Section A.

Technical Notes

SECTION A. TECHNICAL NOTES

SCOPE OF SURVEY

The data presented in these tables are collected biennially through the National Science Foundation's (NSF) congressionally mandated Survey of Scientific and Engineering Research Facilities (Facilities survey). The survey originated in 1986 in response to Congress' concern about the state of research facilities at the Nation's colleges and universities. NSF's 1984 reauthorization legislation, P.L. 99-159, mandated a data collection and analytic system to identify and assess the research facilities needs of academic institutions. The legislation stated:

> The National Science Foundation is authorized to design, establish, and maintain a data collection and analysis capability in the Foundation for the purpose of identifying and assessing the research facilities needs of universities and colleges. The needs of universities by major field of science and engineering, for construction and modernization of research laboratories, including fixed equipment and major research equipment, shall be documented. University expenditures for the construction and modernization of research facilities, the sources of funds, and other appropriate data shall be collected and analyzed. The Foundation, in conjunction with other appropriate Federal agencies, shall report the results to Congress. (42 U.S.C. 1886)

The National Institutes of Health (NIH) have co-sponsored all cycles of the survey. Each survey cycle NIH has added a limited set of questions particularly focused on animal research facilities.

POPULATION

The survey is sent to research-performing colleges and universities in the U.S. Research-performing colleges and universities are defined as meeting one of three criteria: 1) offer doctorates in S&E fields; 2) report at least $150,000 in research and development (R&D) expenditures for fiscal year 1998; or 3) are an Historically Black College or University (HBCU) with any R&D expenditures. The population of academic institutions for this survey is derived from the 1998 NSF Survey of Research and Development Expenditures at Universities and Colleges. The six uniformed service academies are excluded from the population.

The survey is also sent to nonprofit biomedical research organizations. Biomedical research organizations are part of the eligible population if they are an independent research hospital or a nonprofit biomedical research organization. The population of biomedical research and organizations is derived from a 1998 list of NIH grantees receiving at least $150,000 in funding from NIH.

DATA DEFINITIONS

Research is all science and engineering R&D activities that is budgeted and accounted for. Research can be funded by the institution itself, the Federal Government, state governments, foundations, corporations or other sources.

Research space includes: research laboratories; controlled environment space such as clean or white rooms; technical support space such as carpentry and machine shops; space for laboratory animals, such as animal production colonies, holding rooms, isolation and germ-free rooms; faculty or staff offices to the extent that they are used for research; department libraries, to the extent that they are used for research; fixed equipment, such as fume hoods and benches; single pieces of non-fixed equipment each costing at least $1 million, such as MRI equipment; and leased space. It does not include: space that is designated as federally funded research and development centers (FFRDCs); space used by faculty but not administered by the institution such as research space at non-university hospitals; and space administered by the institution but is leased to others for their use.

Biomedical research space is space for research in the biological sciences in medical schools, biological sciences not in medical schools, medical sciences in medical schools and medical sciences not in medical schools.

Net assignable square feet (NASF) is the sum of all areas (in square feet) on all floors of a building assigned to, or available to be assigned to, an occupant for specific use, such as instruction or research. NASF is measured from the inside faces of walls.

Research program commitments are all research activities of an institution that are budgeted, approved, and funded. It includes current faculty and staff or those to whom offers have been made; grants awarded, whether or not research has actually begun; and, programs which have been approved.

Repair/renovation is both major and minor repair/renovation of existing facilities in deteriorated condition; capital improvements on facilities; or conversion of facilities.

Major repair/renovation is an extensive repair/renovation project that results in facilities that are equivalent, or nearly equivalent, to new facilities in the ability to support S&E research.

New construction is construction of a new building or additions to an existing building.

Central campus infrastructure refers primarily to systems that exist between the buildings of a campus (excluding the area within five feet of any individual building foundation) and to the non-architectural elements of campus design (central wiring for telecommunications systems, storage or disposal facilities, electrical wiring between buildings, central heating and air exchange systems, drains and sewers, roadways, walkways, parking systems, etc.)

Deferred project is a repair/renovation or new construction project that meets all of the following criteria: 1) is necessary to meet current S&E research program commitments; 2) is not scheduled; 3) does not have funding; 4) is neither for the purpose of developing new programs nor for expanding faculty beyond what is required to fulfill current S&E research program commitments.

