Science Policy Task Force report : draft chapter number 1 : reports to the Congress on science and science policy : staff report to the Committee on Science, Space, and Technology, House of Representatives, One Hundred First Congress, second session.

[COMMITTEE PRINT]

SCIENCE POLICY TASK FORCE REPORT

DRAFT CHAPTER NUMBER 1: REPORTS TO THE CONGRESS ON SCIENCE AND SCIENCE POLICY

STAFF REPORT

TO THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

Serial K

JANUARY 1990

Printed for the use of the Committee on Science, Space, and Technology

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U.S. GOVERNMENT PRINTING OFFICE

98-771 WASHINGTON : 1990

For sale by the Superintendent of Documents, Congressional Sales Office
U.S. Government Printing Office, Washington, DC 20402

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LETTER OF TRANSMITTAL

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, DC, May 29, 1989.

To the Members of the Committee:

We transmit herewith for your information and review the first of a series of draft chapters based on the hearings and studies carried out by the Committee's Science Policy Task Force.

This draft chapter covers the system of reports submitted to the Congress by the Executive branch of the government in the fields of science and science policy. The many reports submitted to the Congress in these areas constitute an important source of information and oversight of the Federal government's science activities. This draft chapter reviews those reports, and includes proposed conclusions and recommendations for the further improvement in their preparation by the Executive departments and their use by the Congress.

The draft chapter was developed by the staff of the Science Policy Task Force. As such it does not necessarily reflect the views of the Committee or its Members. We invite Members of the Committee to review this draft chapter and advise us of any suggestions for additions, changes, or deletions. As recommended by the Task Force when it began its work, we expect that hearings will be held to obtain further comments when most or all the draft chapters have been completed.

This draft chapter is also being made available to interested officers and individuals in the departments and agencies of the Executive branch of the government, and in industry and the academic world. We invite any such individuals to advise us of any improvements to the draft report chapter they would like to recommend, be they factual, methodological or policy in nature. Such comments should be addressed to: Chairman, Committee on Science, Space, and Technology, U.S. House of Representatives, Washington, D.C. 20515, Attn: Science Policy Task Force.

American science has long been one of the important cornerstones in the nation's cultural, technological, educational, and international affairs. Our Science Policy Study is aimed at further strengthening the nation's scientific enterprise for the decades ahead. In doing so we must preserve those aspects that will insure the continued strength of that enterprise. But at the same time we must not hesitate to examine with an open mind all policies and practices now in effect, and adopt new approaches in those cases

where changes within science or in the environment within which science must function are taking place.

We commend this draft chapter to the attention of the Members of the Committee, the Members of the House and Senate, and to individuals outside the Legislative branch with an interest in American science policy.

ROBERT S. WALKER,
Ranking Republican Member.

ROBERT A. ROE,
Chairman.

LETTER OF SUBMITTAL

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, DC, May 25, 1989.

Hon. ROBERT A. ROE,
Chairman, Committee on Science, Space, and Technology,
U.S. House of Representatives.

DEAR MR. CHAIRMAN: I submit today the first draft chapter of the Committee's Science Policy Task Force Report. This draft chapter is entitled, "Reports to the Congress on Science and Science Policy."

The draft chapter has been prepared by the staff of the Science Policy Task Force. In the preparation of this draft chapter, the Task Force staff has had the assistance of the staff members of the Congressional Research Service and the National Science Foundation, especially with respect to the historical evolution of the science policy reports structure over the last several decades. In addition, an earlier staff draft of this chapter was reviewed by senior members of the Committee's own staff, and their comments and suggestions were incorporated where appropriate.

This draft chapter is based on all the hearings and studies conducted by the Science Policy Task Force and on other studies, reports, and documents which were identified as being of relevance to the subject covered by the present draft chapter. All source materials are described in the notes found at the end of the draft chapter.

Many of the draft chapters in this report are lengthy and contain detailed analysis and numerous statistical tables. For that reason, each chapter includes an initial "Overview" section, which outlines the content of the draft chapter, and a concluding "Recommendations" section, which bring together the specific recommendations found throughout the text of that chapter. Together with the "Overview" and "Recommendations" sections from all the chapters they will eventually constitute the Executive Summary of the report as a whole.

Sincerely,

HAROLD P. HANSON,
Executive Director.

CONTENTS

PREFACE

(This Preface is intended for the final report which will include all the chapters now being drafted. It is being included here, and with each draft chapter, for the information of the reader.)

Over the last 45 years, since World War II ended, the Federal Government has come to play a major role in the financial support of American science. What should that role be in the future? In the next 45 years, as we look ahead to the year 2035, how will American science develop, and what should the Federal role be in providing support to that development? Which of our Federal science policies that have brought us to where we are today should be continued, and which must be changed to take into account new conditions and changed circumstances?

In January 1985, as the 99th Congress began its work, the House Committee on Science and Technology established an 18-member Task Force on Science Policy to address those questions. The need to address those questions arose from a number of factors. In the Congress there was a growing feeling among many Members that they were devoting large amounts of time to careful reviews of each year's budget proposals, the increases and decreases they entailed, and the initiatives they included. But there was not a corresponding degree of attention to the underlying policies and longer-term trends in which those annual changes should be viewed if Federal science policy was to be successful.

Another factor was the emergence in the late seventies and early eighties of a series of problems and policy dilemmas affecting individual parts of Federal science policy. They included concerns about the adequacy of research instrumentation and facilities, proposals for the start-up of a number of costly "Big Science" facilities, predictions of shortages of scientists and engineers in the early and mid-nineties, and a broad-gaged concern about the competitiveness of American technology, especially science-based high-technology.

And, finally, overshadowing all these issues, was the massive growth of the Federal deficit. This was accompanied by an effort, both in the Congress and in the Executive Branch, to balance the Federal budget, efforts that necessarily ran counter to the proposals for increases in the funding of science and science education.

All of those factors came together to suggest that an in-depth review of U.S. science policy would be timely. Such a review would enable the Committee to look beyond the annual budget process and the individual science programs to achieve a broader perspective on the needs and opportunities as well as the limits and con-

straints on which Federal science policy should be based. Such a review would, it was felt, enable the Committee to place its weight behind those past and current policies which will contribute to continued success; it would also enable the Committee to propose and enact changes in policies and practices which are needed to meet present and future circumstances in which American science will find itself in the coming decades.

The last major review of American science policy was conducted in the mid-sixties. That review was also done in the Congress, under the auspices of the House Select Committee on Government Research. Known as the "Elliott Committee" after its Chairman, Congressman Carl A. Elliott of Alabama, that Committee produced a series of 12 special studies and held a series of hearings. It helped provide a perspective on the nation's total research effort as the build-up following Sputnik gathered strength. In the mid-seventies, the Congress sought to have a comparable, in-depth review conducted in the Executive Branch. The Science Policy Act of 1976, which established the OSTP and the President's Committee on Science and Technology, provided, in Title III of the Act, that a "Federal Science, Engineering, and Technology Survey" be conducted in the first two years of the life of that White House Committee. Towards the end of the Ford Administration such a study was initiated by the Committee established according to the Act and co-chaired by Dr. Simon Ramo, the Chairman of TRW, Inc., and Dr. William O. Baker, the President of Bell Laboratories. However, the Carter Administration elected not to reappoint the Committee, and the Survey was not performed.

When the agenda for the present Science Policy Study was initially formulated, much attention was given to the manner in which such a study could best be carried out. It was concluded that two particular approaches, which often are not part of studies of science policy, should be given particular emphasis. One is the historical dimension—the evolution of the policies and institutions that constitute the substance and framework of science policy; the other is the quantitative dimension—the numbers of scientists, dollars, research papers, research institutions, etc. that constitute the inputs and output in U.S. science policy now and in the past, and about which decisions in future years must be made.

The call for inclusion of a historical perspective in the Science Policy Study took the following form in the Committee's Agenda for the Science Policy Study:

> We recognize that science policy is dynamic, ever-changing, and has a past and a future. That past, although comparatively short, is replete with changes that range from adjustments in the nuances of policy to major redirections in program orientation. Similarly, the future of science policy calls for sensitivity to important, but hardly detectable, emerging developments as well as the anticipation of major trends in the factors affecting science and science policy. In the conduct of the Science Policy Study an awareness of historical developments coupled with an acute sensitivity to emerging future needs will be crucial to the achievement of both wise judgements and sensible

> relevance. The Task Force recognizes that, in designing and conducting the Science Policy Study, a balance should be sought between attention to historical developments in American science policy over the last forty years and awareness of potential developments in science, in science policy, and in society as a whole.

This injunction has been interpreted to mean chiefly that developments since 1945, when the Federal Government first entered into the support of civilian science in a major way, should be included. This recent 45-year period saw the evolution of most of the policies and practices for the support of science on which today's science policy is based. A description of those developments does, we believe, provide the dimension of understanding which is helpful in appreciating present-day policies, and which helps in developing realistic recommendations to meet tomorrow's needs.

The suggestion that data-based analysis be included in the Science Policy Study was expressed as follows in the Task Force's 1985 agenda:

> A prominent anomaly of past and current science policy-making has been the very limited use of quantitative information. In neither the evaluation of past programs nor in the development of new initiatives has the arena of science policy formulation seen the use, to any significant extent, of hard data and quantitative analysis. In this respect science policy differs in a noticeable way from policy-making in such fields as defense policy, social security policy, and many others.
>
> The Task Force believes that in many areas of science policy the data is available and the policy making process could potentially benefit from its use in the associated analysis. We recommend, therefore, that in the conduct of the Science Policy Study, particular attention be given to the definition of the issues, the formulation of the questions, and the enunciation of the recommendations in a manner which will permit quantitiative approaches to be brought to bear when possible. Equally important, a concerted effort should be made to evaluate existing programs with the prominent assistance of such quantitative methods.
>
> We are conscious of the limitations of such quantification, especially in a field of public policy which is characterized by a high degree of uncertainty and a noticeable degree of reliance on individual insight and creativity. Nevertheless, we believe that the time has come to supplement, although certainly not replace, the traditional science policy process with a strong component of quantitative analysis, an approach which has proven so successful in science itself.

In developing the report and its individual draft chapters, the analysis consequently includes a significant amount of quantitative data. Reliance has been placed on seeking out both existing quanti-

tative data and, in some cases, on the development of new, additional data.

From the beginning of its work the Task Force was concerned about how the end-product of its work would be effectively used. There was concern that the main result of the Task Force's effort could be limited to a set of hearing volumes and a lengthy report, all of which might do little more than end up gathering dust on the shelves of various libraries. To avoid this, it was agreed that the report of the Task Force would be issued in the form of a draft. This draft would contain the conclusions and recommendations developed following the studies and hearings conducted by the Task Force. The draft would then be widely disseminated and be the subject of hearings before the Committee adopted its final conclusions and recommendations. This approach, which is being implemented with the publication of an initial draft report (in the form of a series of draft chapters), is aimed at insuring that a careful, in-depth examination of the issues, involving all affected individuals and institutions, is, in fact, performed.

As a result, the present report is a draft. The views it presents and the recommendations it contains do not represent the views and recommendations of the Committee on Science, Space, and Technology or any one of its Members. Rather, this draft report was developed at our request by the staff of the Science Policy Task Force. It is based on the background studies and the extensive hearings conducted by the Task Force in the 99th Congress and on the detailed perusal by the staff of the many previous science policy reports, hearings, and special studies related to this subject.

In publishing initially this draft report, we have an illustrious precedent. In 1985 the Senate Armed Services Committee conducted, through its Task Force on Defense Organization, an extensive, in-depth review of the organization of the Department of Defense. That review included, as did our own Science Policy Study, extensive hearings and background studies. The resulting staff report was entitled, "Defense Organization: The Need for Change," and was issued in October 1985. Although identified as a staff report, it was known as the Goldwater-Nunn report after the Committee's chairman and ranking minority Member. In describing the report on the Senate floor, Senator Goldwater noted:

> The task force . . . has not approved or endorsed the study. It is a staff, not a committee product. But it is a first step in the examination and debate on these issues. . . . The recommendations of (the) study are those of the staff only, and I must stress again that our Committee has reached no conclusions as to what possible changes in the Department (of Defense) need to be enacted. The staff study will be the starting point.

The Senate report led eventually, after further hearings in both the Senate and the House, to the passage of Public Law 99–433, the "Goldwater-Nichols Department of Defense Reorganization Act of 1986." It is our hope and expectation that our own initial staff draft which follows, will similarly contribute to a thorough consideration of the many important issues in the nation's science policy which this draft report raises.

It is worth noting, however, that it is not the intent that the recommendations of the Science Policy Study be focused solely or even principally on the passage of extensive legislative changes. Many, perhaps most, of the recommendations which eventually may be adopted by the Committee and the Congress can be better implemented through changes made by the agencies and departments of the Executive Branch and by the many different institutions where research is performed. In order to achieve those changes, the heads of those departments and agencies and the scientists and research managers must themselves agree on the need for such changes. We therefore invite the officers of the Executive Branch and other affected parties to review the draft report in a spirit of cooperation and as part of a common search for the strengthening of Federal science policy.

In our analysis of past and current policies for the support of science by the Federal Government, we frequently make recommendations for changes. We emphasize that in no way should our analysis and recommendations be construed as criticisms of Federal science officials, past or present. Much of our analysis is made with the benefit of twenty-twenty hindsight. Many of the policies to which we suggest changes are policies which our own committee and our sister committees in the House and Senate have in past years initiated and/or supported. The shortcoming which we believe exist are not those of the men and women who have guided American science to the position of preeminence which it occupies today, but rather in the adequacy of today's policies to best meet the demands of the future.

CHAPTER 27

REPORTS TO THE CONGRESS ON SCIENCE AND SCIENCE POLICY

OVERVIEW

An important means through which the Congress seeks to obtain information and achieve accountability by the Executive departments of the government is by requiring the submission of reports. Such reports may be either periodic, that is quarterly, annual or biannual, or they may be one-time reports. In either case the purpose is to provide the Congress with information about the policies and practices of the Executive Branch and, equally important, to encourage the Executive Department in question to review its own policies and practices for effectiveness and for conformity to laws affecting them as well as the legislative intent behind them.

Our focus here is on the periodic and one-time science-related reports mandated by law or legislative action for submission to the Congress. We further distinguish in our analysis of reports to the Congress between a small group of what we call the five major Science Policy Reports, and a much larger group of reports which cover specific aspects of individual research programs, a group which we, in contrast, call the Science Reports, either periodic or one-time.

We note further that reports and information are also requested in less formal ways, for example in the course of a committee's public hearing, through letters from a committee chairman or a Member of Congress to an agency, or even by means of verbal requests. Our review does not encompass these more informal reporting methods.

The Periodic Science Reports

Of the 2,078 periodic Congressional reports currently mandated by the Congress on all subjects, 240 or 12 percent cover science and

science-related issues such as science manpower and science funding. These 240 reports fall into three major categories: 1) reports on research activities and programs, including report on science advisory committees and on research facilities, of which there are 131 or 55 percent, 2) reports on science administration and funding, of which there are 70 or 33 percent, and 3) reports on science manpower and education, of which there are 30 or 12 percent.

The statutory mandate for each such report specifies one or more committees in each house to which the report is to be submitted. In the House, the Science, Space, and Technology Committee and the Energy and Commerce Committee are the principal recipients of periodic science reports. In the Senate, 3 committees, those on Energy and Natural Resources, on Labor and Human Resources, and on Commerce, Science and Transportation are the principal recipients of periodic science reports. But in both the House and the Senate these groups of committees receive less than 60 percent of the periodic science reports. A significant group of other committees such as those on Appropriations, Armed Services, Agriculture, Government Operations, and Veterans Affairs also are mandated to receive considerable numbers of Congressional reports on science.

The purpose of these periodic reports is principally to provide the Congress with information needed in its legislative and oversight functions, both in terms of current progress and emerging problems and issues.

The One-Time Science Reports

The purpose of the one-time reports are, like the purpose of periodic reports, to provide information about progress and emerging problems. In addition, however, a separate and large category of one-time reports serves the purpose of forcing the consideration of new and often different program initiatives and policy options in which the Congress has a particular interest.

Our review of one-time science reports is, due to the data constraints, limited to those mandated for two agencies, the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA), and for the 10 fiscal years 1977-1986. Within those limitations we identified 221 one-time reports, 75, or about one-third requested from the NSF, and 146, or about two-thirds from NASA. Of these, 193, or 87 percent originated with authorizing committees in the House and Senate, while 28, or 13 percent originated in the two Appropriations Committees. In contrast to the statutorily mandated periodic reports, most of the one-time reports were mandated through the vehicle of legislative report language, while only 27, or 12 percent were mandated by statutory enactment.

The responsiveness of the agencies to requests for one-time reports is mixed. Most reports are responsive and on time; but too many are seriously late by as much as a year or more, and a few are never submitted or are unresponsive in content. At the same time the number of requests for one-time reports has grown steadily over the last ten years, in part in response to the intensified debate over resource allocation and policy preferences.

The Science Policy Reports

Our review of the small number of reports on science policy matters, a group that in 1988 has been narrowed to five reports which we label the "science policy reporting structure," includes a detailed history of their evolution since the early fifties. That history serves to show the repeated efforts by the Congress to initiate a continuing discussion of the broader, longer-term trends and needs in Federal policy for the support of research. That review also shows that in spite of continuous interest of the Congress over the decades, the several cycles of effort by the Executive Branch

agencies, chiefly the NSF and, since 1976, the OSTP, those agencies have repeatedly relaxed their attention to this need. In recent years they have failed to meet both the intent for the content of the science policy reports and the time frames for their submission to match the statutory schedule for their submission and the Congressional schedule for their use.

The early role of the NSF and its governing board, the National Science Board, was limited to the inclusion in NSF's annual report of a short statement by the Board chairman and a chapter on science policy. Although these statements and chapters were brief, they were relevant and timely. However, the Chairman's statement was discontinued in 1959, and the science policy chapter was last included in 1961.

After a span of 6 years in the mid-sixties, when no reports were prepared and discussed, a science policy report mechanism was reinstituted in a new format. As the result of the mutual interest of the Congress and the National Science Board, an annual Board report on a topic of interest was prepared by the Board and submitted to the Congress. These reports, mandated through an amendment to the NSF organic act, were very useful. They dealt with such topics as the issues and problems facing individual disciplines of science, university-industry research relationships, and science and engineering manpower. For the most part they made an important contribution to the definition and sharpening of important science policy issues and their solution. They also were the source of the idea that led to the highly successful series of Science Indicator reports beginning in 1973. However, following the submission of the 15th annual report in 1983, the Board asked to be relieved of what had come to be seen as a burdensome chore, and the Congress agreed.

Science Policy Reports From The OSTP

One factor in the willingness of the Congress to abolish the National Science Board reports was the emergence in the White House of the Office of Science and Technology Policy (OSTP), and the statutory mandate on this new science policy office to provide two major science policy reports. One was the annual Science and Technology Report and the other was the Five Year Outlook on Science and Technology and its annual update reports. However, these reports did, regrettably, fail almost entirely to achieve the intended purpose.

A number of circumstances contributed to that failure: Responsibility for their authorship was shifted repeatedly, their size often assumed mammoth proportions obscuring the policy issues instead of illuminating them, and their submission to the Congress became erratic, lessening the attention they could be given in the Congress and therefore their impact in the policy process.

In 1983 the Congress agreed to OSTP's proposal that the two reports should be combined into one "Science and Technology Report and Outlook." That report was made biannual and in alternate years the Science Indicator Reports was converted to a statutorily required report. Each is to be submitted on or before January 15th in the year it is due, but in recent year OSTP and NSF have been erractic in meeting the new schedule.

We continue to believe in the importance of a thoughtful and in-depth review of the nation's science policy and that such a review can and should be made based on these reports. We make certain recommendations to achieve that end. The annual posture hearing with the OSTP Director, begun 1983, has come closest to providing a forum

for the discussion of over-all, longer term national and Federal science policy issues between the Congress and the Executive Branch, and we make specific recommendations for using that hearing as a forum for the discussion of the science policy reports.

INTRODUCTION

The Three Categories of Reports

One of the ways in which the Congress seeks to keep informed about the policies, programs, and activities of the Federal agencies is to require the submission of reports. Typically, when the Congress establishes a new program, it prescribes the objectives, the organizational structure, the level of funding and, as well, the reports that must periodically be submitted on the progress made. On other occasions, during the consideration by the Congress of an ongoing program, a new, periodic report or a one-time report on a particular aspect of a program is prescribed. We begin with an analysis of the continuing, periodic reports, followed by a discussion of the one-time reports.

In addition, from our point of view, the many reports which are submitted by the departments and agencies of the Federal government to the Congress fall into two other distinct categories. One category consists of a small number of reports which are policy oriented in the sense that they deal with the overarching policy questions in the science area. The other category consists of a much larger group of reports which deal with very specific program, facility, financial, and other questions associated with specific programs and activities, whether on a periodic basis or on a one-time basis. In the following analysis we discuss first the program oriented congressional reports on science and their use. This is

followed by a somewhat more detailed discussion of the policy reports which have importance in setting broad national policies for the national science enterprise.

Purposes of Reports to the Congress

Before examining the science related reports which are submitted to the Congress, we discuss in more detail the several purposes which Congressional reports serve. We have already noted that the value of these reports is that they provide information to the Congress about the progress of programs authorized earlier and continuously funded by the legislature. These reports thus enable the committees to review how the Executive departments carry out the intent of the legislation authorizing such programs, the degree to which the intended goals are being accomplished, and how effectively the resources made available to achieve those goals are being utilized. The reports are, in other words, an important tool for the Congress in carrying out its oversight function.

Some of the reports also serve a more immediate, short-term purpose. Some of the reporting requirements are imposed for the purpose of keeping a committee informed on a continuing basis about current activities within a program or within an agency. Such reports are typically required more frequently than once a year, i.e. on a quarterly or monthly basis, and some of these types of reports are submitted on a quite informal basis such as through letters, briefings, or, in the case of event-triggered reports such as, for example, reports on a rocket engine test, by telephone.

A quite different purpose of some Congressional reports, especially in the case of many of the one-time reports, is to explore new policy or program directions. A report can provide new and broader information that will be helpful in establishing a new policy, or which can serve to prod the agency into considering and

adopting a new program or policy. A variation of this kind of purpose is asking for a report in order to keep an issue alive until the following year.

A uniquely and much less frequent Congressional purpose that occasionally is a factor in requesting a report is related to the internal dynamics of a Congressional committee. If there is a split within a committee with respect to an issue, a report may be requested to resolve the issue or to diffuse it. Similarly, a report may be requested to appease an individual Member, or to enable a Member to meet the needs of a constituent interest.

The reports also serve important purposes for the Executive Branch. One such purpose is directly related to the Congressional objective of achieving accountability. By asking the agencies and their program managers to prepare and submit periodic reports to the Congress on the progress of their activities, they are forced to review how well they are meeting the stated objectives, how effectively they are employing the resources placed at their disposal, and, in general, how well they are managing the programs.

Closely related to this purpose is the function of Congressional reports as internal management tools at the departments and agencies. Most reports are prepared at the working level of an agency and are reviewed by successive levels of management before submission to the Congress. That review does, in itself, serve as a tool for management of an agency to review the activities of their programs, and the fact that the reports are to be submitted to the Congress serves in many cases as an additional incentive to close review and monitoring.

Finally, the Congressional reports serve the significant purpose of providing information to the public on the activities of their government. Although the accessibility to the public of these reports varies considerably, most can be obtained by the public or by

their representatives in the Congress and by the press. Some are printed by the agencies or by the Public Printer and many are widely disseminated.

We thus emphasize that Congressional reports, although frequently initiated for the purpose of providing information to a single committee of the Congress, often serve a wider range of purposes. In reviewing the many Congressional science reports, their usefulness, and the desirability of their continued existence, we must therefore be mindful of these several purposes and the degree to which each such purpose does now and will in the future be served.

THE NUMBER OF PERIODIC CONGRESSIONAL REPORTS ON ALL SUBJECTS

Number of Congressional Reports

The number of periodic, Congressional reports is large. A 1984 inventory of such reports by the General Accounting Office found that, in all fields, well over twenty-five hundred reports were being submitted to the Congress. The number of these reports by budget function is shown in Table 27-1. After the "General Government" function, on which 16 percent of the reports are submitted, the largest category is the defense related reports, on which 265 reports, or 13 percent of the total are submitted. Following closely is the "Natural Resources and the Environment" category with 257 reports, or 12 percent of the total. Category 250 covering "General Science, Space, and Technology" includes only 40 reports, which makes it one of the smallest reporting categories among the budget groups, with only 2 percent of the reports. But significant numbers of science related reports also appear in several other categories such as "Energy", "Health", "Defense", "Commerce".

Table 27-1

Number of Periodic Congressional Reports by Budget Function

	Budget Category	No. of Reports	Percentage
050	National Defense	265	13%
051	Dept. of Defense - Military	243	
054	Defense-Related Activities	22	
150	International Affairs	195	9%
151	Foreign Econ & Finance Ass't	45	
152	International Security Ass't	29	
153	Conduct of Foreign Affairs	93	
154	Foreign Infor. & Exch. Actvs	14	
155	Intern't Financial Programs	14	
250	General Science, Space & Tech.	40	2%
251	General Science & Basic Resch	19	
253	Space Flight	18	
254	Space Sci., Appli. & Support	2	
255	Supporting Activities	1	
270	Energy	170	8%
271	Energy Supply	70	
272	Energy Conservation	24	
274	Emergency Energy Preparedness	5	
276	Energy Infor.,Policy & Regul.	71	
300	Natural Resources & Environment	257	12%
301	Water Resources	53	
302	Conservation & Land Manage't	71	
303	Recreational Resources	66	
304	Pollution Control & Abatement	23	
306	Other Natural Resources	44	
350	Agriculture	43	2%
351	Farm Income Stabilization	12	
352	Agricultural Resch & Services	31	
370	Commerce and Housing Credit		
371	Mortgage Credit & Thrift Insur	11	
372	Postal Service	5	
376	Other Department of Commerce	89	
400	Transportation	122	6%
401	Ground Transportation	61	
402	Air Transportation	13	
403	Water Transportation	30	
407	Other Transportation	18	
450	Community & Regional Develop.	37	2%
451	Community Development	21	
452	Area and Regional Develop.	16	

500	Education, Training, Employment and Social Services		166	8%
501	Elementary, Secondary, & Voc. Educ.	33		
502	Higher Education	18		
503	Research & Gen'l Educ. Aids	52		
504	Training and Employment	23		
505	Other Labor Services	20		
506	Social Services	20		
550	Health		97	5%
551	Health Care Services	50		
552	Health Research	29		
554	Consumer & Occupational Health Safety	18		
570	Social Security and Medicare		3	
571	Social Security	2		
572	Medicare	1		
600	Income Security		52	3%
601	Gen'l Retirement & Disability Insurance	16		
602	Federal Employee Retirement and Disability	4		
603	Unemployment Compensation	1		
604	Housing Assistance	7		
605	Food and Nutrition Assistance	9		
609	Other Income Security	15		
700	Veterans Benefits and Services		81	4%
701	Income Security for Veterans	7		
702	Veterans Education, Training, and Rehabilitation	4		
703	Hospital & Med. Care for Veterans	36		
705	Other Veterans Benefits & Service	38		
750	Administration of Justice		80	4%
751	Federal Law Enforcement Activ	42		
752	Federal Litigative & Judicial Activities	33		
754	Federal Correctional Activ	1		
754	Criminal Justice Assistance	4		
800	General Government		333	16%
801	Legislative Functions	77		
802	Exec. Direction & Manag't	94		
803	Central Fiscal Operations	63		
804	Gen'l Property & Records Management	34		
805	Central Property Management	31		
806	Other General Government	34		
850	General Purpose Fiscal Assistance		32	1%
851	General Revenue Sharing	1		
852	Other General Purpose Fiscal Ass't	31		
	Total		2,078	100%

Distribution of Periodic Reports Among Congressional Committees

In most cases when the Congress mandates a report, it prescribes one or more committees in each house to which the reports must be submitted. The breakdown by Committee, in the House and Senate, to whom these reports are submitted is shown in Tables 27-2 and 27-3. Because many of these reports are submitted to more than one committee, the total is necessarily higher than the total number of reports shown in Table 27-1. Because of the differing jurisdictions of the House and Senate committees, the number of report submissions differ for the two houses, with more submissions of the same report titles in the Senate.

In both houses two committees top the list, although in reverse order. The committees on Appropriations and on Energy are the recipients of between 249 and 315 reports each, or combined, between one fourth and one fifth of all reports submissions. The Armed Services Committees in each House receive 10 percent of these reports. Reports on science-related matters are, as in the case with the report classification by budget category, not readily discernible. In the House, the Science, Space and Technology Committee receives 108 or 4 percent of all report submissions. But many reports on science topics are also submitted to such committees as those on Energy and Commerce, Armed Services, Merchant Marine and Fisheries, and Agriculture. Because there is no corresponding Senate committee with principal jurisdiction for science, space, and technology legislation, the distribution of science reports is even more diffuse in that body.

Table 27-2

Number of Periodic Congressional Reports Submitted to Each Committee of the House

Committee	No. of Repts	Percentage
Committee on Appropriations	313	12%
Committee on Energy and Commerce	249	10%
Committee on Armed Services	244	10%
Committee on Interior and Insular Affairs	229	9%
Committee on Foreign Affairs	213	8%
Committee on Education and Labor	181	7%
Committee on Government Operations	162	6%
Committee on Banking, Finance & Urban Affairs	141	5%
Committee on the Judiciary	128	5%
Committee on Science, Space, and Technology	108	4%
Committee on Merchant Marine and Fisheries	96	4%
Committee on Veterans Affairs	89	4%
Committee on Public Works and Transportation	83	3%
Committee on Agriculture	82	3%
Committee on Ways and Means	71	3%
Committee on Post Office and Civil Service	46	2%
Committee on Small Business	34	1%
Committee on House Administration	33	1%
Committee on the District of Columbia	26	1%
Permanent Select Committee on Intelligence	22	1%
Committee on the Budget	20	1%
Committee on Rules	7	---
Select Committee on Aging	4	---
Committee on Standards of Official Conduct	1	---
Total	2,582	100%

Table 27-3

Number of Periodic Congressional Reports Submitted to Each Committee of the Senate

Committee	No. of Repts	Percentage
Committee on Energy and Natural Resources	315	12%
Committee on Appropriations	304	12%
Committee on Labor and Human Resources	272	11%
Committee on Armed Services	260	10%
Committee on Foreign Relations	229	9%
Committee on Governmental Affairs	217	9%
Comm. on Commerce, Science & Transportation	196	8%
Comm. on Banking, Housing, & Urban Affairs	151	6%
Committee on Environment and Public Works	124	5%
Committee on the Judiciary	120	5%
Committee on Veterans Affairs	87	4%
Committee on Agriculture, Nutrition & Forestry	82	3%
Committee on Finance	71	3%
Committee on Small Business	33	1%
Select Committee on Intelligence	21	1%
Committee on the Budget	19	1%
Select Committee on Indian Affairs	16	---
Special Committee on Aging	10	---
Committee on Ethics	1	---
Total	2,528	100%

Reports submitted to the four Joint Committees are shown in Table 27-4. Of these 50 reports, only one was possibly related to research or development, a report by the Defense Department on prime contractors which received awards of over $25,000.

Table 27-4

Number of Congressional Reports Submitted to Joint Committees of the Congress

Joint Committee on Printing	27
Joint Committee on Taxation	9
Joint Economic Committee	8
Joint Committee on the Library	6
Total	50

PERIODIC CONGRESSIONAL REPORTS ON SCIENCE ACTIVITIES

In order to obtain an overview of all those periodic Congressional reports dealing with science and science related subjects, such as science manpower and education and science funding and administration, we analyzed the titles and content description of all the periodic Congressional reports. Our analysis was based on the GAO inventory of such reports. This survey yielded a list of 240 reports. Thus, the number of Congressional reports on science constitutes 12 percent of the 2,078 reports on all subjects. This is a surprisingly high fraction in view of the wide variety of subjects which the Congress deals with in its many committees, and most of which are the subject of one or more Congressional reports.

Inventory of Periodic Congressional Science Reports

The 240 periodic Congressional science reports are listed by title and type in the next 12 tables (Tables 27-6 through 27-17). Those tables show, in addition to the report titles and the frequency of submission, the originating agency in the left-hand column and the receiving committees in the House and Senate in the right-hand column. The abbreviations for the Congressional Committees are listed in the following table. This inventory will serve as the basis for our further analysis of this type of Congressional science reports. (The analysis continuous on page 41).

Table 27-5

Abbreviations for Committee Names

House Committees

Abbreviation	Committee Name
Agric	Committee on Agriculture
Appns	Committee on Appropriations
Armd Svc	Committee on Armed Services
Banking	Comm. on Banking, Finance Urban Affairs
Ed & Lab	Committee on Education and Labor
En & Com	Committee on Energy and Commerce
For Aff	Committee on Foreign Affairs
Gov Opns	Committee on Government Operations
H Admin	Committee on House Administration

Int & IA	Comm. on Interior and Insular Affairs
Judic	Committee on the Judiciary
MM & Fish	Comm. on Merchant Marine and Fisheries
PO & CS	Comm. on Post Office and Civil Service
Publ W&T	Comm. on Public Works & Transportation
Small Bus	Committee on Small Business
SS&T	Comm. on Science, Space, & Technology
Vet Aff	Committee on Veterans Affairs

Senate Committees

Abbreviation	Committee Name
Ag Nu For	Committee on Agriculture, Nutrition, and Forestry
Appns	Committee on Appropriations
Armd Svc	Committee on Armed Services
Banking	Committee on Banking, Housing and Urban Affairs
Com S&T	Committee on Commerce, Science and Transportation
En & NR	Committee on Energy and Natural Resources
Env & PW	Committee on Environment and Public Works
For Rel	Committee on Foreign Relations
Gov Aff	Committee on Government Affairs

Judic	Committee on the Judiciary
Lab & HR	Committee on Labor and Human Resources
R & Adm	Committee on Rules and Administration
Small Bus	Committee on Small Business
Vet Aff	Committee on Veterans Affairs

Joint Committees

Jt Econ	Joint Economic Committee

Reports on Scientific Research. The reports dealing principally with scientific research, as listed in Table 27-6, cover a wide variety of topics and vary notably on the specificity to generality scale. The topics of the 25 reports in this category range from solar voltaics to archeology and from specialized reports on Soviet Area Studies programs in universities to quite general reports on the Federal Ocean program. The reports covering more general fields of science are few in number, and the more specialized reports are highly selective in the areas to be dealt with. As a result, large areas of Federally supported scientific research activity are not subject to specifically focused Congressional reporting. For example, such areas as astronomy, botany, geology, pharmacology, psychiatry and zoology are not the subject of separate Congressional reporting. Nor is arctic research, urban research, cotton research and forestry research.

