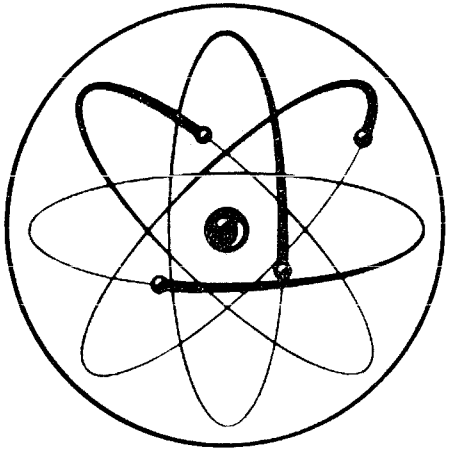
A STATISTICAL SUMMARY OF THE

PHYSICAL RESEARCH PROGRAM

JUNE 30, 1970



DIVISION of RESEARCH

UNITED STATES ATOMIC ENERGY COMMISSION

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A STATISTICAL SUMMARY OF THE PHYSICAL RESEARCH PROGRAM AS OF JUNE 30, 1970

Prepared by:
Reports and Statistics Branch
Division of Research
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PREFACE

This report presents a statistical analysis of the physical research program administered by the Division of Research. Separate analyses are made for the physical research conducted at the Federally Funded Research and Development Centers (FFRDC's), and for the off-site contract research program. Included is information on funds budgeted for salaries and wages, materials and supplies, travel, communications, publications, indirect expenses, and equipment. Definitions used in this report are:

Equipment: Any item individually costing more than $100 and that is expected to have an extended period of service, generally one year or more, in its original form. Title may vest either in the Government or in the contractor.

Publications: Usually refer to journal publications but includes letters such as appear in Physical Review Letters, and notes such as appear in Journal of the American Chemical Society, and other journals. Contributions to books are included if they represent summaries and evaluations of a limited area, e.g., contributions to the Annual Review of Nuclear Science. Also included are papers not abstracts that appear in published proceedings of technical meetings including international meetings, and installation reports that are available for sale.

Personnel categories shown in the analyses are established according to information provided in the proposal or other material supplied by contractors. For educational institutions:

Principal Investigators: Usually are members of the academic staff and includes professors, chairmen/heads of departments, associate professors, or assistant professors who direct the project.

Other Permanent Scientific Staff: Are generally professors, associate professors or assistant professors who work with the principal investigators. (The principal investigator and other professional staff usually divide their time between teaching and the research project.) Also includes visiting scientists, i.e., those at the faculty level but who do not have a position on the faculty of the educational institution where they are temporarily working.

Research Associates: Are generally working full-time on the research investigation and usually are in the post-doctoral category.

Research Assistants: Usually are graduate students working for their doctorate or masters degree.

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PHYSICAL RESEARCH PROGRAM

Division of Research

The Physical Research Program is chiefly concerned with basic research investigations undertaken to discover new scientific knowledge and also includes some applied research investigations relevant to certain aspects of the practical utilization of nuclear energy. Research is conducted in the fields of high, medium, and low energy physics; mathematics and computers; chemistry; metallurgy and materials; and controlled thermonuclear reactions. Approximately three-fourths of the costs are associated with support of research conducted in AEC-owned, contractor-operated, Federally Funded Research and Development Centers (FFRDC's). A little less than one-fourth of the costs are associated with the contract support of research conducted in other laboratories. The major portion of the research at sites other than at FFRDC's is conducted at educational institutions.

Federally Funded Research and Development Centers

There is no clear line of demarcation between Federally Funded Research and Development Centers and other laboratories. The AEC investment in facilities ranges from zero for some contractors to tens of millions of dollars for others, and the annual level of AEC support ranges from a few thousand dollars for some contractors, to tens of millions of dollars for others -- the spectrum is broad with no significant peaks or breaks. For purposes of this report, the following are considered Federally Funded Research and Development Centers operated for the AEC. The listing is consistent with Federally Funded Research and Development Centers as defined by the National Science Foundation and the Office of Science and Technology:

	Laboratory	Contractor
1.	Ames Laboratory Ames, Iowa	Iowa State University
2.	Argonne National Laboratory Argonne, Illinois	Argonne Universities Association (AUA) and University of Chicago
3.	Brookhaven National Laboratory Upton, Long Island, New York	Associated Universities, Inc. (AUI)
4.	Cambridge Electron Accelerator Cambridge, Massachusetts	Harvard University
5.	Lawrence Radiation Laboratory Berkeley and Livermore, California	University of California
6.	Los Alamos Scientific Laboratory Los Alamos, New Mexico	University of California

Laboratory	Contractor
7. Mound Laboratory Miamisburg, Ohio	Monsanto Chemical Laboratory
8. National Accelerator Laboratory Batavia, Illinois	Universities Research Association, Inc. (URA)
9. National Reactor Testing Station Idaho Falls, Idaho	Idaho Nuclear Corporation
10. Oak Ridge National Laboratory Oak Ridge, Tennessee	Union Carbide Nuclear Company
11. Pacific Northwest Laboratory Richland, Washington	Battelle Memorial Institute
12. Princeton Proton Accelerator Princeton, New Jersey	Princeton University
13. Princeton Plasma Physics Laboratory Princeton, New Jersey	Princeton University
14. Stanford Linear Accelerator Center Stanford, California	Stanford University

Some of the FFRDC's are multi-program laboratories engaged in other AEC programs such as nuclear materials production, weapons, biology and medicine, reactor development, etc. The Physical Research Program at these FFRDC's provides, in varying degrees, the basic investigations underlying the applied and development activities of such laboratories. Some of the FFRDC's, however, are engaged in research in a single, well defined area. All FFRDC's have the following common characteristics:

1. They are treated as national facilities.
2. They represent large investments (several millions of dollars) in AEC-owned capital facilities.
3. They have large annual levels (several millions of dollars) of AEC support.
4. It is implicit that they have continuing AEC support.
5. The guidance of smaller scientific efforts within each laboratory is usually vested in the laboratory management with only major overall research guidance supplied by the AEC.

