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ABSTRACT

This report presents information summarizing changes in research and development resulting from the revised budget for the fiscal years 1981 and 1982 transmitted to the Congress by the President of the United States in March, 1981. Adjustments in the funding of research and development are summarized by major R&D agency, and Federal expenditures are identified for: (1) the conduct of research and development; (2) the conduct of basic research; (3) the support of research and development at universities; and (4) research and development facilities. (CS)

Revised Special Analysis of the R&D Component of the 1981 and 1982 Budgets of the U.S. Government

The Energy and Science Division of the Office of Management and Budget has prepared a revision of this R&D Special Analysis, which analyzes the overall R&D impact of the revised FY 1982 budget transmitted by the President to Congress on March 10, 1981. Since this analysis will not be published by the U.S. Government Printing Office, the Division of Science Resources Studies, National Science Foundation, is distributing it to regular recipients of its publications.

Research and Development
Revisions to the Fiscal Years 1981 and 1982 Budgets
March 1981
(Prepared by the Energy and Science Division,
Office of Management and Budget)

On March 10, 1981, the President transmitted to the Congress a revised budget for the fiscal year 1982 incorporating also proposed changes for the fiscal year 1981. The revised budget has led to significant adjustments in the funding of research and development. This analysis summarizes the changes by major R&D agency and separately identifies Federal expenditures by agency for:

-- the conduct of research and development;

-- the conduct of basic research;

-- the support of research and development at universities; and,

-- research and development facilities.

This analysis revises the data included in Special Analysis K: Research and Development that was published as part of the January budget for the fiscal year 1982.

OVERVIEW

The March 10 revisions have been guided by budget and program priorities and criteria applied across all Federal programs. Those that particularly affected decisions on budgeting for R&D are that:

-- The Nation's defense capabilities must be rebuilt.

-- Sound economic criteria must be applied to economic subsidy programs.

-- Fiscal restraint must be imposed on programs that are in the national interest but are lower of priority than the national defense and safety net programs. (Safety net programs refer to income security measures to protect the elderly, unemployed, and poor as well as veterans.)

The application of these priorities and criteria to the funding of R&D has resulted in:

-- A significant increase in the R&D programs of the Department of Defense.

-- Significant decreases in "civilian" R&D programs of an economic subsidy nature, such as those in DOE and DOT, where the Federal Government should not fund R&D with near term pay-off but limit its role to long-term, high-risk, but high-potential programs that the private sector is not likely to support in the national interest.

In addition, it should be noted that private investment in civilian R&D and in the application of innovative technologies in new processes and plants will be encouraged by the plans and proposals of this Administration to reduce inflation, lessen the burden of regulation, and provide tax incentives for investment--including provision for accelerated depreciation.

-- Reduction in the level of increases proposed in January for long-term R&D. Although such R&D is appropriate for Federal support, the large increases in the January budget for agencies such as NASA and the National Science Foundation are clearly inconsistent with the urgent need for fiscal restraint.

One area of traditional Federal responsibility that has been protected from severe reductions in the revised 1982 budget is support of basic research. The Federal Government spends about $5 billion each year to fund about 70% of all basic research performed in the U.S. Many believe that this investment can be utilized most efficiently if it is accompanied by a measure of long-term stability in funding because basic research is a cumulative process, e.g., gaps created in a period of reduced support cannot be quickly overcome by even a sharp increase in basic research spending at a later date. The revised 1982 budget continues to provide strong support for basic research, with obligations for such research expected to rise 1.3% in real terms, taking into account anticipated inflation.

The impact of the revised budget on different categories of research and development support is described below:

Conduct of Research and Development

Tables 1 and 2 show revised estimates of obligations and outlays respectively for the conduct of research and development (not including funds for research and development facilities) by the major departments and agencies for fiscal years 1981 and 1982.

In FY 1981 the budget revisions would increase obligations for the conduct of research and development by $229 million or about 0.7% over the appropriated level. This increase is due to increases in defense-related research and development (totaling $588 million) that more than offset reductions of $359 million in the programs of other agencies. The revised budget provides an increase for Federal obligations of $3.6 billion or 11.4% in 1981 over 1980 research and development. This rate of increase is 1.2% greater than the anticipated inflation rate. Outlays for 1981 would decrease by $353 or 1% below earlier estimates. However, an increase of $3.2 billion or 10.7% over 1980 would be preserved.