Table 27-6

Recurrent Reports to the Congress on

Scientific Research

Agriculture Research

USDA	Investigations Into Increased Use of Protein By-Products Derived From Alcohol Fuel Production (Annual)	H: Agric S: Ag Nu For

USDA	Subtitle M - Rangeland Research (Annual)	H: Agric S: Ag Nu For

Biomedical Research

EPA	Environmental Cancer & Heart & Lung Disease: Annual Report to the Congress (Annual)	H: En & Com S: Env & PW
HHS	Sudden Infant Death Syndrome Research and Research Reports (Annual)	H: En & Com S: Lab & HR
NIH	Report on Amount Requested for SIDS Research (Annual)	H: En & Com Appns S: Lab & HR Appns
EDUC	Status of Research Concerning Handicapped in the U.S. (Annual)	H: Ed & Lab S: Lab & HR
STATE	United States Policy & and Strategy in Biological Diversity	H: For Aff. S: For Rel.

Energy Research

DOE	Solar Photovoltaics Special Reports (when appropriate)	H: SS & T S: En & NR
DOI	Receipts, Expenditures, & Work of State Mining & Mineral Resource & Research Institutes (Annual)	H: Int & IA S: En & NR

Environmental Research

NIH	Report on Research Activities of Relevance to the Clear Air Act (Biennially)	H: En & Comm S: Env & PW
NASA	Rept on the Progress of the Upper Atmospheric Research Program (Biennially)	H: SS & T S: Com S & T
EPA	Results of Research Related to Stratospheric Ozone Protection (Biennially)	H: En & Com S: Env & PW
NSF	National Science Foundation Research on the Stratosphere & the Effects on Ozone Layer Changes (Biennially)	H: En & Com S: Env & PW

Oceanographic Research

NOAA	Federal Ocean Program (Annually)	H: SS & T S: Com S & T
NOAA	Report to the Congress on Ocean Pollution, Monitoring and Research (Annually)	H: MM & Fish S: Com S & T
NOAA	Report to the Congress on Implementation of the Marine Protection, Research, and Sanctuaries Act of 1972 (Biennially)	H: MM & Fish S: Com S & T
NOAA	Research on Chesapeake Bay (Annually)	H: MM & Fish S: Gov Aff

Defense Research

DOD	Report on Chemical Warfare and Biological Research Programs (Annually)	H: Armed Svc S: Armed Svc

Archeological Research

DOI	Preservation of Archeological and Historical Data (Annually)	H: Int & IA S: En & NR
DOI	Activities Carried Out Under the Provisions of the Archeological Resource Protection Act of 1979 (Annually)	H: Int & IA S: En & NR

International Research Cooperation

STATE	Progress in Efforts Toward International Agreements for Research and Protection of the Stratosphere (Periodically)	H: En & Com For Aff S: Env & PW For Rel
DOI	Geological Surveys Conducted Outside the National Domain (Annually)	H: Int & IA S: En & NR
NIH	Annual Report of the United States-Japan Cooperative Medical Science Program (Annually)	H: En & Com S: Lab & HR
STATE	Activities of an Institution Supported Under Title 8 (Soviet & East Europe Area Studies) (Annually)	H: For Aff S: For Rel
S'N	Smithsonian Tropical Research Institute (Canal Zone Biological Area) (Annually)	H: Appns S: Appns

Reports on Research and Development. One group of reports covers, within the same report, both research and development matters. Although our study is not concerned with reports on the development of technology but only with science, we include those R&D reports in our survey (Table 27-7).

This is by the far the largest group of Congressional reports, with a total of 160 or one quarter of all periodic Congressional science reports. As was the case with the reports solely devoted to science, these R&D reports vary widely in scope, level of generality, and in the selectivity of the topics covered. Not surprisingly, the 9 report on biomedical R&D originate mainly in NIH and ADMHA, the 21 energy reports

originate mainly in the Energy Department, etc. And again, wide areas of government supported research are, as a result of the comparatively narrow focus of most of the existing reports, not covered.

Table 27-7

Reports on Research and Development

Agriculture		
USDA	Activities Conducted Under the Dairy Products Promotion and Research Order (Annual)	H: Agric S: Ag Nu For
USDA	Promotion of Aquaculture (Annual)	H: Agric Appns S: Ag Nu For Appns
Biomedicine		
NIH	Nat'l Cancer Program: Report of the Director of the National Cancer Institute (Annual)	H: En & Com S: Lab & HR
NIH	Annual Report on Carcinogens (Annual)	H: En & Com S: Lab & HR
NIH	Annual Report on Arthritis (Annual)	H: En & Com S: Lab & HR
NIH	Annual Rept of the Director, Nat'l Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases (Annual)	H: En & Com S: Lab & HR
NIH	Report of the Director of the National Heart, Lung, and Blood Institute (Annual)	H: En & Com S: Lab & HR
HHS	Research for the Cause, Treatment, and Prevention of Public Health Emergencies (Annual)	H: En & Com S: Lab & HR
ADAMHA	Health Consequences & Extent of Drug Abuse in the United States and Research Findings on Drug Abuse Including Health Effects of Marijuana and Tobacco (Triennially)	H: En & Com S: Lab & HR
ADAMHA	Health Consequences of Alcoholic Beverage usages & Research Findings on Alcohol Abuse Alcoholism (Triennially)	H: En & Com &S: Lab & HR
VA	Journal of Rehabilitation Research & Development	H: Vet Aff S: Vet Aff
Energy		
USDA	Biomass Energy Development (Quarterly)	H: Agric Banking S: Ag Nu For Banking En & NR

DOE	Quarterly Report on General Biomass Energy Development (Quarterly)	H: SS & T Appns S: En & NR Appns
NOAA	Report on the Administration of the Ocean Thermal Energy Conversion Act (Annual)	H: MM & Fish S: Com S&T
DOE	Comprehensive Ocean Thermal Applications and Market Development Plan (Annual)	H: SS & T S: En & NR
DOE	Studies and Investigations of Wind Energy Systems (when appropriate)	H: SS & T S: En & NR
DOE	Comprehensive Program Management Plan on Wind Energy - Annual Update (Annual)	H: En & Com SS & T S: En & NR
DOE	Solar Photovoltaic Energy Program Status (Annual)	H: SS & T S: En & NR
DOE	Methane-Fueled Vehicles Program (Annual)	H: SS & T S: En & NR
DOE	Annual Rept on the Electric & Hybrid Vehicle Program (Annual)	H: En & Com SS & T S: En & NR
DOE	Automotive Propulsion R&D Annual Rept (Annual)	H: SS & T S: En & NR
DOE	Office of Alcohol Fuels Annual Report (Annual)	H: SS & T Appns S: En & NR Appns
DOE	Alternative Fuels Production Activities Rept (Semiannual)	H: SS & T S: En & NR
DOE	National Program for Solar Heating & Cooling (Annual)	H: SS & T S: En & NR
DOE	Annual Rept on the Weatherization Assistance Program (Annual)	H: SS & T S: En & NR
DOE	Demonstrating, Production and Conservation of Energy (Annual)	H: SS & T S: En & NR
DOE	Magnetic Fusion Energy Annual Report (Annual)	H: SS & T S: En & NR
DOE	West Valley Project Quarterly Rept (Quarterly)	H: Int & IA SS & T Appns S: En & NR Appns
DOE	West Valley Demonstration Project	H: En & Com Int & IA SS & T S: En & NR

DOE	Nuclear Safety RD&D Program Plan Revision (when deemed appropriate)	H: SS & T S: En & NR Env & PW
DOE	Nuclear Safety RD&D Program Plan Annual Update (Annual)	H: SS & T S: En & NR Env & PW
NRC	Evaluation of Research, Development, and Demonstration Projects for the Disposal of Radioactive Waste and Spent Nuclear Fuel (As appropriate)	H: Int & IA S: Env & PW

Environment

EPA	Report on Status & Progress of Noise Research & Control Programs in the Federal Government (from time to time)	H: En & Com S: Comm S&T Env & PW
NOAA	The Federal Plan for Meteorological Services and Supporting Research (Annual)	H: SS & T S: Com S&T
NOAA	Program of Research and Monitoring for Early Detection of Stratospheric Ozone Change (Biennial)	H: SS & T S: Com S&T
NOAA	Nat'l Acid Precipitation Assessment Program (Annual)	H: SS & T S: Env & PW
NOAA	Five-Year Plan on National Climate Program Office (Biennial)	H: SS & T S: Com S&T
EPA	Environmental Research Outlook (Annual)	H: SS & T S: -

Oceanography

NOAA	Federal Plan for Ocean Pollution Research and Development and Monitoring (Triennial)	H: MM & Fish S: Env & PW
NOAA	Activities of, and Outlook for, National Sea Grant College Program (Biennial)	H: MM & Fish S: Com S&T

Defense

DOD	Summary of Operational Test and Evaluation Activities of the Department of Defense (Annual)	H: Armd Svcs Gov Opns S: Armd Svcs Gov Aff
DOD	Net Assessment of US/USSR Command Control and Communications Systems (Annual)	H: Armd Svcs Appns S: Armd Svcs Appns
DOD	Militarily Critical Technologies (Annual)	H: Armd Svcs For Aff S: Armd Svcs Banking
DOD	Human Subjects for Testing Biological and Chemical Agents (as experiments are planned)	H: Armd Svcs S: Armd Svcs

DOD	Independent Research and Development and Bid and Proposal Negotiations and Results (Annual)	H: Armd Svcs Appns S: Armd Svcs Appns
DOD	Independent Research and Development and Bid and Proposal Cost Incurred by Major Defense Contractors (Annual)	H: Armd Svcs Appns S: Armd Svcs Appns

Transportation

FAA	Collision Avoidance Systems (Annual)	H: SS & T Publ W&T S: Com S&T
FAA	Rept to Congress on Operation of the National Airway System (Annual)	H: Publ W&T SS & T S: Com S&T
FAA	National Airspace Plan Facilities, Equipment, and Associated Development (Annual)	H: Publ W&T SS & T S: Com S&T
FHA	State of the Art Technology Demonstration (highway design and safety)(1,6,11 years after each project completion)	H: Publ W&T S: Env & PW

Resources

DOI	Annual Report of the Office of Water Research and Technology (Annual)	H: Int & IA S: Env & PW

Space

NASA	NASA Pocket Statistics (Annual)	H: SS & T S: Com S&T

Education Research

HHS	Research Studies and Evaluation (Head Start) (on completion of studies)	H: Ed & Lab S: Lab & HR
EDUC	Research Studies and Evaluation Summaries of the Impact and Effectiveness of Programs and Projects Carried Out Under the Follow Through Act (on completion of studies)	H: Ed & Lab S: Lab & HR
EDUC	Summaries of Results of Activities Carried Out Under the Follow-Through Act (on completion of each activity)	H: Ed & Lab S: Lab & HR
HHS	Research Studies and Evaluation Summaries of the Impact and Effectiveness of Programs and Projects Carried Out Under Head-Start Act (on completion of studies)	H: Ed & Lab S: Lab & HR
EDUC	Index and Analysis of Books and Research Materials Produced (Annual)	H: Ed & Lab S: Lab & HR
EDUC	Summaries of Activities Concerning Research, Demonstration, and Pilot Project Contracts (on completion of contracts)	H: Ed & Lab S: Lab & HR

International

STATE	Activities of the International Atomic Energy Agency and U.S. Participation (as required)	H: For Aff S: For Rel

Reports on Advisory Committees. A distinct group of 22 reports deal solely with the activities of science advisory committees (Table 27-8). One of these is prepared by the General Services Administration, and covers all the advisory committees in the Federal Government, currently about 1,000, of which almost 40 percent deal with scientific and technical questions. The remaining reports cover the activities of specific, individual advisory committees. Eight are in the Department of Education, 6 are in NIH/HHS, and 4 are in the Department of Agriculture. In contrast, no Congressional Reports are submitted on the activities of the Science Advisory Committees in several science agencies including DOE, DOD, NASA and NSF.

Table 27-8

Reports on Science Advisory Committees

GSA	Annual Report of the President on Federal Advisory Committees (Annual)	H: Gov Ops S: Gov Aff
NIH	National Cancer Program: Rept of the National Cancer Advisory Board (Annual)	H: En & Com S: Lab & HR
NIH	Report of the National Heart, Lung and Blood Institute Advisory Council (Annual)	H: En & Com S: Lab & HR
NIH	Rept of the National Diabetes Advisory Board (Annual)	H: Ed & Lab S: Lab & HR
NIH	Annual Rept of the Nat'l Arthritis Advisory Board (Annual)	H: Ed & Lab S: Lab & HR
NIH	Annual Rept of the Nat'l Digestive Diseases Advisory Board (Annual)	H: En & Com S: Lab & HR
HHS	Annual Report on Activities of Advisory Committees (Annual)	H: En & Com S: Lab & HR
EDUC	National Council on Educational Research (Annual)	H: Ed & Lab S: Lab & HR

EDUC	Federal Council on Educational Research and Development Annual Report (Annual)	H: Ed & Lab S: Lab & HR
EDUC	Annual Rept of the Board of Advisors to the Fund for the Improvement of Postsecondary Education (Annual)	H: Ed & Lab S: Lab & HR
EDUC	Annual Report on Federal Advisory Committee: National Board of the Fund for the Improvement of Postsecondary Education (Annual)	H: Ed & Lab S: Lab & HR
EDUC	Annual Report, Advisory Council on Developing Institutions (Annual)	H: Ed & Lab S: Lab & HR
EDUC	Annual Report of the National Advisory Comm. on Black Higher Education & Black Colleges and Universities (Annual)	H: Ed & Lab S: Lab & HR
EDUC	Annual Report of the Interagency Committee on Handicapped Research (Annual)	H: Ed & Lab S: Lab & HR
EDUC	Annual Report of the Advisory Council on Education Statistics (Annual)	H: Ed & Lab S: Lab & HR
USDA	Agricultural Research, Extension, & Education Recommendations-Report to the Secretary by National Research and Extension Users Advisory Board (Annual)	H: Agric S: Ag Nu For
USDA	By the National Agricultural Research and Extension Users Advisory Board: Appraisal of the President's Budget for Food and Agricultural Sciences (Annual)	H: Agric S: Ag Nu For
USDA	Actions Taken or Proposed to Support the Recommendations of the National Agricultural Research & Extension Users Advisory Board (Annual)	H: Agric Appns S: Ag Nu For Appns
USDA	Activities, Membership, and Expenses of Each Advisory Committee (Annual)	H: Agric S: Ag Nu For
NACOA	Annual Rept of the National Advisory Comm. on Oceans and Atmosphere (Annual)	H: MM & Fish SS & T S: Com S & T
DOE	Annual Report of the Interagency Geothermal Coordinating Council (Annual)	H: SS & T S: En & NR
MMC	Charter of the Committee of Scientific Advisor on Marine Mammals (Biennial)	H: MM & Fish S: Com S&T

Facilities Reports. Research and Development facilities require the commitment of large resources and in turn commits an agency's direction in research for many years into the future. In addition, the geographic location of large R&D facilities affect local employment and economic development. As a result

of these several factors, the Congress does now and will always want to keep a close eye on the agencies' plans and commitments for research facilities. As shown in Table 27-9, 24 such reports are currently required.

It is notable, however, that the facility reporting requirements are highly uneven. Extensive reporting on R&D facilities is mandated for the Department of Energy and for NASA. These reports include requirements for advance notification prior to the start of facility construction, as well as progress reports. In contrast, only one facility report is required from the NSF and no separate research facility reporting is required from NIH, NSF, EPA, and the Departments of Agriculture and Transportation, whether it is with respect to facilities for use in their own laboratories or by their grantees and contractors. Defense Department reporting on R&D Facility plans and construction is understood to be included to some extent in its reports on contracts and grants.

Table 27-9

Reports on Research and Development Facilities

Office of Management and Budget

OMB	Recommendation of Another Site for Nuclear Waste Disposal if Prior Approved Site is Disapproved by the Governor or Legislature of the Governing Body of an Affected Indian Tribe (within 1 year of disapproval)	H: En & Com Gov Opns Int & IA SS & T S: En & NR Gov Aff
OMB	Notification of Delay in Making a Decision on a Recommended Nuclear Waste Disposal Site Within the Required 60 Day Period (within 60 days of recommendation)	H: En & Com Gov Opns Int & IA SS & T S: En & NR Gov Aff

Department of Energy

DOE	Estimated Cost to Government of Facilities Exceeding $5 Million and Equipment Exceeding $2 Million (as required)	H: SS & T S: En & NR
DOE	Proposal Concerning Activities of Government-Owned and Contractor Operated Facilities (upon occurrence of event)	H: SS & T S: En & NR
DOE	Vestment of Title or Other Property Interest in an Entity Other than the U.S. Government (upon occurrence of event)	H: SS & T S: En & NR
DOE	Proposed Use of Dept. of Energy Research, Development and Demonstration Facilities for Spent Nuclear Fuel Storage (upon occurrence of event)	H: SS & T S: En & NR
DOE	Rept on the Submission of an Additional Site Recommendation (upon occurrence of event)	H: En & Com SS & T S: En & NR
DOE	Report Regarding the Termination of Site Characterization Activities (upon occurrences of event)	H: En & Com SS & T S: En & NR
DOE	Nuclear Waste Repository Site Deadline Extension (by two specific deadlines)	H: En & Com SS & T S: En & NR
DOE	Annual Federal Interim Storage Deployment Report (Annual)	H: En & Com SS & T S: En & NR
DOE	Report to Congress on Federal Agency Non-Compliance with a Repository's Project Decision Schedule (upon occurrence of events)	H: En & Com SS & T S: En & NR
DOE	Fossil Energy Major Construction Projects (prior to occurrence of events)	H: SS & T S: En & NR
DOE	Use of Appropriated Funds Exceeding $50,000 for Construction, Expansion or Modification of Laboratories (prior to occurrence of events)	H: SS & T S: En & NR

National Aeronautics and Space Administration

NASA	Justification of Proposed Facility Construction in Order to Obligate Funds upon occurrence of events)	H: SS & T S: Com S & T
NASA	Notice of Proposed Construction of National Aeronautics & Space Administration Research & Development Facilities Exceeding $250,000 (upon occurrence of events)	H: SS & T S: Com S & T
NASA	Proposal to Obligate for Expenditure or to Expand to Construct, Expand or Modify Laboratories and Other Installations (prior to occurrence of events)	H: SS & T S: Com S & T

NASA	Proposal Expenditures for "Construction of Facilities" which will Exceed Amounts Authorized by Between 10 Percent and 25 Percent (upon occurrence of events)	H: SS & T S: Com S & T
NASA	Major Facilities Projects Report (Annual)	H: SS & T S: Com S & T
NASA	Minor Facilities Projects Report (Annual)	H: SS & T S: Com S & T
NASA	NASA Report on Major Equipment Approved for Acquisition (Annual)	H: SS & T S: Com S & T
NASA	Disposal of Land Valued in Excess of $50,000 (prior to occurrence of event)	H: SS & T S: Com S & T
	<u>National Science Foundation</u>	
NSF	Survey of Research Facilities Needs of Universities (every 2 years)	H: SS & T S: Ed & Lab Com S&T
	<u>Department of Interior, National Park Service</u>	
PK SV	Program for Development of Facilities, Structures, or Buildings for Each Unit of the National Park System (Annual)	H: Int & IA S: En & NR
	<u>Department of Commerce</u>	
DOC	Notice of Proposed Transfer of the Ownership or Management of Any Civil Land Remote Sensing Space Satellite System to Private Sector (prior to occurrence of event)	H: SS & T S: Com S & T
	<u>Smithsonian Institution</u>	
SN	National Zoological Park - Smithsonian Year (activities and expenses which relate to construction and repair) (Annual)	H: H Admin S: R & Adm

<u>Reports on National Manpower and Education.</u> In the field of National Manpower and Education 16 reports are submitted to the Congress (Table 26-10). Of these 16 reports, no less than 11, or almost 70 percent, deal with health manpower, including health research manpower. Six of these originate in the Department of Health and Human Services, including one from the NIH, 3 originate in the Veterans Administration, and one each in the USIA and the Justice Department. The remainder of these reports focusing on national manpower questions include two from

the NSF covering equal opportunities in science and engineering for women and minorities, and two from the USIA. Notably, none of these reports are focused on the nation's over-all science and engineering manpower situation, including supply and demand, present and projected.

Table 27-10

Reports on National Manpower and Education in Science and Technology

EDUC	Recommended Modifications in the National Graduate Fellows Program (Triennial)	H: Ed & Lab S: Lab & HR
HHS	Report on the Status of Health Professions Personnel in the United States (Biennial)	H: Ed & Lab S: Lab & HR
HHS	Health Professions Students Report (Biennial)	H: En & Com S: Lab & HR
HHS	Students & Applicants for Health Professions Training (Biennial)	H: Ed & Lab S: Lab & HR
NIH	Report on Studies Respecting Biomedical and Behavioral Research Personnel (Biennial)	H: En & Com S: Lab & HR
HHS	Administration of the National Health Service Corps Scholarship Program (Annual)	H: En & Com S: Lab & HR
HHS	A Report on Public & Community Health Personnel (Biennial)	H: En & Com S: Lab & HR
VA	Report on Health Professional Scholarship Program (Annual)	H: Vet Aff S: Vet Aff
VA	Notification on Awarding Scholarships in Other Than Medicine and Nursing (prior to awards)	H: Vet Aff S: Vet Aff
VA	Annual Report on Health Manpower Grants Program (Annual)	H: Vet Aff S: Vet Aff
DOE	Annual Comprehensive Program & Plan on Energy Education, Extension & Information (Annual)	H: SS & T S: En & NR
NSF	Activities and Plans of Committee on Equal Opportunities in Science and Technology (Annual)	H: SS & T S: Lab & HR
NSF	Women & Minorities in Science and Technology (Biennial)	H: SS & T S: Lab & HR
USIA	Report on Exchanges - Board of Foreign Scholarship (Annual)	H: For Aff S: For Rel

USIA	Aliens in Medical Education or Training Programs Who Have Affidavits Under Section 212 (J)(1)(E) of the Immigration and Nationality Act (Annual)	H: Judic S: Judic
DOJ	Foreign Medical Graduates & Investors Adjusted to Permanent Resident Status Pursuant to Public Law 97-116 (Biennial)	H: Judic S: -

Reports on Federal Manpower and Education. Covering the Federal Government's own manpower and education needs and activities, this group of 14 report deals mostly with highly specialized topics (Table 27-11). They cover, for example, NOAA's commissioned officer retirement system, the pay of Veteran Administration's physicians and dentists, and the Defense Department's Nuclear Career Incentive Bonus effectiveness. None of the reports in this category focus on the Federal Government's over-all, longer-term science manpower and educational needs.

Table 27-11

Reports on Federal Manpower and Education

OMB	Medical Personnel Staffing Levels-Certification to Congressional Committees and the Comptroller Generals (Annual)	H: Vet Aff S: Vet Aff
HHS	Annual Report to Congress on Continuation Pay for Dentists (Annual)	H: Armd Svcs S: Armd Svcs
USDA	Employment of Specially Qualified Scientific and Professional Personnel (Annual)	H: Agric PO & SC S: Ag Nu For
DOD	Table 309B, DOD Civilian Personnel Strength by Regional Area and by Country - Military Functions (every 60 days)	H: Armd Svcs Approp S: Armd Svcs Approp
DOD	Salaries of Officers of Federal Contract Research Centers (Annual)	H: Armd Svcs S: Armd Svcs
DOD	Aviation Career Incentive Act Report (Annual)	H: Armd Svcs Approp S: Armd Svcs Approp

DOD	Nuclear Career Accession Bonus Annual Report (Annual)	H: Armd Svcs S: Armd Svcs
DOD	Nuclear Career Annual Incentive Bonus Effectiveness Report (Annual)	H: Armd Svcs Approp S: Armd Svcs Approp
NASA	Positions Established During the Year Pursuant to 5 U.S.C. 3104(b) (scientific & professional personnel (Annual)	H: SS & T H: Com S & T
NOAA	National Oceanic & Atmospheric Administration Commissioned Corps Retirement System	H: SS & T S: Com S & T
NSF	Reduction in Force Plans (Quarterly)	H: PO & CS S: -
NSF	Quarterly Report are the National Science Foundation's Outplaced Employees Affected Reduced Federal Employment Levels (Quarterly)	H: SS & T S: Lab & HR
VA	Report on Special Pay for Physicians and Dentists (Annual)	H: Vet Aff S: Vet Aff
VA	Operation of Special Physicians' & Dentists' Pay (Annual)	H: Vet Aff S: Vet Aff

Reports on Contract and Grant Awards. The reporting requirements on Contract and Grant Awards are heavily concentrated in the Defense Department and in NASA. Nine of the 16 reports are submitted by DOD and they include reports on awards by size and by geographical distribution. Three reports are by NASA and two by the National Science Foundation. The single report by the Energy Department is limited to awards for coal conversion projects, and the sole NIH report covers any awards for the testing of chemical substances. A number of Federal departments and agencies engaged in the support of extramural research through grants and contracts, are not required to report such awards. However, NIH does provide on an annual basis a detailed listing of all its grants and contracts although it is not required by law to do so. NSF provided, since its establishment in 1952, such reports as part of its

annual report, but ceased including this information after the submission of its annual report for 1982. NASA and the Department of Agriculture each provides an annual report listing research grants and contracts, but only those provided to universities.

Table 27-12

Reports on Contract and Grant Awards

DOE	Contract/Agreement for Coal Conversion Projects Under P.L. 85-804 (prior to occurrence of event)	H: Appns S: Appns
NIH	Grants and Contracts Awarded Under Section 27 of Public Law 94-469 (testing of chemical substances) (Annual)	H: En & Com S: Com S & T
DOD	Research, Development & Experimental Contracts Exceeding $50,000 (Army) Semiannual	H: Armd Svcs Appns S: Armd Svcs Appns
DOD	Experimental, Developmental and Research Work of Air Force Contract of $50,000 or More by Company (Semiannual)	H: Armd Svcs S: Armd Svcs
DOD	Report of Contract Awards of Three Million Dollars or More (Annual)	H: Armd Svcs S: Armd Svcs
DOD	Prime Contract Awards (Semiannual)	H: Small Bus S: Armd Svcs
DOD	Department of Defense Prime Contractors which Received Awards over $25,000 (Semiannual)	H: Armd Svcs Small Bus S: Armd Svcs Judiciary Small Bus Jt Econ
DOD	Department of Defense Prime Contract Awards by Service Category and Federal Supply Classification for Past Four Fiscal Years (Annual)	H: Judiciary Small Bus S: Armd Svcs
DOD	Prime Contract Awards by State (Semiannual)	H: Small Bus S: Small Bus
DOD	Prime Contract Awards: By Region and State for the Fiscal Year (Annual)	H: Small Bus S: Small Bus
DOD	One Hundred Companies Receiving the Largest Dollar Volume of Prime Contract Awards (Annual)	H: Armd Svcs Small Bus S: Armd Svcs
NSF	Grants & Contracts Awarded (During Specified Time Period)	H: - S: Lab & HR

NSF	Federal Support to Universities, Colleges, and Selected Non-Profit Institutions (Annual)	H: SS & T S: Lab & HR
NASA	National Aeronautics and Space Administration Annual Procurement Report (Annual)	H: SS & T Gov Opns Stds OC S: Com S & T
NASA	NASA's Use of Authority to Contract Across Fiscal Years for Service Contracts Funded from the Appropriation for Research and Program Management (Annual)	H: SS & T S: Com S & T
NASA	Extraordinary Contractual Actions Taken to Facilitate the National Defense, P.L. 85-804 (Annual)	H: SS & T S: Com S & T

Reports on Financial and Budget Matters. Fourteen separate reports are provided to the Congress in the field of financial and budgetary matters affecting scientific research. Five originate in NASA, 3 in the Energy Department, and 2 in the NSF. Seven of the reports are required in the event an agency transfers appropriated funds between budget categories. Another 4 of these reports are financial reports on specific programs such as the Electric Vehicle program, or the National Cancer program.

Table 27-13

Reports on Financial and Budget Matters

Dept or Agency	Report Title	Congressional Committee
DOE	Base Table - Budget (Quarterly)	H: Int & IA SS & T S: En & NR Appns
DOE	Business/Financial Report on Electric and Hybrid Vehicle Development Fund (Annual)	H: SS & T S: En & NR
DOE	Financial Report on the Geothermal Resources Development Fund (Annual)	H: SS & T S: En & NR
NIH	Annual Budget Estimate for the National Cancer Program (Annual)	H: En & Com S: Lab & HR
FEMA	Transfer Exceeding 10 Percent of the Amount Authorized from or to Categories of the Programs for Earthquake, Hazard Reduction, Fire Prevention and Control or Multi-Hazard Research, Planning and Mitigation (upon occurrence of event)	H: Appns S: Appns

NASA	Notification to Congressional Committees of Actions Proposed to be Taken and the Facts and Circumstances Relied Upon in Support of Proposed Actions (prior to occurrence of event)	H: SS & T S: Com S & T
NASA	Request to Vary Expenditures to Meet Unusual Cost Variations (upon occurrence of event)	H: SS & T S: Com S & T
NASA	Circumstances Surrounding Proposal by Administrator to Increase Appropriated Amounts by up to 25 Percent (upon occurrence of event)	H: SS & T S: Com S & T
NASA	Action Proposed to change Authorized Programs and Support Therefore (prior to occurrence of event)	H: SS & T S: Com S & T
NASA	Expired NASA Authorizations (Annual)	H: SS & T S: Com S & T
NOAA	Statement on the Space Program of the National Oceanic & Atmospheric Administration (fiscal plans and budgets) Annual	H: - S: Com S & T
NSF	Proposal for Transfer of Funds (prior to occurrence of event)	H: SS & T S: Lab & HR
NSF	Statement of Nature of Transfer of Funds Within National Science Foundation Programs (upon occurrence of event)	H: SS & T S: Lab & HR
Multi Agency	Estimated Amount of Funds Requested for Multi-Agency Consulting Services	H: Appns S: Appns

Accounting and Audit Reports. Of the six reports in this category, 3 are by the General Accounting Office (Table 27-14). It is painfully clear that Audit Reports are not a widely used tool among the reporting requirement for the Federal Science Agencies.

Table 27-14

Accounting and Audit Reports

DOD	Report on Numbers and Types of Contract Audits Conducted by the Department of Defense (Semiannual)	H: Armd Svcs Gov Opns S: Armd Svcs Gov Aff
DOD	Accounting System Conformance to Comptroller General Accounting Principles, Standards, and Related Requirements (Annual)	H: Armd Svcs Appns S: Armd Svcs Appns

GAO	Audit of the Office of Civilian Radioactive Waste Management	H: En & Com Int & IA SS & T S: En & NR Env & PW
GAO	Examination of the Audits of Federally Chartered Corporations (Annual)	H: Judiciary S: -
GAO	Performance Evaluation of the Energy Information Administration (Annual)	H: En & Com SS & T S: En & NR
NAS	National Academy of Sciences Report of Independent Audit (Annual)	H: Judiciary S: Judiciary

Reports on Small Business Activities. The long-standing Congressional interest in ensuring that a significant share of Federal procurement funds go to small businesses is reflected in the substantial number of reports required on the support of research in such organizations (Table 27-15). Several of these reports are the direct result of the enactment by the Congress of the "Small Business Innovation Development Act of 1982.".

Table 27-15

Reports on Small Business Activities

OSTP	Implementation & Operation of Small Business Innovation Research Program (Annual)	H: Small Bus S: Small Bus
DOE	Report on Small Business Participation (Geothermal Resources Development) (Annual)	H: SS & T Small Bus S: En & NR Small Bus
DOE	Annual Report on Small Business Participation (Annual)	H: SS & T Small Bus S: En & NR Small Bus
DOE	Small Business & Non-Profit Share of Funding by DOE Non-Nuclear Research, Development and Demonstration Program (Annual)	H: SS & T Small Bus S: En & NR Small Bus
NSF	NSF Activity Report to the Congress: Office of Small Business R&D (Quarterly)	H: SS & T S: Lab & HR

Other Recurrent Reports. Having grouped most of the 240 science related reports being submitted to the Congress into 10 distinct categories by subject, we are left with a residue of 22 reports devoted to a variety of other miscellaneous subjects, as shown in Table 27-16. Half of the reports in this group are event triggered, that is, they must be submitted in connection with the occurrence of a specified event.