The Contract-Research Program

The Division of Research supports, by means of the contract-research program, off-site research investigations at educational institutions, and in a few instances, also at non-profit research institutes and industrial laboratories. In this program, the Division of Research, in AEC Headquarters, is responsible for the approval of AEC support and for the review of the technical progress of research projects in the fields of high, medium, and low energy physics; mathematics and computers; chemistry; metallurgy and materials; and, controlled thermonuclear reactions. The AEC's operations offices in the field negotiate and administer the non-technical aspects of the contracts. Proposals for contracts in basic physical research usually are initiated by the scientist interested in performing the work.

The contract-research program affords a number of distinct benefits.

1. When funds provided by the AEC are added to other funds available to the contractor, the effectiveness of both the basic research program of the AEC and contractor's program increases.

2. The AEC receives the services, in fields of science fundamental to the AEC's future capabilities, of highly qualified scientists who prefer employment at outside laboratories or who prefer to teach and do research at educational institutions.

3. The contract-research program, by providing for the conduct of research at educational institutions, contributes to the training of scientists in fields relevant to the AEC's program.

In conducting this program, the AEC generally uses either a special research support agreement (SRSA), or a cost-type contract. The total cost estimate is reflected in a budget, submitted by the prospective contractor, and includes such items as salaries, materials and supplies, equipment, communications, publications, travel, and indirect expenses.

Special Research Support Agreements: The SRSA's are used for basic research with educational institutions when the annual AEC support under the agreement does not exceed $250,000. It provides for payment to the contractor of a specified amount, which is referred to as the Support Ceiling, and for adjustment of the amount if total costs are less than expected. Payments are made in consideration for the contractor's performance of research activities described in the contract and in accordance with the provisions of the contract. Costs are determined in accordance with Bureau of the Budget Circular No. A-21. When the special research support agreement is used for not-for-profit organizations other than educational institutions, AEC's commercial cost principles may be used in determining actual cost, or the contract provisions may be revised to provide for a lump-sum payment, i.e., fixed-price contract to the contractor in consideration for its commitment to perform particular research at a specified level of effort.

Cost-type Contract: The cost-type is generally used when the annual AEC support under a contract exceeds $250,000.

The total costs of the research may be shared by the contractor and the AEC under each of the aforementioned contractual arrangements.

Reporting Results of Research

Scientific reports on basic research investigations are usually published in the open literature. Special reporting of results in detail before they are ready for publication generally is not required of the contractors. AEC recognizes open publication as the normal and most desirable means for reporting the findings of fundamental research.

AEC annually publishes a special survey of selected significant developments during the previous year in the more basic areas of AEC's research and development activities. This annual report entitled "Fundamental Nuclear Energy Research--A Supplemental Report to the Annual Report to Congress of the U.S. Atomic Energy Commission," may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

SUMMARY OF PHYSICAL RESEARCH PROGRAM

SUMMARY OF PHYSICAL
(Dollars in

Activity	TOTAL		Federally Funded Research and Development Centers		
	Scientific Man-Years[a/]	Publications	Amount	Man-Years	Publications
High Energy Physics	1,835	1,318	$107,547	1,281	591
Medium Energy Physics	198	142	10,193	142	96
Low Energy Physics	589	921	18,645	326	349
Mathematics & Computers ...	124	217	2,958	74	117
Chemistry	1,042	1,567	45,512	753	858
Metallurgy & Materials	550	977	21,176	394	545
Controlled Thermonuclear ..	358	296	25,485	298	140
General Purpose Equipment .	0	0	1,136	0	0
	4,696	5,438	$232,652	3,268	2,696

a/ Does not include part time employment of 3,705 graduate students engaged in performing research.

b/ Represents amount of AEC estimated support ceiling included in the latest extension of contracts in effect as of 6/30/70. (Contracts are usually written for one year and extended annually if necessary.)

c/ The amount includes $7,865,000 under educational institutions that in previous years has been listed under FFRDC's, but is more appropriate for listing under educational institutions.

RESEARCH PROGRAM
Thousands)

Educational Institutions			Not-for-profit Research Institutes and Industrial Laboratories		
Amount [b]	Man-Years	Publications	Amount [b]	Man-Years	Publications
$26,674[c]	554	727	$ 10	0	0
3,979	56	46	0	0	0
14,496	263	564	331	6	8
3,862	50	97	30	0	3
10,410	289	684	326	8	25
8,745	156	420	306	8	12
3,347	60	143	944	11	13
0	0	0	0	0	0
$71,513[c]	1,428	2,681	$1,947	33	61

FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS

Costs and Manpower
As of June 30, 1970

Laboratory	Total Cost	Scientific Man-Years		Number of Graduate Students Engaged in Research	Number of Publications
		Permanent	Visiting		
Ames	$ 7,998,000	110	2	204	252
Argonne National Laboratory	42,208,000	649	48	285	674
Brookhaven National Laboratory	40,897,000	420	56	180	353
Cambridge Electron Accelerator	4,060,000	47	0	0	46
Idaho Nuclear Corporation	168,000	4	0	0	4
Lawrence Radiation Laboratory	43,104,000	522	121	306	483
Los Alamos Scientific Laboratory	9,740,000	115	4	12	89
Mound Laboratory	719,000	11	0	11	26
National Accelerator Laboratory	8,296,000	151	0	0	35
Oak Ridge National Laboratory	36,306,000	544	18	53	571
Pacific Northwest Laboratory	1,070,000	19	4	2	36
Plasma Physics Lab., Princeton U.	7,630,000	70	9	0	30
Princeton Proton Accelerator	4,479,000	50	0	0	16
Stanford Linear Accelerator Center	25,977,000	279	15	46	81
TOTAL	$232,652,000	2,991	277	1,099	2,696

AMES LABORATORY

Activity	Total Cost	Scientific Man-Years Permanent	Scientific Man-Years Visiting	Number of Graduate Students Engaged in Research	Number of Publications
High Energy Physics	$ 512,000	8	0	5	25
Medium Energy Physics	310,000	4	0	8	8
Low Energy Physics	635,000	5	0	14	10
Mathematics & Computers	154,000	4	0	1	11
Chemistry	3,373,000	46	2	119	108
Metallurgy & Materials	2,931,000	43	0	57	90
General Purpose Equipment	83,000	0	0	0	0
TOTAL	$ 7,998,000	110	2	204[a/]	252[b/]

a/ Includes 24 students engaged in research activities but whose salaries are not paid by AMES.

b/ Includes 2 publications that resulted from collaborative efforts with other universities.

ARGONNE NATIONAL LABORATORY

Activity	Total Cost	Scientific Man-Years Permanent	Visiting	Number of Graduate Students Engaged in Research	Number of Publications
High Energy Physics	$ 20,392,000	193	29	224	120
Medium Energy Physics	64,000	1	0	0	1
Low Energy Physics	4,840,000	90	2	47	98
Mathematics & Computers	1,532,000	31	2	2	55
Chemistry	9,309,000	209	6	10	232
Metallurgy & Materials	6,071,000	125	9	2	168
TOTAL	$ 42,208,000	649	48	285[a/]	674

a/ Includes 268 students engaged in research activities but whose salaries are not paid by ANL.

BROOKHAVEN NATIONAL LABORATORY

Activity	Total Cost	Scientific Man-Years Permanent	Scientific Man-Years Visiting	Number of Graduate Students Engaged in Research	Number of Publications
High Energy Physics	$ 24,549,000	210	18	133	79
Medium Energy Physics	138,000	2	0	0	3
Low Energy Physics	5,482,000	61	10	22	73
Mathematics & Computers	700,000	12	3	0	30
Chemistry	5,933,000	96	13	5	107
Metallurgy & Materials	3,231,000	39	12	20	61
General Purpose Equipment	864,000	0	0	0	0
TOTAL	$ 40,897,000	420	56	180[a/]	353[b/]

a/ Includes 162 students engaged in research activities but whose salaries are not paid by BNL.

b/ Includes 11 publications that resulted from collaborative efforts with universities.

LAWRENCE RADIATION LABORATORY

Activity	Total Cost	Scientific Man-Years Permanent	Scientific Man-Years Visiting	Number of Graduate Students Engaged in Research	Number of Publications
High Energy Physics	$ 18,833,000	215	60	82	158
Medium Energy Physics	2,052,000	23	10	9	16
Low Energy Physics	366,000	7	3	5	8
Mathematics & Computers	175,000	5	7	0	10
Chemistry	11,329,000	160	29	112	194
Metallurgy & Materials	2,078,000	25	9	81	71
Controlled Thermonuclear	8,082,000	87	3	17	26
General Purpose Equipment	189,000	0	0	0	0
TOTAL	$ 43,104,000	522	121	306[a/]	483[b/]

[a/] Includes 53 students engaged in research activities but whose salaries are not paid by LRL.

[b/] Includes 5 publications that resulted from collaborative efforts with other universities.

OAK RIDGE NATIONAL LABORATORY

Activity	Total Cost	Scientific Man-Years Permanent	Scientific Man-Years Visiting	Number of Graduate Students Engaged in Research	Number of Publications
High Energy Physics	$ 449,000	6	0	0	31
Medium Energy Physics	1,916,000	37	1	5	33
Low Energy Physics	6,848,000	131	7	10	136
Mathematics & Computers	397,000	9	1	15	11
Chemistry	14,901,000	177	4	14	203
Metallurgy & Materials	6,049,000	110	5	7	127
Controlled Thermonuclear	5,746,000	74	0	2	30
TOTAL	$ 36,306,000	544	18	53[a/]	571[b/]

[a/] Includes 41 students engaged in research activities but whose salaries are not paid by ORNL.

[b/] Includes 27 publications that resulted from collaborative efforts with universities.

