Equipment by NIH Grantees" (July 17, 1973, B-164031(2)). Most Foundation grantees also receive National Institutes of Health (NIH) grant funds. The Chairman was concerned that an increasing share of total research grant funds was being used for equipment purchases.

Pursuant to the Chairman's request and later agreements with our representatives, we:

--Examined the policies and procedures used by the Foundation and NIH to award research equipment grant funds.

--Identified the procedures used by Harvard, Yale, Brown, and Brandeis Universities, the Boston University (Medical Center), and the Massachusetts Institute of Technology (MIT), 1/ for determining the availability of research equipment at the time grant funds were requested and at the time the universities purchased equipment.

--Reviewed the Research Equipment Assistance Program at Iowa State University to see if it promoted sharing of research equipment.

1/These universities received about $253 million in Federal support for research during fiscal year 1976 and the transition period (July 1, 1975, to September 30, 1976)--the latest period for which information was available from the Foundation during our review. The Foundation is responsible for gathering such data under the National Science Foundation Act of 1950, as amended, (42 U.S.C. 1861 et seq) 1970.

--Determined the actions taken by NIH and the six universities regarding the problems and recommendations mentioned in our 1973 report on research equipment management.

--Interviewed Foundation and NIH officials responsible for awarding and administering grants, and officials at the six universities responsible for initiating and approving equipment requests in grant proposals and on purchase orders.

--Interviewed Office of Management and Budget (OMB) officials regarding Federal grant administration policies on equipment.

Our review was limited to equipment financed as part of a grant for scientific research, which is the primary method used by colleges and universities to obtain Foundation or NIH support for equipment purchases. Research equipment, as used in this report, means nonexpendable, tangible, personal property which has a useful life of more than 1 year; costs $300 or more; and is generally usable only for research, medical, scientific, or technical activities. It includes such items as microscopes, centrifuges, and spectrometers. General purpose equipment, such as office equipment and furniture, motor vehicles, and reproduction or printing equipment, is not considered research equipment.

The Foundation, under the authority of the National Science Foundation Act of 1950, as amended, (42 U.S.C. 1861 et seq) 1970, supports scientific research in various disciplines (such as chemistry, physics, biology, and engineering) primarily by awarding grants to colleges and universities. The Foundation expects prospective grantees to have adequate facilities to conduct proposed research; however, it provides funding for necessary research equipment not available to the proposed project through the grantee institution.

NIH 1/, which conducts and supports research on health and disease, awards grants to support scientific research at colleges, universities, and other institutions. NIH provides funding for research equipment if it is unavailable at the institution. The Foundation and NIH pass equipment title to nonprofit institutions at time of purchase.

During fiscal year 1976, the Foundation and NIH awarded colleges and universities about 65 percent of the $2.4 billion in Federal grant funds received by colleges and universities for research activities. These agencies are the two largest Federal sources for college and university research funds. NIH and the Foundation appear to be the leading providers of grant funds for research equipment. In fiscal year 1976, the Foundation awarded about 9,330 research grants totaling about $505 million, which included about $56 million for research equipment. NIH awarded about 13,800 research grants totaling about $1.2 billion, which included about $47 million for research equipment.

The Foundation's and NIH's research equipment funds have increased since 1976, both in dollars and as a percentage of total grant expenses. The Foundation's fiscal year 1978 budget includes about $649 million for total grant expenses, $84 million of which is for equipment--a 50-percent increase over 1976 equipment funds. Equipment as a percentage of total grant expenses rose from about 11 percent in 1976 to about 13 percent in 1978. During fiscal year 1977, NIH awarded about $1.4 billion for research grants, which included almost $59 million for research equipment--a 25-percent increase over 1976 equipment funds. Fiscal year 1977 equipment funds were 5.6 percent of total grant expenses, compared to 5.3 percent in 1976.