Table 27-16

Other Recurrent Reports to the Congress on Management

Office of Management and Budget		
OMB	Reviews of Information Management Activities of Selected Agencies (Triennial)	H: Gov Opns Appns S: Gov Aff Appns
OMB	Managing Federal Information Resources (Annual)	H: Gov Opns S: Gov Aff
OMB	Activities of Office of Federal Procurement (Annual)	H: Gov Opns S: Gov Aff
Department of Commerce		
NBS	Determination that Voluntary Product Standards have not been Published or observed 1 year from Event)	H: En & Com S: Com S & T
Department of Defense		
DOD	Notification of Intent of the Board of Regents of the Uniformed Services Univ. of the Health Sciences to Enter into Agreement with the Foundation for the Advancement of Military Medicine (upon occurrence of event)	H: Armd Svcs S: Armd Svcs
Department of Education		
EDUC	Institutions of Higher Education Index by State & Congressional Districts (Biennial)	H: Ed & Lab S: Lab & HR
EDUC	Determination of Eligibility in Meeting Criterion for Institutional Aid (Annual)	H: Ed & Lab S: Lab & HR
Department of Energy		
DOE	Proposed Establ. of Joint Federal-Industry Nonnuclear Corporation (Prior to occurrence of event)	H: Int & IA S: En & NR

DOE	Economic Impact of Energy Actions (Annual)	H: SS & T S: En & NR
DOE	Status of Negotiations to Develop Written Agreements with States or Affected Indian Tribes (upon occurrence of event)	H: En & Com SS & T S: En & NR
DOE	Report to Congress on the Status of Negotiations of Cooperative Agreements (upon the occurrence of event)	H: Armd Svcs En & Com SS & T S: Armd Svcs En & NR
DOE	Report of Plutonium Air Shipment (upon occurrence of event)	H: SS & T S: En & NR
	National Aeronautics and Space Administration	
NASA	Projected Aggregate Contingent Liability Under Termination Provisions of Contracts for Tracking and Data Relay Satellite Services (Annual)	H: SS & T Appns S: Com S&T Appns
	Department of Health and Human Services	
NIH	Annual Report on Evaluation of Multipurpose Arthritis Centers (Annual)	H: En & Com S: Lab & HR
	Department of Commerce	
NOAA	Review of Regulations Promulgated Pursuant to Title I, P.L. 96-320, Regarding their Status and Impact on Progress in Ocean Thermal Energy Conversion Technology (Triennial)	H: MM & Fish S: Com S&T
	Veterans Administration	
VA	Regional Medical Education Ctr (on completion of evaluations)	H: Vet Aff S: Vet Aff
VA	Report to Congress: Administrative Reorganizations at the Department of Medicine and Surgery Health Care Facilities (upon occurrence of event)	H: Vet Aff S: Vet Aff
	Smithsonian Institution	
S'N	National Museum Act Program - Smithsonian Year (Annual)	H: Appns S: Appns
	Multi-Agency	
-	Waivers of Minimum Funding and Staffing Requirements for Technology Transfer from Federal Laboratories (Annual)	H: SS & T S: Com S&T
	International Activities	
DOE	Proposed Distribution of Special Nuclear Materials (upon occurrence of event)	H: En & Com Int & IA SS & T S: En & NR

DOE	Effects of the President's April 20, 1977 Message on Nuclear Research and Development Cooperation Agreements (upon occurrence of event)	H: For Aff SS & T S: En & NR For Rel
DOE	Notice of Meetings Related to the International Programs (prior to occurrence of event)	H: En & Com For Aff S: En & NR For Rel

Annual Reports. We note finally a separate group of periodic reports, not identified in our search for science related reports, and not part of the 240 reports of that type discussed above. These are the regular annual reports issued by a department, an agency, or a program. We show in Table 27-17 the 15 such reports which originate in departments, agencies, or programs which are science based, or which have within their organization units that are strongly science based.

Table 27-17

Annual Departmental and Agency Reports

Annual Report of the Secretary of Commerce

Annual Activities Report of the Office of Science and Technology Policy

Annual Defense Department Report

Annual Report: U.S. Department of Education

Department of Energy Annual Report

Annual Report, Administrator of Veterans Affairs

National Science Foundation Annual Report

Annual Report of the Public Health Service

Report of the Forest Service

Annual Report of the Institute for Computer Science and Technology, NBS

Biennial Report of the National Institute of Justice

Report of the Smithsonian Institution - Smithsonian Year

Annual Report to the Congress by the Office of Technology Assessment

Annual Report on the Work and Operation of the Gorgas Memorial Laboratory

Annual Report of the East-West Center

Annual Report of the National Climate Program

As we have noted in the cases of other categories of periodic reports, the coverage of the science activities of the departments and agencies of the Federal government through regular annual reports is uneven and spotty. Agencies such as the Agricultural Research Service and the Cooperative State Research Service in the Department of Agriculture, the National Oceanographic and Atmospheric Administration in the Commerce Department, the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration in the Department of Health and Human Services, the Bureau of Mines, the Geodetic Survey, and the Fish and Wildlife Service in the Interior Department, and independent agencies such as NASA and the Environmental Protection Agency have no formal requirements for the submission of annual reports. In part, we emphasize, this is due to the fact that our list includes only those annual reports which are mandated by statute. Several agencies and programs do in fact publish regular, annual reports even though they are not required to do so.

Types of Congressional Science Reports.

The number of science reports in 3 major categories and the 12 subcategories used in the inventory tables is shown in Table 27-18. When grouped in this manner, it is evident that well over half of the reports cover science, R&D, science advisory committees, and R&D facilities. One third deals with a variety of research administration and budget matters, and 12 percent cover science manpower issues.

Table 27-18

Number of Periodic Congressional Reports on Science and Science Related Questions by Type of Content

Report Group	No.of Repts	Percent
Science Reports		
Reports on Scientific Research	25	
Reports on Research and Development	60	
Reports on Science Advisory Committees	22	
Reports on Research & Development Facilit.	24	
	131	55%
Science Administration		
Reports on Contract and Grant Awards	17	
Reports on Financial and Budget Matters	14	
Accounting and Audit Reports	6	
Reports on Small Business Activities	5	
Other Reports on Science Administration	22	
Departmental and Agency Annual Reports	15	
	79	33%
Science Manpower Reports		
Repts on Nat'l Science Manpower Education	16	
Repts on Federal Science Manpower Education	14	
	30	12%
Total	240	100%

Manner of Requesting Reports

Almost all of these 240 periodic reports are mandated by statute. Most originate either in the Act originally establishing a program or an agency, or in the subsequent budget authorization Acts for those activities. A small group of 22 of the periodic reports listed in the GAO inventory do, however, have other, less formal origins. Half of them are submitted on a voluntary basis. Six of these are Defense Department reports on various types of contract awards, 2 are NASA reports on statistics and procurement, and one is the periodic grants award list by the NSF, since discontinued.

The other 11 reports are prepared and submitted in response to committee requests which have been made with varying degrees of informality. For example, the report on Foreign Medical Graduates originated with an "Oral Request by Chairman Rodino to the Attorney General," the NASA Minor Facilities report was "requested by the House Committee on Science and Technology," and the Budget Base Tables report is "required by the Senate Appropriations Committee." Only three of the reports were requested more formally through a request contained in a Committee report. But as noted, by far most of the periodic reports originate with the enactment of a public law.

Distribution of Science Reports to Committees.

The distribution of science reports to the committees in the House and Senate is shown in Table 27-19 and 27-20. It is clear that no single committee in either house has an exclusive or even a dominant interest in science matters as measured by the number of reports mandated by law to come to them. In the House of Representatives the two top committees on the list together receive 133 science reports, or 58 percent of all

submissions. This reflects the jurisdiction of the Science, Space, and Technology Committee of the research programs of NASA, NSF, DOE, NOAA, NBS, and EPA, and the jurisdiction of the Energy and Commerce Committee of biological and biomedical research and development, principally at the NIH.

In the Senate, which does not have a committee with principal responsibility for science and technology, that function is shared by the Committees on Energy and Natural Resources, on Labor and Human Resources, and on Commerce, Science and Transportation. Together these three committees get 148 report submissions or 58 percent of the Congressional science reports.

The remaining report submission are made in each House to their committees on Appropriations and to committees with jurisdiction of mission agencies who support scientific research such as the Committees on Armed Services, Agriculture, and Veterans Affairs.

The distribution of the reports to Committees by content, as indicated in Table 27-19 for the House and Table 26-20 for the Senate, shows, with few exceptions, no discernible, significant pattern, with the distribution varying among reports on science, science manpower, and science administration and funding types of reports. The only notable pattern is the interest in both Houses by the Veterans Committees in science manpower reports and by the Small Business Committees in reports on science administration and funding.

Table 27-19

Submissions of Congressional Science Reports

to the Committees of the House

Committee	Science	Manpower	Administration and Funding	Other	Total
Sci Space & Techn	53	6	21	8	88
Energy and Comm	31	4	4	6	45
Armed Services	7	6	7	2	22
Educ and Labor	17	3	-	2	22
Appropriations	10	3	5	3	21
Interior & Ins Aff	11	-	2	1	14
Agriculture	9	1	-	-	10
Small Business	-	-	10	-	10
Government Opns	4	-	2	3	9
Veterans Affairs	1	6	-	2	9
Foreign Affairs	5	1	-	2	8
Merchant Mar & Fisheries	8	-	-	1	9
Judiciary	-	2	3	-	5
Public Works & Trp	4	-	-	-	4
Post Off & Civ Svc	-	2	-	-	2
Stds of Office Conduct	-	-	-	1	1
Totals	1620	34	55	30	279

Table 27-20

Submissions of Congressional Science Reports to the Committees of the Senate

Committee	Science	Manpower	Administration and Funding	Other	Total
Energy and Nat Res	39	1	8	8	56
Labor and Hum Res	32	10	6	3	51
Comm Sci and Tr	25	2	10	4	41
Armed Services	7	6	9	2	24
Appropriations	10	3	6	3	22
Envir and Publ Wks	13	-	1	-	14
Agric Nutrit For	9	1	-	-	10
Govt Affairs	5	-	1	3	9
Veterans Affairs	1	6	-	2	9
Foreign Relations	5	1	-	2	8
Small Business	-	-	7	-	7
Banking	2	-	-	-	2
Rules and Adm	1	-	-	-	1
Totals	149	31	50	27	257

Some committees have no requirements for mandated reports on science related topics. In both Houses the committees on Budget, Intelligence, Ways and Means/Finance are in this category. The same applies to the House committees on Rules and on the District of Columbia, and in the Senate to the Judiciary Committee.

Timeliness of Report Submissions

Up to this point in our analysis we have focused chiefly on the requirements imposed on the departments and agencies of the Executive Branch, their numbers, types and origin. We now turn to the more difficult question of what happens once the requirements have been imposed: How responsive are the agencies to these requirements and how useful are the reports to the Congress?

Those questions are difficult to answer for several reasons: No comprehensive system for keeping track of Congressional reports exists, making it impossible without extensive archival research to determine if and when reports were submitted. Even the individual committees do not, with a few exceptions and to the best of our knowledge, maintain a system for tracking the various Congressional reports. Only those which are formally submitted to the Speaker of the House and the President of the Senate are regularly kept track of whereas those submitted directly to Committees or Subcommittees, especially the one-time reports, are not subject to any overall-tracking system. Thus, there is no formal way to determine how responsive a report was and how useful it was to the Committee which asked for it. We nevertheless seek to estimate how well the reporting requirements are complied with based on previous studies and our own analysis.

Report Due Dates. The mandate for about 40 percent of the periodic science reports includes a provision specifying the time for the submission of the report. Such deadlines are in most cases selected so that the report will reach the Congress at a time when it is needed in the cycle of the Congressional work schedule. Unfortunately, most report submissions fail to meet that schedule.

For about half of the Congressionally mandated reports no specific due dates are specified. For these reports the only time requirement is that the report be submitted "annually", "biannually", "semiannually", or "quarterly". Such a general timing requirement indicates, in most cases, that the Congress is mainly interested in monitoring progress in general terms without tying those activities to its own budget review cycle. It also gives the agency a good deal of flexibility in when to prepare and submit the report, although it is generally expected that once a certain time for submission is established, such as for example each June for an annual report, it will be adhered to.

For another 10 or 11 percent of these reports, the due date is event-triggered. As we show in Table 27-21, in most of these cases a report is due when a certain event, such as the commitment of funds for a research facility, occurs. For a number of other reports in this category a specific time before or after the occurrence of a particular event serves as the due date for reports.

For the initial group of 120 reports, constituting 39 or 40 percent of the periodic science reports, a specific due date for the submission to the Congress is prescribed. The tabulation of these due dates, as listed in Table 27-21, show that most of these due dates cluster around two important events in the Federal and Congressional budget cycle. Fifty-four of the reports, or 45 percent of those that are time specific, are due in 30-day period between December 30th and January 31st. This is the time when the Congress convenes for its annual session and when the President's budget for the coming fiscal year is submitted. Reports that have due dates in this one month period are needed as part of the consideration of the budget proposals by the Congress, its Committees, and Subcommittees.

Table 27-21

Due Dates of Periodic Congressional Reports

Due Date		No. of Reports
January 1	10	
January 7	1	
"Start of Congressional Session"	5	
"At the Time of President's Budget Submission"	4	
January 15	12	44
"5 Days After Budget Submission"	1	
January 30/31/"120 Days After End of FY"	11	
February 15	2	
February 20	1	
February/March 1	8	
March 15	3	
March 31/April 1/"180 Days after end of FY"	12	
April 30	4	
May 6	1	
May 15	1	
May 30/June 1	3	
June 30/July 1	4	
July 17	1	
August 7	1	
September 15	2	
Sept 30/Oct 1/"End of FY"/"Beginning of FY"	12	
November 4	1	26
November 9/"10 Days After Start of FY"	2	
November 15	1	
Nov 30/Dec 1/"60 Days After End of FY"	8	
Dec 30/31/"90 Days After End of FY"	10	
		120
90 Days Prior to Event	3	
60 Days Prior to Event	2	
30 Days Prior to Event	4	
Prior to Occurrence of Event	3	
On Occurrence of Event	19	
15 Days After Notice	1	
30 Days After Event	1	
1 Year From Date of Event	1	
1 Year, 6 Years, and 11 Years After Event	1	
		35
Unspecified, As Required		154
Total:		309

The other concentration of report due dates falls around the end of the old fiscal year and the beginning of the new one on October 1st each year. Between September 15th and December 1st, 26 reports, constituting 22 percent of the time-specific reports are due. These due dates are tied less to the Congressional work schedule - the Congress may or may not be in

session that late in the year - and more to the budget cycle of the Executive Branch. The end of the fiscal year is a natural point in time to sum up past achievements and discuss future plans. Another 12 reports, some of which are semiannual, are due on April 1st, or halfway through the fiscal year.

The remaining 30 reports, constituting just one quarter of those with time-specific due dates, are due at various scattered dates between February 15th and August 7th. Many of these due dates arise form provisions calling for report submission one year after the enactment of the law mandating the report.

Thus, for those Congressional reports that have specific due dates, those dates are in most cases not arbitrarily selected, but are closely tied to the needs of the Congress. Reports that are submitted on time can thus serve the purposes for which they were mandated. When reports are late, the Congressional process tends to function less effectively and the usefulness of the reports when they are eventually submitted is notably diminished.

The GAO Study. Large numbers of Congressional reports have in the past been significantly late. For the fiscal year 1979, the GAO examined the submissions of the 1,132 reports due that year on all subjects. The results are found in Table 27-22.

Table 27-22

Delinquency of Executive Agency Reports
in Fiscal Year 1979

Days Late	Number of Reports	Percentage of Reports
0-30	246	22%
31-90	125	11%
91-180	195	27%
181-360	566	50%
	1,132	100%

It is notable that none of the reports we found to have been submitted on time, although the category "0-30" may well include some report submissions that were exactly on time, as signified by "0" days late. Furthermore, half of the reports due that year were over 6 months late while only 22 percent came on time or were less than 30 days late.

Executive Communications Records. We sought to determine if the congressional system for recording the arrival of "Executive Communications" would permit a tracking of Congressional reports. Under this system reports formally submitted to the Congress are logged in at the Office of the Legislative Clerk in the House and by the Enrolling clerk in the Senate. They are then passed on to the relevant committees, and are listed in the calendars of each committee. We conducted an analysis of the Executive Communications that were sent to our own committee.

For the 10-year period 1977-1986, 548 such Executive Communications were sent to the Committee on Science, Space, and Technology. However, not all of these were report submissions of the total, 106 or 19 percent were submissions of draft legislation, with the Commerce Department alone accounting for 43 such submissions. The General Accounting Office submitted 79 reports, or 14 percent of the Executive Communications. The remaining two-thirds of the Executive Communications were, in fact, report submissions of which there were 366.

But the records were significantly incomplete. We performed an analysis of the reports required from the Department of Energy, an agency with one of the largest number of mandated, periodic science reports. Those DOE reports recorded as Executive Communications for the 1977-1986 period are shown in Table 27-23, with an indication under "Calendar Listings" of the extent of coverage.

Table 27-23

Periodic Reports on Energy Research
Submitted to the House of Representatives
as "Executive Communication" and Transmitted to the
House Committee on Science and Technology, 1977-1986

Report Title	Calendar Listings
Report on Geothermal Energy Research, Development and Demonstration	Annual Reports for Each Year 1978-1986
Report on Implementation of Electric and Hybrid Vehicle RD&D Act	Annual Reports for Each Year 1978-1986
Report on comprehensive Program and Plan for Federal Education, and Extension and Information Activities	Annual Reports for Each Year 1978-1986, except 2nd Report (1978) not listed
Annual Report on the Department of Energy	Annual Reports for Each Year 1978-1986, but Reports for 1982 and 1983 listed twice with different submissions dates

Quarterly Report on Biomass Energy and Alcohol Fuels Development	Beginning with 5th Quarterly Report in Feb. 1982, all reports shown through 1986
Annual Reports on West Valley Demonstration Project	Annual reports for 1981 through 1984 are shown
Annual Revised Program Management Plan for Ocean Thermal Energy Conversion Systems	Annual reports and Revisions are shown beginning with 1st report in 1982 and through 1986
Annual Revised Comprehensive Program Management Plan for Wind Energy Systems	Annual reports shown beginning with first in 1981 and through 1986
Annual Report on Automotive Technology Development Program	Beginning with Third Annual report in 1981 reports through 1985 are shown
Annual Report on Methane Transportation RD&D Act	Annual reports beginning with firsts in 1982 are shown through 1986
Annual Report on Comprehensive Management Plan for Nuclear Safety RD&D	Annual reports, beginning with first in 1983 are shown through 1985
Annual Report on High Level Radioactive Waste Management Demonstration Project at West Valley	First and Second reports for 1985 and 1986 are shown

For a few of the reports all of the submissions are recorded. But for others, the continuity is broken by missing reports. Furthermore, as shown in Table 27-24, a number of periodic reports submitted by the Department of Energy are not at all recorded as Executive Communications. In addition, the submission of one-time reports is rarely recorded in the Executive Communications system. For example, for the 10-year period used for our review, only 10 such one-time reports from the Department of Energy was recorded in the Science and Technology Committee calendar, an average of one per year.

Table 27-24

Periodic Reports from the Department of Energy
Required to Be Submitted to the
House Committee on Science, Space, and Technology
But Not Recorded as Executive Communications

Business/Financial Report on Electric and Hybrid Vehicle development Function

Comprehensive Ocean Thermal Applications and Market Development Plan

Demonstration, Production and Conservation of Energy

Financial Report on the Geothermal Resources Development Fund

Magnetic Fusion Energy Annual Report

National Program for Solar Heating and Cooling

Office of Alcohol Fuel Annual Report

Report to Congress on the Office of Civilian Radioactive Waste Management

Solar Photovoltaic Energy Program Status

In addition to these reports, many DOE event-triggered reports and a number of non-R&D related reports, such as those on Weatherization Assistance, on the Energy Information Administration, and on the Economic Impact of Energy Actions, are not found among the Executive Communication recorded. Thus, we conclude that this system of recording reports and other communications from the Executive Branch to the Congress is highly incomplete and can therefore not at this stage serve as a tracking system for Congressional reports.

The same inconsistency and incompleteness exists for the reports of other agencies, and in some cases the degree of incompleteness is even higher. For example, most of the Executive Communications recorded as coming from NASA deal with reprogramming of funds or proposed use of facility funds and few of either the recurring or the one-time reports from NASA are included.

We thus conclude that the existing system for tracking Executive Communications, while it may serve other purposes, is not now anywhere nearly adequate for keeping track of Congressional reports. This is due to several factors. One is that many periodic reports and almost all one-time reports are not submitted to the House or Senate as such or to the Speaker of the House or the President of the Senate. Rather, they are submitted to the Committee or Subcommittee requesting them or to their chairpersons. Thus they do not get included in the Executive Communications system, and no central record is kept.

Furthermore, for neither the Executive Communications nor for the reports that are submitted directly to committees does there appear to be any continuing effort to alert either the committee or the executive agency when a report deadline is passed without the submission of the required report. A few committees and subcommittees do keep track of the due dates of Congressional reports. For example, we encountered one subcommittee which on a quarterly basis sends a letter to the head of one agency listing the overdue reports, and asking for attention to the delinquent reports.

Timelessness of Energy Report. For those reports that are recorded in the system of Executive Communications, we can determine the extent to which they are submitted on a timely basis. We show in the following group of tables the due dates, dates of receipt, and number of days late for the 7 energy related reports for which this information is available in the Executive Communications records.

Table 27-25

Degree of Timely Subcommission of 7 Energy Research Related Reports

Year	Due Date	Received	Days Late
Report on Nuclear Safety Research			
1983	Jan 15	Apr 12	86 days
1984	Jan 15	Feb 6	21 days
1985	Jan 15	Feb 21	36 days
Report on West Valley Demonstration Project			
1981	Feb 9	Feb 23	22 days
1982	Feb 9	Feb 9	8 days
1983	Feb 9	Feb 22	21 days
1984	Feb 9	Mar 7	34 days
Clean Thermal Energy Program Management Plan			
1982	Jan 15	Apr 26	99 days
1983	Jan 15	Jun 29	114 days
1984	Jan 15	Feb 2	17 days
1985	Jan 15	Jan 7	ON TIME
1986	Jan 15	Feb 14	29 days
Wind Energy Comprehensive Management Plan			
1981	Jan 15	Nov 13	292 days
1982	Jan 15	May 12	115 days
1983	Jan 15	May 13	116 days
1984	Jan 15	May 14	117 days
1985	Jan 15	Mar 19	62 days
1986	Jan 15	Feb 28	43 days
Report on Energy Education, Extension and Information			
1979	Jan 15	Feb 28	43 days
1980	Jan 15	Mar 19	62 days
1981	Jan 15	Oct 21	276 days
1982	Jan 15	Apr 20	93 days
1983	Jan 15	Mar 21	64 days
1984	Jan 15	May 16	120 days
1985	Jan 15	Feb 4	19 days
1986	Jan 15	Feb 18	33 days
Report on Electric and Hybrid Vehicle RD&D			
1978	Jan 30	Jan 19	ON TIME
1979	Jan 30	Jan 22	ON TIME
1980	Jan 30	Jan 28	ON TIME
1981	Jan 30	Feb 26	26 days
1982	Jan 30	Mar 8	36 days
1983	Jan 30	Mar 1	29 days
1984	Jan 30	Jan 30	ON TIME
1985	Jan 30	Feb 19	19 days
1986	Jan 30	Feb 14	14 days

Quarterly Report on Biomass Energy and Alcohol Fuels

1980	Dec	1	n.a.	
1981	Mar	1	n.a.	
1981	Jun	1	Jun 22	22 days
1981	Sep	1	n.a.	
1981	Dec	1	Feb 2	63 days
1982	Mar	1	Mar 16	15 days
1982	Jun	1	May 26	ON TIME
1982	Sep	1	Sep 16	15 days
1982	Dec	1	Dec 15	14 days
1983	Mar	1	Mar 16	15 days
1983	Jun	1	Jun 8	7 days
1983	Sep	1	Sep 26	25 days
1983	Dec	1	Jan 23	53 days
1984	Mar	1	Mar 19	18 days
1984	Jun	1	Jun 19	18 days
1984	Sep	1	Sep 5	4 days
1984	Dec	1	Jan 7	36 days
1985	Mar	1	May 1	60 days
1985	Jun	1	Jun 27	26 days
1986	Mar	1	n.a.	
1986	Jun	1	Jul 14	43 days
1986	Sep	1	Sep 24	23 days

When we extract from this data summary numbers on the extent to which reports in this small group have been late and use the same time categories as the GAO study described above, the results are as indicated in Table 27-26.

Table 27-26

Delinquency of 7 Energy Research Related Reports

Compared With Delinquency Of Reports In GAO Study

Days Late	Number of Energy Repts	Percentage of Energy Repts	Percentage of Reports in GAO Study
(on time)	(6)	(11%)	n.a.
0-30	31	56%	22%
31-90	15	27%	11%
91-180	7	13%	27%
181-360	2	4%	50%
TOTALS:	55	100%	100%

There is a striking difference in the degree of delinquency of all the reports in 1979 and the group of 7 reports on energy related research issues for which we were able to obtain data through the Executive communications system. For the energy research reports more than half were no more than 30 days late, while for the reports on all subjects just 22 percent were less than 30 days late. We note further that while the GAO data did not show how many reports were on time, our own data shows that the 55 report submissions only 6, or 11 percent, were submitted on or before the due date. On the other hand, in our sample of energy reports only 4 percent were more than 6 months late, while 50 percent of the reports in the GAO study were that late.

Timely submission of Congressional reports serves, as we noted above, both the needs of the Congress, and, in most cases, the interests of the agencies. Their use is almost invariably at the level of Congressional committees. We therefore recommend that those committees that place emphasis on obtaining the information required in a timely fashion, establish some form of centralized tracking system by which due dates can be monitored, report requirements and be added and deleted, and the agencies be reminded of reports due and overdue.

Responsiveness of Report Content

We note finally that while timely submission of Congressional Reports is undoubtedly important, substantive content is unquestionably equally important. We have, however, within the timeframe of this study not been able to review the question of how responsive in content the periodic reports have been. However, we do carry out such an analysis on a limited basis of the periodic reports, and a detailed analysis in the case of the Science Policy Reports. Such a review requires a

detailed comparison between the legislative objective and subsequent communications about report content between Congressional Committees and agency personnel on the one hand, and the actual content of the reports on the other. Such an analysis would no doubt also benefit from extensive interviews of committee Members and staff to obtain their views about the responsiveness of and usefulness of the reports.

Legislation to Eliminate Periodic Congressional Reports

Past attempts to reduce the number of statutorily mandated, periodic reports have met with limited success. In the 40 year period covered by our science policy review, successive Presidents have on occasion submitted lists of Congressionally mandated reports to the Congress suggesting that they be eliminated or modified. Although these proposals have included fairly lengthy lists of reports proposed for elimination, the reports on those lists have constituted a small fraction of the overall number of reports. Furthermore, the Congress has generally chosen to agree to eliminate only some of the reports on the lists, while choosing to retain others. For example, in 1982, the second year of the Reagan administration, a proposal was made to eliminate or modify 200 reports. Those proposed for elimination were only 10 percent of all such reports, and, following a Congressional review of the proposed eliminations, only 77, or 4 percent were actually dropped or modified.

In the last four decades covered by our review, six Report Elimination Acts have been passed. These are shown in Table 27-27 with a breakdown by reports to be deleted and to be modified. In each category we also show the non-science and the

science reports. In total, in these six enactments, 19 science reports were eliminated and 12 were modified. This total of 31 science reports acted upon over the 3 decades since the first Reports Elimination Act in 1954, is, while not negligible, very modest indeed.

Table 27-27

Number of Congressional Reports Eliminated Under Congressional Reports Elimination Acts, 1954-1982

Year	Public Law	Number of Reports Deleted		Number of Reports Modified		Total
		Non-Science	Science	Non-Science	Science	
1954	83-706	30	2	-	-	32
1960	86-533	22	2	1	-	25
1965	89-348	31	3	-	-	37
1975	93-608	20	3	2	-	25
1980	96-470	45	6	37	2	90
1982	97-375	31	3	35	7	76
Totals		179	19	75	12	285

Sunset Provision Proposed

The systematic introduction of a sunset provision for every periodic Congressional report would do much to eliminate the continuation of unneeded reports and keep overall number of reports from constantly growing. A 3-term, or six-year life for most cyclical reports would appear to meet the needs of Congressional oversight. In the case of reports mandated simultaneously with the initiation of a new research program such a life span for the associated reporting requirement would ensure attention while the program was starting up and getting established. The cessation of reporting after the sunset term of 6 years is reached would relieve both the agency and the

Congress from further report writing and review based on these report. We note that other mechanisms of providing information on progress are always available. And exemptions to such sunset requirements, in the form of extensions of the life of particular reports, can always be made by the Congress in the cases of particular need.

The effect of such a 6-year sunset requirement for periodic Congressional reports can be deduced from Table 27-28 which shows the number of report requirements by year of origin and type of report. It is notable that, with one single exception, none of the periodic reports identified by the GAO predate 1954. The exception is a facilities report going back to 1890 required of the Smithsonian Institution on "the expenses of the Zoo which relates to the construction and repair of buildings; improvements of roads, walks, bridges, water supply, sewage, and drainage ... and the care, subsistence and transportation of animals." If a sunset program had been instituted, for example in 1975, 24 reports would have been deleted then. Each year since, and average of 13 or 14 reports would have been deleted unless exempted by Congressional action.

Table 27-28

Year of Origin of Periodic Congressional Reports

Year	Sci Res	R&D	Adv Com	Facils	Nat Mpw Edc	Fed Mpw Edc	Con and Gts	Fin and Bud	Acc and Aud	Sml Bus	Oth	Total
1890				1								1
1954											1	1
1955											1	-
1956							2					2
1957		1										1
1958							1					1
1959									1			1
1960	1											1
1961					1							1
1962												-
1963								1	1			2
1964												-
1965	1		1		1							3
1966	1					1					2	4
1967			2			1						3

1968							2	1				3
1969												-
1970		2	1	1			1					5
1971			1									1
1972		2	4									6
1973	1			1								2
1974	2	1	1		1	2		1			2	10
1975				1								1
1976		2	3	1	2	1			1	1		11
1977	7	1	1		1			1			2	13
1978	1	13	1	5	1			2		1	1	25
1979	3	2				2	1				1	9
1980	2	16	3		2	4				2	7	36
1981	2	6	4	1	4	2		1				20
1982	2	7		9	2	1		2	3	1	3	30
1983	2	5		2			2	3			2	16
Volun		1					8					9
n.d.				2	1			2			1	6
	25	59	22	24	16	14	17	14	6	5	22	243

Conclusions and Recommendations Concerning Periodic Science Reports

Our review of the Congressionally mandated periodic reports on science shows that there is a large number of such reports, currently 240, that they originate in a wide range of agencies and are submitted to many different committees in the House and Senate, and that they cover a wide range of topics. However, it is also evident that coverage is highly unsystematic, with wide areas of science, science administration, and science manpower not at all covered by Congressional reports.

Such factual information about these reports is, however, not sufficient for us to arrive at a judgement about the usefulness of these reports. We emphasize that we have not, as part of this general study of U.S. science policy, conducted an in-depth examination - through interviews and surveys - of the usefulness of these many reports to members of the House and Senate, to the Committees of the Congress, and to the staffs that assist them. Thus we are not able to form conclusions and make recommendations about the individual reports.

With that reservation in mind, we nevertheless draw a number of more general - conclusions and make certain recommendations. In doing so we stress that the observations and conclusions are general in nature, and that they are based chiefly on our experiences with the reports reaching our own Committee, the House Committee on Science, Space, and Technology. They may or may not apply with equal strength to the particular circumstances and needs found in our sister committees in the House and Senate.

The topical coverage of the Congressional science reports is, we find, greatly fragmented. It is possible, in many cases, to explain and understand the concentration of reports in some areas. For example, the spurt of technical reporting requirements on a large number of energy research and development programs arose from the many new initiatives in the Congress taken in the wake of the energy crisis of the early seventies. The gradual increase in reporting on contract and grant awards by NASA and DOD arose from the Congressional interest in the geographical distribution of the large volume of defense and space R&D contracts. Other reporting requirements, for example those on quite narrow, specific programs, can often be traced to the strong interest of a specific member or group of members.

But these historical and personal factors do not explain why so many other parts of the research activities supported by the Federal government are not subject to any reporting. To cite just a few among a very long list of examples, no reports are currently required on the progress of research in the field of organ transplants, projection of manpower needs in applied sociology, grant and contracts awarded under the sea grant program, facilities construction by NSF grantees, and audit

reports on NASA research grantees. Thus, when examined today in terms of the accountability and oversight needs for Federal research activities, the disparity and unevenness of the total reporting system is all too evident.

Furthermore, the number of Congressional reports is currently too large. We doubt that, in the most cases, the efforts now being invested in the preparation of many science reports is comparable to the value they yield for their Congressional and other readers. We have observed that while some reports are widely disseminated and read, many others are placed directly into committee files upon receipt and are rarely if ever retrieved, read, or used.

It is our observation that cyclical reports easily and quickly loose the attention of senior policy-making individuals both in the Congress and in the agencies, while one-time reports, in contrast, generate high levels of attention from both the authoring agency and the receiving committee(s) in the Congress. We therefore recommend that the Congress in requesting reports from the agencies of government, much more frequently employ the ultimate form of sunset report, the one-time report.

As discussed above, the systematic introduction of a sunset provision for every Congressional report would do much to eliminate the continuation of unneeded reports and keep the overall number of reports from constantly growing. A 3-term, or six-year life for most cyclical reports would appear to meet the needs of Congressional oversight. In the case of reports mandated simultaneously with the initiation of a new research program such a life span for the associated reporting requirement would ensure attention while the program was starting up and getting established. The cessation of reporting

after the sunset term of 6 years was reached would relieve both the agency and the Congress from further report writing and review based on these reports. Furthermore, other mechanisms of providing information on progress are always available. And exemptions to such sunset requirements, in the form of extensions of the life of particular reports, can always be made by the Congress in the cases of particular need.

We therefore recommend that legislation to put into effect such a sunset provision be introduced to cover existing periodic reporting requirements, and that the Committees on Government Operations in the House and on Governmental Affairs in the Senate review this matter. We further recommend that in the future legislation including requirements for periodic reports to the Congress include a provision for a 6-year life of such reports.

With respect to our finding that the topical coverage by the existing reports is highly sporadic and unsystematic, we conclude that this is not necessarily undesirable. For our own purpose of review and oversight in the Congress, we must necessarily limit ourselves to a small number of programs and activities to which attention can be given each year. The variations in scope and level of generality of the reports are, in most cases well suited to that purpose. As a result, we do not recommend any changes in this aspect of the reporting system. In arriving at this recommendation we note that, in our considered view, the Congressional reports should and must primarily serve the needs of the Congress. Such other purposes as internal agency management and wider public information needs, are important, but should, in our view not be allowed to become dominant, and can well be accomplished through other channels and other means.

