SF-83-I SUPPORTING STATEMENT

for

Higher Education Research and Development Survey and Federally Funded Research and Development Centers R&D Survey

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Supporting Statement

July 2019

A. JUSTIFICATION

This request is for a three-year extension of the previously approved OMB clearance for the Higher Education Research and Development (HERD) Survey and the FFRDC R&D Survey. The surveys were last conducted for FY 2018. The OMB clearance for the surveys will expire on September 30, 2019 (Attachment 1).

1. Need for Data Collection and Legislative Authorization

The National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF) collects, maintains, and disseminates information on science and engineering resources in the United States. Specifically, Section 505 within the America COMPETES Reauthorization Act of 2010 directs NSF as follows:

> "(a) Establishment- There is established within the Foundation a National Center for Science and Engineering Statistics that shall serve as a central Federal clearinghouse for the collection, interpretation, analysis, and dissemination of objective data on science, engineering, technology, and research and development.
>
> (b) Duties- In carrying out subsection (a) of this section, the Director, acting through the Center shall--
>
> > (1) collect, acquire, analyze, report, and disseminate statistical data related to the science and engineering enterprise in the United States and other nations that is relevant and useful to practitioners, researchers, policymakers, and the public, including statistical data on--
> >
> > > (A) research and development trends;…"

The HERD Survey (Attachment 2) provides essential data on the resources devoted to research and development in the higher education sector where over one-half of the Nation's basic research is conducted. Conducted annually since FY 1972, the survey provides both summary data on R&D resources, by source and discipline, and data on individual institutions. Between 2007 and 2010, the survey underwent a full-scale redesign of both content and methodology. Beginning in FY 2012, institutions reporting $1 million or more in R&D expenditures in the previous fiscal year were asked to respond to the full HERD survey in the current survey fiscal year, whereas institutions reporting under $1 million were sent a short form version of the survey containing only a few questions (Attachment 3). A population screener is sent each year to institutions not currently in the survey to determine eligibility (Attachment 4 and Attachment 5).

Results of this survey are combined with other NCSES data for the federal and business sectors to arrive at national levels of R&D spending, as required by the law cited above. Without information from the HERD Survey, NSF policymakers and planners, as well as other policymakers in the Executive Branch, Congress and the states, would have an incomplete and inaccurate understanding of the Nation's R&D activities. Furthermore, the data from this survey are used in conjunction with information from other surveys of academic science and engineering (S&E)—such as the Survey of Graduate Students and Postdoctorates in Science and Engineering and the Survey of Science and Engineering Research Facilities—to provide the background statistics that are critical for obtaining a meaningful understanding of research activities in the academic sector.

Additionally, the population of academic institutions surveyed in the HERD Survey serves as the universe for a related survey effort mandated by the United States Congress: the previously-mentioned Survey of Science and Engineering Research Facilities (Section 108, Public Law 99-159 [1986]).

Data from the HERD survey and other NCSES surveys have been integrated into an on-line data resource system, the NCSES Interactive Data System (IDS). The IDS provides a growing data library with multi-year statistics on the state of higher education in general and academic S&E resources specifically. The IDS can be accessed at the NCSES web site: https://ncsesdata.nsf.gov/ids/.

NCSES utilizes a subset of questions from the HERD survey to collect R&D performance data and the funding sources from all FFRDCs (42 FFRDCs in FY 2018) (Attachment 6). According to responsibilities assigned to the NSF in 1990 under the Federal Acquisition Regulations as recorded in the Federal Register (vol. 55, no. 24, February 5, 1990), the NCSES "maintains a list of FFRDCs… and information on each FFRDC, including sponsoring agreements, mission statements, funding data, the type of R&D being performed…" The data collected through this FFRDC R&D survey are used to inform the public on individual FFRDC R&D expenditures and to provide information on this sector's contribution to the national R&D total.

2. How, by Whom, and for What Purpose the Information Is to Be Used

Federal Uses

The HERD and FFRDC Surveys meet many information needs for federal policy makers. The data are used in policy formulation, implementation and evaluation, budget analyses, congressional hearings, program planning, and annual publications mandated by Congress. The information is provided to Congress, the Office of Management and Budget, and the Office of Science and Technology Policy through published reports, briefings by the NSF Director and staff, and in special tabulations.