	Total Cost	Scientific Man-Years Permanent	Visiting	No. of Grad. Res. Students	Number of Publications
CAMBRIDGE ELECTRON ACCELERATOR					
High Energy Physics	$ 4,060,000	47	0	0	46
IDAHO NUCLEAR CORPORATION					
Metallurgy & Materials	168,000	4	0	0	4
LOS ALAMOS SCIENTIFIC LABORATORY					
Medium Energy Physics	5,713,000	61	3	8	35
Controlled Thermonuclear	4,027,000	54	1	4	54
MOUND LABORATORY					
Low Energy Physics	295,000	5	0	5	16
Chemistry	324,000	4	0	4	6
Metallurgy & Materials	100,000	2	0	2	4
NATIONAL ACCELERATOR LABORATORY					
High Energy Physics	8,296,000	151	0	0	35
PACIFIC NORTHWEST LABORATORY					
Low Energy Physics	179,000	4	1	1	8
Chemistry	343,000	5	2	1	8
Metallurgy & Materials	548,000	10	1	0	20
PLASMA PHYSICS LABORATORY					
Controlled Thermonuclear	7,630,000	70	9	0	30
PRINCETON PROTON ACCELERATOR					
High Energy Physics	4,479,000	50	0	0	16
STANFORD LINEAR ACCELERATOR CENTER					
High Energy Physics	25,977,000	279	15	46	81

NUMBER OF AGREEMENTS, TOTAL COSTS, AND CONTRACTOR AND AEC CONTRIBUTIONS IN THE PROGRAM BY ACTIVITY
As of June 30, 1970

Activity	Number of Agreements	Total Project Cost	Contractor Contribution	Percent of Total	AEC Contribution	Percent of Total
High Energy Physics	49	$30,474,533[a]	$ 3,800,928	12	$26,673,605[a]	88
Medium Energy Physics ...	16	5,074,708	1,095,759	22	3,978,949	78
Low Energy Physics	64	17,744,699	3,249,075	18	14,495,624	82
Mathematics & Computers .	23	4,113,880	251,318	6	3,862,562	94
Chemistry	204	11,700,379	1,290,336	11	10,410,043	89
Metallurgy & Materials ..	151	9,621,243	876,353	9	8,744,890	91
Controlled Thermonuclear.	43	3,780,448	433,234	11	3,347,214	89
TOTAL	550	$82,509,890[a]	$10,997,003	13	$71,512,887[a]	87

[a] Includes $7,865,246 that in previous years has been listed under FFRDC's, but more appropriately belong under educational institutions.

CONSOLIDATED BUDGET
INCLUDED IN THE
As of
(Dollars in

SRSA	Items of Expense Projects	Total Amount	%	High Energy Physics	%	Medium Energy Physics	%
(1)	Salaries and Wages	$ 13,855	51.6	1,772	45.9	362	49.2
(2)	Equipment	1,874	7.0	378	9.8	38	5.2
(3)	Materials and Supplies	3,895	14.5	806	20.9	137	18.6
(4)	Travel	558	2.1	127	3.3	32	4.3
(5)	Communications	49	.2	9	.2	0	0
(6)	Publication Costs	387	1.4	64	1.7	11	1.5
(7)	Indirect Expenses	6,221	23.2	703	18.2	156	21.2
(8)	TOTAL	$ 26,839	100.0	3,859	100.0	736	100.0
(9)	Contributed by Universities	4,413	16.4	1,288	33.4	167	22.7
(10)	Supported by AEC	22,426	83.6	2,571	66.6	569	77.3
(11)	Including Unexpended Balance of.	1,038		137		0	
	Cost-Type Projects						
(12)	Salaries and Wages	$ 26,391	47.4	12,424	46.7	1,947	44.9
(13)	Equipment	5,588	10.0	2,024	7.6	748	17.2
(14)	Materials and Supplies	9,799	17.6	5,116	19.2	702	16.2
(15)	Travel	1,109	2.0	759	2.8	65	1.5
(16)	Communications	198	.4	102	.4	17	.4
(17)	Publication Costs	302	.5	127	.5	22	.5
(18)	Indirect Expenses	12,281	22.1	6,063	22.8	838	19.3
(19)	TOTAL	$ 55,668[a/]	100.0	26,615[a/]	100.0	4,339	100.0
(20)	Contributed by Universities	6,584[a/]	11.8	2,513[a/]	9.4	929	21.4
(21)	Supported by AEC	49,086[a/]	88.2	24,102[a/]	90.6	3,410	78.6
(22)	Including Unexpended Balance of.	237		90		0	

[a/] Includes $7,865,246 that in previous years has been listed under FFRDC's, but more appropriately belong under educational institutions.

OF THE 550 PROJECTS
PHYSICAL RESEARCH PROGRAM
June 30, 1970
Thousands)

EDUCATIONAL INSTITUTIONS

Low Energy Physics	%	Mathematics and Computers	%	Chemistry	%	Metallurgy and Materials	%	Controlled Thermonuclear	%	
1,810	53.5	566	58.5	4,524	51.6	3,814	52.6	1,007	53.6	(1)
235	7.0	72	7.4	661	7.5	363	5.0	127	6.8	(2)
432	12.8	63	6.5	1,213	13.8	1,073	14.8	171	9.1	(3)
71	2.1	19	2.0	169	1.9	101	1.4	39	2.1	(4)
10	.3	2	.2	14	.2	11	.2	3	.1	(5)
43	1.3	15	1.6	121	1.4	106	1.5	27	1.4	(6)
779	23.0	230	23.8	2,070	23.6	1,778	24.5	505	26.9	(7)
3,380	100.0	967	100.0	8,772	100.0	7,246	100.0	1,879	100.0	(8)
672	20.0	97	10.0	1,116	12.7	876	12.0	197	10.5	(9)
2,708	80.0	870	90.0	7,656	87.3	6,370	88.0	1,682	89.5	(10)
94		51		360		294		102		(11)
7,389	51.4	1,360	43.2	1,405	48.0	981	41.3	885	46.5	(12)
1,478	10.4	561	17.8	324	11.1	329	13.9	124	6.5	(13)
2,104	14.6	487	15.5	470	16.1	506	21.3	414	21.8	(14)
187	1.3	20	.6	28	1.0	24	1.0	26	1.4	(15)
41	.3	6	.2	13	.4	17	.7	2	.1	(16)
86	.6	14	.5	24	.8	20	.8	9	.5	(17)
3,080	21.4	699	22.2	662	22.6	498	21.0	441	23.2	(18)
14,365	100.0	3,147	100.0	2,928	100.0	2,375	100.0	1,901	100.0	(19)
2,577	17.9	154	4.9	175	6.0	0	.0	236	12.4	(20)
11,788	82.1	2,993	95.1	2,753	94.0	2,375	100.0	1,665	87.6	(21)
137		0		0		0		10		(22)