There are, however, a number of special areas where we believe additional emphasis and therefore further reporting is warranted. The question of research facilities has, in recent years assumed increased importance both in the area of large installations costing in excess of $25 million, and with respect to those in the medium cost range, costing from $1 million to $25 million. As we noted, some agencies report extensively on the plans, costs, and operations of such facilities, while other agencies do not in any fashion report on such facilities. We recommend that all departments and agencies of the Federal government be required to submit reports to the Congress on this subject.

The absence of any separate periodic reporting on overall science and engineering education and manpower issues for the nation as a whole and for the Federal government itself is notable. The strongest periodic review and reporting on this subject now appears in the Science and Engineering Indicators report which appears every other year. In view of the increasing critically of this issue in future years, as discussed elsewhere in this report, we recommend that the Office of Science and Technology Policy be required to report annually on the evolving supply and demand picture in this area, either through a new report or as part of one of the existing OSTP reports.

The one area of reporting in which we find the disparity and unevenness of current coverage sufficiently serious to call for action is the reporting of grant and contract awards. The growing concern about the thrust and direction of research support by the Federal government will require closer attention to the actual and specific activities being conducted. This will require that the reporting of individual projects be

reported government-wide. We find the existing, annual group of reports by the National Institutes of Health of research grants and contracts a model of such reporting. Similarly, the annual report of the National Science Foundation of grants awards was ideal, and we regret its abrupt and unexpected discontinuation. We recommend that the agencies supporting research, either extramurally and intramurally or both, be required to report on the initiation of all scientific research projects and research support grants and contracts. Furthermore, such reporting should include a number of standard items of information such as title, name of principal investigator, institution, amount, and duration. Such reports should be made quarterly in order to allow trends and new developments to be analyzed, and will, we believe, be easily and cost-effectively made through the use of computer data bases with this information now in existence in most Federal agencies.

Finally, we conclude that the audit report, both those focused on financial audits and those covering performance audits is notably underused in Federal research and development activities. We recommend that the Committees of the Congress make increased use of the financial and performance audit reporting their oversight activities.

THE NUMBER AND PURPOSE OF ONE-TIME CONGRESSIONAL REPORTS

In addition to the use of periodic reports, the Committees of the Congress also employ one-time reports to provide information from the departments and agencies of the Executive Branch. These reports are formally requested in the legislative reports of each Committee, typically in the reports dealing with the annual budget authorizations and appropriations, and on occasion in the corresponding public laws.

These reports are of the same types as the periodic reports but in addition include reports dealing with two other topics: "Program Planning" and "Research Utilization and Technology Transfer." More significantly, the purpose of many of the one-time reports is often different from the purpose of the periodic reports. While the periodic reports provide information useful for oversight and management purposes, many of the reports in the several categories of one-time reports, most notably the largest group dealing with Program Planning reports, have the purpose of providing information about program and policy options which are not currently being pursued by the agencies. They are typically mandated in order to stimulate new programmatic initiatives or policy redirection which are believed to be desirable by the Congress.

Survey of One-Time Science Reports

To determine the scope and use of one-time reports, we examine first the experience with such reports in the recent past.

Sample of One-Time Reports. Unlike the periodic reports discussed above, for which the comprehensive inventory by the General Accounting Office served as a starting point, no inventory of the one-time congressional reports is known to exist. We therefore compiled our own inventory of such reports.

But because of the extensive effort which a comprehensive inventory would require, we limited our search to two agencies, NSF and NASA, representing a basic research agency and an agency supporting both research and development. This provides, in the most rough and general way, a degree of comparability with the inventory of periodic reports analyzed above. Our examination covered the authorization and appropriations Acts and the associated committee legislative reports from the relevant House and Senate Committees.

In order to be reasonably representative we covered the ten year period from fiscal year 1977 through fiscal year 1986. Our entire examination, as a result, necessitated the study of 26 Public Laws and 69 legislative reports. Because several authorization Acts for the NSF did not reach the President's desk for signature due to failure of the Congress to complete action, and because more than one authorizing committee in the Senate issued authorization reports on the NSF, the number of Acts and legislative reports is not exactly 30 and 60 respectively.

Number of One-Time Reports. Our survey yielded 221 one-time report requests. The distribution of these by year, house, and authorization versus appropriations categories is shown in Table 27-29.

Table 27-29

Number of One-Time Reports Requested from NSF and NASA in Their Authorization and Appropriations Legislation and in Accompanying Legislative Reports for Fiscal Years 1977-1986

		Authorizations			Appropriations			
FY	Agency	House Repts	Senate Repts	Public Laws	House Repts	Senate Repts	Public Laws	Totals
1977	NSF	0	2	4	0	0	0	6
	NASA	3	3	0	0	0	0	6
1978	NSF	0	0	0	0	1	0	1
	NASA	8	3	0	0	1	0	12
1979	NSF	3	1	1	0	2	0	7
	NASA	6	7	1	0	1	0	15
1980	NSF	4	2	2	0	1.5	0	9.5
	NASA	9	2	0	0	.5	0	11.5
1981	NSF	8	0	4	1	2	0	15
	NASA	4	2	0	0	0	0	6
1982	NSF	4	0	-	0	0	0	4
	NASA	10	3	0	0	0	0	13
1983	NSF	1	1	-	0	1	0	3
	NASA	6	1	3	0	1	0	11

1984	NSF	4	2	-	0	.5	0	6.5
	NASA	11	1	1	1	.5	0	14.5
1985	NSF	5	1	-	1	3	0	10
	NASA	16	5	1	1	1	2	26
1986	NSF	7	-	4	2	0	0	13
	NASA	14	8	5	0	4	0	31
TOTALS		123	44	26	6	20	2	221

Total in Authorization: 193 Total in Appropriations: 28
Total NSF: 75 Total NASA: 146

Although we are cognizant of the difficulties of generalizing about one-time reporting requirements for all of Congressional science matters based on a survey of the requirements for only two agencies, albeit two major research agencies, we nevertheless believe that the following observations and trends are valid.

The requirements for one-time reports have grown, with some fluctuations, from 12 in 1977 to 44 in 1986, and have thus almost quadrupled. Throughout this ten-year period, by far the dominant number of report requests has come from the authorizing committees. They originated 183, or 82 percent of all the report requests. Within this group, the House authorizing committee dominates with 123 - 36 for NSF and 87 for NASA - or 67 percent, two thirds of all the report requests, or more than half (55 percent) of all the report request in our survey as a whole. The authorization Acts account for 26 or 12 percent of all the report requests.

In contrast, the Appropriations Committees originated only 29, or 13 percent of all the report requests for the two agencies, and all but two of these - both in the Appropriations Act for fiscal year 1985 and both affecting NASA - were requested in the legislative reports, rather than in the Appropriations Acts.

Types of One-Time Science Reports

Our analysis of the types of one-time Congressional reports employs the same categories as we used in classifying the periodic reports. We found that many of the one-time reports, when analyzed

for content based on their titles and content description, were of the same types as the periodic reports. Thus the Congress has asked for one-time reports on scientific research, on research facilities, on financial and budget matters, and on national manpower and education issues. In addition, we noted two other significant categories of reports: One large group of reports on what we call "Program Planning", and a smaller group dealing with "Research Utilization and Technology Transfer."

In the following 13 tables (Table 27-30 through Table 27-43) we provide an inventory of the 221 one-time reports by type, including the two additional categories mentioned above, the originating agency, and the source of the Congressional request. Within each category of report, the individual report titles are listed chronologically. (The analysis continues on p.89)

Table 27-30

One-Time Reports on Scientific Research

Mandated by Report Language

Space Research

NASA	Report on Review by NASA Advisory Council of Adequacy of Current Space Research Technology Programs for Support of & Future Planetary Missions	H.Rept. 98-65, p.19 NASA Authn FY 1984
NASA/NAS	National Academy of Sciences Report on Importance of Sun-Earth Interactions and Scientific Disciplines Involved	H.Rept. 98-65, p.20 NASA Authn FY 1984
NASA/NAS	Review jointly with National Academy of Sciences of Future Astronomical Missions incl. Cost and Design Implications	H.Rept. 98-629, p.23 NASA Authn FY 1985
NASA	Report on NASA's Implementation of Summer Study by Task Force on Scientific Uses of Space Station	S.Rept. 99-91, p.6 NASA Authn FY 1986

Aeronautics Research

NASA	Long Range Technical & Budget Plan for a Focused Research Program in High Speed Aeronautics	H.Rept. 98-629, p.33 NASA Authn FY 1985
NASA	Report on Reorientation of Aero-propulsion Research at Lewis Research Center	H.Rept. 99-32, p.27 NASA Authn FY 1986

Research in Other Disciplines

NSF	Report on Plans for Support of R&D in Area of Appropriation Technology	H.Rept. 95-98, p.8,25 NAS Authn FY 1978
NSF	Study of NSF's Projected Support for Policy Research	H.Rept. 95-98, p.25 NSF Authn FY 1978
NSF	Study of Problems and Need of Flood Prediction and Flood Recover Policy	H.Rept. 96-61, p. NSF Authn FY 1980
NASA	Advise Committee on How to Resolve Jurisdictional Issues Between Government Agencies in the Earth Sciences	H.Rept. 96-52, p.11 NASA Authn FY 1980
NSF	Full Account of Steps Taken to Encourage Other Federal Agencies to Support Research Terminated by NSF	H.Rept. 96-61, p.10 NSF Authn FY 1980
NSF/NAS	National Academy of Sciences Study of Status and Need of Marine Earth Sciences	H.Rept. 96-999, p.8 NSF Authn FY 1981
NSF	Inform Committee of Assessment of the Overall State of Population Research	H.Rept. 96-999, p.35 NSF Authn FY 1981
NSF	Report on Future Direction of Ocean Drilling Sciences	S.Rept. 98-195, p.6 NSF Authn FY 1986
NSF/DOE/ USGS	Joint Implementation Plan for the Continental Drilling Program	H.Rept. 99-44, p.31 NSF Authn FY 1986
NASA	Ten-Year Plan for NASA Computational Fluid Dynamics Research Capability includes costs	H.Rept. 99-32, p.27 NASA Authn FY 1986
NASA	Report on Physiology & Pharmacology Research at Florida A&M College of Pharmacy and Impact on NASA Life Sciences	S.Rept. 99-129, p.67 HUD Appns FY 1986

Mandated by Public Law

NSF	Report on Ocean Margin Drilling Program includes Plans for Conversion of Glomar Explorer Drilling Ship	P.L.96-516 Sec 14(a) NSF Authn FY 1981
NSF/NAS	National Academy of Sciences Study of Marine Earth Sciences	P.L.96-516 Sec 14(b) NSF Authn FY 1981

Table 27-31

One-Time Reports on Research and Development

Mandated by Report Language

Space Research and Development

NASA	Solar Power Satellite Definition and Evaluation Report	S.Rept. 95-120, p.30
NASA	Report on Feasibility, Costs, and Benefits of Putting Large Format Camera on Second Orbital Flight of Space Shuttle	S.Rept. 95-280, p.45 HUD Appns FY 1978
NASA	Inform Committee Promptly of Outcome of the Engine Testing Now Underway	S.Rept. 95-799, p.11 NASA Authn FY 1979
NASA	Plan for Advanced Rocket Engine Propulsion Technology Base Activity and Assessment of Industrial Base to be Maintained	H.Rept. 96-52, p.14 NASA Authn FY 1980
NASA	Keep Committee Informed About Progress on Space Shuttle Development Program	S.Rept. 96-207, p.9 NASA Authn FY 1980
NASA/USAF	Joint Study to Reexamine Options for Development of an Upper Stage in Addition to Centaur for Planetary Missions	S.Rept. 97-100, p.13 NASA Authn FY 1982
NASA	Submit Rescoped 30/20 Gigahertz Communications Satellite Test and Evaluation Flight Mission Plan	H.Rept. 97-502, p.9 NASA Authn FY 1983
NASA	Submit Project Status Report on Major Programs incl Space Shuttle, Galileo, Space Telescope, Landsat D, and others	H.Rept. 97-502, p.19 NASA Authn FY 1983
NASA	Report on NASA's Materials Processing in Space Program	H.Rept. 98-65, p.21 NASA Authn FY 1984
NASA	Present Substantive Evidence that a Mission Planning Activity for the Space Nuclear Reactor Technology Program is in place	H.Rept. 98-65, p.23 NASA Authn FY 1984
NASA	Provide as part of Budget of Plans and Budgetary Projections for the Space Nuclear Reactor Program	H.Rept. 98-65, p.23 NASA Authn 1984
NASA	Study Usefulness and Feasibility of a Shuttle-Borne Test of the Gravity Probe-B Experiment	H.Rept. 98-629, p.8 NASA Authn FY 1985
NASA	Prioritized List of Improvements Underway to Upgrade Performance, Reliability and Cost Efficiency of Shuttle Orbiter	H.Rept. 98-629, p.20 NASA Authn FY 1985

NASA	Report Overall Plan and Progress Toward Solving Recurring Technology Problems in Solid Rocket Propulsion Technology	H.Rept. 98-629, p.34 NASA Authn FY 1985
NASA	Keep Committee Informed on a Timely Basis of Reexamination of National Upper Stage Technologies and Capabilities	S.Rept. 98-455, p.8 NASA Authn FY 1985
NASA	Inform Committee of Final Resolution of the two separate K-Band Problems Affecting the Tracking Data Relay Satellite	S.Rept. 98-455, p.56 NASA Authn FY 1985
NASA	Report on Progress and Future Plans for Intermediate Class Payload Development for the Space Shuttle	H.Rept. 99-32, p.21 NASA Authn FY 1986
NASA	Report on Implementation and Costs of Recommendations for use of Automation Robotics in the Space Station	S.Rept. 99-91, p.6 NASA Authn 1986
NASA	Keep Committee Informed of Any Problems Arising in the Ulysses and Galileo Programs	S.Rept. 99-91 NASA Authn 1986
NASA	Keep Committee Informed of NASA's Response to the Brake Failure Experienced on Shuttle Mission 51-D	S.Rept. 99-91, p.49 NASA Authn 1986
NASA	Keep Committee Informed of Additional Technical Difficulties and Resource Requirements of Tracking Data Satellite	S.Rept. 99-91, p.54 NASA Authn 1986

<u>Aeronautics Research and Development</u>

NASA	Program Plan for Achieving Technology Readiness for an Advanced Supersonic Transport by the Early 1980's	H.Rept. 95-67, p.18 NASA Authn FY 1978
NASA	Research Plan for How to Increase Productivity of Agricultural Aircraft	S.Rept. 95-120, p.27 NASA Authn FY 1978
NASA	Resubmit Plan for Achieving Technology Readiness for an Advanced Supersonic Transport by the Early 1980's	H.Rept. 95-973, p.9 NASA Authn FY 1979
NASA	Keep Committee Informed of Progress Toward Integrating Aerial Applications Activities with General Aviation Program	S.Rept. 95-799, p.37 NASA Authn FY 1979
NASA	Comprehensive Report on the Needs for New Technology for Commuter Aircraft	S.Rept. 95-799, p.37 NASA Authn FY 1979
NASA	Submit Program Plan for Research on Pilot Fatigue and Jet Lag	H.Rept. 96-899, p.18 NASA Authn FY 1981

NASA	Plan for the Advanced Turboprop Program	H.Rept. 97-32, p.26 NASA Authn FY 1982
NASA	Technology Readiness Plan for Alternative Fuels for General Aviation	H.Rept. 98-629, p.33 NASA Authn FY 1985
NASA	Technology Readiness Plan for Fuels for General Aviation	H.Rept. 98-629, p.33 NASA Authn FY 1985
Research and Development in Other Fields		
NSF	Concrete Program Plan for Appropriate Technology	H.Rept. 95-933,p.8,22 NSF Auth FY 1979
NSF	Plan for Program of Science and for the Handicapped	H.Rept. 95-993,p.8,21 NSF Authn FY 1979
	Mandated by Public Law	
NSF	Comprehensive Analysis and Assessment of the Science for Citizens Program	P.L. 94-471 Sec 5(d)
NSF	Feasibility Study of Transmitting Solar Energy to Earth by Using Orbiting Structures in Consultation with OSTP	P.L. 95-434 Sec 8 NSF Authn FY 1979
NSF	Flood Hazard Mitigation Study and Report Specific Program Recommendation	P.L. 96-44 Sec 8
NASA	Feasibility Study to Ensure Flight Opportunities for Physically Disabled Americans	P.L. 99-170 Sec 111 NASA Authn FY 1986

Table 27-32

One-Time Reports on International Science and Technology Matters

	Mandated by Legislative Report Language	
NASA	Review of Domestic and International Users of the Space Shuttle	H.Rept. 96-899, p.16 NASA Authn FY 1981
NSF	Report on Steps Taken in the International Science Programs to Protect Human Rights and Academic Freedom	H.Rept. 96-999, p.25 NSF Authn FY 1981
NSF	Study of Economic Cooperation Between Canada, Mexico, and the U.S. by an Association of Universities	H.Rept. 96-1114, p.38 HUD Appns FY 1981
NSF	Study of the Translation of Japanese Scientific and Technical Literature in Cooperation with Other Agencies	H.Rept. 98-642, p.23 NSF Authn FY 1985

NASA	Keep Committee Informed About Progress in Obtaining International Participation in Space Station including Financial	S.Rept. 98-455, p.12 NASA Authn 1985
NASA	Review of NASA's Support and Contributions to the International Geosphere Biosphere Program	H.Rept. 98-629, p.32 NASA Authn FY 1985
NASA	Immediate Study of Potential for International Financial Contributions Towards Additional Space Shuttle Orbiters	H.Rept. 98-629, p.34 NASA Authn FY 1985
NSF	Report on NSF's Role in International Science	H.Rept. 99-44, p.27 NSF Authn FY 1986
NASA	Report on Opportunities for Joint East-West Mars Probes, Manned and Unmanned	S.Rept. 99-91, p.27 NASA Authn FY 1986

Mandated by Public Law

NASA	Report on Action Taken to Establish in 1992 an International Space Year	P.L. 99-170 Sec 115 NASA Authn FY 1986

Reports on Program Planning. This category of reports was not included in our analysis of the periodic reports. It embraces a unique type of report which constitutes, with 45 entries, the largest group among the one-time reports. This group includes a large number of reports that focus on a specific R&D program. Not only do these reports ask for information about the R&D or technical aspects of a program but also required is information about the budgetary and schedule issues. The remaining reports in this group of Program Planning provide information about policies for the agency as a whole and the policy options available.

These reports typically seek to explore program or policy options that are not currently being pursued by the agency in question, but which the Congressional Committee believes should be explored. In some cases they represent programs or policies which the Congress has already decided to adopt, in other case they cover potential policy and program options. Thus, these Program Planning reports aim to do more than provide information to the Congress.

They seek to signal to the agency that the Congress has a strong interest in having the policy or program option pursued and to get the agency actively involved in doing the same.

Table 27-33

One Time Reports on Program Planning

Mandated by Legislative Report Language

Space Program

NASA	A Follow-on plan for SEASAT	H.Rept. 95-67, p.17 NASA Authn FY 1978
NASA	Report on Progress Toward Meeting the Planning and Analysis Recommendations of Report "Future Space Programs"	H.Rept. 94-897, p.8 NASA Authn FY 1977
NASA	Report on Establishment of Non-NASA Centers for Upper Atmospheric Research	S.Rept. 94-718, p.11 NASA Authn FY 1977
NASA	Report on Actions Planned or Underway to Strengthen Future Peaceful Space Program Planning	H.Rept. 95-973, p.15 NASA Authn FY 1979
NASA	Report on NASA's Future Role in Communications Satellite R&D and its role relative to Other Agencies and Private Sector	H.Rept. 95-973, p.19 NASA Authn FY 1979
NASA	Report on Cost and Performance Implications of Leasing Instead of Leasing Instead of Purchasing a Tracking and Data Relay Satellite	S.Rept. 95-1060, p.45 HUD Appns FY 1979
NASA	Space on Strategies for Future Space Programs to Avoid Reductions in the Institutional Base at Field Centers	H.Rept. 96-52, p.10 NASA Authn FY 1980
NASA	Advise Committee in Writing of Future Management Plan for Landsat D prior to Commitment of Additional $30 million	S.Rept. 96-719, p.24 NASA Authn FY 1981
NASA	Report on Reassessment of National Requirements for a New Upper Stage, in Cooperation with Other Agencies	H.Rept. 97-32, p.8 NASA Authn FY 1982
NASA	A Set of Space Goals Based on an Aggressive Space Policy Aimed at Maintaining Continuing Dominant Presence in Space	H.Rept. 97-32, p.19 NASA Authn FY 1982
NASA/USAF	Report on Joint Review of Requirements Additional Shuttle Orbiter Vehicles	H.Rept. 97-32, p.20 NASA Authn FY 1982

NASA	Report on Reassessment of National Oceanic Satellite System Concept and Its Institutional Arrangements	H.Rept. 97-32, p.22 NASA Authn FY 1982
NASA/USAF	Repeat Request for Joint Review of Requirements for Additional Shuttle Orbiter Vehicles	H.Rept. 97-502, p.5 NASA Authn FY 1983
NASA	Keep Committee Fully and Currently Informed About NASA's Space Station Planning Effort	S.Rept. 97-537, p.62 HUD Appns FY 1983
NASA	Plan for Maintenance of Expandable Launch Vehicle Capability	H.Rept. 98-65, p.17 NASA Authn FY 1984
NASA	Report on Long Term Plans for Technology Development for Deep Space Missions Beyond Galileo and ISPM	H.Rept. 98-65, p.19 NASA Authn FY 1984
NASA	Study of Costs and Feasibility of Landsat Retrieval and Repair Compared with Procurement of Follow-on Satellite	S.Rept. 98-108, p.27 NASA Authn FY 1984
NASA	Report on National Policy Regarding Future of the Shuttle System and of Commercial Expendable Launch Vehicles	H.Rept. 98-223, p.35 HUD Appns FY 1984
NASA	Report on Formal Response by NASA to the NASA Advisory Council's Study of the Mission of NASA	H.Rept. 98-629, p.18 NASA Authn FY 1985
NASA	Report on Costs and Technical Aspects of Development of an Extended Duration Orbiter	H.Rept. 98-629, p.19 NASA Authn FY 1985
NASA	Report on NASA Space Station Development Management Plan and Procurement Strategies	H.Rept. 98-629, p.19 NASA Authn FY 1985
NASA	Keep Committee Informed of NASA's Progress in Maintaining A-equate Spares and Logistics for the Space Shuttle	H.Rept. 98-629, p.20 NASA Authn FY 1985
NASA	Preliminary Timetable for the "Fencing" of all Space Shuttle Budgets, Facilities and Personnel	H.Rept. 98-629, p.20 NASA Authn FY 1985
NASA	Report on Selection Criteria for When to Use Available Space Mission Platforms, i.e. Space Lab, Shuttle, Freeflyer	H.Rept. 98-629, p.21 NASA Authn FY 1985
NASA	Study of Government Purchased of Commercial Launch Services and Long Range Implications for the Space Shuttle Program	H.Rept. 98-629, p.21 NASA Authn FY 1985

NASA	Keep Committee Well Informed About New Developments in the Space Station Program	S.Rept. 98-455, p.14 NASA Authn FY 1985
NASA	Assessment of NASA's Evaluation of Decision on Building a Fifth Shuttle Orbiter and Ramifications of Not Proceeding	S.Rept. 98-455, p.51 NASA Authn FY 1985
NASA	Report on Reassessment of NASA's Views of a 12-14 Day On-Orbit Stay Capability for the Space Shuttle	H.Rept. 99-32, p.18 NASA Authn FY 1986
NASA	Detailed Plan for Conducting Joint NASA/DOD Study of Space Transportation Need for the Period 1995-2010	H.Rept. 99-32, p.19 NASA Authn FY 1986
NASA	Review of All Potential Missions Under Study or in Development With a View Toward Termination Those Unlikely to Go	H.Rept. 99-32, p.20 NASA Authn FY 1986
NASA	Report on Detailed Plans for the Operation, Maintenance, and Refurbishment of the Space Telescope	H.Rept. 99-32, p.22 NASA Authn FY 1986
NASA	Analytical Review of Space Telescope Development as an Aid to the Management of Future Large Science Programs	H.Rept. 99-32, p.22 NASA Authn FY 1986
NASA	Report on Space Telescope Science Institute's Impact on the Telescope Development to Aid Future Space Science Activities	H.Rept. 99-32, p.22 NASA Authn FY 1986
NASA	Report on the Early Post-Launch Operations of the Space Telescope Science Institute	H.Rept. 99-32, p.22 NASA Authn FY 1986
NASA	Report on Option for Replacement of ATS-1 Communications Satellite for the Pacific Basin	S.Rept. 99-91, p.37
NASA	Report on Opportunities for Supporting Private Initiatives on Projects Such as Shuttle Enhancement and Space Station	S.Rept. 99-129, p.66 HUD Appns FY 1986

Aeronautics Programs

NASA	White Paper Detailing Potential Program Options, costs and schedules to Meet National Needs for Increased Productivity in Air Transportation	H.Rept. 96-52, p.13 NASA Authn FY 1980

Programs in Other Fields

NSF	List of Projects and Programs Which the Foundation Plans to Discontinue in 1980	S.Rept. 96-258, p.68 HUD Appns FY 1980
NSF	Provide Preliminary Plans for Applications - Directed Research Program	H.Rept. 96-999, p.28 NSF Authn FY 1981

NSF	Detailed, Interim Progress Reports in FY 1981 on Planning for Deep Sea Drilling includes Possible Use of Glomar Explorer	S.Rept. 96-926, p.78 HUD Appns FY 1981

Mandated by Public Law

NASA	Study to Define Current and Future Needs of the Government for Land Remote Sensing Data including Role of Private Sector Parallel	P.L. 97-324 Sec 201 NASA Authn FY 1983
NASA/Priv Sect	Two Studies Outside Government to Independently Assess Alternatives for Meeting Demand for Land Remote Sensing Data	P.L. 97-324 Sec 201 NASA Authn FY 1983
NASA	Any Proposed Policy or Decision to Commercialize Expendable Launch Vehicle Technologies Shall be Presented to the Committees for Review	P.L. 88-52 Sec 110 NASA Authn FY 1984
NASA	National Commission on Space Report on Long Range Plan for U.S. Civilian Space Activity	P.L. 98-361 Title II NASA Authn FY 1985
NASA	Study of an Option to Phase-In the Permanently Manned Features of the Space Station	P.L. 98-371 HUD Appns FY 1985

Table 27-34

One Time Reports on Research Utilization and Technology Transfer

Mandated by Legislative Report Language

NASA	Report on Suggested Approaches for an Operational System for the Use of Landsat Data	S.Rept. 94-718, p.18 NASAAuthn FY 1977
NASA	Evaluation of Strategies and Programs to Strengthen User Oriented Programs at all Levels	H.Rept. 95-973, p.17 NASA Authn FY 1979
OSTP	Report on Plan for Moving from Experimental Remote Sensing Satellites to an Operational Sys.	S.Rept. 95-799, p.32 NASA Authn FY 1979
OSTP	Complete OSTP Study of Methods to Broaden and Integrate Technology Transfer & Applications Activities	S.Rept. 95-799, p.34 NASA Authn FY 1979
NASA	Report on Strategies and Programs Necessary to Strengthen User Oriented Programs	H.Rept. 96-52, p.12 NASA Authn FY 1980
NASA	Report on Progress in Implementing Committee's Recommendations on Technology Utilization	H.Rept. 96-899, p.18 NASA Authn FY 1981

NASA	Review of Areas Ripe for Technology Transfer to Private Sector, Mechanisms for Transfer, and Progress Made	H.Rept. 97-32, p.13 NASA Authn FY 1982
NASA	Review of Activities & Institutional Arrangements for Technology Utilization and Potential Role of Private Sector	H.Rept. 97-32, p.13 NASA Authn FY 1982
NASA	Review of Activities & Institutional Arrangements for Technology Utilization and Potential Role of Private Sector	S.Rept. 97-100, p.34 NASA Authn FY 1982
NASA	Report on Short and Long Terms Plans to Establish Private Sector Space Shuttle Payload Marketing Activity	H.Rept. 98-65, p.17 NASA Authn FY 1984
NSF/NBS	Report on Mechanisms for Dissemination of Research Results in Computer Science	H.Rept. 98-642, p.19 NSF Authn FY 1985

Mandated by Public Law

None

Table 27-35

One Time Reports on Science Advisory Committees

Mandated by Legislative Report Language

NASA	Reports on Steps Taken to Make NASA Advisory Committees Available to Congressional Committee	H.Rept. 97-32, p.23 NASA Authn FY 1982

Mandated by Public Law

NASA	Report by Advanced Technology Committee Identifying Space Station Systems Which Advance Automation and Robotics	P.L. 98-371 HUD Appns FY 1985

Table 27-36

Reports on Research and Development Facilities

Mandated by Legislative Report Language

NASA	Report on Review of Computerized Utility Control Systems at NASA Field Centers to Reduce Energy Consumption	H.Rept. 94-897, p.17 NASA Authn FY 1977
NASA	Report on Study of Cost Reduction for a Second Launch Pad at Kennedy Space Center	H.Rept. 95-67, p.21 NASA Authn FY 1978

NSF	Operating Plan for Providing Research Equipment and Instrumentation, including 2 and 4 year colleges	S.Rept. 95-851, p.25 NSF Authn FY 1979
NASA	Study of Global Information System for Earth Resources, Environmental and Meteorological Remote Sensing Data	S.Rept. 95-799, p.32 NASA Authn FY 1979
NASA	Report on Reevaluation of Leasing and Financing of Tracking and Data Relay Satellite System	H.Rept. 96-52, p.14 NASA Authn FY 1980
NASA	Keep Committee Informed of Events Concerning NASA's Occupancy Rights at Ellington Air Force Base	H.Rept. 96-52, p.15 NASA Authn FY 1980
NSF	Report on Design and Implementation of Research Equipment & Facilities Programs include Selection Criteria	H.Rept. 97-34, p.13 NSF Authn FY 1982
NSF	Issue Soon and Frequently Reports Resulting from NSF's Status of University Research Instrumentation	H.Rept. 98-73, p.13 NSF Authn FY 1984
NSF	Keep Committee Appraised of Progress of Studies for Radio Astronomy Telescope and New Technology Telescope and Costs	H.Rept. 98-73, p.16 NSF Authn FY 1984
NSF	Report Defining National Needs for Access to Scientific Computers and Networks, Software Research, and Institutions	H.Rept. 98-73, p.22 NSF Authn FY 1984
NSF	Progress Reports on Supports for Computer Hardware and Software for Large Scale Computing	H.Rept. 98-73, p.23 NSF Authn FY 1984
NSF	5-Year Funding Plan for University Supercomputer Operation and Use	S.Rept. 98-195, p.9 NSF Authn FY 1984
NASA	Comprehensive Manufacturing Plan for Solid Rocket Booster Refurbishment Activities	H.Rept. 98-65, p.18 NASA Authn FY 1984
NASA	Report Describing Steps Taken to Avoid Future Structural Facility Failures, includes Management Changes	H.Rept. 98-65, p.22 NASA Authn FY 1984
NSF	Notify Committee of Distribution of Supercomputer Funds Among NSF Directorates and Their Use	S.Rept. 98-412, p.8 NSF Authn FY 85
NASA	Keep Committee Informed of Plans and Efforts to Upgrade University Laboratory Research Equipment	S.Rept. 99-91, p.20 NASA Authn FY 1986
NASA	Report on Computer Aided Design, Engineering, and Manufacturing to Reduce Costs in Space Station Program	S.Rept. 99-129, p.65 HUD Appns FY 1986

Mandated by Public Law

NSF	Report Indices, Correlates and Other Measures or Indicators of the Status and Need for Scientific Instrumentation	P.L. 96-44 NSF Authn FY 1980
NSF	Report in Research Facilities Needs of Universities	P.L. 96-44 NSF Authn FY 1986

Table 27-37

Reports on National Manpower and Education in Science and Technology

Mandated by Legislative Report Language

NSF	Report on Alternative Policy Options and Evaluations for the Support of Young Scientists and Engineers	S.Rept. 96-106, p.23 NSF Authn FY 1980
NSF	List of Undergraduate Faculty Members Participating in the Faculty Development Programs	H.Rept. 96-999, p.15 NSF Authn FY 1981
NSF/Educ	A Joint Science Education Program Plan Developed with the Secretary of Education	H.Rept. 96-999, p.37 NSF Authn FY 1981
NSF	Report by the National Science Board on How and Where NSF is Supporting the Best Science Education, and Action to Break Down Barriers Between Basic Research and Science Education	H.Rept. 96-999, p.38 NSF Authn FY 1981
NSF	Final Program Reorganization Plan for the Science and Engineering Education Directorate	H.Rept. 97-34, p.9 NSF Authn FY 1982
NSF	Report and Plan of Implementation for a New, Comprehensive Science Education Program	H.Rept. 97-485, p.5 NSF Authn FY 1983
NSF	Report on Plan of Implementation for a New, Comprehensive Science Education Program at All Levels	S.Rept. 97-457, p.10 NSF Authn FY 1983
NASA	Plan for Building Closer Relationship with Educational Institutions serving significant number of Minority Students	H.Rept. 98-629, p.34 NASA Authn FY 1985
NASA	Plan for Building Closer Relationships with Universities Serving Significant Numbers of Minorities	H.Rept. 98-803, p.37 HUD Appns FY 1985
NSF	Request for Science Education Programs that is at Least 8.5 percent of NSF Total Budget Request	H.Rept. 98-803, p.40 HUD Appns FY 1985
NASA	Plan for Building Closer Relationships with Universities Serving Significant Numbers of Minorities	S.Rept. 98-506, p.71 HUD Appns FY 1985

NSF/OSTP	Review of Presidential Young Investigators Program include Budgetary Implications of Substantial Growth	S.Rept. 98-506, p.77 HUD Appns FY 1985
NSF	Contract Study of Plan for NSF Science Education Program and Management of Science Education Directorate	S.Rept. 98-506, p.79 HUD Appns FY 1985
NSF	Long Range Plan for the Science and Engineering Directorate of NSF	H.Rept. 99-94, p.9 NSF Authn FY 1986
NSF	Report on Plan and Implementation of a Community College Program	H.Rept. 99-94, p.10 NSF authn FY 1986
NSF	Report on Progress Made in Obtaining Matching Funds from Industry for the Presidential Young Investment Program	H.Rept. 99-94, p.22 NSF Authn FY 1986
NSF	Report on the Success of the 5-year Postdoctoral Research Fellowships in Plant Biology and Environment Biology	H.Rept. 99-94, p.24 NSF Authn FY 1986
NSF	Report on the Needs of Undergraduate Colleges and NSF's Plans for their Support	H.Rept. 99-212, p.49 HUD Appns FY 1986
NSF	Report on Planned Obligations of all Science Education Funds, including month-by-month obligation	H.Rept. 99-212, p.50 HUD Appns FY 1986