The National Science Board, the Director of NSF, and NSF program directors and managers use the HERD and FFRDC Survey data for long-range planning and policy formulation. Specific uses include the following:

(1) The NSF Office of Integrative Activities uses HERD data to help assess the need for and the impact of special NSF programs in the Office of Experimental Programs to Stimulate Competitive Research.

(2) Data from the HERD and FFRDC Surveys are incorporated into NCSES's periodic analytical report, *National Patterns of R&D Resources*, and the National Science Board's biennial report, *Science and Engineering Indicators* (*SEI*). The *SEI* report is mandated by Congress (42 U.S.C. 1863, Section 4(j)), as follows:

> "The Board shall render to the President and Congress, no later than January 15 of each even numbered year, a report on indicators of the state of science and engineering in the United States."

(3) Data on HERD and FFRDC R&D expenditures are used in conjunction with other data sources for maintaining current information on funding, staffing, and impacts of the Nation's scientific, engineering, and technological activities. The data and related reports may be found on the NCSES website at http://www.nsf.gov/statistics/.

(4) The Bureau of Economic Analysis (BEA/DOC) uses data from the HERD and FFRDC Surveys for the development of R&D investment in the core accounts of U.S. gross domestic product (GDP) and other National Income and Product Accounts (NIPAs).

Professional Societies and Foundation Uses

Representative data users in this category include: the American Association for the Advancement of Science, the Association of Public and Land-grant Universities, the Association for Institutional Research, the National Research Council, the Council on Governmental Relations, the Association of American Universities, and the National Council of University Research Administrators.

State Uses

State governments frequently request R&D expenditures statistics that are unavailable from state records for cross-state comparisons. The data are requested regularly by individual state government agencies (such as state boards of higher education in Florida, Maryland, Ohio, and Texas) and by national and regional state government organizations (such as the National Governors Association and the Southern Governors Association).

The data are also used in the compilation of the annual *Science and Engineering State Profiles* published by NCSES.

University Uses

Universities extensively utilize the HERD data for their own purposes. Requests for the data are received from hundreds of individual institutions, as well as from national academic organizations. Specifically, NCSES has an agreement with the Association of American Universities' Data Exchange to provide them with more timely and comprehensive data from the HERD survey. Institutional Profiles (summary reports containing institution-specific trend data on key data elements from several NCSES surveys) are available electronically on the web (https://ncses.nsf.gov/profiles/).

Public universities and colleges often use R&D expenditures data in studies demonstrating the economic benefits of instruction and research to state legislatures.

Media Uses

HERD expenditures data are well reported by the press, including the *Washington Post*, the *New York Times*, the *Chronicle of Higher Education*, *Science*, *USA Today*, and the *Wall Street Journal*.

International Uses

The Organization for Economic Cooperation and Development (OECD) has requested that NCSES provide HERD and FFRDC survey data annually for use in their periodic publications and for international comparisons of total R&D efforts. Other foreign users have included the Association of Universities and Colleges of Canada, the Canadian Institute for Public Policy and Public Administration, King Abdullah University of Science and Technology, and the National Institute of Science and Technology Policy in Tokyo, Japan.

3. Consideration of Using Improved Technology

The HERD and FFRDC Surveys are web-based data collection efforts, although respondents to the surveys may use an alternative approach, by downloading a PDF or Excel version of the form. The response via the web was 99.9 percent in FY 2017. The vast majority of respondents prefer the web version of the survey for the ease of submission and error resolution capabilities. Respondents are electronically sent the survey package, including a letter of introduction, survey instructions and related materials.

Reporting burden is stable or potentially reduced when the survey population is constant and institutions are accustomed to providing the data requested. In the case of these surveys, most respondents have established automated systems for assembling the

requested data. In addition, the survey questions are intended to be as consistent as possible with the principles of financial accounting followed by institutions of higher education and FFRDCs. Generally, these data are readily available from year-end financial records and other records maintained regularly by most institutions. To obtain the full set of data requested in the survey, business officers of some institutions must sometimes consult with multiple colleagues, including heads of departments, research administrators, and other academic officials of the institution.