1/NIH consists of 12 separate institutes organized by categories of disease, such as cancer, heart, and arthritis. Each institute receives its own annual appropriation from the Congress. NIH is not an independent Federal agency as is the Foundation. NIH is part of the Public Health Service which is a major component of the Department of Health, Education, and Welfare (HEW). HEW and the Public Health Service prescribe the general operating policies for NIH.

PROCEDURES FOR EVALUATING EQUIPMENT REQUESTS IN RESEARCH PROPOSALS

The Foundation and NIH rely mainly on the researcher to request only necessary equipment. Officials from both agencies expect that either the researcher or the department head has determined that department equipment will not satisfy proposed research needs before requesting Federal funding. However, agency officials said they do not know how colleges and universities eliminate unnecessary equipment requests. For example, they do not know the extent that equipment inventories at colleges or universities are used for screening equipment requests or whether departments share equipment.

University equipment screening procedures

At the six universities visited, officials said they rely heavily on the researcher to request only necessary equipment. The following table shows university procedures used to supplement the researchers' personal knowledge in determining the need for new equipment.

Procedures For Evaluating Equipment Requests

	Research proposal stage			Time of purchase	
University	Inventory records of existing equipment were available for researcher's use	Department head review (personal knowledge)	Department head review (inventory records used)	Department head review of existing equipment	Purchasing office review of existing equipment
Boston	No	No	-	No	No
Brandeis	No	Yes	No	No	No
Brown	Yes	No	-	No	a/Yes
Harvard	No	No	-	No	No
MIT	Yes	Yes	b/Yes	c/Yes	No
Yale	d/Yes	Yes	d/Yes	No	No

a/For equipment costing $1,000 or more.

b/Departmental records only. A universitywide listing was available but was not used.

c/Departmental records only. For equipment costing $1,000 or more.

d/Departmental records only. No universitywide listing was available.

As shown in the table, Boston and Harvard Universities rely exclusively on the researchers' personal knowledge of equipment availability. Brandeis supplements this with the department head's review based only on personal knowledge. In most Yale departments, the researcher and department head have access to departmental inventory records. Boston, Brandeis, Harvard, and Yale Universities do not review available equipment before purchasing new equipment. Brown and MIT only review equipment if the requested item costs $1,000 or more. Brown uses universitywide records, and MIT uses only the equipment records of the requesting department.

In October 1977, the Foundation tried to encourage grantees to screen existing equipment by requiring institutional certification that research equipment costing over $10,000 in a grant proposal was essential and not reasonably available and accessible. The Foundation did not set requirements for institutions to follow in making the certifications. At the six universities we visited, screening processes have not changed, although certification is now required by the Foundation. NIH does not require a certification.

Other techniques for evaluating equipment requests

The Foundation and NIH use their research proposal evaluation systems, including peer review, budget reductions, and site visits, to help eliminate unnecessary equipment requests.

Peer review

Foundation and NIH proposal evaluation systems, although structurally different, mainly consist of reviews by agency officials and peer reviewers (experts usually external to the agency) knowledgeable in the proposal's subject matter. Agency officials said the part of these reviews dealing with research equipment mainly provides a check of whether the requested equipment is necessary to conduct the proposed experiments. Occasionally a reviewer has knowledge of the equipment in the researcher's laboratory; but this is about the most help the reviewer can give in determining if equipment at the institution could be used.

Budget reductions

According to both agencies' officials, budget cuts (differences between amounts requested and amounts awarded) are effective in reducing unnecessary equipment purchases. Officials said when total requested funds are reduced, unnecessary equipment requests will be "weeded out."

We examined 14 research projects funded by the Foundation that included requests for equipment funds. Twelve of the projects requested funds for equipment in the original proposal; two did not, but received supplemental funding for equipment after the award was made. Of the 12 projects, 1 received total funding as requested, and funding was reduced for 11. In only 4 of the 11 cases, some equipment was eliminated; 2 of the 4 received funds later to purchase equipment.