<u>Mandated by Public Law</u>

NSF	Program Plan for Continuing Education in Science & Engineering	P.L. 94-471, Sec 6(a) NSF Authn FY 1977
NSF	Report on Activities and Their Evaluation in the Programs Aimed at Minorities, Women and the Handicapped	P.L. 94-471 Sec 7(c)
President/ OSTP/NSF	The President with the Assistance of the Directors of OSTP and NSF Report on the Impact of Science and Technology on Women and Minority	P.L. 96-516 sec 35(b) NSF Authn FY 1981
President/	The President with the Assistance of the Directors of OSTP and NSF Report on National Policy and Program to Promote Equal Opportunities for Women and Minorities in Science and Technology	P.L. 96-516 Sec 35(a)
NSF	Five-Year Strategic Plan for Science and Engineering Education	P.L. 99-159 Sec 201 NSF Authn FY 1986

Table 27-38

Reports on Federal Manpower and Education

Mandated by Legislative Report Language

NASA	Report on In-House Staff Growth, Headquarters and Field Centers Management Structure, and Improvements and Cost Reductions	H.Rept. 94-897, p.18 NASA Authn FY 1977
NASA	Study of Benefits and Trade-offs to Redress Balance Between In-House Aeronautical Research and Use of Contractors	H.Rept. 95-67, p.19 NASA Authn FY 1978
NASA	Report on Recommendations for Improvements in Cost Reporting for NASA's In-House Institutional Management	H.Rept. 95-67, p.21 NASA Authn FY 1978
NASA	Examination of Current Policies for Use of Support Service Contractors and the Reporting of Civil Service Manpower	H.Rept. 95-67, p.22 NASA Authn FY 1978
NASA	Report on NASA Staffing Plans for Aeronautical Research	S.Rept. 95-120, p.27 NASA Authn FY 1978
NASA	Comprehensive Survey of NASA's Student Programs and Future Plans for Student Activities	S.Rept. 95-799, p.59 NASA Authn FY 1979
NSF	Appraise Committee of Steps Being taken to Place Persons with Applied Research Background in NSF Research Directorates	H.Rept. 97-34, p.22 NSF Authn FY 1982
NASA	Report on Available Alternatives for Increasing In-House Aeronautical Research Personnel by 220	H.Rept. 98-65, p.21 NASA Authn FY 1984
NSF	Report on Status of Affirmative Action	H.Rept. 98-642, p.22
NASA	Report on How Reductions of $3 million in Research and Program Management will be Implemented	S.Rept. 99-129, p.70 HUD Appns FY 1986

Mandated by Public Law

NASA	Report on Policy regarding conflict of Interest, Standards of Conduct, and Financial Disclosure and Implementation	P.L. 95-401 Sec 8 NASA Authn FY 1979

Table 27-39

One Time Reports on Procurement Policy
Contracts and Grants Awards

Mandated by Legislative Report Language

NASA	Comparative Data on Leasing vs. Government Ownership of the Tracking and Data Relay Satellite	S.Rept. 94-718, p.25 NASA Authn FY 1977
NSF	Study of Problems and Benefits of Broadening NSF's Research Funding to including Institutions Not Universities	S.Rept. 94-888, p.45 NSF Authn FY 1977
NSF	Report on Appropriate Administrative Actions that can Contribute to Fairness in the Grants-Awards Process	S.Rept. 95-280, p.50 HUD Appns FY 1978
NSF	Keep Committee thoroughly informed about Progress in Broadening Geographical Distribution of Scientific Capability in the U.S.	H.Rept. 95-993, p.8 NSF Authn FY 1979
NASA	Report on Review of the Balance between In-House and University Activities in the Field of Space Applications R&D	H.Rept. 96-52, p.12 NASA Authn FY 1980
NSF	Assemble and Develop Ideas for New Funding and Organization Schemes for Research Support in Preparation for Examination of the Basic Mechanisms of Federal Research Support	H.Rept. 96-61, p.7 NSF Authn FY 1980
NSF	Study of whether Small Grants for Research can be made Effectively and Efficiently	H.Rept. 96-61, p.8 NSF Authn FY 1980
NSF	Status Report on Master Grant Experiment for Post-Grant Administration	S.Rept. 96-106, p.25 NSF Authn FY 1980
NSF	Evaluation of Benefits and Difficulties of Including in Grant Titles a Statement of Purpose	H.Rept. 96-999, p.37 NSF Authn FY 1981
NASA/NSF	Joint NASA/NSF Report on the Process that will be used for the Selection of Principal Investigators on Space Telescope	S.Rept.98-152,p.64,72 HUD Appns FY 1984
NSF	Report on Internal System for Status of Research in Progress and Cost of Participation in NTIS Dissemination System	H.Rept. 98-642, p.21 NSF Authn FY 1985
NASA	Report on NASA Administrator's Decision on Use of Competition for Solid Rocket Booster Production	H.Rept. 99-32, p.18 NASA Authn FY 1986

NASA	Report on Study of the Use of Existing Procurement Authority to Encourage Commercial Space Ventures	H.Rept. 99-32, p.26 NASA Authn FY 1986

Mandated by Public Law

NSF	Feasibility Study of Operating Peer Review System so as to Assure that Identity of Proposed is Not Known to Reviewers	P.L. 94-471 Sec 2(f) NSF Authn FY 1977

Table 27-40

One Time Reports on Financial and Budget Matters

Mandated by Legislative Report Language

NASA	Report on Findings of Reevaluation Reimbursement Policy for Expendable Launch Vehicles	H.Rept. 95-973, p.16 NASA Authn FY 1979
All Agencies	Notify Committee Prior to Reprogramming in Excess of $250,000 or 10 percent whichever is Less	S.Rept. 96-258 HUD Appns FY 1980
NASA	List of Shuttle Items That Can Be Procured Under Existing Authorization and Those Items that Require Reprogramming	H.Rept. 96-899, p.19 NASA Authn FY 1981
NSF	Report by Letter on Feasibility of Full Navy Funding of Antarctic Logistic Services	H.Rept. 97-34, p.22 NSF Authn FY 1982
NASA	Report of Additional Costs of Communications Security for Tracking and Relay Data Satellite to be Borne by DOD	H.Rept. 97-32, p.23 NASA Authn FY 1982
NASA	Report on Policy for Indemnification of Contractors by NASA Against Third Party Liability	H.Rept. 97-32, p.24 NASA Authn FY 1982
NASA/DOD	Report by NASA Jointly with DOD on Ways to Reduce Shuttle Orbiter Production Costs	S.Rept. 97-100, p.10 NASA Authn FY 1982
NASA	Assessment of How the Hearth Study of Cost Overruns is Being Implemented for Gamma Ray Observatory	H.Rept. 97-502, p.20 NASA Authn FY 1983
NASA	Report Within 30 Days of Determining that an Overrun of 15 Percent or More Will Occur and Any Major Project	H.Rept. 97-502, p.20 NASA Authn FY 1983
NASA	Detailed Assessment of Each New Program Start and How the Hearth Study of Cost Overruns is Being	H.Rept. 97-502, p.20 NASA Authn FY 1983 Implemented

NASA	Report on Space Shuttle Orbiter Procurement Costs Is Again Requested	S.Rept. 97-449, p.11 NASA Authn FY 1983
NASA	Report Providing Information on Space Shuttle Operational Costs	H.Rept. 99-32, p.16 NASA Authn FY 1986
NASA	Plan for Achieving Visibility of the Status of Operational Cost Parameters for the Space Station	H.Rept. 99-32, p.16 NASA Authn FY 1986

Mandated by Public Law

NSF	Report on Implementation of Recommendations of President's Private Sector Survey on Cost Control Affecting NSF	P.L. 99-159 Sec 112 NSF Authn FY 1986
NASA	Report on Implementation of Recommendations of President's Private Sector Survey on Cost Control Affecting NASA	P.L. 99-170 Sec 110 NASA Authn FY 1986
NASA	Report on Feasibility of Providing Space Shuttle Launch Services on a Basis of Royalty Recovery	P.L. 99-170 Sec 112 NASA Authn FY 1986
NASA	Study of Proposed Pricing Policy for Services Such as On-Orbit Service, Repair or Recovery of Spacecraft	P.L. 99-170 Sec 113 NASA Authn FY 1986

Table 27-41

One Time Reports on Accounting and Audits

Mandated by Legislative Report Language

NSF	Report on the Results of Post-Research Evaluation Pilot Program	S.Rept. 95-1060, p.54 HUD Appns FY 1979
NSF	Report on the Evaluations and Recommendations Produced by the Office of Audit and Oversight	S.Rept. 95-1060, p.54 HUD Appns FY 1979
NASA	Keep Committee Informed of Administrator's Management Assessment for the Space Transportation System	S.Rept. 97-207, p.9 NASA Authn FY 1980
NSF	Independent, Third Party Report on Methodology for Post-Performance Evaluation of Research	S.Rept. 96-926, p.81 HUD Appns FY 1981
NSF	Report on Implementation of Recommendations from Studies of Post-Performance Evaluation of Research	S.Rept. 97-537, p.68 HUD Appns FY 1983
NSF	Update Report on Implementation of GAO's 4-Year Old Recommendations for Improving Management Information System	H.Rept. 98-642, p.20 NSF Authn FY 1985

NSF	Report on Plan for Evaluation System for Supercomputer Centers	S.Rept. 98-506, p.76 HUD Appns FY 1985
NSF	Report by National Science Board on Actions Taken by the Board to Delegate its Authority	H.Rept. 99-94, p.17 NSF Authn FY 1986

Mandated by Public Law

None

Table 27-42

Other One Time Reports

Mandated by Legislative Reports Language

NSF	Report on Activities of NSF's Western Project Office	S.Rept. 94-888, p.51 NSF Authn FY 1977
NASA	Report on Review by NASA Administrator of Agency's Project Management Practices With an Eye Toward Streamlining	H.Rept. 95-973, p.21 NASA Authn FY 1979
All Agencies	The Committee Wishes to be Informed Regarding Reorganizations of Offices and Programs Prior to Implementation	S.Rept. 96-258, p.5 HUD Appns FY 1980
NASA	Provide Signed Interagency Operations Agreement for National Oceanic Satellite System Before Contracting Development	S.Rept. 96-719, p.25 NASA Authn FY 1981

Mandated by Public Law

NSF	Report on National Science Board Delegations of Authority	P.L. 99-159 Sec 109 NSF Authn FY 1986

Types of One-Time Reports

For the purpose of obtaining an overview of the various types of one-time reports we tabulate in Table 27-43 the number of reports in each category.

Table 27-43

Number of One-Time Reports from NASA and NSF for the Years 1977-1986 by Type of Content

Report Group / Science Reports	No. of Reports	Percentage
Scientific Research	19	
Research and Development	35	
International Science	10	
R&D Facilities	19	
Science Advisory Committees	2	
	85	38%
Program Planning Reports		
Program Planning	45	
Research Utility and Tech. Trf	13	
	58	26%
Science Manpower Reports		
National Manpower and Education	24	
Federal Manpower and Education	11	
	35	16%
Science Administration Reports		
Procurement Policy, C & G	14	
Financial and Budget Matters	17	
Accounting and Auditing	8	
	39	18%
Others	5	2%
Totals	222	100%

In comparison with the types of periodic reports, the one-time reports are used for many of the same purposes. We have already noted, however, the major exception of the Planning Reports which is a category not found among the periodic reports. This type of report accounts for well over one-third, or 38 percent of all the one-time reports. In contrast, the reports on science administration, including those on contracts and grant awards,

finances, and accounting, which account for 33 percent, or one third of the periodic reports, account for less than one-fifth or 18 percent of the one-time reports. This suggests that the one-time reports are better suited to provide information about scientific and technical program content, while the periodic reports are better suited to cover administrative and management questions.

Timeliness of One-Time Reports

Almost all requests by a committee for a one-time report is accompanied by a deadline for its submission to the Congress, specified by a date usually 2-12 months in the future. In a few cases the time for submission of these reports is "before next year's budget authorization hearing," or some comparable event-related deadline. Such deadlines are set in part to give the responsible agency sufficient time to prepare the report, and in part to meet the committees own schedule of oversight hearings, field visits, and other activities. The deadlines are frequently arrived at in discussions with the agency.

However, the record of timely submission of the one-time reports is deplorably poor. While little in the way of formal tracking or record keeping exists for the one-time reports, we have made our own estimate based on a survey of those reports commented on in later legislative reports as having not been submitted more than one year after they were requested, and on an informal survey of committee staff personnel.

Legislative Report Statements About Timeliness. The concern and unhappiness of the Committees when these reports are not submitted on time or in some cases not at all is reflected in the legislative reports submitted in the following years. The expressions of unhappiness vary a good deal from the mildest

observations about noncompliance to quite severe restrictive actions. In the former category, a report on the NASA authorization noted:

> "In the FY 1979 authorization report the Committee noted a reduction in the funds to support technology transfer and applications programs. The Committee recommended that NASA evaluate what strategies and programs are necessary to strengthen user oriented programs at all levels and advise prior to FY 1980 annual authorization. NASA has yet to communicate with the Committee in this regard."

Another report, this one dealing with the authorization for the NSF, noted:

> "The Committee reiterates its expectation expressed in the FY 1985 Committee report (H.Rept. 98-642) that the Foundation prepare and implement a plan for the development of a community college program."

In slightly stronger tones, some legislative reports will specifically repeat the request for the missing report. A NASA authorization report stated: "The Committee ... looked forward to receiving NASA's long range program plan in the fiscal year 1978 authorization request. Since such a plan has not been presented, the Committee requests that NASA provide to the Committee at the earliest practicable date a follow-on plan for SEASAT." Similarly, a House Appropriations report stated: "Last year the Committee requested a

report by September 30, 1984 detailing the planned obligations of all science education funds in 1985. That detailed report was not forthcoming - and the Committee expects to receive detailed projections on month-by-month obligation rates for Fiscal Year 1986 by September 30, 1985."

More direct expressions of unhappiness are also found. In a Senate authorization report on the NASA authorization we find: "The Committee is distressed that the report requested last year on orbiter procurement costs has not been received. It should be submitted to Congress by August 1, 1982." A House report on NASA's authorization observed: "The Committee has reviewed NASA's response to the request of last year for a program plan leading to technology readiness for an advanced supersonic transport and has found it unacceptable and unresponsive. Therefore the Committee requests that NASA redo the plan in accordance with the specifics contained in the report on the FY 1978 NASA authorization bill."

Finally, in occasional instances, the Appropriations Committee finds it necessary to invoke specific inducements to assure that the needed reports will be forthcoming. In 1984 the House Appropriations Committee noted: "The Committee has included language making available the $15,000,000 requested for initiation of the new Very Long Baseline Array radio telescope. However, the language does not permit the obligation of these funds until the Foundation submits a fiscal year 1986 request for science education programs that is at least 8.5 percent of the total budget request submitted for the NSF." Six years earlier the same Committee observed: "The Committee has deleted $6,750,000 from the revised request as a result of NASA's failure to conform to reprogramming requirements established by this Committee in the purchase of a reconnaissance aircraft."

As a final recourse, or when a study request is to receive particular emphasis as to importance and/or timeliness, it is mandated by law, as are most of the periodic reports. When this approach is used, a separate section of the Act prescribes the agency or individual, "the Administrator" or "the Director", responsible for preparing and submitting the report and outlines the desired content, and, in most cases, the due date.

Estimate of Number of One-Time Reports Submitted Late. We identified 13 such expressions of concern or unhappiness in the legislative reports for the 10-year period which we reviewed, 5 about reports from NSF and 8 about reports from NASA. Ten were in authorization reports, and 3 in appropriations reports. In the same period, as we noted above, 221 reports were requested in the same legislative reports or the associated laws, so that at least 6 percent of all the reports requested from these two agencies, were not submitted within a year. Because the statements of concern and unhappiness which reach the level of formal expression in next year's legislative reports is only a small fraction of all the reports which are submitted late, we estimate, based on interviews with the staff of our own Committee, that at least eight times as many, or about 50 percent of such one time reports are submitted after the requested due date.

This is an unacceptably high degree of unresponsiveness from agencies of the Executive Branch to requests for information by the legislative branch.

Manner of Requesting One-Time Reports.

There have occasionally been cases when an agency official took the position that only reports mandated in law were binding on the agency, and that reports mandated by report language did not carry the same obligatory sense to produce a report. Conversely, when the

number of reports mandated in a given statute grew beyond two or three, complaints have often been heard from officers of the Executive Branch, notably including the Office of Management and Budget and its predecessor organizations, to the effect that the laws of the land were being "cluttered up" with report requests that did not properly belong in the nation's statutes.

We take the view that both options constitute reasonable ways to direct an agency of the executive branch to conduct studies and submit them to the Congress and one or more of its committees. The option of placing all such report requests in the statutes enacted is always available to the Congress. But we conclude that the present balance between requesting major reports by means of legislative enactment, and requesting the bulk of the studies, that is those with more limited range, shorter term, and smaller size, by means of the legislative report route is sound. Furthermore, as we have noted in the introduction to this chapter, requests for studies, information and other data is also made in the hearing process, through letters from Committee Chairpersons and individual Members, and through verbal requests. This range of methods for asking for information and reports provides a degree of flexibility which neither the Congress nor, we believe, the Executive Branch will want to abandon, and we recommend that it be preserved and continued.

"Fully and Currently Informed" Doctrine

In cases where the Congress has concluded that an area of government activity involves rapidly changing circumstances in an area of major importance to the nation, it has imposed especially strong information production requirements on the agency responsible. The most often used device to obtain such frequent and in-depth information and reports is the "fully and currently informed"

doctrine. It has been imposed by including in law a provision requiring the agency in question to keep the Congress or specific committees of the Congress "fully and currently informed" about the agencies activities.

In the post-World War II period, the most significant example of the use of this approach came in the field of atomic energy, an area of science and technology which in the late forties and fifties was advancing rapidly and which was considered, in the wake of the explosion of the atomic bomb, to be of major importance in the areas of military and foreign policy. Under the original Atomic Energy Act of 1946, which established both the Atomic Energy Commission and the Joint Committee on Atomic Energy, it was provided that "The Commission shall keep the Joint Committee fully and currently informed with respect to the Commission's activities."

Although the flow of information from the AEC to the Joint Committee did not give rise to complaints in the early years, by the time the Commission's organic act was up for review in 1954 a need had developed to make it clear that no limitations were intended, and the word "all" was added so that the provision read: "The Commission shall keep the Joint Committee fully and currently informed with respect to all of the Commission's activities." The legislative report added that "It is the intent ... that the Joint Committee be informed while matters are pending rather than after action has been taken."

In spite of this clarification of the law, its interpretation in practice remained to be worked out. The Joint Committee, during the period of the chairmanship of Senator Hickenlooper, took the view that all aspects of the atomic energy program were of importance to its functions of writing legislation and conducting oversight, and asked for and obtained access to such information as FBI

investigative files on personnel, intelligence reports and sources, records of Commission meetings, plans for the provision of classified nuclear submarine technology to Britain, and advance review of press releases by the Commission and policy speeches by the Commissioners and by Commission officials.

On other hand, such activities as contracts for the procurement of office supplies were not of interest to the Joint Committee, and the increased flow of information to the Congressional committee after 1954 led a later Joint Committee chairman to complain about the AEC chairman that "his technique was to deluge the Committee with considerable numbers of individual letters and reports while on key questions he would hold out important information."

The disputes over the production of information under the "fully and currently informed" clause was said to be a factor in the Senate's failure to confirm former AEC Chairman Lewis Strauss when he was nominated by President Eisenhower to be Secretary of Commerce. Subsequent Commissioners, including the Nobel Laureate Glenn Seaborg and Dr. Leland Haworth, who later served as the second Director of the National Science Foundation, pledged that they would keep the Joint Committee informed about matters that were pending rather than after action had taken place.

The "fully and currently informed" provision was kept in place when, in 1974, the Atomic Energy Commission was abolished and the Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC) were established. Later when the Department of Energy was formed and when the Joint Committee on Atomic Energy was abolished by an Act of Congress the clause was maintained, although, the "all" was removed. The current clause reads as follows:

> The Secretary of Energy and the Regulatory Commission shall keep the committees of the Senate and the House of Representatives which, under the rules of the Senate and the House have jurisdiction of the functions of the

Secretary or the Commission, fully and currently informed with respect to the activities of the Secretary and the Commission (42 U.S.C. 2259(a)).

In recent years the clause has only occasionally been explicitly applied. In a few instances certain items of specific information which originally were provided to the Joint Committee under the clause continue to be routinely supplied to the committees now having jurisdiction. An example is the annual submission of the so-called "Holafield Tables" showing the detailed history of the Department of Energy's annual budget request leading up to the final budget request numbers. But such information has also been provided to the committees from agencies not subject to a "fully and currently informed" clause.

The general question arises as to whether it would be desirable for the Congress to adopt similar clauses for one or more of the other science agencies of the Executive Branch. We are aware, for example, that in the early seventies, our own committee adopted the inclusion of a "fully and currently informed" clause in the organic act of the National Science Foundation, but it was not agreed to in conference with the Senate.

For the future we conclude that a blanket inclusion of this clause in the organic acts of the NSF, NASA, NIST, EPA, NOAA and possibly other science agencies does not appear to be needed at this time. These science agencies have generally been cooperative with the committees of jurisdiction in providing the information requested. The main problem in most cases has been, as we note elsewhere in this chapter, with the timeliness in obtaining the required information.

Should there, however, be a notable change in the urgency of having detailed and current information available or in the willingness of one or more of these agencies to provide needed information, we recommend that the use of a "fully and currently informed" clause be considered.

It is worth recalling that the imposition of such a clause should only be undertaken in a situation where a committee is prepared to devote substantial time and effort to the detailed oversight of an agency's policies, programs and activities. It can lead to the supply to a committee of much more information than it can usefully digest and it can lead to protracted confrontation between a committee and an agency about such questions as advance notification of policy deliberations. Such a deeper involvement in an agencies operational affairs may be warranted only in those areas of government science policy, such as atomic energy in the immediate post war period, where the closest Congressional supervision is necessary. We note, for example in comparison, that the only instance in recent years where the "fully and currently informed" doctrine has been instituted and vigorously employed by the Congress is in the relationship between the intelligence committees and the intelligence agencies.

Conclusions and Recommendations Concerning One-Time Reports

We noted in our earlier discussion of the periodic reports that there is a seemingly unavoidable tendency for them to become routinized, to be prepared on ever lower levels in the organization, and therefore to loose the attention of policy-level officials in both the agencies and in the Congress. As a result, their content tends to become bland and not addressed to contentious but current policy issues.

In contrast, we have observed, the one-time report tends, both in the stages of preparation within an agency and in the stages of analysis and reaction following receipt by the Congress, to be focused on current policy or program questions, and therefore to have the attention of policy level officials in the authorizing agency and in the recipient Congressional Committee. It would be tempting,

therefore to suggest that our recommendation for a reduction of the number of periodic reports be accompanied by a recommendation for increased reliance on one-time reports to meet Congressional report needs.

We are, however, well aware of the demands which Congressional report requests can impose on an agency. We do not believe that it makes sense to impose so many report requests on an agency that they become an encumbrance for the agency head and his or her senior managers that distracts them from their primary duty or managing the agency. We are also conscious of the limits, in most cases, on our own committees and subcommittees and their Members to deal effectively with an excessive number of such reports in addition to their many other tasks.

We therefore recommend that one-time reports continue to be used for the several purposes for which they have proved helpful and useful to the Congress in the past. But we also recommend that restraint be exercised by the committees of the Congress in the number of one-time reports that are requested from an agency each year. We note that, in the case of our own committee, NASA was asked, for the 5-year period 1977-1981, for an average of 6 reports each year. For the following 5-year period, 1982-1986, however, the annual average rose to 11, and peaked in 1985 at 16 reports. This compares with comparable Senate authorizing committee annual averages of 3 for the first 5-year period, and 4 for the next 5 years. For the National Science Foundation the House and Senate authorizing committees averaged for the two 5-year periods 1, 2, 1, and 1 report per year.

We recommend that the optimum number of one-time reports be 5 per year per agency, and that the total in any given year not exceed 8. At the same time we recognize that these suggested limits may have to be exceeded in extenuating circumstances such as, for example, in the case of NASA during the period following the Space Shuttle failure.

The problem of delinquent report submissions must, we believe, be worked on by both the agencies and the Congressional committees. In the Congress we recommend that, at the time a legislative report is issued or a bill becomes law, the interested committees direct a letter to the head of the agencies listing the reports that are being mandated and their due dates. Alternatively, the legislative report could include, as an appendix, a list of the reporting requirements contained in the report and their due dates with a cross reference to the place in the report where the needed content is described in more detail. Either or both of these approaches would help to provide an overview of the new report requirements for that year, an overview that is now absent because most reporting requirements are typically "buried" in the often lengthy text of the legislative report.

In the agencies there is a corresponding need to maintain some form of overview of all the Congressional reporting requirements and to insure that their preparation is going forward in a manner that will insure their timely submission. It is especially important for the agencies to appreciate that the dates established for these reports are not arbitrary, and that once one or more reports become delinquent, it has effects on the Congressional work schedule and therefore on the attention that can be given to all the reports as they are received.

THE NATIONAL SCIENCE POLICY REPORTS

We address now the small number of specialized reports which the Congress has sought to establish for the purpose of obtaining information on broad, long-term science policy questions from the executive departments, the difficulties that have been encountered, and the importance we attach to them. We noted in the introduction to this chapter that, in additional to the several hundred

Congressional reports on quite specific science topics, there is a much smaller group of five reports oriented toward broad, overarching science policy issues. We address below the purposes, history, and current status of those reports.

Our discussion of these science policy reports is comprehensive and quite detailed in order to emphasize our interest in and concern about the maintenance and continuation of these policy-oriented reports and their purpose in helping the Congress, in close collaboration with the Executive branch, to chart the nation's overall science policy. This is a function which we have long believed must be considered separately from the oversight function of existing science programs which the previous groups of reports are intended to serve.

The Existing Science Policy Report Structure

The five reports series listed in Table 27-44 constitute that group of reports which, at the time of our Science Policy Study, are by law required to be submitted from the President to the Congress.

Table 27-44

National Science Policy Report Series

Title	Year Begun
Aeronautics and Space Report	1958
Reports of the National Science Board	1968
Science and Technology Indicators	1974
Science and Technology Report and Outlook	1976
Science, Technology and American Diplomacy	1980

As now constituted these reports are intended to provide an overview of the nation's science and technology activities and the significant policy issues in this field on both the national and international scene. They constitute what we over the years

have come to term the "Science Policy Reporting Structure." Our view is that the five reports dealing with national science policy issues, and possible changes affecting them, should be reviewed together, because they constitute important parts of an integrated whole.

Evolution of the Science Policy Reporting Structure

These reports have over the last several decades been the subject of a series of changes as to their organizational authorship, their content, and even their continued existence. Those changes reflect the difficulty and the occasional reluctance on the part of the several Executive Branch agencies required to prepare and submit them, and the continued interest on the part of the Congress to have the Executive Branch engage in broad policy discussions and in longer-term planning with respect to Federal support of science.

The Hoover Commission. The search for a way to obtain a broad, long-term overview of the Federal research programs had its origin in the first Hoover Commission. In the area of research and development, the Commission noted that "in 1947, total Federal expenditures, excluding atomic energy"(a sensitive topic at the time) amounted to $626 million. It found that "a satisfactorily coordinated research program for the National Government has not yet been realized." And it called for the continuing examination of the total scientific research effort of the nation, the assessment of the proper role of the Federal Government in this effort, and the evaluation of the division of research effort among the scientific disciplines and among fields of applied research. The Commission specifically noted that, "there is need for an organization to facilitate the development of research policy for the Federal Government as a whole."

NSF's Science Policy Role. With the passage of the Act establishing the National Science Foundation in 1950, that function was lodged in the new agency. The Foundation was "authorized and directed to develop and encourage the pursuit of a national policy for the promotion of basic research and education in the sciences" and "to evaluate scientific research programs undertaken by agencies of the Federal government, and to correlate the Foundation's scientific research programs with those undertaken by individuals and by public and private research groups." Those efforts were, initially, reflected and reported on in the NSF Annual Reports.

During the first 19 years of its existence, covering the years 1950-1968, a single annual report was required from the National Science Foundation. Under the original statutory mandate that report was to summarize the activities of the Foundation and make such recommendations as it may deem appropriate. Furthermore, "such report shall include ... minority views and recommendations if any, of members of the Board".

In his message transmitting the first of these annual reports to the Congress, President Truman forcefully stated the policy function of the NSF:

> The Foundation is much more than a new executive agency added to those already in existence with a research mission. It was conceived as a much-needed keystone in the structure of the national research program. Its principal task is to appraise the rapid growth of research activity, both public and private, and to recommend the broad goals toward which this massive effort should be channeled. In addition, the Foundation will support those areas of

> basic research and scientific training where the needs are most acute ... As long as the Federal Government continues to be the largest factor in the national research effort, it must frankly face the responsibility to insure that this effort is conceived and executed soundly and effectively.

NSB Chairman's Statement. In meeting that objective the early NSF annual reports contained both an introductory statement by the Science Board Chairman, and, as well, a chapter devoted to National Science Policy. The broad view of the Foundation's major functions was, for example, noted by the second Board Chairman, Chester I. Barnard, in his statement in the third annual report. After observing that the Foundation's research grants program would benefit from the removal by the Congress of the statutory limit of $15 million on the NSF's annual budget, a provision that had been included in the original organic Act, Barnard went on to state:

> "Except for certain specified operating functions, the Foundation is essentially an authoritative advisory body, potentially capable of securing factual knowledge and advisory opinion, that makes it authentic but not determinative. Whom does it advise? Obviously, the President and the Congress; but also, through publication and consultation, other agencies and institutions, public and private, and individuals."

But the first seeds of doubt as to NSF's ability to perform President Truman's ambitious mandate was also noted by Bernard when he added that "... the Foundation can neither police nor direct activities of other agencies, of academic institutions, of industrial research, nor of individual scientists."

The practice of including a statement by the Board Chairman in the NSF annual report was not to last, however. The last report to contain such a statement by the Board Chairman, in this case, Dr. Detlev W. Bronk, who also was President of the National Academy of Sciences, was the 9th annual report for 1959.

Science Policy Chapter in NSF Annual Report. Beginning in 1952 and for next 9 years, the lead chapter in the NSF Annual Report was devoted to science policy. Entitled variously "Science and Public Policy" (1953), "National Science Policy" (1954), "Studies and Reports Relating to National Science Policies" (1957), and "Stimulating the National Research Effort" (1960), these chapters dealt with a wide variety if issues. For example, the chapters for 1954 and 1955 included careful policy statements on the subject of "Loyalty and Security Considerations in Making Grants for Nonclassified Scientific Research"; the chapter for 1956 included, a year-and-a-half before the Soviet Sputnik, a section on "Science and Scientific Manpower in the U.S.S.R." and a section on "Federal Policy on the Conduct and Support of R&D in Synthetic Rubber"; and the chapter for 1957 had a section on "High Energy Nuclear Research in the United States", and a discussion of the Congressional proposal to establish by law a Geophysical Institute in Hawaii.

The NSF also initiated a detailed statistical review of the existing national patterns of research and development focused specifically on the level of Federal research funding in the government agencies and the distribution of scientific manpower. The purpose was to determine where strengths and shortages in these areas existed and thus enable the Foundation to base its studies and recommendations on a stronger base of factual information.

These chapters provided a useful vehicle for raising these and similar policy issues, although it must be noted that only rarely did the Board or the NSF take a position or make recommendations on their own.

The NSB Science Policy Reports. In the 1967-1968 overhaul by the Congress of the Foundation's organic Act, responsibility for the NSF annual report was transferred from being the joint responsibility of the Board and the NSF to be the sole responsibility of the Director of NSF. In its stead, the Board, on its own recommendation, was given responsibility for a new report on the status and health of science. This new reporting requirement was put in place after a lapse of 8 years from the appearance of the last science policy chapter in the joint annual report. The specific, statutory mandate for the new Board report was as follows:

> The Board shall render an annual report to the President, for submission on or before the 31st day of January of each year to the Congress, on the status and health of science and its various disciplines. Such report shall include an assessment of such matters as national scientific resources of trained manpower, progress in selected areas of basis scientific research, and an indication of those aspects of such progress which might be applied to the needs of American society. The report may include such recommendations as the Board may deem timely and appropriate.

In its legislative report accompanying the bill the Congressional Committee stressed, however, that "there is no intent here to pin a time-consuming, repetitive task on either the Board or the Foundation staff. The Committee would not

expect a complete evaluation and report each year on every discipline or every phase of technology or scientific education. The committee would expect the Board to be selective, to report on areas and developments which appear to it most significant and most timely, for example, where achievement has occurred, or where the gaps and needs exist."

The legislative report then stated the Congressional intent as it affected the new report: "The Committee conceives of a report to the Nation somewhat similar to the President's Annual Economic Report. A similar report on Science and Technology, the Committee believes, could be highly useful to Congress and beneficial to the Nation and to the scientific community." While adding this new report to the Board's functions, the Board was also given, for the first time, statutory authority to appoint up to 5 staff members to provide administrative support, including support with the preparation of its new report.

This National Science Board Report was for many years the sole report series which provided in-depth coverage of broad science policy issues to the Congress, the scientific community and the public. Begun with the reorganization of the NSF in 1968, the reports were submitted every succeeding year to the Congress. Following the Congressional suggestion, each dealt with a topic selected by the Science Board for its current and future importance. To monitor the development of each report the Board customarily appointed a Board subcommittee which supervised the preparation of each report. The reports were developed by the staff of the NSF, sometimes with help in such areas as data collection and survey performance from private sector contractors.