In FY 1982, the budget revisions would reduce obligations for the conduct of research and development by a net $795 million or 1.9% below the January budget but would preserve an increase of $5.3 billion or 15% over 1981. Included within these adjustments for FY 1982 are increases in obligations for defense-related research and development of $1.4 billion in 1982 that partially offset the reduction of $2.2 billion applied to the R&D programs of other agencies. Outlays in 1982 would decrease by $1,018 million or 2.6% below January estimates but would still be $4.7 billion or 14% above the 1981 level.

Conduct of Basic Research

Tables 3 and 4 show the obligations and outlays respectively for the conduct of basic research by the major departments and agencies for fiscal years 1981 and 1982.

In 1981, the budget revisions would reduce Federal obligations for the conduct of basic research by $86 million or 1.7% below the appropriated level. The reduced level would be $356 million or 7.6% over 1980. The outlays for the conduct of basic research in 1981 would remain unchanged from the January estimates.

In 1982, the reduction in obligations for the conduct of basic research amounts to $319 million or 5.4% below the January budget. However an increase of $507 million or 10.1% over 1981 would be preserved providing a 'real' growth of 1.3% above the anticipated inflation in 1982. Outlays in 1982 would decrease by $160 million or 2.9% below the January budget but this reduced level would be $499 million or 10.4% above 1981.

Research and Development at Universities and Colleges

Tables 5 and 6 provide the revised estimates of obligations and outlays by the major departments and agencies for Federal support of research and development at universities and colleges.

In 1981, the obligations would be reduced by $104 million or 2.3% below the January estimates. The reduced level would be $256 million or 6.1% above 1980. In 1982, the obligations would be reduced by $342 million or 6.8% below the January budget. However an increase of $271 million or 6.1% over 1981 would be preserved.

Research and Development Facilities

Tables 7 and 8 provide the revised estimates of obligations and outlays in Federal expenditures for research and development facilities. Significant savings would be achieved both in 1981 and 1982 primarily through reductions in the funding for research and development facilities through the Department of Energy.

AGENCY R&D PROGRAMS

Department of Defense

The Department of Defense would increase obligations by $588 million in FY 1981 and $1436 million in FY 1982 relative to the January budget for the conduct of research and development. Increases for the programs of the Navy will be applied to work on high energy lasers, development of a new destroyer, upgrade of a missile fire control system and development of long-distance submarine communications. The Army will receive increases for support of test ranges, work on ballistic missile defense, and development of equipment for use with chemical munitions. Additions to the Air Force research and development effort will be applied to the development of a manned bomber and work on air-to-ground capabilities for strike aircraft. These increases will be offset, in part, by decreases elsewhere in the R&D account, including reductions in the use of consultants and reductions in travel of personnel.

National Aeronautics and Space Administration

The revised budget for NASA represents a reduction in obligations for research and development by $14 million in 1981 and $572 million in 1982 below the January budget. Despite the reductions, the commitment to the development of the space shuttle and its operation will continue. The savings have been achieved by deferring or eliminating 1981 and 1982 new program initiatives and by reducing selected ongoing programs. Specifically, in the area of space science, the launches of the Venus Orbiting Imaging Radar (VOIR) and Gamma Ray Observatory (GRO) missions would be delayed from 1986 to 1988, and spacelab experiment development and the International Solar Polar Mission would be curtailed. However, the Galileo mission to Jupiter and the Space Telescope programs would continue as planned. In space applications, the proposed new initiatives in Carter budget such as the multi-agency National Oceanic Satellite System (NOSS), the development of instruments for a proposed upper atmosphere research satellite and a geological application program would be delayed or cancelled. Ongoing programs such as materials processing in space, the agricultural application of remote sensing (AgRISTARS) and technology transfer and utilization would also be curtailed. However, programs related to operation of previously launched satellites and development of high priority projects would continue. In aeronautics, in addition to cancellation of new proposed initiatives (e.g. the Numerical Aerodynamic Simulator), there will be a reduced level of effort primarily in the systems technology programs. However, long-term fundamental research and technology programs as well as defense-related programs would continue as planned.