Site visits

Usually, the primary purpose of a site visit is to determine the merit of a proposed project. However, site visits by program officials or peer reviewers can also help eliminate unnecessary equipment requests. But they are usually restricted to very large or complex proposals because of limited time or scarce resources, according to agency officials.

Of the 14 projects we reviewed, proposals for 7 were for less than $150,000; 4 ranged from $155,000 to $277,000; and 3 were for $344,000, $350,000, and $750,000, respectively. A site visit was made on only one project, which was funded at $320,000, including about $34,000 for equipment. The researcher asked for $344,000, including $52,000 for equipment. The site visit report did not mention equipment requested in the proposal, and no other documentation in the file showed why the equipment amount was reduced. Foundation officials said there was no requirement to discuss equipment in site visit reports at the time this project was reviewed.

Rebudgeting authority

Researchers may also obtain equipment by rebudgeting 1/ research funds. These actions do not receive peer review and do not require approval except as follows.

1/Rebudgeting transfers within limitations can be made between any of the budget categories within the total direct cost of the grant to meet unanticipated requirements.

A typical Foundation or NIH grant will specify the amount of funds for the researcher's and research assistant's salaries and wages, related benefits, overhead costs, travel, supplies, and in many instances, equipment. Researchers may transfer funds from other budget categories to purchase research equipment, except when the equipment will cost $1,000 or more, or when the cumulative equipment expenditures will exceed the approved research equipment budget by 25 percent or more. Under Foundation grants, all other budgeted funds transferred to purchase equipment, depending on the cost, require approval by either the Foundation or the institution's prior approval system, if one exists. 1/ NIH requires its grantees to establish a prior approval system. NIH delegates authority to the designated institution official to review and approve research equipment rebudgeting actions. However, transfers that will exceed $25,000 or 10 percent of the total budgeted direct costs for the grant require approval by NIH.

PROPERTY MANAGEMENT STANDARDS

Both agencies had property management controls as part of their grant administration requirements 2/ for funded research equipment. Foundation grantees were expected to have (1) appropriate property records, (2) periodic physical inventories, (3) controls to prevent loss, damage, or theft, (4) adequate maintenance procedures, and (5) procedures for sale or disposal of unneeded property. NIH grantees were required to maintain accurate property records and effective inventory control and maintenance procedures. In addition, NIH grantees were required to take a physical inventory and reconcile the results with property records at least once every 2 years, to verify the existence, use, and continued need for the property.

These standards could help college and university officials determine equipment needs. Foundation and NIH officials said they were not staffed to monitor compliance with the standards and did not know if institutions had complied.

1/In a prior approval system, a designated institution official provides the necessary approval for deviations from the approved project.

2/OMB recently issued uniform grant administration requirements which, upon implementation by the agencies, will supersede their requirements. (See p. 10.)

These officials said the program officers and grants management staff are not responsible for knowing institutions' procedures. They have to rely on the institutions' systems since they cannot possibly know all equipment at all institutions. The officials also believed that, practically speaking, monitoring compliance was an auditing responsibility.

University compliance

At the time of our visits, Boston, Brandeis, and Harvard Universities were not maintaining inventory records for research equipment. Brown and MIT maintained universitywide inventory records. Brown listed all university-owned equipment that originally cost $200 or more, and MIT listed equipment that originally cost $300 or more. These inventories included about 28,000 items and 73,000 items, respectively. At Yale, most departments maintained inventory records of their equipment which originally cost $500 or more.

Two of three universities with inventory records (Yale and MIT) were taking physical inventories at the time of our visits, to see if their records agreed with equipment on-hand. Brown University, according to the property officer, had not taken a physical inventory in recent years and did not plan to do so. The Director of the Office of Research Administration said an inventory report is periodically prepared for each department and submitted to the department head, to certify that the listed equipment is in use.