NUMBER OF SCIENTIFIC EMPLOYEES, RESEARCH ASSISTANTS & PUBLICATIONS UNDER THE PHYSICAL RESEARCH PROGRAM

Activity	Principal Investigators		Research Associates		Other Permanent Scientific Staff (Including Visitors)		Research Assistants	Publications
	No.	MY's	No.	MY's	No.	MY's		
High Energy Physics	152	72	337	239	376	243	681	727
Medium Energy Physics	28	10	32	19	53	27	86	46
Low Energy Physics	111	38	171	127	212	98	554	564
Mathematics & Computers ..	27	9	16	11	59	30	100	97
Chemistry	233	76	241	176	114	37	520	684
Metallurgy & Materials ...	179	60	107	78	47	18	505	420
Controlled Thermonuclear .	57	17	39	22	61	21	153	143
TOTAL	787	282	943	672	922	474	2,599	2,681

TYPE OF ORGANIZATIONS

Projects with:	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
State Institutions	301	25	9	39	11	114	80	23
Private Institutions ..	244	23	7	25	11	88	70	20
Municipal Institutions.	5	1	0	0	1	2	1	0
TOTAL	550	49	16	64	23	204	151	43

OPERATIONS OFFICES ADMINISTERING THE BUSINESS ASPECTS OF THE AGREEMENTS

Operations Offices	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
Chicago	151	14	1	21	4	64	41	6
Idaho	1	0	0	0	0	1	0	0
New York	182	20	4	17	6	59	61	15
Oak Ridge	127	5	9	8	4	54	34	13
Richland	22	1	0	7	1	8	4	1
San Francisco	66	9	2	10	8	18	11	8
Savannah River	1	0	0	1	0	0	0	0
TOTAL	550	49	16	64	23	204	151	43

TYPE OF AGREEMENTS

Type	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
Cost Contracts	84	25	9	24	6	10	5	5
SRSA	466	24	7	40	17	194	146	38
TOTAL	550	49	16	64	23	204	151	43

AGREEMENTS BY AEC DOLLAR LEVEL

Dollar Level	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
0	13	0	2	3	1	1	3	3
1 - 9,999	19	0	0	0	1	8	7	3
10,000 - 19,999	46	1	1	1	1	33	9	0
20,000 - 29,999	98	1	0	3	1	51	33	9
30,000 - 39,999	96	2	1	5	3	34	44	7
40,000 - 49,999	56	2	2	7	4	22	17	2
50,000 - 59,999	31	2	1	2	3	15	3	5
60,000 - 69,999	25	0	0	2	0	11	6	6
70,000 - 79,999	26	3	0	7	2	6	7	1
80,000 - 89,999	15	1	0	3	1	5	4	1
90,000 - 99,999	11	0	0	2	0	3	6	0
100,000 - 249,999	54	12	5	11	2	10	10	4
250,000 - 499,999	26	10	0	9	2	3	1	1
500,000 + ...	34	15	4	9	2	2	1	1
TOTAL	550	49	16	64	23	204	151	43

PERCENT OF AEC CONTRIBUTION TO THE TOTAL COST OF THE RESEARCH

Percentage	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
0 - 9	14	0	2	3	1	3	2	3
10 - 19	0	0	0	0	0	0	0	0
20 - 29	4	1	2	1	0	0	0	0
30 - 39	5	3	0	1	0	0	0	1
40 - 49	5	1	1	0	0	1	2	0
50 - 59	12	5	0	3	0	3	1	0
60 - 69	37	2	1	8	1	17	6	2
70 - 79	58	7	2	9	0	18	18	4
80 - 89	121	5	3	12	5	52	39	5
90 - 99	60	1	1	2	5	19	19	13
100*	234	24	4	25	11	91	64	15
TOTAL	550	49	16	64	23	204	151	43

* Includes a large number of contracts where the universities contribute to the cost of the research but do not estimate a specified amount.