Table 27-45

Year	Report Number	Title	No. of Pages
1969	1st	Toward A Public Policy For Graduate Education in the Sciences (2 vols.)	231
1970	2nd	The Physical Sciences	62
1971	3rd	Environmental Science-Challenge for the Seventies	50
1972	4th	The Role of Engineers and Scientists in a National Policy for Technology	48
1973	5th	Science Indicators	145
1974	6th	Science and the Challenge Ahead	56
1975	7th	Science Indicators 1974	242
1976	8th	Science at the Bicentennial A Report from the Research Community	154
1977	9th	Science Indicators 1976	304
1978	10th	Basic Research in the Mission Agencies-Agency Perspective on the Conduct and Support of Basic Research	405
1979	11th	Science Indicators 1978	263
1981	12th	Only One Science	216
1981	13th	Science Indicators 1980	368
1982	14th	University Industry Research Relationships	33

The reports developed by the National Science Board and submitted to the President and the Congress are shown in Table 27-45, which covers the 13-year period during which these reports were required (1969-1982). Apart from the Science Indicators reports which began with the 5th report in 1973 and which are discussed separately below, they covered nine distinct topics. Two, the 2nd in 1970 and the 3rd in 1971, dealt with

scientific disciplines, respectively the physical sciences and environmental science. Two others, the 1st in 1969 and the 4th in 1972, presented analyses of education and manpower issues. Two of the later reports dealt with the organizational and administrative aspect of American science, the 10th in 1978 with basic research in the mission agencies, and the 14th in 1982 with university-industry research relationships.

The three remaining Board reports took up unique, quite diverse topics. "Science and the Challenges Ahead" was the title of the 6th report issued in 1974. In that report a number of important issues facing the nation and the world were identified. They included such problems as health, population, minerals, and the environment, and two in-depth studies in the areas of cancer and energy research. The need for additional research in all of these areas was emphasized. The selection of the topic of the eighth report in 1976 was influenced by the approach of the bicentennial of the American revolution. The report consisted of an extensive survey of 900 research administrators in universities, government, and industry. It was aimed at identifying the critical problems that appeared to be developing and that would have to be addressed in the third century of the republic if American science was to retain its vitality. The 12th report in 1981 omitted all policy and budget recommendations, and provided instead 6 case histories of the search for and application of scientific knowledge. Entitled, "Only One Science" this quite different approach was aimed at showing how the legislative mandate of "appraising the impact of research upon industrial development and upon the general welfare" could be met.

Discontinuation of the NSB Annual Reports. In 1982, following the submission of its 14th annual report, the Board asked the Congress to relieve it if the requirement that the reports be compiled and submitted on an annual basis. The reason was several fold: the preparation of the reports was becoming more time- and effort-consuming, the identification of important topics to be covered by the reports was becoming more difficult, and there was a concern that the usefulness and impact of the reports was not comparable to the effort involved in their preparation. Instead the Board recommended that its policy reports be submitted as needed. As worked out with the Congress, the present statutory language provides that "The Board shall render to the President for submission to the Congress reports on specific, individual policy matters related to science and engineering and education in science and engineering, as the Board, the President, or the Congress determines the need for such reports".

Since the requirement for Board reports on an annual basis was removed the Board has, at its own initiative, issued two reports. In 1986 it issued the Report "Undergraduate Science, Mathematics and Engineering Education" (known also as the "Neal Report"). In 1987 the Board issued a report on "The Role of the National Science Foundation in the Polar Regions" (known also as the "Colwell Report"). The latter report, although focused on the functions of the NSF as the lead agency for polar research, also considered the research activities of other federal agencies. Neither of these two reports are in a formal sense Board Reports to the President and the Congress, but rather they are reports by Board committees to the full Board. Board reports prepared at the request of the President or the Congress have not to date been initiated.

The Science Indicators Report

The Science Indicators report originated as a biannual report by the National Science Board. In 1972, as the Board was debating the topic for the 5th report, it was suggested by a member of the Board, Dr. Roger Heyns, that it might be useful to develop a report which, on the basis of various statistical series regarding science funding, manpower and other topics, would provide an over-all statistical picture of the health of American science. The first five Science Indicators reports were, as shown in Table 27-23, actually issued and submitted as part of the National Science Board report series.

With the passage of the "Congressional Reports Elimination Act of 1982" the Congress elected to make the Science Indicators report a statutorily required report. Under the Act, which is now in effect, it is provided that "The Board shall render to the President for submission to the 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."

The Science Indicators Reports have generated an extraordinary amount of interest, both here and abroad. The Congress have held hearings on the Science Indicator reports and individual members and staff have made extensive use of them. They have been used by scholars and policy makers alike, and science indicator reports have sprung up in Europe, Japan and the O.E.C.D., the international economic organization of 24 Western nations and Japan headquartered in Paris.

Several factors have, however, lessened the impact and slowed the further development of the state of the art in this area. The tradition of having a subcommittee of the National Science Board oversee its preparation meant that the structuring, analysis, and editing was limited to that committee

and the full Board. After several of the indicator reports had been issued, control of the report's preparation gradually shifted to the NSF staff. This meant that the content of the report also was reviewed by the many layers of the NSF bureaucracy with the result that innovative approaches and searching questioning of the data was ground down.

When the report was made a Presidential report in 1982, further review by the Office of Science and Technology Policy and the White House staff were imposed leading to both additional caution and delay. As a result, the analysis became increasingly conservative and attempts to introduce new indicator series and interpret them in ways that were in fact or potentially incompatible with the agency's organizational objectives or the Administrations policy objectives were not encouraged. Finally, NSF has not supported anything but the most modest level of extramural research in the area of science indicators. Over the last decade, research on science indicators has averaged one or two extramural study projects per year, a level entirely inadequate to identify and develop new indicators, new techniques for the analysis of such data, and new methods for their presentation. Since 1987 no funds for indicator research have been provided by the Foundation.

We recommend that the Science Indicator report series be continued, but that a way be found to insure that it comes more innovative, independent, policy relevant, and timely. The possibility of moving responsibility for this report to the Office of Science and Technology Policy should be considered. This is an approach modeled on the President's Economic Report, which is prepared by the members and staff of the Council of Economic Advisors in the White House. That report has achieved a reputation for high quality, and we understand that its preparation involves a significant fraction of the Council's

staff on a year-round basis. A similar arrangement for the present Science Indicators staff of 4 people, through their transfer to the OSTP could significantly improve the quality, policy relevance, and timeliness of the report.

Science Policy Reports by the O.S.T.P.

In the mid-seventies several forces converged which led to the formal reestablishment of the presidential science advisory mechanisms that had been abolished by President Nixon in 1973. Committees in both the House and the Senate held hearings on the statutory formation of a science advisory office based on a variety of legislative proposals that had been introduced in the 94th Congress. With that movement, attention was again focused on the need to develop sound reporting on national science policy issues, both in terms of past trends and future needs.

1976 Hearings on the Science Policy Act The need for one or more such reports on science policy was emphasized in the hearings by the first Science Advisor, Dr. James R. Killian, Jr. Since serving as President Eisenhower's Science Advisor, Dr. Killian had returned to the presidency of M.I.T. He had also, during the period 1971-72 served as chair of an Academy of Sciences committee which authored the "Report on Science and Technology in Presidential Policymaking." In that connection, Dr. Killian noted in his testimony before the Senate Committee:

> ... I do also feel that there should be an annual report of a very special kind prepared by the mechanisms created in the White House. I know that it is difficult to contemplate any kind of comprehensive report on the state of science in the country. That is not what I am talking about. And that is not what the NAS Committee recommended.

Rather, it was urging that there be an opportunity for this Science Adviser in the White House annually to submit to the President or to the Congress a statement of what he thinks are some of the acute and current problems that they should be aware of or to give attention to. And what are some of the budgetary problems that we face and problems of technology assessment.

... I think, for example, of the importance of a reordering of priorities which will enable our Government to generate and encourage new technologies which can contribute to the strength of our economy.

The broad intent of the annual report was emphasized in the hearings in the following exchange between Senator Kennedy and Vice President Rockefeller during the early, informative phase of the legislation in July 1975:

Sen. Kennedy... Mr. Vice President, do you expect in this annual report that one of the responsibilities of the advisory group would be to indicate what should be the national investment in the areas of science and research, whether we ought to establish some goals in those areas, and perhaps how we ought to be allocating the resources within those goals, so that we will be looking ahead to the allocations of resources in the area of science and technology over a period of, say 5 years?

Is this something you think should be included or would be useful in providing both the country and the Congress, with some guideposts as we consider this whole area?

Vice President Rockefeller. I would have to say, Senator, I think that is the key to it. I think it is the heart, what you have gone right to. It is the conceptual approach to the whole of science and technology in our whole society of life, its future, and our role in the world.

In levying the requirement for this report on the OSTP, the Congress was well aware of the difficulties which might attend its preparation. The House legislative report noted that:

> There was mixed reaction to the requirement for an annual report in the Committee bill and in earlier proposals. A number of witnesses recognized that the time and resources required to prepare such a report might not be available in an office of the limited size proposed in the Administration bill. Some recommended that this provision should not be included; others that the report might be prepared outside the Executive Office. One witness who did not support the inclusion of Title I, suggested that a substitute for it might be a requirement for an annual statement on science and technology similar to the President's statement of March 1972.
>
> The Administration bill was silent on this requirement but the Vice President indicated that in all probability the Science Adviser would make an annual estimate, appraisal, and recommendation to the President and Congress.

Several witnesses viewed long-range planning as a necessary function of the science advisory office. NAS President Handler discussed the necessity to carry on long-range planning in conjunction with current program and decision-making, despite the tendency of the latter to dominate the former.

The then Presidential Science Adviser, Dr. H. Guyford Stever, made two important points concerning long-range or "horizontal scanning" function: First, the Administration proposal contemplated the utilization of outside sources for this function, which would presumably have more time to devote to it. The second point was that while an adviser may be aware of an emerging problem, he has to have "listeners - in the President and also in the Congress."

Although the Congress, in both the House and Senate Committees, were thus thoroughly aware of the difficulties and problems that might be associated with the preparation these reports, they did, after thorough consideration of all the factors, elect to include them in the statute. The overwhelming factor in these considerations was the importance of achieving an overall focus in the Federal Government for weighing the nation's policies in the field of science and technology.

Report Requirements in the Science Policy Act. As finally enacted by the Congress and signed into law by President Ford in May 1976, the Science Policy Act required that two major science policy reports were to be prepared by the O.S.T.P. Director and submitted by either him or the President to the Congress by the newly established Office of Science and Technology Policy: 1) A "Five Year Outlook" on science and technology issues of national significance followed by annual revisions keeping the five year perspective current, and 2) a "Science and Technology Report" reviewing past developments of national significance in science and technology.

As a way of lessening the size of the reports and the burden on both those with responsibility for the preparation of the Five Year Outlook report and on those who would read it, the 1976 Act provided that instead of a completely new report each year, annual updatings

would be submitted. Following the submission of the initial report in May 1977 the updatings were to take into account new problems, constraints and opportunities and changing national goals and circumstances, and thus extend the Outlook so that it always extended five years into the future. However, this concept was never carried out in practice.

Responsibility for the Science Policy Reports in the 1977-1981 Period

During the five year period following the enactment of the 1976 Science Policy Act, the transfer of responsibility for the two OSTP science policy reports to the NSF occurred, along with several related developments. Some of these developments strengthened the reports while others contributed to their weakening.

Transfers of Policy Reports to the NSF. In July 1977, 14 months after President Ford had signed the Science Policy Act, President Carter asked the Congress for approval to move, by reorganization plan, responsibility for the two science policy reports from the OSTP to the National Science Foundation. That request was part of a much larger reorganization of the Executive Office of the President.

President Carter had campaigned on a platform which included extensive reorganizations of the Federal government as a means to improve the functioning and efficiency of the government. His reorganization Plan No. 1 of 1977 abolished the Domestic Council, the Office of Drug Abuse Policy, the Office of Telecommunications Policy, and the Economic Opportunity Council. It also transferred from many of the organizations within the Executive Office specific functions to other Departments and agencies outside the Executive Office.

In proposing these changes, the President said that "The basic thrust of the proposals today involving the Executive Office of the President is to strengthen Cabinet government. I am very much opposed to having a concentration of a large numbers of people and authority in the White House staff. I much prefer that Cabinet officers make their own decisions, manage their own departments, and that the coordination effort rests with me." The changes and transfers would have the effect of reducing the overall staff size of the Executive Office from 1,712 to 1,459, a reduction of 253.

The OSTP, along with the National Security Council, the Office of Management and Budget, the Council on Environmental Quality, the Council of Economic Advisors, the Intelligence Oversight Board, and the Special Trade Representative, were to continue in existence. The OSTP, said the President, "should retain those science, engineering and technology functions which can be so useful in helping the President and his advisors make decisions about policy and budget issues." After noting that the responsibility for preparing certain reports should be transferred to the National Science Foundation, the statement concluded: "The proposal places manageable limits on OSTP's broad mandate while emphasizing functions that support the President." The statement made no mention of support for the needs of the Congress.

The actual transfer to the NSF was made in two steps. The initial Reorganization Plan, which was submitted in July 1977, simply transferred the responsibility for the two reports to the President. Early in the following year, in February 1978, an Executive Order spelled out the details of how the transfer of these and other science and technology policy functions were to be carried out by the NSF, the OSTP, and the OMB.

Changes in the Reports Elimination Act of 1982. In the Spring of 1982 the Reagan Administration submitted to the Congress an extensive reports elimination proposal. Eighty existing reports on a wide variety of topics, which by statute were in the past submitted by the executive departments to the Congress, would be either eliminated or modified. In subsequent testimony the representative of the OMB observed that the relevant Congressional committees were not contacted prior to final compilation of the recommendations into the draft legislation.

In the House, the Committee on Government Operations decided that it would be desirable to determine the merits of the proposed report eliminations. As part of its consideration of this proposal, it consequently asked the other standing committees to review the proposed changes as they might affect their information, oversight, and report needs. The Science and Technology Committee, based on its past experience with several of these reports, agreed to the elimination of a number of the topical reports. However, in the case of the science policy reports, the less than satisfactory experience with the preparation and submission of these report by the NSF led to the conclusion that the review triggered by the Reports Elimination Act should be used to restructure the number and content of the several of the reports in that area.

The Administration had proposed that 1) the Science and Technology Report be deleted, 2) the Five Year Outlook be deleted, and 3) that in their place a combined "Science and Technology Report and Outlook" be made a statutory requirement. The new report was to be submitted by the President to the Congress "no less frequently than biennially." It was to be prepared under the guidance of the OSTP with the cooperation of the NSF and with appropriate assistance from other Federal departments and agencies and "such consultants and contractors" as the OSTP and NSF deemed necessary.

The scope of the combined report was also to change. The Five Year time frame for the Outlook was to be abolished, and be limited to "a forecast of emerging issues of national significance resulting from, or identified through, scientific research or in which scientific or technical considerations are of major importance;" the concept of annual updatings was to be eliminated; and the requirement to evaluate actions by Federal, State, and local governments or by the private sector in this field was to be dropped.

Proposed for retention in the combined report were a review of developments of national significance in science and technology; a forecast of emerging issues of national significance resulting from, or identified through, scientific research or in which scientific or technical considerations are of major importance; and a discussion of opportunities for, and constraints on, the use of new and existing scientific and technological information, capabilities and resources, including manpower resources, to make significant contributions to the achievement of Federal program objectives and national goals.

To be dropped from the former Annual Report on Science and Technology were the following six specific reporting topics: 1) the significant effects of current and projected trends in science and technology on the social, economic, and other requirements of the Nation; 2) a review and appraisal of selected science-and technology-related programs, policies, and activities of the Federal Government; 3) an inventory and forecast of critical and emerging national problems the resolution of which might be substantially assisted by the application of science and technology; 4) the identification and assessment of scientific and technological measures that can contribute to the resolution of such problems in light of the related social, economic, political, and institutional considerations; 5) the existing and projected scientific and technological resources, including specialized manpower, that could

contribute to the resolution of such problems; and 6) recommendations for legislation on science and technology-related programs and policies that will contribute to the resolution of such problems.

From the original Five Year Outlook Report a somewhat longer requirement was to be dropped. This called on the Director of OSTP to consult as necessary with officials of the departments and agencies to "identify and evaluate alternative actions that might be taken by the Federal Government, State and local governments, or the private sector to deal with such problems, or opportunities and ensure that alternative actions are fully considered by departments and agencies in formulating their budget, program, and legislative proposals."

To be added to the combined report were the following three requirements: 1) A statement of the President's current policy for the maintenance of the Nation's leadership in science and technology; 2) a description of major Federal decisions and actions related to science and technology that have occurred since the previous such report; and 3) a discussion of currently important national issues in which scientific and technical considerations are of major significance.

The Congress agreed to the combination of the "Five Year Outlook" and the "Annual Science and Technology Report" into a single report. It also agreed to the proposed scope of the new, combined "Science and Technology Report and Outlook." But it changed the responsibility for the report and the timing of its submission. In unusually forceful and assertive language, the Reports Elimination Act that President Reagan signed into law in December 1982 provided, in an amendment to the Science Policy Act of 1976 that specifically

rejected the 1977 Reorganization Plan, that "Notwithstanding the provisions of Reorganization Plan Number 1 of 1977, the Director shall render to the President for submission to the Congress no later than January 15 of each odd numbered year, a Science and Technology Report and Outlook ... which shall be prepared under the guidance of the Office and with the cooperation of the Director of the National Science Foundation, with appropriate assistance from other Federal departments and agencies as the Office or the Director of the National Science Foundation deems necessary."

This strong language accepted the O.S.T.P. Director's contention that staff support for the data gathering, writing and editing was not then available within the OSTP. But it nevertheless reasserted the strong and continuing Congressional conviction that, as a broad policy report on science and technology reflecting the view of the entire Federal government and the policy orientation and policy preference of the current administration holding office at the time of the report's submission, the report ultimately must be the responsibility of the office at the White House level established for that purpose and its Director.

This report and its predecessors has thus been the subject of frequent moves and changes. Since its establishment (1976), it has been transferred to the President (1977), to the NSF (1978), and back to the OSTP (1982) where responsibility for its authorship now rests.

The Science and Technology Report to the Congress, 1977-1982

One of the two reports mandated by the 1976 Science Policy Act was the Annual Report on Science and Technology. Intended to provide chiefly an analysis and discussion of past and current research and policy issues, the report was later, as we have noted above, effective with the passage of Public Law 97-375 in December 1982, combined with the Five Year Outlook report on Science and Technology

into a single "Science and Technology Report and Outlook" to be submitted on January 15 of each odd numbered year. However, as of the time of the conclusion of our hearings in 1986, only the first version of this new, combined report had been submitted to the Congress. And as of the writing of this report 24 months later, a second edition, which we comment on below, had been submitted. We therefore comment first on the five Annual Science and Technology Reports submitted for the years 1977 through 1982.

Following the change of responsibility from the OSTP to the NSF under Reorganization Plan No. 1 of 1977, all five of these reports were prepared by the NSF. They were submitted to the Congress by the President under brief cover letters from which all discussion of policy issues was notably absent. As President Carter noted in his short transmittal letter to the first report: "I believe that this report, and its successors, can play an important role in providing a foundation for informed debate on scientific and technological issues ..." Similarly, the NSF Director did, only in the cases of the 1st and 3rd reports, include a short statement in the reports, respectively by Directors Richard C. Atkinson and John B. Slaughter. In contrast, one of the other major science Policy report, the annual "Science, Technology, and American Diplomacy" has included since the first report in 1980 a substantive statement by the President outlining recent accomplishments and stating current policies and policy objectives. Furthermore, the Science and Technology reports were, with the exception of the first report, descriptive and neutral in tone rather prescriptive and assertive of policy goals.

The First Annual S&T Report. The first annual report focused on what NSF Director Richard Atkinson in his transmittal letter to the President called "a few important and timely issues (which) were selected for incisive treatment." In six short chapters the report dealt with Federal R&D Funding Over the Last 10 Years, R&D and

Economic Progress, the Comparative Performance of U.S. Technology, the Status of Basic Research in Industry, and Some Issues in the Support of Academic Science. More notably, the analysis of each of these issues was remarkable for its candid appraisal of the issues and its evenhanded discussion of the value to society of investment in research and development. Although slightly academic in tone, it did provide the kind of "rigorous analysis" which Director Atkinson called for and the kind of in-depth discussion which the Congress expected when the report was mandated.

In its analysis of the connection between R&D and economic progress, the report noted that the U.S. economy had performed poorly in terms of the growth of productivity and GNP over the most recent 10 years when compared to the previous 20 years. But, it observed, "somewhat paradoxically the level of investment in R&D has been substantial, the performer base is diverse, and, in absolute terms, the U.S. supports more than 50 percent of the R&D performed in the world." It noted that knowledge about the relationship of R&D to the economy is limited to the observation that it probably is "positive, significant, and high." But what we know, it concluded, is limited because of difficulties in obtaining more precise measurement of the contribution of R&D to technological innovation and the contribution of innovation to the economy.

It pointed to three problems of measurement: 1) the inability to accurately measure the influence of new or improved technology on the quality of goods and services produced; 2) the problem of tracing the contribution of research to improved technology and then tracing technology's contribution to economic progress; and 3) the lack of information and techniques to assess, measure, and adjust productivity figures for the harmful effects by products of technology resulting from research and development.

The analysis went on to note that the private sector appears to underinvest in R&D because, "for many types of research, firms cannot capture competitive returns for their outlays." But, "the proper government response is difficult to determine. ... One response could be to accept the market imperfections as given, and increase investment in civilian R&D and innovation. Alternatively, government can attempt to remove market imperfections while holding constant Federal spending for civilian R&D and innovation." And it concluded that "to justify government action it is necessary not only to demonstrate that private returns are insufficient to call forth adequate private investment in innovation activities, but also that proposed government policies and actions are cost-effective." Furthermore, "one serious problem in trying to achieve a consensus is the lack of analytical methods that would provide valid evaluation and assessment of the social payoffs from various proposed Federal actions."

The discussion of the comparative performance of U.S. technology is equally frank and devoid of many of the usual cliches commonly found in discussions of that topic. It found that "ideally, an international comparison of the U.S. technology position would provide an indication of a rise, leveling, or fall of U.S. technological capabilities. Estimates of technological capabilities across countries would measure the stock of scientific and technical knowledge, the growth of this stock, and the extent to which this knowledge is utilized in the production of goods and services. However, direct measurements of knowledge and technological capability is not available."

The discussion continues with the observation that a number of proxy indicators are used to measure the comparative status of U.S. technology. None of these are fully adequate to measure the comparative status of U.S. technology, but taken together they can provide an over-all view of the situation. These indicators include

resources devoted to R&D, mainly dollars and manpower, the number of patents as a rough indicator of technological innovation, and international earnings from R&D activities as measured by trade in high technology and licenses. It concludes that, "With regard to technology output and international earnings form R&D intensive activities, available data indicate little or no erosion in U.S. technological capabilities. The data on both inputs and outputs from innovative activity thus suggest that the relationships between science and technology and economic and trade performance are not direct or simple."

The discussion in the report of basic research in industry is also provocative. Continuing the useful approach of raising questions that probe below the surface of accepted wisdom, the analysis devoted to this question opens with the observation that while recent discussions "have described the decline in the funding of basic research by industry, the question of whether or not this decline is a problem, and the options for government policy action immediately raises the issue of industrial performance of basic research."

It notes that both industry's own funding of scientific research has declined, as has the Federal government's funding of such research in industry. "Whether the gradual shift in industry's allocation of R&D resources away from basic and applied research has had or will have an adverse effect on the economic welfare of the U.S. is a question which has no agreed answer. The value to society of basic research findings vis-a-vis applied R&D results simply cannot be assessed in terms that will allow us to say that basic research should have x Dollars added to it or that y dollars should be taken away from another phase of the R&D process. Therefore, we cannot say whether or not an economy that devotes 9 percent of its

R&D funds to basic research and 69 percent to development (as was true in 1960) is better or worse off than an economy that spent 13 percent of its R&D budget on basic research and 65 percent on development (the case in 1977)."

In a concluding chapter the first Annual Report discussed what it termed "Some Issues in the Support of Academic Science." After a review of such questions as the shortage of research and teaching openings at universities and the emerging issue of obsolescence of equipment and instrumentation, the report asked: "Whether basic research funding can and should be used as a tool to mitigate pressures arising from the universities' educational situation is an issue that needs to be considered further."

This first annual Report thus went a long way toward achieving one of its objectives: To serve as a focus for the discussion, not of that years' science budget, but rather for the broader, underlying assumptions upon which the Federal government's science policy is built. It succeeded in pointing out the highly uncertain nature of many of the assumptions on which current Federal science policy is based. What the first report notably lacked was any statement of what the Administration's policy was in the areas of science policy under review. It asked many important questions, it threw the light of data on these questions, but it failed to set forth a specific policy response to those questions.

The Annual Science and Technology Reports for 1979-1984. The succeeding Science and Technology Reports took a different approach. Instead of the analytical and probing approach used in the first report, the succeeding reports became much more descriptive. In addition they evolved to cover a series of particular topics, most of which were encapsulated into identical chapters found in each

successive report. The discussion of policy questions and responses came to constitute the opening chapter of each of these five reports. But it was short, rarely exceeding 20 pages of each report, or 15 percent of the total content.

The policy discussion appeared initially in the report for 1979 under the heading "Highlights of Presidential Initiatives." In the four subsequent reports the corresponding chapter was entitled, somewhat more modestly, "Decisions and Actions Concerning Science and Technology." In that part of the report the Federal government's science policy, and its changing rationale and areas of emphasis did in fact find expression. This has been the part of the report most closely reflecting the science policy of successive administrations.

In the first of these 4 annual reports the NSF Director noted explicitly that while, at that time, responsibility for the report had been transferred from the OSTP to the NSF, "nonetheless, OSTP prepared the Strategic Overview chapter and helped substantially in structuring of the report ... and in improving the text." No such explicit acknowledgment appears in later reports, even after December 1982 when responsibility was by statute transferred back to the OSTP. There are, in fact, occasional lapses suggesting that the research and writing was done at a lower staff level within the NSF, such as the paragraph in the 1980 report which refers to the OSTP Director in the third person, beginning with the statement "The Director of the Office of Science and Technology Policy (OSTP), in hearings before the Subcommittee on Science, Technology and Space of the Senate Committee on Commerce, Science and Transportation in September 1980, identified five key factors that he regarded as essential to strengthen the capacity of the science and technology enterprise." But on balance, this policy portion of the report does, in all five annual report editions bear clear marks of reflecting the views of the administration responsible for the report at the time of its submission.

To indicate the policy-oriented nature of this part of the report it is only necessary to show the changing science policy priorities expressed in successive reports. The report for 1979 noted the Carter Administration's view that it was committed to the growth of basic research, a policy that had been reaffirmed in the President's R&D Message to the Congress in March of that year. However, that message had also placed emphasis on the government's role in the technology demonstration activities. It noted further, that "as a result of reprogramming to achieve the President's anti-inflation objective, some restraint on R&D spending is necessary." The report for 1980 reiterated these policies, and, in addition, noted the need to emphasize education, a matter which had been the subject of NSF's August 1980 report to the President on "Science and Engineering Education for the 1980's and Beyond."

Beginning with the report for 1981 the science policy views of the Reagan Administration were reflected in the policy chapter. That policy was to maintain and increase the nation's scientific and technological capabilities "which are critical to two Administration goals: a revitalized domestic economy and a restored defense capability." It noted that "the new national policy for science and technology must be related more intimately than in the past to international relations, energy, and social services. Above all, the new national science and technology policy must be consistent with the economic realities of the 1980's." Given the need for fiscal responsibility, "the imperative to establish priorities and recognize limits on all components of the Federal budget, including research and development, becomes obvious," it stated, and it went on to say for emphasis "... it is clear that automatic increases in Federal spending for these activities in the recent period of fiscal austerity is not a goal to which a viable science and technology policy can aspire."

The report presented a series of "Criteria for Federal Support of Research." These criteria were elaborated into a statement of U.S. science policy accompanied by a "Strategy to Implement of U.S. Science Policy" in 1982 report. The science policy was stated to be: 1) to enhance the contribution of science to the two most pressing, long-term needs of the U.S.: national defense and the international competitiveness of U.S. industry, 2) To maximize the return on national R&D investment, and 3) to ensure the long-term vitality of the U.S. science and technology base. The strategy called for a number of objectives and steps, such as placing emphasis on excellence in research results and in people, stressing relevance to national needs, and emphasizing having in the U.S. the leading research universities in the world. These policies and criteria were further discussed and their implementation through engineering research centers, supercomputer support and other actions were covered in the 1983-84 report. Notably, in that report the emphasis on reductions in the R&D budget was absent reflecting the administration's decision to resume the policy of broad-based funding growth for all basic research activities.

This section of the Annual Science and Technology Report thus did provide a discussion of each Administration's science policy views. Although a close reading was sometimes necessary to tease out the shading in policy shifts, it is clear that a conscientious effort was made to think through what the policy for science should be and what the broad guidelines for its implementation should amount to.

We applaud that effort, as it has been reflected in each of the reports that have been submitted to the Congress. We recommend that this policy oriented section of the report become the core of future reports, and that the more descriptive chapters, discussed below, be shortened or eliminated.

Another chapter that has appeared in each report has been devoted to a description of the ongoing R&D programs of the Federal agencies. At various levels of detail these entirely descriptive chapters have covered the 11 R&D areas shown in Table 27-46. Most of these topics have been discussed in each of the five reports. However, "Education" received separate attention as a Federal activity only in the reports for 1980 and 1981, "General Science and Technology" was omitted in the 5th and 6th reports, and "International Science and Technology" issues were not discussed in the report for 1980.

The order in which these topics appeared in each report, shown by the numerals in the table, undoubtedly reflected to some extent the priority attached to each topic. There is, significantly, an extensive reordering of the topics between those in the second annual report covering 1979, the last submitted prior to the election defeat of President Carter, and the 1980 report, which was submitted following the election of President Reagan. "National Security" R&D moved from being part 8 to being part 1 and remained in all the subsequent reports; "Space R&D" which has been part 7 became fixed as part 2; "Health" R&D moved form being 1st to 3rd; "Environment" R&D moved from 3rd to 6th; and "Energy" R&D from 2nd to 4th.

Table 27-46

Federal R&D Activities Covered in the
Annual Report on Science and Technology to the Congress
(numerals indicate order in which each topic appeared
in that year's report)

	1st	2nd	3rd	4th	5th	6th
	1978	1979	1980	1981	1982	1983-84
Agriculture	-	6	9	9	8	8
Education	-	-	10	10	-	-
Energy	-	2	4	4	4	4

Environment	-	3	7	7	6	6
General S&T	-	9	5	5	-	-
Health	-	1	3	3	3	3
International	-	10	-	11	9	9
National Security	-	8	1	1	1	1
Natural Resources	-	5	6	6	5	5
Space	-	7	2	2	2	2
Transportation	-	4	8	8	7	7
S&T Policy Coord.	-	x	x	-	x	-

The changing relative emphasis on the various topics by Chapter is shown in Table 27-47. Several notable shifts can be observed. During the first four years the size of these reports grew from 57 pages to almost 170 pages. The policy discussion which occupied the entire document in the initial report, was reduced to only 12 pages, or 7 percent of the report in the fourth report. At the other extreme, the chapter on Federal R&D activities, which is almost entirely descriptive in content, grew steadily from occupying one-fifth, or 22 percent, in the second report to just over half, or 52 percent, in the 6th report. In the 4th and 5th reports the entire Special Analysis on Research and Development, an appendix that originally had appeared in the OMB Budget Book for that year, was reprinted, occupying in each case about 30 pages of the Science and Technology reports.

Table 27-47

Percentage of Text Devoted to Major Topics in the

Annual Science and Technology Report to the Congress

	Policy Discussion		Emerging Issues in S & T		Developments in Selected Areas of S&T		Federal R&D Activities		Appendix on Current Budget		Introd., Other		Total	
1st - 1978	57	(100%)	-		-		-							
2nd - 1979	12	(14%)	24	(27%)	20	(23%)	19	(22%)	6	(7%)	6	(7%)	57	(100%)
3rd - 1980	22	(15%)	40	(28%)	7	(5%)	50	(35%)	20	(14%)	5	(3%)	87	(100%)
4th - 1981	12	(7%)	46	(27%)	-		78	(46%)	28	(17%)	5	(3%)	144	(100%)
5th - 1982	20	(14%)	-		18	(13%)	68	(49%)	31	(22%)	2	(2%)	169	(100%)
6th - 83-84	15	(11%)	(18)	(13%)	24	(17%)	74	(52%)	6	(4%)	4	(3%)	139	(100%)

The Five Year Outlook on Science and Technology, 1977-1982

Like the Annual Report on Science and Technology, the Five Year Outlook for Science and Technology report was mandated by the Science Policy Act of 1976. Although the two reports were combined under a legislative enactment in 1982, we discuss here the initial 4 submissions of the separate Five Year Outlook reports. Following our initial analysis, we then make our recommendations with respect to the Outlook portion of the combined report.

During the five year period (1977-1981) for which separate Outlook reports were required from the Executive Branch of the government, the preparation, format, authorship and length of the report went through a number of changes. Because these changes have an effect on the future preparation and use of the now combined "Science and Technology Report and Outlook" report, we review them here in some detail.

The First Two Outlook Reports, 1980-1981. The first report in this series was a massive, large-format, 2-volume affair. Subtitled "Problems, Opportunities and constraints in Science and Technology," its preparation involved many Federal agencies and a number of private consultants. It was, as was noted in the report, the result of an experiment: "The Director of NSF, in consultation with the OSTP, decided that this Five Year Outlook should be regarded as an experimental, pilot project that would be useful in its own right, and also would provide guidance for the preparation of subsequent Five Year Outlook."

Consequently, the report was prepared in two steps. In step one a wide-ranging survey of the problems and opportunities in science and technology and of the probable impact of science and technology on issues of policy interest was conducted. That survey included written statement and from 21 agencies of the Federal government, from the National Academy of Sciences, and papers commissioned from individual scientists and other experts. In step two all these studies and reports were then used as inputs in the preparation of the report itself by the NSF Director and his staff. But they were also made part of the Five Year Outlook report itself, constituting the 672-page volume II of the report.