Department of Energy

The overall R&D strategy for the Department of Energy, which is reflected in activities across a wide spectrum of energy-supply and demand-reduction technologies, has been significantly redefined by the Reagan Administration. Direct Federal intervention into technologies which are near the marketplace has been significantly restrained or eliminated. It is expected that research and development on technologies which have near-term payoff will be financed by corporations with a stake in the market. The Federal role as patron of truly long-term high-payoff scientific inquiry and advanced technology development has been continued.

This long-term emphasis and short-term reduction strategy has resulted in only minor adjustments in the level of effort for the conduct of basic research within the 1982 request of $680 million showing an increase of $86 million over the 1981 level of $594 million.

However, in the more applied research, development, and demonstration areas which comprise the major portion of the DOE request, there have been significant decreases and reorientation of activities. For example, funding for operation of major fossil energy pilot and demonstration plants and other near term fossil research and development was reduced by more than $300 million from the Carter Administration request for 1982. The shift in the solar energy program from near-term development and demonstration toward longer-term research and development would decrease this program more than $270 million. In addition, there have been significant decreases in conservation technology development.

Partially offsetting increases in the 1982 Budget are proposed for the Clinch River Breeder Reactor, commercial waste management programs, and research at the Three Mile Island nuclear plant.

On balance, this redefinition of the Federal role in R&D has resulted in a decline in obligations of $245 million in fiscal year 1982 from 1981 for the conduct of R&D. Likewise, the obligations associated with R&D facilities have also declined by $325 million from 1981 to 1982. This also represents a reduction in facility construction of $916 million when compared to the Carter 1982 Budget. This reduction primarily is in construction funds for coal demonstration plants.

Health and Human Services

The budget revisions include reductions in obligations for research and development by the Department of Health and Human Services amounting to $30 million in 1981 and $94 million in 1982 below the January budget. These amount to about 1% in 1981 and 2% in 1982. The reductions in obligations for the conduct of basic research amount to only $16 million or 1% in 1981 and $44 million or 2% in 1982 below the January budget. Despite these reductions, basic research obligations by the Department, which are the largest of any government agency, will increase by 6.4% in 1981 over 1980 and 7.4% in 1982 over 1981. These revisions would reduce the increases proposed in the January budget but still cover most of the cost increases due to inflation, particularly in 1982.

Obligations for research and development by the National Institutes of Health would be reduced by about $25 million in 1981 and $28 million in 1982. These would primarily reduce the rate of increase in basic research support funding through the NIH. In addition, programs for drug abuse and mental health would be reduced including phase out of all but currently ongoing programs in social research. The Food and Drug Administration, the Centers for Disease Control and other components of HHS would also absorb some reductions.

National Science Foundation

Obligations for research and development by the National Science Foundation would be reduced by $74 million or 7% in 1981 and $149 million or 13% in 1982 below the January budget. Within these reductions the obligations for the conduct of basic research would be reduced by $53 million in 1981 and $113 million in 1982. However, the budget revisions would preserve an increase in NSF's support of basic research. In the natural sciences and engineering, this increase would amount to 9% in 1981 over 1980 and 12% in 1982 over 1981--about 3% over and above the cost increases due to anticipated inflation in 1982.

The budget revisions would reduce or eliminate all NSF research and development programs that are narrowly focused or relatively less critical to the Foundation's principal responsibilities in the support of research in the natural sciences and engineering that underlies the long term economic health of the Nation. Programs that would be reduced or eliminated include the support of social, behavioral and economic sciences, science education, and a number of miscellaneous programs including intergovernmental, international and industrial science

and technology programs. The revised budget would largely protect the core programs of the Foundation for the support of research in the mathematical and physical sciences, biological and neural sciences, earth, ocean, atmospheric and astronomical sciences, and engineering. In addition, the Antarctic research program and the ocean drilling programs would continue largely as planned. The NSF obligations for research and development facilities would be reduced by $85 million in 1982 below the January budget as a result of the deferral of new initiatives (i.e., a university research instrumentation upgrading program and a 25 meter telescope) proposed in the Carter budget.