NUMBER OF AGREEMENTS BY STATES AND CONTRACTORS

State and Contractor	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
Alabama	3	0	0	0	0	2	1	0
Alabama, University of ...	1	0	0	0	0	1	0	0
Auburn University	1	0	0	0	0	1	0	0
Tuskegee Institute	1	0	0	0	0	0	1	0
Alaska	3	0	0	3	0	0	0	0
Alaska, University of	3	0	0	3	0	0	0	0
Arizona	9	0	0	2	0	5	2	0
Arizona State University .	1	0	0	0	0	1	0	0
Arizona, University of ...	8	0	0	2	0	4	2	0
Arkansas	2	0	0	0	0	2	0	0
Arkansas, University of ..	2	0	0	0	0	2	0	0
California	63	8	2	10	8	17	10	8
California Inst. of Tech..	9	1	0	1	0	4	2	1
California, University of.	39	7	2	8	3	9	4	6
Southern California, U. of	6	0	0	1	1	2	2	0
Stanford University	9	0	0	0	4	2	2	1
Colorado	4	1	0	1	0	1	0	1
Colorado State Univ.	1	0	0	0	0	1	0	0
Colorado, University of ..	3	1	0	1	0	0	0	1
Connecticut	10	1	1	2	0	2	3	1
Connecticut, Univ. of	1	0	0	0	0	0	1	0
Yale University	9	1	1	2	0	2	2	1
Delaware	1	0	0	0	0	0	1	0
Delaware, University of ..	1	0	0	0	0	0	1	0

NUMBER OF AGREEMENTS BY STATES AND CONTRACTORS

State and Contractor	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
District of Columbia	7	0	0	1	0	4	2	0
Catholic University	2	0	0	1	0	1	0	0
Georgetown University	1	0	0	0	0	0	1	0
George Washington Univ. ...	1	0	0	0	0	1	0	0
Howard University	3	0	0	0	0	2	1	0
Florida	10	1	0	0	0	6	1	2
Florida State University ..	3	1	0	0	0	2	0	0
Florida, University of	4	0	0	0	0	3	1	0
Miami, University of	3	0	0	0	0	1	0	2
Georgia	9	0	0	0	0	5	2	2
Georgia Inst. of Tech.	6	0	0	0	0	2	2	2
Georgia, University of	3	0	0	0	0	3	0	0
Hawaii	2	1	0	0	0	0	1	0
Hawaii, University of	2	1	0	0	0	0	1	0
Idaho	1	0	0	0	0	1	0	0
Idaho State University	1	0	0	0	0	1	0	0
Illinois	27	3	0	1	3	12	8	0
Chicago, University of	9	2	0	0	1	5	1	0
Illinois Inst. of Tech. ...	4	0	0	0	0	2	2	0
Illinois, University of ...	7	1	0	1	2	2	1	0
Northwestern University ...	7	0	0	0	0	3	4	0
Indiana	19	2	0	3	0	10	4	0
Indiana University	3	1	0	0	0	2	0	0
Notre Dame, University of .	3	0	0	2	0	1	0	0
Purdue University	13	1	0	1	0	7	4	0

NUMBER OF AGREEMENTS BY STATES AND CONTRACTORS

State and Contractor	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
Iowa	4	0	0	0	0	3	0	1
Dordt College	1	0	0	0	0	1	0	0
Iowa, State University of .	2	0	0	0	0	2	0	0
Iowa, University of	1	0	0	0	0	0	0	1
Kansas	6	0	0	3	0	3	0	0
Kansas State University ...	3	0	0	2	0	1	0	0
Kansas, University of	3	0	0	1	0	2	0	0
Kentucky	5	0	0	0	0	3	2	0
Kentucky, University of ...	4	0	0	0	0	3	1	0
Murray State University ...	1	0	0	0	0	0	1	0
Louisiana	1	0	0	0	0	0	1	0
Louisiana State Univ.	1	0	0	0	0	0	1	0
Maryland	25	2	3	3	3	6	5	3
Johns Hopkins University ..	6	1	0	2	1	2	0	0
Maryland, University of ...	19	1	3	1	2	4	5	3
Massachusetts	33	7	1	2	1	11	10	1
Boston University	1	0	0	0	0	0	1	0
Brandeis University	5	1	0	0	0	2	2	0
Clark University	1	0	0	0	0	1	0	0
Harvard University	5	2	0	0	1	2	0	0
Massachusetts Inst. of Tech.	12	1	1	2	0	3	4	1
Massachusetts, Univ. of ...	2	1	0	0	0	0	1	0
Northeastern University ...	2	0	0	0	0	0	2	0
Southeastern Massachusetts University	1	1	0	0	0	0	0	0
Tufts University	3	1	0	0	0	2	0	0
Worcester Polytechnic Inst.	1	0	0	0	0	1	0	0

NUMBER OF AGREEMENTS BY STATES AND CONTRACTORS

State and Contractor	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
Michigan	26	2	0	4	0	11	8	1
Michigan State Univ.	11	1	0	2	0	5	3	0
Michigan Tech. Univ.	3	0	0	0	0	1	2	0
Michigan, University of ..	9	1	0	2	0	3	2	1
Wayne State University ...	3	0	0	0	0	2	1	0
Minnesota	9	1	0	1	0	2	5	0
Minnesota, Univ. of	9	1	0	1	0	2	5	0
Mississippi	1	0	0	0	0	1	0	0
Mississippi, Univ. of	1	0	0	0	0	1	0	0
Missouri	7	1	0	0	0	5	1	
Missouri, University of ..	1	0	0	0	0	0	1	0
Washington University	6	1	0	0	0	5	0	0
Montana	2	0	0	0	0	1	1	0
Montana State University .	2	0	0	0	0	1	1	0
Nebraska	1	0	0	0	0	1	0	0
Nebraska, University of ..	1	0	0	0	0	1	0	0
Nevada	1	0	0	0	0	1	0	0
Nevada, University of	1	0	0	0	0	1	0	0
New Hampshire	2	0	0	0	0	1	1	0
New Hampshire, Univ. of ..	1	0	0	0	0	1	0	0
Dartmouth College	1	0	0	0	0	0	1	0
New Jersey	11	1	0	1	0	5	1	3
Princeton University	6	1	0	1	0	3	1	0
Rutgers University	2	0	0	0	0	2	0	0
Stevens Inst. of Tech. ...	3	0	0	0	0	0	0	3