Institutional plan is an institution's approved plan, including goals, strategies, steps, and budgets, for fulfilling the institution's mission during a specific time period.

Animal housing space is all general animal housing (for example, cage rooms, stalls, wards, isolation rooms) and maintenance areas (for example, feed storage rooms, cage-washing rooms, shops, storage), if these areas directly support research.

Animal laboratory space is all animal laboratory space used exclusively for research activities, such as bench space, animal production colonies, holding rooms, germ-free rooms, surgical facilities and recovery rooms.

Animal research space is the combined amount of animal laboratory and animal housing space.

Changes In Reporting

Since these data were first collected in 1986, several changes have been made to the population, the sample, and some of the survey questions. The 1999 cycle changes include:

- The minimum level of R&D expenditures for eligible research-performing academic institutions is increased from institutions with at least $50,000 in R&D expenditures to institutions with at least $150,000 in R&D expenditures (except HBCUs). For biomedical organizations the minimum level in NIH funding received increases from at least $50,000 to at least $150,000 in funding.

- A census of eligible institutions is surveyed. In prior years, eligible institutions were sampled using a stratified sampling design.

- The animal research facilities survey questions changed over survey cycles to correspond to the changes in the issues associated with animal research facilities. For the 1999 cycle, most of the animal research facilities questions are modeled after the general S&E survey questions regarding the amount of space, the condition of space, the new construction and repair/renovation of space; and the costs of new construction and repair/renovation.

Analytic Definitions

Several analytic subgroups are presented in the table data. These subgroups are defined as follows.

Regions

In some tables, states are divided into the four U.S. regions defined by the U.S.Census Bureau. These regions are:

- Northeast: ME, NH, VT, MA, RI, CT, NY, NJ, PA.
- Midwest: OH, IN, IL, MI, WI, MN, IA, MO, ND, SD, NE, KS.
- South: DE, MD, DC, VA, WV, NC, SC, GA, FL, KY, TN, AL, MS, AR, LA, OK, TX.
- West: MT, ID, WY, CO, NM, AZ, UT, NV, WA, OR, CA, AK, HI.

EPSCoR and IDeA

In addition to the regional groupings, in some tables, states are grouped according to their eligibility for NSF or NIH funding. States are eligible for the NSF Experimental Program to Stimulate Competitive Research (EPSCoR), if they have historically received less Federal R&D funding than other states. The purpose of the program is to increase the R&D funding competitiveness of these states by assisting in the development and utilization of science and technology resources located at the major universities.

NIH sponsors the Institutional Development Award (IDeA) program. This program was established in 1993 in order to enhance the competitiveness for research funding of institutions located in states with historically low aggregate success rates for NIH grant applications. The goal is to broaden the geographic distribution of NIH funding for health research.

The states currently eligible for these programs are as follows:

- EPSCoR: AL, AK, AR, ID, KS, KY, LA, ME, MS, MT, NE, NV, ND, OK, PR, SC, SD, VT, WV, WY.
- IDeA: AK, AR, DE, HI, ID, KS, KY, LA, ME, MS, MT, NH, NM, NE, NV, ND, OK, RI, SC, SD, VT, WV, WY and Puerto Rico.

Minority Designations

The survey included subgroups to identify minority-serving institutions, including Historically Black Colleges and Universities (HBCUs) and Hispanic-Serving institutions (HSIs). According to the Department of Education, HBCUs are postsecondary institutions of higher education founded before 1964 whose educational mission has historically been the education of black Americans. The HBCU list (updated August 1999) was provided by the White House Initiative on HBCUs. The original Survey of Scientific and Engineering Research Facilities included 29 HBCUs. These institutions have been identified separately for trend analysis.

Hispanic-serving institutions (HSIs) are defined as any accredited and degree-granting institution of higher education with 25 percent or greater total Hispanic undergraduate full-time equivalent enrollment. An institution may be both an HBCU and an HSI. A list maintained by the Department of Education (revised March 27, 2000) is the source of information on this group of schools. See Appendix C for a List of Institutions surveyed.

Other Definitions

Two other analytic subgroups are used in the tables. **Field leaders** are defined as the 10 institutions with the most research space in a given field. **Institutional control** is defined as private or public institutions.