The result was a report which, while comprehensive, was neither focused or comprehensible. Few if any Members of Congress or their staff members were able to read the Outlook report in its entirety. Furthermore, the inclusion of the many agency statements and other papers, while perhaps well intended, had the effect of obscuring the message of the report by suggesting that the reader rather than the author should integrate all of these statements and draw his or her own conclusions about what the outlook for science and technology and the associated policy issues were, and what the views and conclusions of the Administration amounted to.

The second Outlook report, submitted a year later in 1981, was almost as massive. It consisted, like the first report, of the Academy generated analysis of specific science questions. This was followed by reports from two major, private scientific organizations, the American Association for the Advancement of Science and the Social Science Research Council, the latter in particular constituting a useful and innovation contribution to the outlook deliberations. But again there was a total absence of any overview or summing up representing the conclusions and views of the Administration.

The Third Outlook Report, 1982. The third Outlook report took a different, but equally unsatisfactory approach. Eight distinguished American scientists, two at the Bell Laboratories, one at the National Cancer Institute, and the others at U.S. universities, were asked to contribute papers on topics in which they were expert. The resulting chapters in the report dealt, for example with "Lasers," "Psychobiology," and "Turbulence in Fluids," and each chapter included footnote references to the scientific literature found in traditional scholarly papers. In his letter of transmittal, NSF Director Knapp noted, after stating that "this report (is) about trends and opportunities in eight selected areas of fundamental science and engineering," that "The most important policy implication that I derive from reading this report is the imperative need to strengthen the links among the varied institutions that comprise the U.S. scientific enterprise so that the enterprise can, collectively, better realize its considerable potential to contribute to national goals. This need has been recognized and assigned a high priority by the Reagan Administration. Indeed, one of the key elements of the Administration's science policy is to improve the links between laboratory and marketplace, between academia and industry, and

between the research and educational functions of academia." But the connection between this brief policy statement and the commissioned papers was unclear, and the report failed to provide the overview and sense of future policy direction which was expected. Nor did it have any detectable continuity with the previous Outlook reports.

The Fourth Outlook Report, 1984. Following these three Outlook reports, and the several expressions of concern by Members of the Congress about their format and content, the National Academy of Sciences took the initiative to improve drastically the shape and content of the Outlook report. The Academy's President, Dr. Frank Press, took a personal interest in this new approach, and the Academy's Committee on Science, Engineering and Public Policy, as the author of the report, enthusiastically joined in this effort. The result was an Academy Outlook report 50 pages in length in a handy book-sized package. More important, the content of the third Outlook report was succinct, well organized, and focused, and, as a result, highly readable.

Based on a brief analyses of nine fields of scientific research, including, for example, the advances likely to take place in oncogenes, plasma physics, parasitism, and chemical engineering, the report discussed a number of cross-cutting policy issues. These included International Competition in Science and Technology, Science and Engineering Personnel, Issues in Human Biology, and the Global Atmospheric Effect of Nuclear Explosions. The discussion of each topic concluded with a statement of "Issues for the Congress," which served to sum up in 8 to 10 lines the Academy Committee's policy concerns in coming years. None of the input papers or background studies used by the Academy committee were included in the report.

This Outlook report was well received in the Congress. Chairman Fuqua of the House Science and Technology Committee expressed his appreciation for the reduced length and increased readability of this Outlook report. But it was also noted that this was entirely an Academy report, written and issued by the National Academy of Science, but without any participation, review, or endorsement by either the NSF or OSTP, as intended by the Congress.

The Concept of a Five Year Outlook. When the idea of a report that was to look ahead and forecast developments in science and technology was initially proposed some skepticism about the practical feasibility of such and undertaking was expressed. It was felt by some that the nature of both technology and science was such that prediction of future developments was nearly impossible and that predictions of the policy and societal reactions to such developments would be even more difficult.

The committees that wrote the 1976 act were well aware of these difficulties. But they were also acutely aware of the serious consequences that would arise if such predictions were not attempted. That concern had led in 1974 to the enactment of the law that established the Office of Technology Assessment, an agency charged with helping the Congress to foresee new developments in science and technology and the secondary social effects that could be expected.

Furthermore, a number of such forecasting requirements were already in existence and functioning with various degrees of success. To obtain a picture of the extent to which such outlook reports are in use today, we reviewed the currently mandated Congressional reports. The results are listed in Table 27-47 which shows the agency, the report title, and the receiving committees in the Congress together with the statutory language describing the content of these reports. It can be seen that 8 such reports requiring 5-year Outlook reports from five different agencies are now on the

books. In addition we identified two reports, one from NOAA and on from the FAA which require 10-year outlook reports. On the basis of these considerations, we conclude that the requirement for a certain degree of forecasting, although by no means either easy or certain, can and should be undertaken in future science policy reports.

Table 27-47

Congressional Report Requirements with Longer Term Forecasting and Outlook Requirements in Specific Areas of Science and Technology

Five Year Outlook Reports

NIH	National Cancer Program: Report of the Director of the National Cancer Institute "The report shall include a report on the progress, activities, and accomplishments of, and expenditures for, the information services of the program during the next five years." (P.L. 95-622)	H: En & Com S: Lab & HR
NIH	Report of the Director of the National Heart Lung, and Blood Institute "The Director of the ... Institute shall submit ... each year an annual report setting forth the activities ... and accomplishments ... during the proceeding year and a plan for the program during the next five years." (P.L. 95-622)	H: En & Com
DOE	Nuclear Safety RD&D Program Plan Revisions ... a comprehensive program management plan for nuclear safety, research, development ... during the next 5 years."	H: SS & T S: En & NR Env & PW
DOE	Nuclear Safety RDD&D Program Plan Update "... an update comprehensive program management plan for nuclear safety research, development ... during the next 5 years."	H: SS & T S: En & NR Env & PW
NOAA	Federal Plan for Ocean Pollution Research and Development and Monitoring "The National Oceanic and Atmospheric Administration, in consultation with other agencies, prepares biennially a five year Federal Plan for the National Marine Pollution Program"	H: MM & Fish

NOAA	Five-Year Plan on National Climate Program Office	H: SS & T S: Com S&T

A final 5-year plan must be submitted to Congress ... that shall be revised and extended biennially."

EPOA	Environmental Research Outlook	H: SS & T S: -

"The Administrator of the Environmental Protection Agency shall submit to the Congress ... a comprehensive 5-year plan for environment research, development, and demonstration. The plan shall be appropriately revised annually ... ."

S'N	Smithsonian Institution, Five-Year Prospectus	H: Admin S: Rul & Adm

"This report presents a summary of the programs and activities of the Smithsonian Institution which will be give priority and emphasis over the next five years."

Ten Year Outlook Reports

NOAA	National Acid Precipitation Assessment Program	H: SS & T S: Env & PW

"The Acid Precipitation Task Force shall ... each year a report which shall detail the progress of the 10-year research progress ..."

FAA	National Airspace System Plan - Facilities Equipment, and Associated Development	H: PW & Tran SS & T S: Com S&T

"The plan shall set forth, for a ten-year period, the research, engineering, and development programs ... ."

Length of the Outlook Reports. The four Outlook reports varied greatly in size. Because the volume size and the print size in each report varied from year to year, we have, instead of noting the number of pages, estimated the number of words in each report for comparative purposes, and the results are shown in Table 27-48.

Table 27-48

Estimated Length of the Five Year Outlook Reports

1980-1985

Report	Year	No of Words Per Page	No of Text Pages	Estimated No of Words
1st Report	1980	794	68	53,992
Appendix		794	536	425,584
			Total:	479,576
2nd Report	1981	426	151	64,326
Appendix		794	335	265,990
			Total:	330,316
3rd Report	1982	830	85	70,550
4th Report	1985	314	49	15,386

These estimates of the lengths of the Outlook reports show that, disregarding the appendix volumes, the reports grew slowly for the first three reports form 53,000 words to 70,500 words. This was followed by a drastic cutback in the length of the fourth report to 15,400 words, or less than one-quarter of the average size of the previous three reports.

That sharp reduction was the result of widespread expressions of concern about the lengths of the earlier reports. They were widely criticized for being much too long, for being indigestible, for lacking in focus, and in general, for not meeting the requirements of the report. The much shorter fourth report was, in contrast, widely praised for its brevity and succinctness. As the chief author of that report, the Academy can take credit for having responded effectively to these concerns and for having produced a short, well-written, and well-organized Outlook report, and we commend the Academy for decisively meeting this challenge.

Annual Updatings. When the Congress was formulating the requirement for the Five Year Outlook for Science and Technology in the mid-seventies, it was quickly realized that the preparation of such a report would be a formidable task. Consequently, the 1976 Science Policy Act specifically provided that a complete report would not be prepared and submitted every year. Rather, following the submission of the initial Outlook report, the Act prescribed that annual updating should be submitted. This was aimed at making these annual submissions easier to prepare on the part of the Office of Science and Technology Policy, and easier to read and absorb by the readers of the reports.

Unfortunately, this objective was never achieved. None of the subsequent Outlook reports were prepared as clear efforts to update the initial, comprehensive report, and none were labelled or referred to as "Updatings." Only in the very limited sense that the portion of the report reviewing the individual science and engineering disciplines consisted of a new group of disciplines in each report, did the report avoid the repetition of previously covered topics which the updating concept was aimed at.

The failure by the OSTP/NSF to follow this approach and the failure by the Congress, which we acknowledge, to insist that it was followed may well have contributed, along with other factors discussed below, to the deterioration in the content and timeliness of the Outlook report.

NSF as the Principal Report Agent. When responsibility for these reports initially was transferred to the National Science Foundation, few if any questions were raised about the possible disadvantages of such a move. The main thrust of the idea was to reduce the workload on the staff of the OSTP, and once the decision to dislodge them from the OSTP had been reached, the choice of NSF as

its new home was considered logical. NSF had, and still has, resources of well-qualified staff, funds to support external research, writing and editing through grants and contracts, and responsibility for all fields of science from botany to zoology.

In retrospect it is now possible to observe that certain disadvantages also have become evident. The issues, orientation and perspectives that NSF has brought to the report task are those of university-based basic research, of the large research universities and their capacity to perform research in terms of the health of their finances, their research infrastructure, and their personnel. And, as we noted, with the singular exception of the first Science and Technology Report, the unquestioning belief in the societal benefits of basic research has been the hallmark of the NSF prepared reports.

In comparison, the largest single government research agency is the National Institute of Health with responsibility for biomedical research, basic, applied and clinical, and with a budget three-and-a-half times that of the NSF. Yet the concerns in the area of biomedical research, of teaching and research hospitals, of therapeutic drug development, approval and use, and of the pharmaceutical sector of industry are notably underrepresented in the reports. Yet if responsibility for the science policy report had been placed with the NIH, these same issues might well have come to be overrepresented.

Furthermore, and perhaps most important, up until now, the NSF has had little background or shown little interest in technology, its development, marketing, and use. Thus the balance in the report between science and technology has favored the issues and policies facing American science at the expense of the equally complex and important issues facing American technology.

Transition in Outlook Authorship. As originally envisioned in 1976 by the Congress and the senior officers of the Ford Administration, the Five Year Outlook was to constitute, each year following the first submission, an updating of the longer term outlook in science and technology and the resulting policy impacts. The view was to reflect not only developments expected within science and technology, but also their interaction with national goals, alternative policy choices, existing opportunities and constraints, and the needs of the departments and agencies of the Federal government. It was, in other words, to reflect not only future developments in science and technology, but also the policies, preferences and possibilities of the government and the Administration. It was for those reasons that it was to be prepared at the level of the White House.

The several steps in the redelegation and consequent dilution of its policy content occurred, as we have noted above, early in the Carter Administration. By Reorganization Plan, responsibility for the Outlook was reassigned from the OSTP to the President. This was followed in short order by a redelegation of responsibility form the President to the National Science Foundation, by means of an Executive Order.

The third redelegation was less visible but much more damaging. The National Science Foundation, for reasons never made explicit, elected not to prepare subsequent Outlook reports through the use of its own and OSTP's staff, but to have the report prepared by a non-government contractor. It selected for the task the National Academy of Sciences.

Beginning with the third Outlook report for 1982 a remarkable transition took place. The Academy Outlook Studies, which were intended to serve, along with studies and inputs from other sources, as inputs to the official Outlook report prepared by the NSF/OSTP, became, themselves, the official Outlook report.

In the case of the 1982 report, the third Outlook report, the full text of the Academy report was reprinted in NSF covers and a brief, one-page letter "To the Members of the Congress" signed by the NSF Director was added. But no changes and no other analyses or content was included. In the case of the 4th Outlook report for 1985 no separate government document ever appeared. Instead, the Academy study, as produced and issued in a softcover edition by the Academy, was itself distributed and submitted to the Congress and thus became the official Outlook report for that year. It did not include a statement or transmittal letter from either the NSF or the OSTP Director, or from the President.

This transition in authorship had several unfortunate consequences. Without reflecting on the quality and usefulness of the Academy study, we observe that it did not and could not reflect the views of the Federal government and its senior officers. Thus, the 1982 and 1985 Outlook reports, while presenting the view of the Committee of scientists and engineers who wrote the study and of the Academy itself, could not be taken by its readers as an expression of the outlook for science and technology as expressed by the Federal government. It did not place the topics and issues discussed in the perspective of other Federal missions and needs, of the Federal government's resource constraints, and of the political objectives in areas of high science- and technology-content issues of the Administration holding office at the time it was submitted. This was the intent of the statutory mandate for the Outlook report and was the expectation of the Congress.

Commercial Publication. Following the preparation of each of its contributions to the first three Five Year Outlook reports, the Academy arranged for the publications of its studies by a commercial publisher. Entirely reset typographically and issued in attractive

paperback covers, these version of the Academy's work on the Five Year Outlook served to make the results of its studies much more widely available to the scientific community, including students, and to the public at large.

The Academy generally publishes almost all of its reports through its own Academy Press, and this does serve to make its report available to interested parties. In fact, the Academy, when accepting new studies, insists on the right to publish the resulting report. The much more rarely used practice of issuing Academy reports through a commercial publisher, with its experience in and desire to reach the widest possible market, unquestionably enhances very significantly the access of many to the results of Academy studies.

However, this wide dissemination of the Academy's contribution to the Five Year Outlook also had several less desirable effects. As we noted in the case of the Appendix volumes to first two Outlook reports with respect to all inputs to the Outlook reports, the separate publication of the extensive inputs to the OSTP/NSF, had the effect of making it less clear what the conclusions, policies, and recommendations of the OSTP/NSF were as distinct from those departments, agencies and private and semi-private organizations who advised the OSTP/NSF. It may also have made it less easy for the NSF/OSTP to take positions which differed from the advice it received from these organizations.

In addition, the issuance and wide distribution of these Academy volumes served to blur the distinction between the Five Year Outlook reports officially prepared under the statutory mandate by the NSF/OSTP and the Academy reports which were intended as inputs to those reports.

The Combined "Science and Technology Report and Outlook"

The changeover from the two separate OSTP reports, one the Five Year Outlook on Science and Technology and the other the Annual Science and Technology report, into a single, combined, biannual "Science and Technology Report and Outlook" took considerable time. Although this change was enacted in 1982, the 4th and last Outlook report was published by the National Academy in September 1984. Similarly, the 5th and final separate Annual Science and Technology Report was submitted to the Congress in October 1983.

The new, combined report would technically have been due in January 1983. But because the Reports Elimination Act which enacted this change did not become law until December 1982, a reasonable interpretation would make the first such report due in January 1985, the first, subsequent, odd numbered year. It did, in fact, arrive a year later, on January 22, 1986, simultaneously with the Science and Engineering Indicators Report due at that time.

The Science and Technology Report and Outlook Due January 1985. The first submission of the combined Report and Outlook was completed by the OSTP in October 1985. But because of delays in the White House clearance process, it did not, as noted above, reach the Congress until January 1986. Its author was OSTP Director George A. Keyworth. Slightly mistitled - omitting the word "Outlook" - it was called "Biennial Science and Technology Report to the Congress: 1983-84". The new report was of considerable size. Our examination shows that it contained approximately 66,600 words. This compares with the 64,300 words of the second Outlook report, disregarding the Appendix volume, and the 15,400 worlds of the shorter 4th Outlook Report prepared by the National Academy of Sciences.

Table 27-49

Title, Authorship and Length of Chapters in the

"Biennial Science and Technology Report to the Congress: 1983-84"

Chapter	Title	Lenghts Pages	Percent
I	Decisions and Actions in Science and Technology	13	9%
II	Outlook in Selected Areas of Science and Technology	28	18%
III	Federal Research and Development Programs	90	60%
IV	International Cooperation in Science and Technology	20	13%

The basic division of the report into 4 major chapters, as shown in Table 27-49 was also adopted for the second edition of the report which was submitted in January 1989. Since this is the case we focus our analysis of the content on this edition of the report.

The Science and Technology Report and Outlook Due January 1987.

The Report and Outlook due on January 15, 1987 was not submitted to the Congress. Our inquiries to the OSTP and the NSF at that time indicated that a report was not then in preparation.

The following year, when our Committee received the Science and Technology Indicators Report due that year, we were also advised that work was underway on the overdue Report and Outlook. At that time the OSTP Director was contacted with the suggestion that, rather than submitting in mid-1988 a late version of the Report and Outlook which had been due in January 1987, it was our recommendation that the report then in preparation be instead updated and submitted when the next such report was due in January 1989. Under that suggestion it would be our understanding that, in reporting past OSTP and other

Federal activities, the entire period since the last report would be covered. The Senate counterpart Committee was advised of the suggested change in the report submission schedule. Our suggestion was readily accepted by the OSTP Director, and the OSTP and NSF staff proceeded with the preparation of the report on that basis.

The Science and Technology Report and Outlook -- 1985-1988.

The Report and Outlook due in mid-January 1989 was received by the Congress on January 14th, thus making it one day early. In a brief but succinct letter transmitting the report, President Reagan said: "This report highlights the significant Government decisions and actions in science and technology and the future outlook in selected areas of science and engineering." The President also summed up his Administration's policies and priorities for science and technology:

> Strong support for our Nation's science and technology has been the policy of this Administration. The goals of this support are enhanced national security, increased economic strength and competitiveness, and improved quality of life. Today, more than ever before, we must use our technical resources purposefully and effectively in order to retain international leadership.

And, looking ahead, the President stated: "Our challenge for the future is to draw upon our unique strength in basic science and to accelerate the development of technology and products that will benefit our society."

This edition of the report was lengthy. We estimate that it contains 100,000 worlds on 260 pages of single-spaced typing. This size thus exceeds by far the 15,000 words on 49 pages of the Fourth Outlook report for 1985 which we found commendably readable and of

the right length. It also exceeds in length any of the earlier Outlook reports which peaked at 70,000 words if the Appendix volumes are not included.

The report, using the same format as the first edition of the combined report, is divided into 4 extensive chapters, two of which were authorized principally by the OSTP and two of which were authored principally by the NSF as noted in the Preface. The title, authorship and lengths of these four chapters is shown in Table 27-50.

Table 27-50

Title Authorship and Length of Chapters in the "Science and Technology Report and Outlook -- 1985-1988"

Chapter	Title	Author	Length Pages	Length Percent
I	Decisions and Actions in Science and Technology	OSTP	37	14%
II	Outlook in Selected Areas of Science and Engineering	NSF	36	14%
III	Federal Research and Development Programs	NSF	143	56%
IV	International Cooperation in Science and Technology	OSTP	40	16%

The initial chapter on "Decisions and Actions in Science and Technology" provides a well-written and useful overview of the science and technology issues dealt with in the last 3 years of the Reagan Administration. This time period corresponds roughly with the incumbency of the Reagan Administration's second and last OSTP Director, Dr. William Graham. In sufficient detail to avoid reliance solely on general statements of policies and accomplishments, it includes enough specifics to allow connections to be made between policy objectives and programmatic specifics.

In a 2-page statement early in the chapter, an overall delineation of "U.S. Science and Technology Policy" is provided. The purposes of the government's total research and development effort is given in no-nonsense terms:

> To achieve the highest possible return on national investments in basic sciences, in applied sciences, in technology, and in development; and
>
> To encourage the long-term vitality of the U.S. science and technology base; and
>
> To ensure that U.S. scientific leadership translates into economic strength and national security.

And in a thoughtful declaration it explains the reasons for the government's role in the support of basic research:

> First, research grants to universities, where the majority of the basic research is conducted, permit the training of tens of thousands of graduate students under demanding and stimulating research conditions,
>
> second, strong support for basic research permits U.S. scientists and engineers to challenge intellectual frontiers in those fields of science and technology that provide the new knowledge that drives our national defense, and
>
> third, well chosen basic research projects can stimulate productive partnerships between scientists and engineers in all sectors of society -- partnerships that are increasingly vital to the development of new technologies that will keep American industry competitive --- and will speed the application of new knowledge to our increasingly technological defense needs.

These two policy declarations are followed by statements of the Administrations policies in 3 specific areas: private sector responsibility for non-defense, applied research, development, and demonstration; reciprocity in science and technology exchanges with foreign countries; and protection of intellectual property rights worldwide.

The balance of the first chapter is devoted to the "Implementation of U.S. Science and Technology Policy" in the three year period 1985-1988 covered by the report. It covers a wide range of diverse issues in which the OSTP has been active. These include: national security, space, aeronautics, a number of life and biological sciences issues such as AIDS, biotechnology, and animal research, and a number of technology issues such as superconductivity, materials research, and competitiveness. Special attention is devoted to the Administration's international science and technology policy, an area in which the OSTP Director and his staff played a significant role.

The chapter includes a description of the role of the Federal Coordinating Council on Science, Engineering, and Technology, and the various commissions, committees, and task forces set up during this period by the OSTP and the results of their work. Included is discussions not only of those groups that have completed their work and submitted their reports, but also those who are still at work and who can be expected to report in the coming months.

In painting this picture of the activities of the White House Office of Science and Technology Policy there are certain omissions. On the organizational level there are only a few passing references to the activities of the White House Science Council, the advisory group of experts from outside government which reports to the OSTP Director. A general review of the Council's work and contributions would be appropriate and useful, especially in view of the Congressional intent in the 1976 legislation establishing the OSTP that this Council be a statutory advisory committee. This is not the organization called for in the legislation. It was, instead, established by Dr. Keyworth as an advisory Committee to the Science Advisor.

On balance, however, this chapter, with its statements of the Administration's science and technology policies and the reasonably detailed descriptions of how these policies have been implemented, constitutes an excellent review closely matching the expectations in the Congress for this report.

The second chapter is devoted to the "Outlook in Selected Areas of Science and Engineering." Fifteen specific areas of research and engineering have been selected, and each is discussed in brief, 2- or 3-page summaries. The areas range from basic research fields, such as the mathematics of chaos and research on protein structure, through applied research, such as ceramics and biotechnology in agriculture, to engineering research areas, such as computer vision and earth remote sensing.

These are all areas which share a number of common characteristics. They are topics in which research is well underway, for which a practical applications is clearly in view, and for which there is extensive Federal funding. We applaud especially the explicit and well-explained relationship between research and its application in the discussion of most of these research areas. Helpful, as well, is the inclusion, for each area discussed, of a reasonable and often thoughtful discussion of the future outlook for research and application in each area. In general, we find the condensation from the original, somewhat technical text in the Research Briefing reports to be a successful and welcome example of how to make scientific topics easily comprehensible for the non-expert policy-maker.

One aspect of these outlook summaries is especially striking. A number of them include statements which raise profound questions about the way the American research system functions. For example, in the section on the mathematics entitled, "Order, Chaos, and Pattern," we find the statement: "The interdisciplinary nature of nonlinear science has made it difficult to establish a niche for the

field in the rigidly defined disciplinary structure typical of the U.S. universities, and this is slowing the development of U.S. expertise in the field. ... Nonlinear science (is) politically fragile, so it will require special attention from policymakers." In the section on superconductivity, we find the observation: "Because science and technology in this field are strongly intertwined, progress must occur simultaneously in basic science, manufacturing processing, and engineering application." And in the section on the "Chemical Processing of Materials" it is stated: "There are several computer-vision research centers at universities and private laboratories, but additional centers should be created."

These statements, and others like them, raise basic science policy issues. In the examples just cited the issues are the adequacy of the American research university, with its departmental organization centered on the traditional disciplines, for the conduct of interdisciplinary research; the question of how best to couple tightly basic science, engineering application, and manufacturing; and the extent to which research should be supported through the funding of centers as opposed to other funding mechanisms. These statements and the issues they raise are, however, not highlighted in the report. Instead, they can be found buried in the text of the report language. Nor are they discussed further here or elsewhere in the report. This chapter, which is especially devoted to the outlook for future developments, might well be the place for a discussion of these important policy issues, and we regret that a more careful elaboration of these and similar questions have not been included in the report.

A number other improvements to this chapter on the outlook in science and technology can be suggested. It would be helpful if the basis for the selection of these particular areas of science and technology was explained. We note that, as noted in the

introduction to this portion of our analysis, they are the areas which were included in the three most recent "Research Briefings" prepared by the National Academy of Sciences at the request of the OSTP Director. We understand that the topics to be included in the research briefings were jointly selected by the OSTP and the Academy, but the basis for that joint selection is not explained. We note further that the commissioning by the OSTP of "Research Briefing" reports from the National Academy of Sciences appears to have been discontinued. In the future reports this will require a new basis for the selection of the topics and the preparation of the summaries in this part of the report. We recommend that if the use of comparable examples be used in future reports to discuss the outlook for science and technology, the basis for their selection be made explicit. We also suggest that in the absence of the Academy developed studies found in the past in the "Research Briefings," other means of obtaining the in-depth analysis needed to be pursued, and pursued early in the report preparation cycle.

The third chapter on "Federal Research and Development Programs" occupies well over half of the report. Although over 12 Federal departments and agencies are covered, the chapter is organized, not be agency jurisdictions, but into eight major subject categories: national security, space, health, energy, natural resources, environment, transportation, and agriculture.

The discussion in each category is well-organized and well-written. although occasionally overwhelming in the amount of detail included, the descriptions of the thrusts and programs is crisp and not infrequently illuminating. For example, in discussing the Department of Defense Software Initiative, the report gives a clear and concise description of the relationship between the STARS (Software Technology for Adaptable, Reliable Systems), the Ada Programming Language development effort, and the Software Engineering Institute at Carnegie Mellon University, and their individual

functions. It covers the role of software development in carrying out the missions of the military services, and it suggests the future outlook in this field of research.

On the other hand, in a few cases over-use of scientific jargon will overwhelm the non-expert. For example, under the heading "Development and Testing of Drugs for Treatment" of AIDS we encounter the following: "Phase I and II clinical trials of candidate anti-HIV immunomodulators, immune enhancement agents, and agents for the treatment of opportunistic infections are being conducted ...". In rare cases we find somewhat disingenuous statements. For example, following the heading "Engineering and Geosciences" we find: "The Engineering and Geosciences program conducts fundamental research for DOE in two distinct areas: Engineering Research and Geosciences research." But these are exceptions in an otherwise readable and solid chapter.

Thus, although lengthy, this comprehensive overview of Federal R&D programs constitutes a notable improvement in coverage of this subject over earlier reports on that topic, most notably the massive but turgid 170-page section in volume 2 of the 1980 Outlook Report. Nevertheless, we have several reservations about this extensive exposition of Federal R&D activities. One is the length. In a report intended to convey the views and policies of the Administration holding office and the outlook for the future, the emphasis, as seen by the Administration, should be on policy. A discussion of science policy in the Federal agencies must necessarily be tied closely to the objectives of each agency and hence to the R&D activities of those agencies. But the primary audience of this report are the Members of Congress, and we believe that as such the

report should seek to rebalance its content to place less emphasis on the details of agency programs, important as they are, and devote more attention to how these agency activities fit into the larger whole of Federal R&D activities. And that suggests our second point. In reviewing this chapter, and the many activities in eight major categories, we do not obtain a general sense of what the overall objectives, strategies, and policies are in each area of Federally supported research, how those policies are evolving, and how they can be expected to change further. Such a discussion would help us and our colleagues in the Congress to focus on, grasp, and further elucidate the science policy issues that properly should be the subject of Congressional attention, rather than programmatic detail.

Our final reservation about this chapter is a fundamental one. Does this lengthy description of all major Federal R&D activities belong in this report? On reflection we conclude that it does not. It constitutes a useful overview of the R&D programs throughout the Federal government, and as such can be helpful in conveying the totality of the government's R&D activities, and thus establish the entire framework within which current science policy issues are considered. Yet few of the intended readers can read through and absorb the wide range of information that is covered. Nor do we believe that this report is the place for such a compendium which can serve as a reference source for information about individual R&D programs. Finally, we are aware of the extensive effort required for the preparation of the material included in this chapter. We recommend, therefore, that in future issues of this report, this topic be omitted. If, however, the OSTP Director concludes that he wishes to include this material for other reasons, we recommend that it be the subject an appendix to the report, patterned on the format used in another important White House report, the Economic Report of the President, which has three major subdivision: the Economic Report of the President, the Annual Report of the Council of Economic Advisers, and Appendices.

The final chapter on "International Cooperation in Science and Technology," provides a detailed review of recent development in this area, with special emphasis on the role which the OSTP and its Director has played in international science cooperation activities.

The Administration's policy in this field is firmly and unequivocally stated: "The Reagan Administration has supported and encouraged international cooperation as an integral aspect of its broad science and technology policy because it recognizes the benefits to the United States of such cooperation." There follows an enumeration of those benefits. But it also notes, as a practical matter, that "while the international dimensions of each agency's science and technology program generally are designed to augment its domestic objectives, the aggregate of all such international science and technology efforts contributes significantly to accomplishing U.S. foreign policy objectives as well as national S&T objectives." Such explicit statements of Administration policy are appropriate and welcome, especially in view of their absence from other, earlier science policy reports.

Describing the chief bilateral relationships, the report covers, for example, the changing pattern of science collaboration with Japan, the reasons for that change, and the shape of the new agreement signed by the President and the Prime Minister in June 1988. Similar coverage is included for U.S. science cooperation with China, the Soviet Union, and 20 other countries in Asia, Europe, the Middle East, and the Americas. However, in one case, Czechoslovakia, the report is very brief - 6 lines - and in a number of other cases, such as Pakistan, Hungary, and Poland, the reports are highly condensed and mainly descriptive. Nevertheless, this chapter constitutes a useful review of the Administration policies, initiatives, and actions in international science cooperation.

We express two reservations that may be relevant to future reports on this subject. One is the weak discussion of the future outlook in this area. We realize the difficulty of predicting coming developments in America's science relationships with other countries and the possible sensitivity, in some cases, of discussing future trends and objectives. In spite of this we urge a somewhat stronger emphasis on the future outlook. The second question we raise is the evident overlap of this subject with another major science policy report, the annual "Science, Technology and American Diplomacy" report. Much of the descriptive material found in the present report has also, in past years, been included in the Diplomacy report. We do not suggest that the subject of international science cooperation should not be covered in both reports. We do, however, recommend that the content of the two reports be coordinated by the OSTP with a view to avoiding unnecessary redundancy.

Commenting on the report as a whole, we must note that, apart from the several statements and restatements of general, overall science policy in such areas as basic research support and international cooperation, the report is predominantly descriptive in content. It lacks any analytical review and it does not include very much discussion of science and technology in the economy and in our society as a whole. It does not discuss which research and development efforts have been successes and which have failed to succeed in accomplishing the objectives set for them.

The issues that have been the subject of debate and analysis during the time period covered by the report are legion. Some of these issues have been substantially resolved, others will continue to be discussed in the coming years. They include, for example, the proposal to make military use of the space station and the resolution of that issues with our European and Japanese partners; the debate on

"Little Science" versus "Big Science," a debate triggered most recently by the plan to build the Supercollider; and the question of whether to transition from research to action in the area of acid rain. The report omits any but the most passing references to a major responsibility of the OSTP, the question of the supply and demand of scientists and engineers, and their education.

And, finally, we note that the report studiously avoids any mention or reference to resources, dollars, or budgets. In one sense this is a welcome approach because it removes the focus of attention from that topic and allows instead a strong and concentrated focus on research and development activities themselves, their purposes, and the issues they raise. But this omission also places an unfortunate constraint on the report's discussion of the nation's R&D policy. It has often been remarked that in science policy, as in most other government fields of activity, the budget numbers reflect the priority choices made. In that sense the report's omission of any reference to the Federal science budgets also omits any discussion of the important question of science priorities, past, present, and future.

How well does the report fulfill the statutory prescription for the report. In its present form, as we noted above, the statutory prescription for the content of the report asks that the following areas be covered in the report (42 U.S.C. 6615):

> (1) a statement of the President's current policy for the maintenance of the Nation's leadership in science and technology;
>
> (2) a review of developments of national significance in science and technology;
>
> (3) a description of major Federal decisions and actions related to science and technology that have occurred since the previous such report;

(4) a discussion of currently important national issues in which scientific or technical considerations are of major significance;

(5) a forecast of emerging issues of national significance resulting from, or identified through, scientific research or in which scientific or technical considerations are of major importance; and

(6) a discussion of opportunities for, and constraints on, the use of new and existing scientific and technological information, capabilities, and resources, to make significant contributions to the achievement of Federal program objectives and national goals.

We have noted above, that in certain specific areas this most recent version of the Report is not as explicit and inclusive as we expect and in a few other areas its coverage is too detailed and lengthy. Nevertheless, it is our conclusion that this edition of the Report substantially fulfills the statutory mandate and the legislative intent for its content.

We earlier expressed our concerned that in all too many cases periodic reports have tended to become routinized. Responsibility for their preparation has frequently been delegated to relatively low levels in the responsible agency and their content has tended to become repetitive and bland. The Report and Outlook has not, at this point in time, achieved that unfortunate distinction. The repeated changes in the scope, responsibility, and frequency have no doubt contributed to the fact that the OSTP Director himself and his Deputy have, in various degrees, been personally involved in shaping the content of the reports.