Other Departments and Agencies

The research and development programs of other departments and agencies account for only about 10% of the total Federal obligations for research and development and for the conduct of basic research. The changes proposed in the revised budgets of these departments and agencies would have a relatively smaller impact on overall Federal expenditures for research and development. Major reductions are in the programs of the Departments of Commerce and Labor.

-- Obligations by the Department of Commerce for research and development would be reduced by $28 million in 1981 and $123 million in 1982 below the January budget, largely through the termination of the Economic Development Administration and reductions of programs of the National Oceanic and Atmospheric Administration (NOAA). The termination of the Economic Development Administration is part of the effort to move away from misdirected subsidy programs and to rely on the President's comprehensive economic plan to address the real problems associated with deteriorating economic performance. The NOAA reductions include cancellation of the National Oceanic Satellite System (NOSS) and termination of the Sea Grant Colleges program. The reductions in NOAA programs were made largely due to the need to apply fiscal restraint even in some programs of national interest.

-- In the programs of the Department of Labor, the proposed revisions would reduce obligations for research and development by $63 million in 1981 and $236 million in 1982 below the January budget primarily through phaseout of Welfare Demonstration Pilot Projects and elimination of 9 out of the 10 Positive Adjustment Assistance Demonstration Projects that were proposed in the Carter Budget. The welfare reform demonstrations, which include federally funded public jobs for welfare eligibles, were curtailed because they were designed to test concepts that this Administration will not renew. The Positive Adjustment Assistance Demonstration Projects would be curtailed because training and relocation programs for dislocated workers are now being reviewed by the Administration and this review does not require the expensive projects proposed in the Carter budget.

Other significant reductions in obligations in 1982 from the January budget for research and development include reductions in the Department of Transportation including termination of the Cooperative Automotive Research Program, reductions in the Agency for International Development for agricultural research targetted at the food production problem of Africa, and reductions in the Department of Interior including the termination of the Office of Water Research and Technology.

Table 1. Conduct of Research and Development by Major Departments and Agencies -- Obligations
(In millions of dollars)

	1980	1981			1982		
	Actual	January Budget	March Budget	Change	January Budget	March Budget	Change
Defense-military Functions	13,943	16,226	16,814	+588	20,033	21,469	+1,436
National Aeronautics & Space Admin.	5,084	5,422	5,408	-14	6,589	6,017	-572
Energy	4,754 1/	5,033 1/	4,935	-97	5,338 1/	4,690	-648
Health & Human Services	3,790	3,964	3,934	-30	4,285	4,191	-94
(National Institutes of Health)	(3,182)	(3,350)	(3,326)	(-25)	(3,596)	(3,568)	(-28)
National Science Foundation	882 1/	1,012 1/	938	-74	1,151 1/	1,002	-149
Agriculture	687	775	769	-6	871	859	-12
Interior	411 1/	429 1/	420	-9	461 1/	393	-68
Transportation	374	413	398	-15	474	391	-83
Commerce	342	365	337	-28	411	288	-123
Environmental Protection Agency	345	364	363	-1	345	303	-42
Labor	241 1/	158 1/	95	-63	332 1/	96	-236
Nuclear Regulatory Commission	190	216	216	--	232	232	--
Agency for International Development	119	120	120	--	230	135	-95
Veterans Admin.	133	147	145	-2	163	153	-10
Education	132	141	129	-12	154	90	-64
All other	266	275	267	-8	326	290	-37
Total, Conduct of R&D	31,693	35,061	35,290	+229	41,393	40,598	-795

1/ DOE, Interior, Labor and NSF R&D Totals have been revised to reflect additional information not available when the Special Analysis was published.