Data Considerations

Users should be aware of several analytic issues associated with the data.

- Definition of medical schools. In tables 1 through 41, institutions are defined as having space 'in medical schools' if respondents indicated that they had space in either the biological sciences in medical schools or the medical sciences in medical schools, regardless of whether the medical schools are accredited. In tables 46 through 57, data are only included for academic institutions with medical schools accredited by the American Association of Medical Colleges (See Section C). Both sets of tables include standalone medical schools. In table data from prior survey cycles, the former definition of medical schools is used for all tables.

- Source of funds. Caution must be exercised when examining the data on source of funds. Several institutions provided inconsistent information about the costs of new construction and repair/renovation and the source of these funds for the period 1998-99. Consequently, the table data for sources of funding may not be consistent with table data on new construction and repair/renovation costs.

- Quality of research space. Respondents were asked to estimate the percent of their research space in each S&E field according to four quality designations (i.e., suitable for the most scientifically competitive research, suitable for most levels of research, requires major repair or renovation, requires replacement). These percents were multiplied by the NASF in each field from question 1 in order to compute the total NASF for each field quality category. The sums of these NASF field totals are presented in some of the tables. The percentages shown are the fractions of this total NASF, summed across all institutions, that fall into the quality category. For example, suppose that ratings were received from institutions that had a total of 11.4 million NASF for the biological sciences in medical schools. Suppose further that 5.5 million NASF (48 percent) was rated as 'suitable for the most scientifically competitive research.' The table would show that 48 percent of the NASF in the biological sciences in medical schools was 'suitable for the most scientifically competitive research.' The total across all fields is the sum of the rated areas in all fields for each level of quality, divided by the total rated area.

Response Rate

The 1999 survey was mailed to academic institutions in November of 1999 and data collection ended on July 30, 2000. For biomedical organizations, surveys were mailed in December of 1999 and data collection ended August 31, 2000.

Of the 529 eligible academic institutions, 71 percent returned surveys. Of the 254 eligible biomedical institutions, 61 percent returned surveys.

Weighting

The academic survey respondents are divided into nine strata. These strata are:

1) the top 100 institutions based on 1998 R&D expenditures;

2) the 29 HBCUs in the survey since 1988;

3) the other 35 HBCUs not included in the original survey;

4) institutions that were not HBCUs but had at least 25 percent black student enrollment;

5) institutions enrolling at least 25 percent Hispanic students;

6) public, doctoral-granting institutions;

7) private, doctoral-granting institutions;

8) public, non-doctoral granting institutions; and

9) private, non-doctoral institutions. In addition, if institutions within a stratum housed an accredited medical school, a separate stratum for these schools was created. For example, strata 1a became top 100 institutions with medical schools and strata 1b became the remaining top 100 institutions.

Biomedical institutions were stratified into two strata of hospitals and other nonprofit research institutions.

Within each stratum, a weight was computed to be the quotient of the population size for that stratum divided by the number of institutions responding. The weights ranged from 1.00 to 1.77. The average weight was 1.40.

Item Nonresponse

Data are imputed for survey questions 1, 5 and 7 for those respondents who only provided partial data. To impute the missing data for question 1 on instructional and research space, similar institutions to those with the missing data were identified. Similar institutions were identified by the weighting stratum to which they belonged and by the total amount of construction and repair/renovation funds in Question 7. For each institution with missing data, a similar respondent was randomly selected and question 1 data was imputed from that institution's information.

For question 5 on the dollar amount of repair/renovation and new construction begun in 1998 or 1999, data are imputed by sorting on 1) whether the institution is private or public; 2) their weighting stratum; and 3) total research area.

Data are also imputed for question 7 on the source of funds for repair/renovation and construction. For repair/renovation costs, institutions are sorted by 1) whether the institution is private or public; 2) their weighting stratum and 3) their total repair costs in question 5. If the repair costs are also missing, total research area is used. For construction costs, institutions are sorted by 1 and 2 above and then by total construction costs in question 5. If the construction costs are also missing, total research area is used.

Data Availability

Data published in this report are also available on the World Wide Web and can be found at http://www.nsf.gov/sbe/srs/stats.htm. Due to a pledge of confidentiality with the responding institutions, individual institutional data are not available; all data are in aggregate form only.