We expect that the statutory prescription for the Report and Outlook its content, format, and frequency has now reached a stable configuration. We, ourselves, would only with the greatest reluctance agree to further changes in the now existing statutory prescription for the report. This could potentially mean that this report might fall prey to the same routinization that has befallen other periodic reports. We expect, however, the OSTP Director to be the principal author of this report on behalf of the President. We cite, in this connection, as we have more than once in our discussion of the science policy reports, the example of the Economic Report of the President which has avoided this routinization, and which, has achieved a high level of credibility and respect as a statement of the Administrations over-all economic policy.

Furthermore, while we recognize the continuing need to have the assistance of the NSF staff in this endeavor, we believe that the principal responsibility for the preparation, shaping and editing of the report must rest with the OSTP Director and his staff. Our earlier recommendation that the staff preparing the Science and Engineering Indicators report be transferred from the NSF to the OSTP would make additional expertise and staff support available within the OSTP for the drafting of the report.

We specifically oppose the redelegation by either the OSTP or the NSF to an outside contractor or grantee of responsibility for the actual preparation of parts or all of the actual report, a practice that occurred with unfortunate results in the case of both the Five Year Outlook report and the Science, Technology and American Diplomacy report in earlier years.

Since the OSTP was established in 1976, 18 editions of these statutorily mandated reports have been submitted to the Congress. The most recent edition of the report is, beyond doubt, among the best. The introductory chapter comes close to providing what President Eisenhower's Science Advisor, Dr. James Killian suggested

the OSTP Director should cover: "A statement of what he thinks are some of the acute and current problems that they (the President and Congress) should be aware of." We believe that future Science and Technology Report and Outlook editions, especially if significantly reduced in length, can make a strong and significant contribution to U.S. science policy in the legislative and executive branches of the Federal government.

Report on Activities of the O.S.T.P.

When the White House Science Office was established on a statutory basis in 1976, the Congress did not only ask for the two broad, policy-oriented reports, the Science and Technology Report and the Five Year Outlook on Science and Technology. It also included in the Act a provision calling for a report on "the overall activities and accomplishments of the Office" itself. This report is to be provided "at least once a year."

It was not intended that this should be an extensive, elaborate report. Rather, this was visualized as a brief report, outlining the issues which had been taken up by the O.S.T.P., the actions taken, and the major, internal, managerial developments such as studies conducted, committees established, major personnel changes, and O.S.T.P.'s financial report. The statutory language provided that this report should be submitted to the President "pursuant to" the section of the act calling for the President to prepare and submit the annual Science and Technology Report.

Prior to 1982 no such report was submitted to the Congress either by the President or the OSTP, and neither as a separate report or as part of the annual Science and Technology Report. As a result, when a review of the OSTP science policy reports was conducted in 1981-82, by both the Executive Branch and the Congress, action was

taken to strengthen somewhat the provision governing the annual OSTP Activities report. In the section of the 1976 Act governing this report, the words "and the Congress" were inserted so that the provision reads as follows, a wording that is still in effect: "the Director shall ... report at least once a year to the President and the Congress on the overall activities and accomplishments of the Office, pursuant to section 209 (the Science and Technology Report) of this Act." This amendment to the 1976 OSTP organic Act became law through the enactment of the "Reports Elimination Act of 1982" which, as described above, also made changes in the other OSTP reporting requirements.

In the years since the establishment of the OSTP in 1976, a source of much of the information required in the OSTP Activities Report has, in fact, been available. It has appeared in the annual testimony presented to the Appropriation Committee in explanation and justification of the OSTP budget request for the next fiscal year. That statement, which is almost always presented personally to the Appropriations Subcommittee on H.U.D. and Independent Offices in each House by the OSTP Director, contains both a description of the issues dealt with by the Office, and, in the accompanying budget documents, most of the specifics regarding the management of the Office. Thus, most of the information required for this report is already compiled, although in a slightly different format.

Since the two policy report prepared by the OSTP under the original Act were combined into a single "Science and Technology Report and Outlook," two editions have been submitted, one in January 1986, and one in January 1989. In both reports, and especially in the 1989 edition, there is found a reasonably extensive, although scattered description of the activities and accomplishments of the OSTP. Both reports give particular emphasis to the work of the Federal Coordinating Council for Science, Engineering and Technology,

an integral part of the OSTP which has as its chairman the OSTP Director. But other aspects of the OSTP's work and activities, such as, for example, the activities of the White House Science Council and the administrative and financial aspect of the operation are not covered.

Based on the above consideration, and the desire of the Congress, as currently expressed in the statute, to receive such a report annually, we recommend that the OSTP Director develop a format for this report and submit it to the Congress each January. Because the combined Report and Outlook now is submitted only every other year, it is not a suitable vehicle for the submission of the OSTP Activities report. We further recommend that this report be comparable in content and length to the OSTP Director's statement and associated submissions to the Committee on Appropriations.

Timeliness of Submission of the Science Policy Reports.

When prescribing in the several statutes the various science policy reports and their content, the Congress also, in most cases, has laid down specific due dates. In each case these dates are early in the year, mostly in January, and in one case February 15th. The purpose of prescribing such submission dates for the science policy reports early in each year is to make the reports most relevant and useful in the Congressional cycle of policy making and budget review. When the reports are received as each session commences, at about the same time as the President's budget proposals are sent to the Congress, the relevant committees and interested members can review them before the detailed, subcommittee-level hearings on individual agency budget begin.

The record of timely submission of the several science policy reports is uneven, but generally dismal. Some of the report series such as the report on "Science, Technology and American Diplomacy" have generally been 1-3 months late but not more and have not missed any submission altogether. Others, notably the Five Year Outlook Updates have been excessively late and have missed submissions altogether. The specifics for each report series are shown in Table 27-51 and are summarized below for the thirteen years 1977-1989.

The Aeronautical and Space reports has once been on time: in 1981 when it arrived two weeks before the January 31 due date. For the other years it has always been at least 7 months late and once, in 1985, a full 12 months late.

The Science and Technology Report was, under the Science Policy Act of 1976, due initially on February 15, 1978. It was 7 months late. The second report was 21 months late, or, if we regard the report due in 1979 as having been skipped, 9 months late. The third report arrived two months after the second, and was thus 11 months late, or, again under the assumption of the 1979 report having been omitted, was actually a month early. The fourth and fifth reports were respectively 14 and 19 months late, or under the same assumptions 2 and 7 months late.

Beginning in 1983 the Science and Technology report was merged with the Outlook report and made biannual, and due in odd numbered years. Thus the first combined report was due on January 15th, 1983. Instead, on January 22, 1986, an even numbered year, the first of the biennial reports was submitted, unfortunately using the incorrect title "Biennial Science and Technology Report to the Congress 1983-1984." No report were received by the Congress for 1985 and 1987.

Table 27-51

Due Dates and Submission Dates of
Science Policy Reports

Due Date		Report Title	Report Number	Report Submission Date	Late
1977	Jan 31	Aeronautical and Space Report	1976	7 Sep 77	7mo.
	Aug 12	Five Year Outlook	1st	none rec'd	
1978	Jan 31	Aeronautical and Space Report	1977	14 Sep 78	7mo.
	Feb 15	Science and Technology Report	1st	27 Sep 78	7mo.
	Aug 12	Five Year Outlook Update	2nd	none rec'd	
1979	Jan 31	Aeronautical and Space Report	1978	5 Sep 79	7mo.
	Feb 15	Science and Technology Report	2nd	12 Nov 80	21mo.
	Aug 12	Five Year Outlook Update	3rd	none rec'd	
1980	Jan 31	Aeronautical and Space Report	1979	12 Nov 80	9mo.
	Feb 15	Science and Technology Report	3rd	19 Jan 81	11mo.
	Aug 12	Five Year Outlook Update	4th due		
			1st rec'd	12 Nov 80	mo.
	Jan 31	Science, Techn and Am Dipl	1st	12 Nov 80	9mo.
1981	Jan 31	Aeronautical and Space Report	1980	15 Dec	10mo.
	Feb 15	Science and Technology Report	4th	21 Apr 82	14mo.
	Aug 12	Five Year Outlook Update	5th due		
			2nd rec'd	no date	on
	Jan 31	Science, Techn and Am Dipl	2nd	16 Jan 81	time
1982	Jan 31	Aeronautical and Space Report	1981	8 Sep 82	7mo.
	Feb 15	Science and Technology Report	5th	3 Oct 83	19mo.
	Aug 12	Five Year Outlook Update	6th due		
			3rd rec'd	2 Mar 82	mo.
	Jan 31	Science, Techn and Am Dipl	3rd	2 Mar 82	2mo.
1983	Jan 31	Aeronautical and Space Report	1982	17 Oct 83	9mo.
	Jan 15	Science & Techn Report Outlook	1st due	22 Jan 86	36mo.
	Jan 31	Science, Techn and Am Dipl	4th	11 Jul 83	5mo.
1984	Jan 31	Aeronautical and Space Report	1983	24 Sep 84	8mo.
	Jan 15	Science Indicators Report	1982	26 Jan 84	11day
	-	Five Year Outlook Update	4th	Sep 84	-
	Jan 31	Science, Techn and Am Dipl	5th	21 Feb 84	21day
1985	Jan 31	Aeronautical and Space Report	1984	22 Jan 86	22day
	Jan 15	Sci & Techn Rept and Outlook	2nd	none rec'd	
	Jan 31	Science, Techn and Am Dipl	6th	20 Mar 85	2mo.
1986	Jan 31	Aeronautical and Space Report	1985	n.d.	
	Jan 15	Science Indicators Reports	1985	22 Jan 86	7day
	Jan 31	Science, Techn and Am Dipl	7thqq	14 Apr 86	2mo.

					on
1987	Jan 31	Aeronautical and Space Report	1986	21 Jan 87	time
	Jan 15	Sci & Techn Rept and Outlook	3rd	none rec'd	
	Jan 31	Science, Techn and am Dipl	8th	17 Jun 87	5mo.
1988	Jan 31	Aeronautical and Space Report	1987		late
	Jan 15	Sci. and Eng. Indicators - 1987	1987	14 Jan 89	on time
	Jan 31	Science, Techn and Am Dipl	9th	5 Apr 89	2 mo.
1989	Jan 31	Aeronautical and Space Report	1988		late
	Jan 15	Sci and Techn Rept and Outlook	4th	14 Jan 89	on time
	Jan 31	Science, Techn and Am Dipl	10th	5 Apr 89	2 mo

The Five Year Outlook was, according to the Act, due within the first year of operation of the Office of Science and Technology Policy. Taking the swearing-in day of the first OSTP Director, Dr. H. Guyford Stever, on August 12, 1976, as the starting point for OSTP the first Outlook report would have been due on August 12, 1977. It was in fact received by the Congress on November 12, 1980, and it was thus 3 years and 3 months late. Disregarding this initial delay, subsequent annual Outlook Updates were in fact received in 1981 and 1982, although as noted in the earlier analysis, they were not in fact updates of the first report. The last separate Outlook report, the short Academy report, became available in September 1984, two years after the Outlook report had, by statute been combined with the Science and Technology Report, and a year and a half after the first edition of the new, combined report had been submitted to the Congress. No further Outlook reports or updates have been submitted.

The Science Indicators report which became a statutory report in the 1982 Act, was, under that Act, due on January 15th in even numbered years. In the first two years since then when it has been due it has been submitted almost on time. In 1984 it was 11 days late and in 1986 it was 7 days late. However, in 1988 it was received on April 18th making over 3 months late. In the first two instances the Committee on Science and Technology was able, in its annual posture hearings with the Science Advisor to the President to consider the content and implications of the Science Indicators report, as intended.

The Science, Technology and American Diplomacy Report which was first submitted in 1980, has had an uneven record of timely submissions. It was on time in 1981, and just 3 weeks late in 1984. But in most other years it has been 2 months late, and in 1983 and 1987 it was 5 months late. A further delaying factor is that this report, unlike most other reports from the Executive branch is not printed by the authoring agency. Rather, following the submission of the typewritten copy to the Congress, it is printed as a joint committee print by the House committees on Foreign Affairs on and Science, Space, and Technology. This additional step consumes additional time before the report is distributed more widely to the Members of Congress and the wider general public, although even more extensive delays has been experience with reports printed by the Executive Branch agencies.

The Research Briefing Reports

One report series which is closely related to the statutory science policy reports, but which is not itself statutorily mandated for submission to the Congress, must be mentioned here. This is the Research Briefing reports.

Those reports were, during the 6-year period 1982-1987, prepared by the National Academy of Sciences at the request of the Director of the OSTP. They consist of a group of in-depth reviews of a small number of fields within science and engineering, with emphasis on the promise which further research in each field could yield in terms of both scientific discoveries and technological pay-off.

This report series was initiated as the result of discussions between the Academy leadership and the OSTP Director. The first report was issued in 1982, and reports have been prepared each year since through 1987. The specific science and engineering topics to be covered in each report is the subject of negotiation between the

OSTP, the Academy, and the NSF which is the contracting agency for the reports. The criteria used in the selection of the topics include 1) unusual promise for rapid technological advances or scientific breakthroughs, 2) urgency of making further progress in the interest of U.S. industrial competitiveness, and 3) particular interests of senior science policymakers in government or leading personalities outside government.

The Topics covered in these reports are shown in Table 27-52.

Table 27-52

Topics Covered in the Annual Research Briefing Reports

1982	Mathematics
	Atmospheric Sciences
	Astronomy and Astrophysics
	Agricultural Research
	Neurosciences
	Materials Science
	Human Health Effects of Hazardous Chemical Exposures
1983	Selected Opportunities in Chemistry
	Cognitive Science and Artificial Intelligence
	Immunology
	Solid Earth Sciences
	Computers in Design and Manufacturing
1984	Computer Architecture
	Information Technology In Precollege Education
	Chemical and Process Engineering for Biotechnology
	High Performance Polymer Composites
	Biology of Oncogenes
	Interaction Between Blood Vessels (Incl Biology of Atherosclerosis)
	Biology of Parasitism
	Solar Terrestial Plasma Physics
	Selected Opportunities in Physics
1985	Remote Sensing of the Earth
	Pain and Pain Management
	Biotechnology in Agriculture
	Weather Prediction Technologies
	Ceramics and Ceramic Composites
	Scientific Frontiers and the Superconducting Supercollider
	Computer Vision and Pattern Recognition

1986	Science of Interfaces and Thin Films Decision Making and Problem Solving Protein Structure and Biological Function Prevention and Treatment of Viral Diseases
1987	Order and Patterns: Aspects of Nonlinearity Biological Control and Managed Ecosystems Chemical Processing of Materials and Devices for Information Storage and Retrieval High Temperature Superconductivity

Their strength is that, through the mechanism of an Academy convened Committee, they bring to bear on the analysis of each topic the best experts from the American scientific and engineering communities. Their conclusions and recommendations therefore carry considerable weight. But these reports also have notable weaknesses. Because the membership of the Academy committees consists of researchers who are active in each specialized field, they naturally have an interest in making recommendations that serve to advance that field. Although we understand that an effort is made to be dispassionate and objective, the factor of enthusiasm and advocacy cannot be entirely discounted.

A broader deficiency of these reports is that they do not address the obverse question of identifying those fields and topics in science and engineering which should receive less emphasis and reduced funding. Using the reverse criteria from those now being applied, what are those fields and topics that 1) have been exhausted and show little promise of further, important advance, and 2) those with little potential to produce results that have practical technological payoff in the nation's economy? It would be highly useful to have the Academies views on these fields of science and engineering as well.

The relevance of these reports to our own concerns is clear. They can yield results that are applicable to the planning and budgeting for the Federal government's science and technology programs, and therefore what should be included in the Annual Science and Technology and Outlook reports. In fact, the content of the Research Briefing reports have found their way into the Annual Science and Technology reports, the Five Year Outlook, and the combined Science and Technology Report and Outlook reports in the past.

These reports were initiated by the officers of the Executive Branch and are primarily for their use. We therefore limit our views with respect to them to an expression of support for their continuation or resumption to the extent that the OSTP Director and others find them useful in the conduct of their offices. But we make no specific recommendations with respect to their frequency or content.

Congressional Response to Science Policy Reports

The Congress has steadily expressed its strong interest in the conduct of policy studies with a longer term perspective. It has repeatedly reinstated the statutory requirement for the preparation and submission of reports based on such studies. But, we must note, it has been less than steady and strong in responding to these reports through their formal review and utilization.

Individual members have found the reports of great interest and have used them in their legislative and oversight work. The data, analysis and recommendations have not infrequently been the subject of discussion in budget authorization and oversight hearings. But in terms of specific focused analysis hearings targeted on the reports and the issues they raise, the Congressional response has been intermittent.

Hearings on Science Policy Reports. We show in Table 27-53 the science policy reports submitted and the hearings held in our own committee which were directly related to the reports. Our examination of the science policy activities and publications of all committees in the House and Senate did not identify any other hearings specifically held to review the science policy reports.

Table 27-53

Hearings on Science Policy Reports in the Committee on Science, Space, and Technology

87th Congress (1961-62)	-
88th Congress (1963-64)	-
89th Congress (1965-66)	-
90th Congress (1967-68)	-
91st Congress (1969-70)	-
92nd Congress (1971-72)	Hearing on Fourth Annual Report of the National Science Board
93rd Congress (1975-76)	-
94th Congress	Hearing on Annual Report on Federal R&D Programs- FY 1976 Hearing on Science Output Indicators Print: Review of the Annual Report on Federal R&D Programs - Fiscal Year 1976
95th Congress (1977-78)	Print: Science & Technology Report, 1978

96th Congress (1979-80)	Hearing on Five Year Outlook Report on Science and Technology
	Print: Analysis and Commentary on the First Annual Report on Science and Technology
	Print: Science, Technology and American Diplomacy (1st Annual Report to Congress)
97th Congress (1981-82)	Print: Science, Technology and American Diplomacy (2nd Annual Report to Congress)
98th Congress (1983-84)	Hearing: Oversight Review of the Five-Year Outlook Report on Science and Technology
	Print: Science, Technology and American Diplomacy (3rd Annual Report to Congress)
	Print: Science, Technology and American Diplomacy (4th Annual Report to Congress)
99th Congress (1985-86)	--
100th Congress (1987-88)	--

This record shows that in the 16 years since 1972, when the first hearing specifically devoted to one of the science policy reports was held, a total of 4 other such hearings have been held, or on the average one hearing every 3 years. We recognize that a hearing devoted solely to a particular report is a comparatively major event. Other forms of bringing such reports to the attention of the Members of Congress have been used more extensively, including discussion of the issues raised by such reports in other hearings and in other forums, briefings on the report contents and recommendations for individual members or groups of members and for staff members and groups, and the distribution of reports to Member offices. We note

also that in the same time period two analytical reviews of the contents of two of the annual Science and Technology Reports were performed at the request of our Committee by the Congressional Research Services of the Library of Congress. Both of these studies were published as Committee Prints.

Nevertheless, we believe that more sustained and systematic attention to these science policy reports can and should be given by the committees of the Congress in order to provide the broader and longer term perspective to the intense consideration which is given to the annual budget request and to individual legislative proposals. In the following section we discuss an approach through which to achieve such sustained and systematic attention on a periodic basis, while at the same time maintaining the involvement of senior science policy officers and legislators in the executive and legislative branches.

Posture Hearings with the Director of the OSTP. Although the record of the Congress has been spotty in paying formal attention to the various science policy reports, it has developed an alternate mechanism that serves a closely related purpose. This is the annual full Committee posture hearings in late January or early February with the Director of the Office of Science and Technology Policy as the sole witness. That annual hearing was initiated by the House Science, Space, and Technology Committee in 1983 and has been held each year since. As can be seen in Table 27-54, the first OSTP Director in the Reagan Administration testified at this posture hearing in 1983, 1984, and 1985. The Acting Director, Dr. John McTague testified in 1986 following Dr. Keyworth's departure from government service, and in 1987 and 1988 Dr. William Graham testified as the OSTP Director. The 1989 hearing with Dr. Graham was scheduled but was postponed indefinite's.

The occasion for this posture hearing is the Federal budget for research and development which is being submitted by the President at about the same time, and which covers the fiscal year beginning the following October. The hearing serves to provide an overall review of the budget proposals for science and technology, and, equally significant, a discussion of the broader assumptions, goals, and policies on which the R&D budget recommendations are based. Longer term trends in the funding of development and research, basic and applied, and by agency and overall, new initiatives in the development of big science research facilities, developments in science and science policy on the international scene, and more specific topics such as the status of the space program are discussed in these hearings. Thus the annual posture hearings have come to touch on many of the topics which are also expected to be covered by the several science policy reports.

Table 27-54

House Science, Space, and Technology Committee
Annual Posture Hearings with the Director
Office of Science and Technology Policy

Number	Witness	Date
1st	Dr. George A. Keyworth, Jr. Director, OSTP	3 Feb 1983
2nd	Dr. George A. Keyworth, Jr. Director, OSTP	1 Feb 1984
3rd	Dr. George A. Keyworth, Jr. Director, OSTP	1 Feb 1985
4th	Dr. John P. McTague Acting Director, OSTP	6 Feb 1986
5th	Dr. William R. Graham Director, OSTP	28 Jan 1987
6th	Dr. William R. Graham Director, OSTP	23 Feb 1988
7th	Pending	--

Such posture hearings already take place in the fields of defense and economic policy. In the defense field, from which the term "posture hearing" is borrowed, the Secretary of Defense presents an overview to the Armed Services Committees at the beginning of each year. In the economic field the Chairman of the Federal Reserve Bank twice a year presents a discussion of the current situation and future trends in national and international economics. We recommend that the R&D overview or posture hearing serve as an occasion for the presentation by the OSTP Director of the science policy report due that year, either the Science and Engineering Indicators report or the Science and Technology Report and Outlook.

Conclusions and Recommendations Concerning Science Policy Reports.

Several points will be clear from the above discussion of the science policy report structure. One is that the Congress has, and in our view will continue to have a strong interest in obtaining such science policy reports. A second point is that with a few exceptions, the several offices, agencies and departments of the Executive Branch have floundered in making such reports available to the Congress on a consistent and timely basis. The third point is that, in part because of the irregular submissions of these report, the Congress has failed to respond to the presence or lack of presence of these reports, and has not indicated in a firm, unequivocal, and repetitious manner what its concerns and needs are in this area.

We reaffirm the view that the Federal Government must, on a continuing basis, review the nation's overall science policy. As a basis for that review, the preparation and examination of the several science policy reports should serve as an important building block in that endeavor. We recommend that these reports be strengthened to emphasize the over-all Federal and national science policy issues and that they be written and analyzed with particular regard for the longer term effects and needs of U.S. science policy.

RECOMMENDATIONS

We summarize below the recommendations made throughout this chapter on Reports to the Congress:

RECOMMENDATION 27-1

We recommend that the Congress, when requesting reports from Federal agencies, either by law or through legislative report language, give preference to one-time report over periodic reports.

RECOMMENDATION 27-2

We recommend that for all new periodic reports requested by the Congress, an automatic termination clause or Sunset provision taking effect after 6 years be included, and that existing periodic reports be reviewed for termination after a comparable or shorter time period.

RECOMMENDATION 27-3

We recommend that the current, sporadic reporting requirements covering research facilities be expanded to cover all Federal agencies, that they cover both intramural and extramural research facilities, and planning, acquisition, and operating plans and costs, and that the format of such reports be standardized.

RECOMMENDATION 27-4

We recommend that the Federal agencies supporting extramural research or intramural research or both be required to submit quarterly reports on all scientific research projects and research support grants and contracts initiated by them.

RECOMMENDATION 27-5

We recommend that audit reports, both financial audits and performance audits, be used on a increasing scale as part of the conduct of Congressional oversight of Federal science programs.

RECOMMENDATION 27-6

We recommend that restraint be observed in imposing one-time report requirements on the departments and agencies of the Executive Branch, and that each committee limit its requests for such reports to an average each year of 5 such reports, and only in exceptional cases ask for more than 8 reports in a single year.

RECOMMENDATION 27-7

We recommend that the balance between a small number of highly important, one-time report requests made through legislative enactment and the much larger number of report requests made through legislative report language be continued.

RECOMMENDATION 27-8

We recommend that the "fully and currently informed" doctrine be instituted by law only in exceptional cases where the closest Congressional supervision of a science agency is required, and we find no need for such a requirement now or in the foreseeable future.

RECOMMENDATION 27-9

We recommend that those committees that place emphasis on obtaining the information required through reports, establish some form of centralized tracking system by which due dates can be monitored and the agencies be reminded of reports due and overdue.

RECOMMENDATION 27-10

We recommend that the departments and agencies, working closely with the committees of the Congress, substantially improve their performance in the preparation and timely submission of the report requested for use by the Congress.

RECOMMENDATION 27-11

We recommend that the content of the "Science and Technology Report and Outlook" due from the Office of Science and Technology Policy in January 15th in each odd-numbered year be changed to reduce or eliminate the extensive, descriptive portions, and that the report instead consist of a short 30-40 page statement of present and future policy direction reflecting the current administration's view.

RECOMMENDATION 27-12

We recommend that the Office of Science and Technology Policy be required to report annually on the evolving supply and demand situation for scientific and engineering manpower, and the current and future science and engineering education needs of the nation.

RECOMMENDATION 27-13

We recommend that responsibility for the preparation and submission of the "Science and Engineering Indicators Report" due on January 15th in each even-numbered year, be transferred to the Office of Science and Technology Policy together with the staff group at the National Science Foundation now preparing the report.

RECOMMENDATION 27-14

We recommend that the OSTP Director submit the Annual OSTP Activities report in January of each year and that a suitable format for a concise report to meet this requirement be developed.

RECOMMENDATION 27-15

We recommend that those committees in the House and Senate with extensive jurisdiction of Federal research and development activities conduct an annual R&D Posture hearing each January at the time of the submission of the President's budget proposals, and that the science policy report due that year be presented and reviewed at that hearing.

RECOMMENDATION 27-16

We recommend that the Congress and the President, when the need for a particularly important study and report arises, make use of the statutory authority to request such studies from the National Science Board.

NOTES TO CHAPTER 27

pp. 9 The GAO survey of periodic Congressional reports is found in Requirements for Recurring Reports to the Congress, A Directory Issues by the Comptroller General, General Accounting Office, Washington, D.C. GAO/AFMD-85-4, 1985. The entire system of legislatively mandated reports to the Congress - not just the science reports - has been the subject of

several studies, most notably by the General Accounting Office (GAO). An initial 1973 study by the GAO was performed at the request of the House Government Operations Committee, which expressed its concern about the volume and variety of recurring reports. The GAO recommended that legislation be introduced to eliminate and modify some of the statutory reporting requirements.

The Budget Act of 1974 directed the Comptroller General, as head of the GAO, the "assist the committees in developing their information needs including such needs expressed in legislative requirements ..." and to monitor the recurring reporting requirements and recommend improvements. In 1980, the 1973 study was updated by the GAO and a separate study entitled, "Using Congressional Reporting Requirements in the Budget Process," was issued.

Then, in 1981, also in response to the Budget Act mandate, the GAO came forward with specific recommendations in a report entitled: "A Systematic Management Approach Is Needed for Congressional Reporting Requirement." The GAO's overall conclusion was that "those reporting requirements are not being managed in a way that achieves the objectives for which they were created." The GAO recommended that a systematic management approach be developed to insure that reports are timely, that they be distributed to

those who can make the most productive use of them, and that both the reporting requirements and the resulting documents reflect the needs of the Congress in its decision making process. The inventory of reporting requirements issued by the GAO in 1985 referred to above, was also prepared under authority of the Budget Act. These GAO studies and reports have been helpful by calling attention to the magnitude and diversity of the Congressional reporting system.

pp. 49 The GAO reports on Congressional reporting requirements have to date included the following titles: "Usefulness to the Congress of Reports Submitted by the Executive Branch," U.S. General Accounting Office, B-115398, October 26, 1973; "Analysis of Requirements for Recurring Reports to the Congress," U.S. General Accounting Office, PAD-80-72, April 18, 1980; "Using Congressional Reporting Requirements in the Budget Process," U.S. General Accounting Office, PAD-81-24, December 18, 1980; and "A Systematic Management Approach Is Need for Congressional Reporting Requirements" U.S. General Accounting Office, PAD-82-12, November 25, 1981. The GAO inventory of recurring Congressional Reports was published under the Title: "Requirements for Recurring Reports to the Congress - A directory issued by the Comptroller General" U.S. General Accounting Office, GAO/AFMD-85-4 (790 p), 1985.

pp. 58 The 1982 Reports Elimination Act was originally introduced in the House on March 31, 1982 as H.R. 6005. The legislative report describing the committee's hearings and subsequent actions was issued September 14, 1982 as House Report 97-804.

pp. 91 The quotations from legislative reports expressing various degrees of concern and unhappiness with late reports were taken from the following documents: The statement about the NASA report on technology transfer and applications: House Report 96-52, NASA FY 1980 Authorization, p.12;

The statement about the NSF report on Community College programs: House Report 98-642, NSF FY 1986 Authorization, p. 10;

The statement about the NASA report on NASA's Long Range Program Plan: House Report 95-67, NASA FY 1978 Authorization, p. 17;

The statement about the NSF report on the Obligation of NSF Education Funds: House Report 99-212, HUD Independent Offices FY 1986 Appropriations, p.50.

The statement about the NASA report on Orbiter Procurement Costs: Senate Report 97-449, NASA FY 1983 Authorization, p. 11

The statement about NASA's report on Technology Readiness for an Advanced Supersonic Transport: House Report 95-973, p. 9

The statement about NSF's Report on Science Education Programs: House Report 98-803 HUD Independent Offices FY 1985 Appropriations, p. 40 and the Statement about NASA's report on the Purchase of a Reconnaissance Aircraft: House Report 96-926, HUD Independent Offices FY 1981 Appropriations, p. 65.

pp. 94 A detailed analysis and discussion of the use of the "fully and currently informed" clause in the case of the Atomic Energy Commission and the Joint Committee on Atomic Energy can be found in the study The Joint Committee on Atomic Energy: A Study in Fusion of Governmental Power by Harold P. Green and Alan Rosenthal which was published by the National Law Center of the George Washington University in Washington, 1961. Our summary of the history of these developments is based especially on the section "Access to Information" at pages 108 to 127.

pp. 102 The quotation from the Hoover Commission Report is from: Commission on Organization of the Executive Branch of the Government, Federal Research, March 1949, House Document No. 140, 81st Congress, 1st Session, p. 48

pp. 103 President Truman's statement quoted here is taken from the President's Message to the Congress transmitting the first annual report of the National Science Foundation. Mimeographed copy of these message included with the submission the first annual NSF report in Committee files.

pp. 106 The statutory mandate for the science policy reports by the National Science Board appears in Public Law 90-407, Section 4(g). The associated report language explaining the intended content of the Board's report is found in House Report No. 34, 90th Congress 1st Session, March 6, 1967, Amending the National Science Foundation Act of 1950 to Make Improvements in the Organization and Operation of the Foundation, at pages 21-22.

pp. 113 The hearings that led to the Science Policy Act of 1976 were published as follows: In the Senate the hearings were held jointly before 3 committee, the Special Subcommittee on National Science Foundation of the Education and Labor Committee, the Special Subcommittee on Science, Technology, and Commerce of the Commerce Committee, and the Committee on Aeronautical and Space Sciences. They took place on October 28 and on November 4th and 12th, 1975 and were published by the Labor and Public Welfare Committee under the title "National Policies and Priorities for Science and Technology Act, 1975." The Killian quotation is taken from page 119, Academy President Handler's comments appear on pages 56-58, and Dr. H. Guyford Stever's statement on the Administration's position in found on page 211. The exchange between Vice President Rockefeller and Chairman Kennedy is found in the hearing volume "Proceedings of the White House Science Advisory Conference, 1975", Committee Print, Senate Labor and Public Welfare Committee, June 6, 1975, at page 30-31.

The House legislative report was House Report 94-595,

dated October 29, 1975, and the statement quoted is taken from page 13 of that report.

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APPENDIX

List of Hearings and Background Studies
Published by the Task Force of Science Policy

Agenda - 1984

An Agenda for a Study of Government Science Policy

Hearings - 1985

Volume 1	Goals and Objectives of National Science Policy
Volume 2	The Role of the Research Museums
Volume 3	The Relationship of Industrial Basic and Applied Research to Government Science Policy
Volume 4	International Cooperation in Big Science: High Energy Physics
Volume 5	The Future of Science
Volume 6	The Federal Government and the University Research Infrastructure
Volume 7	International Cooperation in Science
Volume 8	Science in the Political Process
Volume 9	Scientists and Engineers: Supply and Demand
Volume 10	The Impact of the Information Age on Science
Volume 11	The Role of the Social and Behavioral Sciences
Volume 12	Science in the Mission Agencies and Federal Laboratories
Volume 13	British Science Evaluation Methods

Hearings - 1986

Volume 14	Demographic Trends and The Scientific and Engineering Work Force
Volume 15	Science and the Regulatory Environment
Volume 16	Research Funding Mechanisms
Volume 17	Research Project Selection
Volume 18	National Research Funding Levels
Volume 19	Policies for Biomedical Research
Volume 20	Research Funding as an Investment
Volume 21	The Role of the National Academies
Volume 22	Research and Publications Practices
Volume 23	Report of the White House Science Council Panel on the Health of U.S. Colleges and Universities
Volume 24	Scientific Research and University Finances

Background Studies

Volume 1	A History of Science Policy in the United States, 1940-1985
Volume 2A	Bibliography of Studies and Reports on Science Policy and Related Topics, 1945-1985
Volume 2B	Bibliography of Reports by the National Academy of Science, 1945-1985
Volume 3	The Nobel Prize Awards in Science as a Measure of National Strength in Science
Volume 4	World Inventory of "Big Science" Research Instruments and Facilities
Volume 5	The Impact of Information Technology on Science
Volume 6	Research Policies for the Social and Behavioral Sciences
Volume 7	Expertise and Democratic Decisionmaking: A Reader
Volume 8	Science Support by the Department of Defense
Volume 9	Demographic Trends and the Scientific and Engineering Work Force
Volume 10	The Regulatory Environment for Science
Volume 11	Alternative Mechanisms of Research Support: Inventory and Assessment
Volume 12	Research Funding as an Investment: Can We Measure the Returns?

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