Table 2. Conduct of Research and Development by Major Departments and Agencies -- Outlays
(In millions of dollars)

	1980 Actual	1981 January Budget	1981 March Budget	1981 Change	1982 January Budget	1982 March Budget	1982 Change
Defense-military Functions	13,451	15,874	15,587	-287	18,925	19,596	+671
National Aeronautics & Space Admin.	4,711	5,130	5,118	-12	6,207	5,742	-465
Energy	4,698 1/	4,887 1/	5,003	+116	5,411 1/	4,858	-553
Health & Human Services	3,517	3,676	3,644	-32	3,964	3,938	-26
(National Institutes of Health)	(2,954)	(3,163)	(3,138)	(-25)	(3,397)	(3,392)	(-5)
National Science Foundation	831 1/	924 1/	896	-28	1,021 1/	904	-117
Agriculture	659	754	748	-6	854	843	-11
Interior	417 1/	428 1/	421	-7	449 1/	399	-50
Transportation	377	387	380	-7	424	354	-70
Commerce	357	375	359	-16	405	327	-78
Environmental Protection Agency	385	343	344	+1	347	327	-20
Labor	139 1/	266 1/	214	-53	306	103	-203
Nuclear Regulatory Commission	179	208	208	--	223	223	--
Agency for International Development	106	117	117	--	134	120	-14
Veterans Admin.	132	140	138	-2	155	146	-9
Education	121	139	136	-2	143	110	-33
All other	272	291	274	-17	323	283	-40
Total, Conduct of R&D	30,351	33,937	33,584	-353	39,289	38,271	-1,018

1/ DOE, Interior, Labor and NSF R&D Totals have been revised to reflect additional information not available when the Special Analysis was published.

Table 3. Conduct of Basic Research by Major Departments and Agencies -- Obligations
(In millions of dollars)

	1980	1981			1982		
	Actual	January Budget	March Budget	Change	January Budget	March Budget	Change
Health and Human Services	1,758	1,887	1,871	-16	2,053	2,009	-44
(National Institutes of Health	(1,639)	(1,759)	(1,746)	(-13)	(1,909)	(1,884)	(-25)
National Science Foundation	819 1/	930 1/	877	-53	1,063 1/	950	-113
Energy	523	591	594	+3	710	680	-30
Defense-military functions	539	605	612	+7	704	721	+16
National Aeronautics & Space Administration	559	555	541	-14	681	592	-89
Agriculture	275	322	319	-3	367	361	-6
Interior	72 1/	79 1/	79	--	93 1/	79	-14
Smithsonian Institution	40	44	44	--	53	53	--
Commerce	29	33	32	-1	41	37	-5
Education	18	18	19	+1	24	15	-9
Veterans Administration	14	16	15	-1	18	15	-3
Transportation	--	12	1	-11	17	--	-17
Environmental Protection Agency	14	15	14	-1	13	14	+1
All other	22	18	19	+1	28	20	-8
Total	4,682	5,124	5,038	-86	5,864	5,545	-319

1/ NSF and Interior basic research totals have been revised to reflect additional information not available when the Special Analysis was published.

Table 4. Conduct of Basic Research by Major Departments and Agencies -- Outlays
(In millions of dollars)

	1980	1981			1982		
	Actual	January Budget	March Budget	Change	January Budget	March Budget	Change
Health and Human Services	1,657	1,742	1,730	-12	1,911	1,904	-7
(National Institutes of Health	(1,530)	(1,641)	(1,629)	(-12)	(1,795)	(1,786)	(-9)
National Science Foundation	773 1/	848 1/	839	-10	940 1/	853	-87
Energy	526	586	589	+3	709	680	-29
Defense-military functions	476	540	583	+42	632	686	+54
National Aeronautics & Space Admin.	519	526	515	-11	614	574	-40
Agriculture	259	309	306	-3	362	357	-5
Interior	71 1/	76 1/	74	-2	90 1/	79	-11
Smithsonian Institution	39	43	43	--	50	50	--
Commerce	32	35	35	--	41	38	-3
Education	18	20	20	--	23	16	-7
Veterans Administration	15	16	15	-1	18	15	-3
Transportation	--	6	1	-5	12	--	-12
Environmental Protection Agency	14	16	16	--	14	14	--
All other	22	22	19	-2	28	18	-10
Total	4,419	4,785	4,785	--	5,444	5,284	-160

1/ NSF and Interior basic research totals have been revised to reflect additional information not available when the Special Analysis was published.