The web versions of the surveys have a real-time monitoring system, which allows NCSES to monitor data, response status, and comments from respondents. From the perspective of the respondents, the web versions are more convenient and simplify the survey (e.g., by automatically calculating totals). NCSES benefits from the use of the web versions by receiving improved data quality.

4. Identification of Duplication

The HERD Survey collects essential information on the financial resources allocated to research and development by universities and colleges. There are no other statistical sources of comprehensive national data for this information.

The U.S. Department of Education/National Center for Education Statistics' (NCES) Integrated Postsecondary Education Data System (IPEDS) finance survey series is related in that it collects data on a full range of financial resources and expenses in institutions of higher education including research expenses, while the NCSES HERD Survey requests data on research and development expenditures. However, the IPEDS survey does not collect the following information requested by the NCSES survey: (1) separately accounted for R&D expenditures by field, source of funding, and type of R&D; and (2) current fund expenditures for research equipment by field. NCSES regularly consults with the NCES to ensure that the information sought by the HERD Survey is unavailable from other sources.

The Association of University Technology Managers (AUTM) collects annual data on university technology transfer activities such as patents filed and licensing revenues. The AUTM survey also asks for total R&D expenditures to be reported. However, the survey is only administered to approximately 200 AUTM member institutions and does not cover the full population of research-performing universities and colleges. It also does not collect any detailed data on the fields or types of R&D expenditures.

The FFRDC R&D Survey also collects information that cannot be obtained from any other existing statistical data source. Although NCSES's Federal Funds for R&D Survey collect data on R&D obligations from the Federal agencies that obligate those funds, there are no other known sources of *total* FFRDC expenditure data.

5. Small Businesses Involvement

The survey universe consists entirely of universities and colleges that perform R&D and of FFRDCs. There is no small business involvement.

6. Consequences of Less Frequent Surveying

Academic R&D expenditures data were collected on a biennial basis for the period 1964 through 1972. The NSF Director and the National Science Board subsequently determined that annual information about academic R&D resources was necessary to support informed programmatic and policy analysis.

The availability of national totals of R&D resources on an annual basis provides a current and timely overview of the status of R&D activity in each sector of the economy. Given the sophistication and pace of science and technological development worldwide, it is anticipated that the need for annual data on national R&D expenditures will continue.

The experience of NCSES staff, academic advisory group members, and workshop participants indicate that survey respondents prefer to report a consistent set of data items on an annual basis. Many universities and colleges and FFRDCs have automated their record keeping systems, facilitating their ability to respond to NCSES on an annual cycle. These automated record systems considerably reduce the time required to assemble and report information needed for NCSES concerning sources of R&D support, R&D expenditures by field, etc. Thus, collecting consistent data annually considerably reduces respondent burden for academic institutions with automated data systems, since the database and software are retained and kept current. Many responding institutions have indicated that if the data were to be collected on a less frequent basis, the database and related software might not be maintained, resulting in increased burden.

Furthermore, federal, institutional, and major data users have strongly expressed their need for R&D data on no less than an annual basis. As a specific example, annual HERD and FFRDC data are needed by the Bureau of Economic Analyses to use in updating the National Income and Product Accounts. Further, because NCSES policies have a national impact, the timeliness of the data used to formulate policy, budget, and planning decisions is critical.

7. Special Circumstances

No special circumstances.

8. Federal Register Notice & Consultation with Persons Outside the Agency

An announcement of the NCSES request for clearance was published in the Federal Register on Friday, March 18, 2019 (84, FR 9839) (Attachment 7). NCSES received three public comments in response to the announcement.

One comment came from the Bureau of Economic Analysis (BEA). They expressed general support for the HERD and FFRDC surveys and requested that they be informed of any future questionnaire modifications (Attachment 8). NCSES is in regular contact with BEA about their data needs and sends annual data files to support their national income and product accounts (NIPAs), industry economic accounts (IEAs), and gross domestic product (GDP) by state estimates. BEA noted the specific items used from each survey.