NUMBER OF AGREEMENTS BY STATES AND CONTRACTORS

State and Contractor	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
New Mexico	1	0	0	0	0	1	0	0
New Mexico Highlands University	1	0	0	0	0	1	0	0
New York	82	6	1	7	4	27	28	9
Brooklyn, Polytechnic Inst. of	2	0	0	0	0	0	0	2
Clarkson College of Tech.	4	0	0	0	0	2	2	0
Columbia University	11	1	1	2	0	4	2	1
Cornell University	19	1	0	1	0	1	13	3
Fordham University	1	0	0	0	0	1	0	0
Long Island Univ.	1	0	0	0	0	1	0	0
New York, City Univ. of .	3	0	0	0	1	2	0	0
New York, State Univ. of	14	1	0	2	1	5	5	0
New York University	3	0	0	0	2	0	0	1
Rensselaer Polytechnic Inst.	9	0	0	0	0	4	5	0
Rochester, University of	7	1	0	1	0	3	0	2
Rockefeller University ..	1	1	0	0	0	0	0	0
Syracuse University	3	1	0	0	0	1	1	0
Yeshiva University	4	0	0	1	0	3	0	0
North Carolina	15	1	0	4	1	2	7	0
Duke University	3	1	0	2	0	0	0	0
North Carolina State of the University of North Carolina	4	0	0	1	0	1	2	0
North Carolina, Univ. of	7	0	0	1	1	1	4	0
Wake Forest College	1	0	0	0	0	0	1	0
North Dakota	1	0	0	0	0	0	1	0
North Dakota, Univ. of ..	1	0	0	0	0	0	1	0

NUMBER OF AGREEMENTS BY STATES AND CONTRACTORS

State and Contractor	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
Ohio	20	3	0	2	1	7	7	0
Case Western Reserve	8	1	0	1	0	2	4	0
Cincinnati, Univ. of	2	1	0	0	0	0	1	0
Kent State University	1	0	0	0	1	0	0	0
Ohio State University	7	1	0	0	0	4	2	0
Ohio University	1	0	0	1	0	0	0	0
Toledo, University of	1	0	0	0	0	1	0	0
Oklahoma	3	0	0	0	0	1	2	0
Oklahoma State Univ.	1	0	0	0	0	1	0	0
Oklahoma, University of ...	2	0	0	0	0	0	2	0
Oregon	8	1	0	2	1	3	1	0
Oregon State Univ.	5	0	0	1	1	2	1	0
Oregon, University of	3	1	0	1	0	1	0	0
Pennsylvania	32	3	2	2	0	10	14	1
Carnegie-Mellon Univ.	10	1	1	1	0	5	2	0
Lehigh University	3	0	0	0	0	1	2	0
Pennsylvania State Univ. ..	7	0	0	0	0	1	5	1
Pennsylvania, Univ. of	6	1	0	1	0	3	1	0
Pittsburgh, University of .	4	1	0	0	0	0	3	0
Temple University	2	0	1	0	0	0	1	0
Puerto Rico	3	0	0	0	0	1	2	0
Puerto Rico, Univ. of	3	0	0	0	0	1	2	0
Rhode Island	5	1	0	1	0	1	2	0
Brown University	4	1	0	1	0	1	1	0
Rhode Island, Univ. of	1	0	0	0	0	0	1	0

NUMBER OF AGREEMENTS BY STATES AND CONTRACTORS

State and Contractor	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
South Carolina	3	0	0	1	0	1	1	0
Clemson University	1	0	0	0	0	0	1	0
South Carolina, Univ. of .	2	0	0	1	0	1	0	0
Tennessee	9	1	0	0	0	4	3	1
Tennessee State Univ. at Nashville	1	0	0	0	0	1	0	0
Tennessee, University of .	6	1	0	0	0	2	2	1
Vanderbilt University	2	0	0	0	0	1	1	0
Texas	30	1	4	2	1	16	2	4
Baylor University	2	0	0	0	0	2	0	0
Houston, Univ. of	4	0	1	0	0	2	0	1
Rice University	6	0	1	1	1	3	0	0
Texas A&M University	10	0	2	0	0	8	0	0
Texas Christian Univ.	1	0	0	0	0	0	1	0
Texas Tech University	1	0	0	0	0	0	0	1
Texas, University of	6	1	0	1	0	1	1	2
Utah	4	0	0	1	0	0	3	0
Brigham Young Univ.	2	0	0	1	0	0	1	0
Utah, Univ. of	2	0	0	0	0	0	2	0
Vermont	1	0	0	0	0	0	1	0
Vermont, Univ. of	1	0	0	0	0	0	1	0
Virginia	8	0	2	0	0	2	3	1
Roanoke College	1	0	0	0	0	0	0	1
Virginia Polytechnic Institute	3	0	1	0	0	2	0	0
Virginia, Univ. of	4	0	1	0	0	0	3	0

NUMBER OF AGREEMENTS BY STATES AND CONTRACTORS

State and Contractor	Division Total	High Energy Physics	Medium Energy Physics	Low Energy Physics	Math and Computer	Chemistry	Metallurgy & Materials	Controlled Thermonuclear
Washington	9	0	0	2	0	4	2	1
Washington State Univ. ..	3	0	0	0	0	2	0	1
Washington, Univ. of	5	0	0	2	0	1	2	0
Western Washington State College	1	0	0	0	0	1	0	0
Wisconsin	11	1	0	2	0	3	2	3
Marquette University	1	0	0	0	0	0	1	0
Wisconsin, Univ. of	10	1	0	2	0	3	1	3
Wyoming	1	0	0	1	0	0	0	0
Wyoming, Univ. of	1	0	0	1	0	0	0	0
TOTAL	550	49	16	64	23	204	151	43

NOT-FOR-PROFIT RESEARCH INSTITUTES AND INDUSTRIAL LABORATORIES

In addition to the contract-research program at educational institutions, the Research Division supports some research projects at not-for-profit research organizations and at industrial laboratories.