Table 5. Funding of R&D at Universities and Colleges
Obligations
(In millions of dollars)

	1980	1981			1982		
	Actual	January Budget	March Budget	Change	January Budget	March Budget	Change
Health and Human Services	2,076	2,185	2,173	-12	2,354	2,314	-40
(National Institutes of Health)	(1,897)	(2,011)	(1,994)	(-17)	(2,159)	(2,135)	(-24)
National Science Foundation	661 1/	759 1/	703	-56	863 1/	751	-112
Defense-military functions	451	528	528	--	639	639	--
Energy	284	312	289	-22	351	280	-71
Agriculture	221	241	241	--	283	282	-1
National Aeronautics & Space Administration	171	188	188	--	204	196	-8
Education	65	71	64	-7	79	38	-41
Agency for Internation Dev.	53	60	60	--	68	58	-10
Commerce	46	44	44	--	44	17	-27
Interior	42	43	37	-6	44	24	-20
Environmental Protection Agency	47	50	50	--	40	40	--
Transportation	19	20	20	--	23	22	-1
All other	43	39	38	-1	54	44	-10
Total	4,179	4,539	4,435	-104	5,048	4,706	-342

1/ NSF totals have been revised to reflect additional information not available when the Special Analysis was published.

Table 6. Funding of R&D at Universities and Colleges
Outlays
(In millions of dollars)

	1980 Actual	1981 January Budget	1981 March Budget	1981 Change	1982 January Budget	1982 March Budget	1982 Change
Health and Human Services	1,960	2,007	1,995	-13	2,213	2,202	-11
(National Institutes of Health)	(1,779)	(1,857)	(1,842)	(-15)	(2,042)	(2,019)	(-23)
National Science Foundation	615 1/	706 1/	654	-52	803 1/	699	-104
Defense-military functions	430	503	503	--	608	608	--
Energy	281	310	292	-18	352	282	-70
Agriculture	206	238	238	--	272	270	-2
National Aeronautics & Space Administration	147	169	169	--	184	176	-8
Education	55	65	63	-2	68	48	-20
Agency for International Dev.	37	44	44	--	50	42	-8
Commerce	44	42	42	--	43	17	-26
Interior	39	40	33	-6	42	35	-7
Environmental Protection Agency	31	40	40	--	36	36	--
Transportation	19	18	18	--	21	20	-1
All other	39	37	36	-2	52	42	-10
Total	3,902	4,217	4,127	-91	4,743	4,477	-266

1/ NSF totals have been revised to reflect additional information not available when the Special Analysis was published.

Table 7. Research and Development Facilities by Major Departments and Agencies -- Obligations
(In millions of dollars)

	1980 Actual	1981 January Budget	1981 March Budget	1981 Change	1982 January Budget	1982 March Budget	1982 Change
Energy	1,025 1/	1,397 1/	1,184	-213	1,775 1/	859	-916
Defense-military functions	208	236	236	--	280	277	-3
National Aeronautics & Space Administration	159	115	115	--	137	105	-32
National Science Foundation	19 1/	14 1/	14	--	103 1/	18	-85
Agriculture	57	37	37	--	40	39	-1
Health & Human Services	32	61	66	+5	36	18	-18
(National Institutes of Health)	(30)	(29)	(34)	(+5)	(15)	(17)	(+2)
All other	64	53	60	+7	88	59	-29
Total	1,563	1,913	1,712	-201	2,458	1,375	-1,083

1/ DOE and NSF totals have been revised to reflect additional information not available when the Special Analysis was published.

Table 8. Research and Development Facilities by Major Departments and Agencies -- Outlays
(In millions of dollars)

	1980 Actual	1981 January Budget	1981 March Budget	1981 Change	1982 January Budget	1982 March Budget	1982 Change
Energy	963 1/	1,371 1/	1,093	-278	1,723 1/	958	-765
Defense-military functions	205	204	210	+6	230	229	-1
National Aeronautics & Space Administration	140	156	156	--	157	154	-3
National Science Foundation	18 1/	13 1/	13	--	88 1/	16	-71
Agriculture	28	53	53	--	39	38	-1
Health & Human Services	77	43	44	+1	49	48	-1
(National Institutes of Health)	(76)	(37)	(38)	(+1)	(36)	(37)	(+1)
All other	57	65	65	--	76	70	-6
Total	1,487	1,905	1,634	-271	2,361	1,512	-849

1/ DOE and NSF totals have been revised to reflect additional information not available when the Special Analysis was published.