Brandeis did not have inventory records but was taking a physical inventory and establishing equipment management procedures at the time of our visit. When its system becomes operational (planned for 1978), it will provide enough information (such as equipment description, percentage of time used, and location) to enhance equipment sharing and better justify equipment purchases. Department heads will receive a listing of equipment in their departments to use when reviewing equipment requests. Another university official will receive a universitywide equipment listing for use in further evaluating equipment requests. Before the equipment is bought, purchasing department personnel will screen the universitywide listing to identify equipment which could be used instead.

Boston and Harvard Universities, both without inventory records, plan no improvements in equipment management. According to the Business Manager at the Boston University Medical Center, and the Director of the Office of Research

Contracts at Harvard, the schools will continue to rely on researchers' personal knowledge of existing equipment.

Inadequate equipment management--
a longstanding problem

The Department of Health, Education, and Welfare Audit Agency, in a 1968 report to the Director of NIH and other HEW agency heads, concluded that many institutions needed to substantially improve their practices relating to equipment purchased with HEW funds. Principal problem areas included inadequate property records and the need to screen available equipment before purchasing new equipment. HEW issued instructions in April 1969 for improved equipment management. In 1971 HEW auditors noted identical equipment management weaknesses and concluded that Federal agencies needed to better monitor the property control system of grantees.

Our July 197[illegible] report (see p. 1) stated that grantees' property management records were inadequate for screening available equipment before making new purchases. For example, universitywide inventory records were not maintained, and at one institution we visited a physical inventory had never been taken. We recommended to the Secretary of HEW that NIH be directed to (1) instruct grantees to improve their records so that grantee officials could screen all major equipment before purchasing new equipment and (2) issue guidelines or instructions for its grantees to foster establishment of equipment pools and other means for sharing equipment. According to NIH documents and officials, a plan to implement these recommendations was approved in October 1973 but was not implemented, because OMB was working on uniform Federal grant administration requirements for nonprofit institutions. Although a "wait-and-see" attitude prevailed, NIH took some interim actions.

NIH asked the HEW Audit Agency to more thoroughly review equipment use and control as part of its routine review of grantees. As of October 1977, the Audit Agency had not reported on equipment management procedures at MIT and at Brandeis, Brown, Harvard, and Yale Universities since the 1973 report was issued. At Boston University, an audit report for the period ended June 30, 1974, showed that the institution did not have inventory records and, as a result, had little assurance that existing equipment was used effectively or that purchases of additional equipment were justified.

In December 1973 NIH distributed an abstract version of our report to 400 of its largest grantees (which included the six universities we visited), and in August 1974 requested responses on the impact of the report from 50 of them. An NIH January 1975 status report stated:

> "Even with follow-up telephone calls, we have received only thirty-five responses which I feel, in itself, is an indication of the difficulty in trying to stimulate interest in the area of equipment management improvement. An analysis of the data provided in the thirty-five responses is difficult because we did not follow a questionnaire approach * * *."

According to an NIH official, 28 of the 400 grantees were visited either in December 1973 or January 1974, primarily to review the institutions' implementation of NIH's policy on rebudgeting research funds. NIH officials also held discussions with researchers, department heads, and laboratory chiefs regarding research equipment inventories and screening procedures. According to the NIH official, most of the institutions visited did not have universitywide equipment inventories that could be used for screening requests for new equipment. In addition, those that did have inventories were not using them to screen equipment requests.

OMB CIRCULAR A-110

On July 30, 1976, OMB published Circular A-110 establishing uniform grant administration requirements, such as property and procurement standards and financial reporting requirements. These were established for Federal agencies to follow in administering grants to academic and other nonprofit institutions. Previous Federal requirements, such as the Foundation's and NIH's inventory controls, are superseded upon implementation of the circular. The Foundation implemented the circular in October 1977. HEW (which includes NIH) expects to implement the circular in 1978.

The OMB property management standards state that agencies having statutory authority shall vest title to equipment purchased with grant funds in the institution. This will be done without further obligation or accountability to the Federal Government, unless the agency determines that to do so would not be in the Government's interest.