On June 30, 1970, there were 23 such projects in effect, for a total AEC funding level of $1,947,069. Fifteen of these were with 7 nonprofit research organizations, totalling $596,192, and 8 were with 5 industrial firms, for a total of $1,350,877, as follows:

Not-for-profit Research Organizations

	Number of Projects	AEC Support Level
Battelle Memorial Institute, Ohio	1 [a]	$ 30,000 [a]
Franklin Institute, Pennsylvania	3	148,797
Institute for Advanced Study, New Jersey	1	59,510
Midwest Research Institute, Missouri	1	30,461
National Academy of Sciences, Washington, D.C.	6	183,425
New England Institute, Connecticut	1	45,000
Stanford Research Institute, California	2	98,999
TOTAL	15	$ 596,192

Industrial Laboratories

	Number of Projects	AEC Support Level
Atomics International, California	3[a]	$ 252,500[a]
Avco-Everett Research Laboratory, Massachusetts	1	101,827
Gulf General Atomic, California	2	763,900
Texas Nuclear Corporation, Texas	1	72,680
United Aircraft Corporation, Connecticut	1	159,970
TOTAL	8	$ 1,350,877

Of these 23 contracts, 9 were of the SRSA or Lump Sum type (mostly with the nonprofit organizations) while 14 were cost-reimbursement types. Two were administered by the Chicago Operations Office, 13 by New York, 1 by Oak Ridge, and 7 by San Francisco.

[a] Terminated 6/30/70--not funded beyond FY 1970.

AEC SUPPORT LEVEL, AND NUMBER OF SCIENTIFIC EMPLOYEES, GRADUATE STUDENTS AND PUBLICATIONS OF THE 23 CONTRACTS, BY ACTIVITY

As of June 30, 1970

Activity	Number of Contracts	AEC Support	Scientific Employees		Graduate Students	Publications
			Number	Man-Years		
High Energy Physics	0	$ 10,000[a/]	0	0	0	0
Low Energy Physics	8	331,105	22	6	0	8
Mathematics & Computers	1	30,461	1	0	0	3
Chemistry	6	325,926[a/]	16	8	3	25
Metallurgy & Materials	5	306,197[a/]	12	8	0	12
Controlled Thermonuclear ...	3	943,380[a/]	18	11	4	13
TOTAL	23	$1,947,069	69	33	7	61

[a/] Includes $10,000 contribution to a Low Energy Physics agreement with National Academy of Sciences.

CONSOLIDATED BUDGET OF THE 23 CONTRACTS INCLUDED IN THE PHYSICAL RESEARCH PROGRAM

As of June 30, 1970

(Dollars in Thousands)

Items of Expense	Total Amount	%	Low Energy Physics	%	Math	%	Chemistry	%	Met. & Mat'ls	%	CTR	%
SRSA Or Lump Sum Contracts (9)												
Salaries and Wages	$ 343	51.7	56	56.0	13	43.3	109	51.4	21	42.9	144	53.0
Equipment	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0
Materials and Supplies	92	13.9	10	10.0	2	7.1	27	12.8	4	8.2	49	18.0
Travel	9	1.4	1	1.0	1	3.4	3	1.4	0	.0	4	1.5
Communications	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0
Publication Costs	7	1.1	1	1.0	0	.0	4	1.9	0	.0	2	.7
Indirect Expenses	212	31.9	32	32.0	14	46.2	69	32.5	24	48.9	73	26.8
TOTAL	$ 663	100.0	100	100.0	30	100.0	212	100.0	49	100.0	272	100.0
Contributed by Contractors ..	120	18.1	30	30.0	0	.0	38	17.9	0	.0	52	19.1
Supported by AEC	543	81.9	70	70.0	30	100.0	174	82.1	49	100.0	220	80.9
Cost-Type Contracts (14)												
Salaries and Wages	717	35.8	212	33.7			61	34.6	132	40.4	312	35.9
Equipment	87	4.4	0	.0			0	.0	13	4.0	74	8.5
Materials and Supplies	304	15.2	62	9.9			29	16.5	18	5.5	195	22.5
Travel	214	10.7	172	27.3			12	6.8	13	4.0	17	2.0
Communications	11	.6	8	1.3			1	.6	1	.3	1	.1
Publication Costs	0	.0	0	.0			0	.0	0	.0	0	.0
Indirect Expenses	667	33.3	175	27.8			73	41.5	150	45.8	269	31.0
TOTAL	$2,000	100.0	629	100.0	0	.0	176	100.0	327	100.0	868	100.0
Contributed by Contractors ..	596	29.8	358	56.9			24	13.6	70	21.4	144	16.6
Supported by AEC	1,404	70.2	271	43.1			152	86.4	257	78.6	724	83.4