The second comment came from the University of Washington (Attachment 9). They indicated that the HERD survey is very useful for the research community as a key set of data. They believe the burden estimate is low, based on their experience. They provided examples of work elements that comprise their overall HERD survey effort. They noted that clear definitions in some areas, specifically reporting of institutionally-funded research, and enforced adherence to the definitions is critical for maintaining integrity and comparability across institutions. In order to minimize survey burden, they suggested NCSES minimize yearly changes to the survey content and instructions (perhaps to every 2-3 years), ensure that the survey is coordinated with federal-wide data standards, and allow for data uploads. NCSES plans to reach out to the University of Washington to further discuss the issues raised. We also plan to investigate the potential for a more robust data upload option. Currently, participants can upload their data through an MS Excel workbook questionnaire. This requires manual data entry into the workbook. The NCSES Survey of Graduate Students and Postdoctorates in S&E has a data upload option that users can populate through report automation and could be used as a model for the HERD survey.

The third comment came from the University of Wisconsin, Madison (Attachment 10). They also highlighted the HERD survey burden and mentioned that the current Excel file upload must be manually populated. This creates the potential for errors. A file format that could be uploaded after automatically being generated by the respondent would be more efficient and reliable. This is something that NCSES will explore. They also noted that NCSES was considering a revision to the HERD survey that would permit multiple campuses within a system to report together under certain criteria. After discussions and solicitation of feedback from the Council on Government Relations and the Association of American Universities Data Exchange, as well as individual universities, NCSES has decided to keep the established criteria for reporting campus-level data in place. No changes to the guidance are forthcoming, which is also in line with the University of Wisconsin's desire. NCSES plans to reach out to the University of Wisconsin to further discuss the issues raised.

Since 2017, NCSES has visited the campuses of and conducted interviews with representatives from 8 universities and colleges and 2 FFRDCs. These interviews provided useful information on the impact of the survey's current and planned data requests upon academic respondents. Copies of the summary reports from these activities are available upon request.

9. Payments or Gift to Respondents

There will be no payments or gifts to respondents.

10. Assurance of Confidentiality

No items on the FFRDC R&D Survey are deemed confidential. All items on the HERD Survey are reported at the institutional level except for the breakdown of institution funds within question 1 (institutionally financed research, cost sharing, and unrecovered indirect costs), and the amount of recovered vs. unrecovered indirect costs in question 12. These items are presented only as aggregate totals in resulting publications. The following confidentiality statement, covering these excepted survey items, is included on the questionnaire:

> "Information from confidential items is not published or released for individual institutions; only aggregate totals will appear in publications. In accordance with the National Science Foundation Act of 1950, as amended, and other applicable federal laws, your responses will not be disclosed in identifiable form to anyone other than agency employees or authorized persons. Per the Federal Cybersecurity Enhancement Act of 2015, your data are protected from cybersecurity risks through screening of the federal information systems that transmit your data."

11. Sensitive Questions

There are no sensitive questions in the HERD or FFRDC R&D Surveys. Data are collected at the institution level.

12. Estimated Response Burden

Data for the FY 2016 HERD Survey were collected from 897 institutions (639 standard HERD survey and 258 Short Form Survey). The FY 2017 survey was collected from 903 institutions (644 standard HERD survey and 259 Short Form Survey). The FY 2018 survey included 915 institutions (650 standard HERD survey and 265 Short Form Survey). NCSES expects modest increases in both the HERD and the Short Form

populations each year as new institutions meeting the threshold are added. For purposes of estimating total burden during this clearance period, NCSES assumes a total HERD population of 950 (650 in the full survey and 300 in the Short Form).

The FY 2016-18 FFRDC R&D Surveys have included the full population of FFRDCs each year (42 in each year). The size of the FFRDC population has been highly stable over time.

High response rates have consistently been obtained: in FY 2016 the response rate for the HERD Survey was 97.1%, in FY 2017 it was 96.2%, and in FY 2018 the response rate was 96.9%. The FFRDC R&D Survey response rate has been 100% each year.

Based on past experiences and limited changes to the surveys, NCSES is estimating only slightly increased burden hours to previous years. For FY 2019-21, NCSES is estimating an average annual burden of 1 hour for the HERD population screener, 54 hours for the standard HERD Survey, 8 hours for the HERD Short Form, and 11 hours for the FFRDC Survey.