The Foundation and NIH have statutory authority to unconditionally vest equipment title in nonprofit institutions at the time of purchase and are now doing so. Conversely, the circular provides stringent property management standards which institutions must follow for purchasing equipment with grant funds from agencies that cannot or will not unconditionally vest title. These standards include sharing the equipment, maintaining property records, conducting physical inventories, and establishing a control system to prevent damage, loss, or theft.

The procurement standards of Circular A-110 seemingly provide a further dichotomy. It states that all institutions purchasing equipment shall follow a procedure to avoid purchasing unnecessary or duplicative items. Therefore, although institutions have no further accountability to the Federal Government for equipment once title passes, property management records and screening procedures will be needed to avoid purchasing unnecessary equipment. Foundation instructions to grantees implementing Circular A-110 did not state how grantees should avoid unnecessary purchases as required in the circular's procurement standards. 1/ HEW's proposed instructions are also silent on this subject. An OMB official said the intent of the "general" procurement standard was to allow institutions flexibility in choosing procedures to satisfy the standard's objective.

Officials at the six universities we visited told us they do not plan to change their equipment management and screening techniques because of Circular A-110. (See pp. 4 and 8.)

The financial reporting requirements prescribed in the circular also affect equipment management. Before the circular, the Foundation and NIH required their grantees to periodically submit a financial report of expenditures on each grant by listing the items, such as salaries, supplies, and equipment. A final report was due within 90 days of grant expiration. Circular A-110 requires grantees to report only the total amount of grant expenditures. As a result, Federal agencies will not know the amount of grant expenditures for equipment--or other budgeted items. Foundation and NIH officials advised us that the financial

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1/Foundation instructions do require institutions to provide a certification for proposed equipment acquisitions costing more than $10,000 requested in research proposals. (See p. 5.)

report was used to monitor reallocation of grant funds among budget categories, such as overstating salaries in the budget and using the excess to buy equipment.

EQUIPMENT MANAGEMENT CAN FACILITATE SHARING

Iowa State University, at Ames, with financial assistance from the Foundation, 1/ developed a program which facilitates equipment sharing and oftentimes prevents the purchase of unnecessary equipment. The Research Equipment Assistance Program is based on the faculty's voluntary cooperation in sharing scientific equipment or meeting other equipment-related needs. The objective of the program is to improve research and teaching productivity by providing equipment for university staff and students.

There are four principal program elements:

--An alphabetical listing of equipment which originally cost $500 or more, showing its name, manufacturer, model number, availability, and condition.

--A service which finds faculty with equipment for faculty without it.

--A central storage area of mainly excess equipment used to make equipment loans.

--A procedure for reviewing equipment requests in grant proposals and purchase orders to determine whether existing equipment could be used.

The university personnel assigned to the program initially visited researchers and other equipment custodians, to gather information such as description, condition, and availability of equipment for sharing. The visits also acquainted researchers with the program, and gave them an opportunity to transfer excess equipment to the equipment storage area.

The program staff includes former researchers and clerical persons who are available to help researchers locate

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1/In February 1974 a grant was awarded under the Foundation's Research Management Improvement Program. The Congress terminated this Foundation program in fiscal year 1975.

equipment. The staff tries to locate the item in the equipment listing or storage area. If the item is available from the storage area, it is loaned directly to the researcher. If it is not, the staff uses the equipment list and their personal knowledge to locate a researcher with the needed equipment. If this is successful, the staff contacts the individual to see if the equipment is available. If so, the two researchers are put in contact with each other to work out the arrangements.

In August 1977 we visited the Iowa State University to determine the nature and extent of research equipment sharing resulting from the program. Between January 1 and June 30, 1977, the program received about 1,150 inquiries for equipment, 80 percent of which were satisfied by locating the equipment. We analyzed 241 of the 369 satisfied requests which were for research equipment costing at least $51 each. Our analysis showed that about 86 percent of the 241 requests were satisfied with equipment loaned from the program's equipment storage area; about 12 percent through interdepartmental sharing; and 2 percent by obtaining equipment from the requester's department.