A summary of the annual burden estimates is included in the table below. At an estimated cost of $35 per hour (based on the Bureau of Labor Statistics May 2017 average hourly wages for "Budget Analysts," and "Financial Analysts" within NAICS 611300 - Colleges, Universities, and Professional Schools, accessed on February 15, 2019 at http://data.bls.gov/oes/), the total annual cost to respondent institutions is $1,333,045 ($1,193 per respondent).

Table A-12.1. Annual Burden Estimates for FY 2019-21 Surveys

Category	Estimated # of Responses	Respondent Burden (hours)	Total Burden Hours	Total Cost Burden
HERD population review	125	1	125	$4,375
HERD Survey	650	54	35,100	$1,228,500
HERD Short Form	300	8	2,400	$84,000
FFRDC Survey	42	11	462	$16,170
Total annual burden	1,117	-	38,087	$1,333,045

13. Estimate of Annual Cost Respondent Burden

Not Applicable. There are no capital or startup costs to the respondents to the HERD Survey.

14. Estimate of Annual Cost to Federal Government

The estimated total cost to the Federal Government for the FY 2019, FY 2020, and FY 2021 HERD and FFRDC Surveys is approximately $4.2 million over a period of 36 months, for an annualized cost of $1.4 million. The estimate includes labor costs for NCSES staff of approximately $420,000 (project manager (part time), mathematical statistician (part time), program director (part time) and other staff) and the survey management contractual cost of $3.78 million.

15. Changes in Burden

The FY 2019 HERD population review screener will ask about R&D expenditures for two fiscal years: the reference year on the upcoming HERD survey and the previous year. This will results in two additional questions on the screener. The change to the screener is being made to reduce response burden. For the past 3 survey cycles, an average of 73.7% of the institutions sent the population review screener had also been sent the screener during the previous collection. Adding the additional questions will enable us to survey many institutions less frequently (every other year) while still identifying newly qualified institutions each year. We estimate that the additional burden in a given year to any particular institution would be minimal since the expenditure information for each fiscal year would come from the same data source. We estimate a 50% drop in the number of institutions being sent a screener in a given collection cycle.

Only minor instructional and navigational changes were made to the FY 2019 HERD questionnaire. These edits were made to reduce the submission of erroneously formatted data and to reduce the ambiguity of several checkboxes. The edits should ease navigation for respondents.

Question 3 on the FY 2019 FFRDC survey was added to collect more detail on funding from “other federal agencies” collected in question 2h. From a design standpoint, the new question 3 is virtually the same as HERD question 10. After completion of the FY 2018 FFRDC survey, respondents with data entered in question 2h were asked to provide the names and funded expenditure totals of the “other federal agencies” listed in question 2h. These data were needed to compare agency-level funding for R&D collected through the FFRDC R&D survey and the Survey of Federal Funds for Research and Development. Respondents were able to provide these data without great effort since they already provide R&D expenditure data funded by 7 federal agencies.

16. Schedules for Data Collection and Publication

The FY 2019 survey will begin with a population review and screening in late summer 2019. The HERD and FFRDC Surveys will be sent electronically to all institutions in the FY 2019 survey population and meeting the R&D expenditures threshold of $150,000 in November 2019 with a due date of January 31, 2020. Actual closeout of the surveys will

be in approximately mid-May 2020, in order to allow time for late responses, corrections, and updating of previous years' data.

The contractor is responsible for all data collection and processing activities, including editing data submissions to resolve errors. For FY 2019, the same procedures will be used as those used for FY 2018 survey. For the FY 2019 survey, following the closeout of data collection in May 2020 the contractor will generate inflator/deflator factors to impute for non-response, based on data reported by responding institutions. After closeout, data for non-respondent institutions will be machine-imputed using an imputation plan developed and approved by NCSES.

The data from the FY 2019 survey will be analyzed in an NCSES Info Brief to be published in the late fall of 2020. A report containing detailed tables showing institution-level data will also be available on the web.

17. Displaying the OMB Expiration Date

The OMB number and expiration date will appear on the survey form.

18. Exceptions in Item 19 on Form 83-I

No exceptions sought.