Faculty members who had used the program said it had

--supported student research,

--aided the general teaching effort,

--replaced inoperative equipment,

--enhanced current research and research proposals, and

--prevented unnecessary equipment purchases.

CONCLUSIONS

The Foundation and NIH provide significant funding through research grants to colleges and universities for equipment needed to conduct research experiments--about $103 million in fiscal year 1976. Recent budget and expenditure trends indicate that the agencies' financing of research equipment will increase to over $140 million by 1978.

Problems in equipment management at colleges and universities have been documented for nearly a decade. During our recent visits to seven universities (including Iowa State), we saw that while some institutions were making improvements, others were operating without such rudimentary management tools as inventories.

Foundation and NIH officials do not know the techniques used by colleges and universities to eliminate unnecessary equipment requests in research proposals. Officials at six universities rely heavily on the researchers to request only necessary equipment. However, only three have inventory records to help the researcher determine if the equipment requested might be available elsewhere at the institution.

At the other three universities, the decision to request equipment funding in grant proposals is based on personal knowledge of current equipment. One of these universities is developing inventory records. The seventh university we visited (Iowa State) has implemented a centralized equipment management system.

Prior to OMB Circular A-110, the Foundation and NIH had property management requirements for grantees which could have provided data useful to researchers in determining the need for new equipment. However, the Foundation and NIH do not know if institutions complied with the standards. Three institutions we checked did not comply. OMB Circular A-110 could encourage institutions to maintain the status quo in equipment management, since they now have no accountability to the Federal Government for equipment when title passes. The circular does state that grantees should have a system to avoid unnecessary equipment purchases, but does not state how this should be done.

Visits to the universities showed a wide variance in the procedures used to justify new equipment purchases, ranging from a centralized equipment management system to total reliance on the researchers' personal knowledge of what equipment is available at the institution. OMB needs to establish minimum standards for grantees to follow in meeting the objective of Circular A-110--to avoid unnecessary equipment purchases. We do not believe that an elaborate equipment management system, such as the Iowa State University program, is needed at each institution. However, institutions should at least have an equipment inventory listing with sufficient descriptive data, periodically updated, to use when determining the need for new equipment. Also, agencies should, through their normal audit procedures, insure that grantees' compliance with this minimum requirement is periodically checked.

AGENCY COMMENTS AND OUR EVALUATION

We proposed that OMB revise Circular A-110 to provide (1) minimum requirements for grantees to follow to avoid unnecessary equipment purchases and (2) procedures to periodically check grantees' compliance with the requirements.

OMB comments

By letter dated March 10, 1978, OMB advised us that the requirements of Circular A-110, attachments N and O, and proposed revisions to Circular A-21, "Cost principles for educational institutions," appeared to go beyond our proposed recommendation regarding minimum requirements for avoiding unnecessary equipment purchases. We disagree with the position taken by OMB that the circulars more than satisfy our recommendation.

OMB advised us that A-110, attachment N, requires that grantees maintain accurate, detailed property records, take physical inventories at least every 2 years, and reconcile the results with the property records. We note, however, that under section 5 of attachment N, this requirement is not applicable to Federally-financed equipment when title is vested in the grantee pursuant to statutory authority. As previously stated, the Foundation and NIH are vesting equipment title in nonprofit institutions at time of purchase, and they appear to be the leading providers of Federal grant funds for research equipment.

According to OMB, attachment O of Circular A-110 requires that grantees' procurement actions follow a procedure to assure that unnecessary or duplicative items are not purchased. However, our review showed that the Foundation and NIH have not provided guidance to grantees on what procedures should be followed to comply with this requirement. At the seven institutions we visited, the systems used to justify purchases of equipment ranged from a centralized equipment management system to total reliance on a researcher's personal knowledge of equipment available at the institution. Also, at some institutions, available equipment records were not always used to review equipment requests.

OMB also advised us that proposed revisions to Circular A-21 (now titled Federal Management Circular 73-8) would require capitalization of equipment having an acquisition cost of at least $300 and a 1-year life. Also, as currently required, property records and physical inventories

would be necessary to recover depreciation costs on such equipment. We note, however, that Circular 73-8 prohibits institutions from charging equipment use or depreciation allowances on Federally-financed or donated equipment. Therefore, the property records and physical inventories requirements of 73-8 are not applicable to Federally-financed equipment.

We suggested to OMB that in implementing our recommendation, an equipment inventory listing, which is periodically updated, would be the minimum needed by grantees to review equipment requests. As we have stated, the circulars cited by OMB have no inventory requirements for Federally-financed equipment, except Circular A-110 when Federal title is retained--a practice not followed by the Foundation or NIH. OMB advised us that it would attempt to clarify the circulars to place greater emphasis on avoiding unnecessary equipment purchases. At this time the specific revisions to the circulars, if any, that will be made by OMB to avoid grantees using Federal funds to purchase unnecessary equipment, are unknown.

Regarding our second recommendation, OMB agreed with us that grantees' compliance with the requirements of the circulars can best be determined as part of the periodic audit of each university. OMB intends to show our report to the cognizant Federal agencies responsible for auditing colleges and universities, and remind them of the importance of reviewing institutions' procedures for avoiding unnecessary equipment purchases. This action does not fully comply with our recommendation. As our report states, the HEW Audit Agency has, on many occasions, reported that equipment management at colleges and universities is a problem. Our recommendation is for OMB to include in Circular A-110 requirements for Federal agencies to insure that cognizant audit agencies consider grantees' compliance with the equipment management controls we are recommending, and that deficiencies be corrected. However, until OMB establishes minimum requirements for grantees to follow in avoiding unnecessary equipment purchases, the latter recommendation is largely academic.

Foundation and NIH officials comments

On February 13 and 16, 1978, respectively, Foundation and NIH officials advised us that they generally agreed with our conclusions and recommendations, and that they would be willing to work with OMB in implementing our recommendations.

Officials from both agencies also commented that inventory controls were a prerequisite to equipment management. However, inventories might not necessarily result in more sharing of research equipment.

We agree with their views and believe that Federal sponsoring agencies and grantee institutions will need to follow procedures for approving new equipment requests that will determine whether existing equipment is available for sharing within practical limits. Establishing and using adequate inventories would be an important step toward fostering maximum use of existing equipment and avoiding unnecessary purchases.

Since our meeting the Foundation has taken the following actions to improve its monitoring of institutions' equipment utilization. In a February 15, 1978, memorandum, the Director requested that Foundation staff members, as a routine part of site visits, look into the institution's utilization of equipment and the availability of equipment in the department or neighboring departments which might be used by the researcher. Staff members are also required to include the results of these inquiries in their site visit reports.

The Director's memorandum states that auditors of other agencies making audits either at the specific request of the Foundation or as the agency having audit cognizance for an institution should be requested to include, within the limits of resources available, spot checks of equipment utilization. The auditors should also spot check the institution's system for generating the required certification for equipment costing over $10,000 requested in research proposals.

In addition, on February 24, 1978, the Foundation issued an "Important Notice to Presidents of Universities and Colleges and Heads of Other NSF Grantee Organizations," advising grantee institutions to examine their equipment management procedures and strengthen them wherever possible. The Foundation's notice stated that in view of the rapidly rising cost of equipment and other factors contributing to the escalating cost of research, it was extremely important for grantees to take full advantage of available equipment in laboratories. The Foundation also announced plans to sponsor a conference later this year on systems used by various institutions to inventory and promote shared use of scientific equipment.

RECOMMENDATIONS

We recommend that the Director of OMB, in cooperation with Federal agencies awarding research grants to nonprofit institutions, develop for inclusion in Circular A-110:

--Minimum requirements for grantees to follow to avoid unnecessary equipment purchases.

--Procedures to periodically check grantees' compliance with the requirements.

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