

# *Appendix*

# ***Budget Profiles***

## Appendix

# Budget Profiles

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This appendix contains the detailed information that underlies the quantitative aspects of our Portfolio Summary. The building blocks for this information are the Research Summary Profiles (RSPs), developed around individual Core Research Activities (CRAs), each with a unique title. In constructing the Profiles, DOE science programs were asked to organize their research into component pieces that could be “mapped” into the twelve science challenges. The goal was to reformulate (for purposes of this analysis) the programs in a way that would reveal additional insights into the makeup of the Department’s portfolio—insights beyond those apparent through the budget structure alone. The result of this iterative effort is the 95 Research Summary Profiles, one for each Core Research Activity, for the Science Portfolio. In a number of cases, these Core Research Activities depict research areas at a finer level than they are presented in the President’s FY 2000 Budget Request to Congress.

Each Research Summary Profile contains the following information, distributed across the two tables in this Appendix.

**Title:** a short descriptive title of the Core Research Activity.

**Resources:** an estimate of the amount for FY 98 and FY 99 that can be attributed to that Core Research Activity. Although the apportionment is subjective, all estimates collectively meet the budget control totals for science programs and for the overall science budget. *Because of the overlapping and highly crosscutting nature of the Science Challenges, multiple counting occurs across each Challenge. Merely adding the resource estimates across science challenges will yield an estimate far in excess of the actual science budget. The tables in this Appendix display how the Core Research Activities contribute to multiple challenges.*

**B&R Links:** reference to the contributing budget element(s)

**Impacts:** a subjective evaluation of the degree(s) to which the particular research item support(s) one or several of the twelve major science challenges. Impact is identified as either Strong (S) or Moderate (M). A blank indicates a lower impact.

**Research Performers:** an estimate of the distribution of resources by different categories of research performer: national labs, universities, industry, U.S. government, international/foreign.

**Table A-1. Research Summary Impacts**  
(M=Moderately Supportive, S=Strongly Supportive)

RSP Title	FY 1999	FY 2000	FY 2001 Presd.Req	New Fuels		Clean and Affordable Power		Efficient Energy Use		Sources and Fate of Energy Byproducts		Impacts on People and the Environment		Prevention and Protection		Components of Matter		Origin and Fate of the Universe		Complex Systems		Instrumentation for the Frontiers of Science		Scientific Simulation		Institutional Capacity		
				1	2	3	4	5	6	7	8	9	10	11	12													
1 Structure of Materials	\$24.111	\$23.841	\$26.778	M	S							M				S	S	M										
2 Engineering Behavior	\$15.226	\$15.521	\$18.218	S	S													M	S	M								
3 Mechanical Behavior and Radiation Effects	\$16.267	\$16.570	\$16.410	S	S													M	M	S								
4 Physical Behavior of Materials	\$13.496	\$14.065	\$13.790	M	S													S	M	M								
5 Neutron and X-Ray Scattering	\$24.891	\$23.097	\$23.441			M									M		S	M	M									
6 Experimental Condensed Matter Physics	\$32.420	\$33.313	\$35.649	S	M										S		S	M	M									
7 Theory & Simulations of Matter, Engineering Physics	\$15.124	\$15.767	\$18.876		M	M									S		S	S	S									
8 Materials Chemistry	\$25.938	\$25.796	\$27.645	S		M									M		S	M	M									
9 Experimental Program to Stimulate Competitive Research (EPSCoR)	\$6.815	\$6.815	\$9.815	M	M	M	M			M																S		
10 Photochemistry and Radiation Research	\$23.871	\$23.351	\$25.842	S		M	M								M		S	S										
11 Chemical Physics Research	\$36.384	\$31.191	\$38.515		M	S				M							M	S	S									
12 Atomic, Molecular, and Optical Science	\$11.018	\$11.092	\$12.123		M										S	M	S	S	M									
13 Catalysis and Chemical Transformations	\$22.304	\$21.857	\$24.952	M		S	M										S	M										
14 Separations and Analysis	\$13.950	\$12.617	\$14.617	M		M	M			S							S	M										
15 Heavy Element Chemistry	\$6.642	\$6.720	\$7.376				S			M	M							M	M									
16 Chemical Energy and Chemical Engineering	\$9.207	\$9.009	\$9.975	S	S	M												M	M									
17 Mechanical Systems, Systems Science, and Engineering Analysis	\$17.476	\$14.352	\$17.767		M	S												S		M								
18 Geosciences	\$22.792	\$14.997	\$15.205	S			S			M							S	M	S									
19 Energy Biosciences	\$26.643	\$25.041	\$27.966	S			M	M		M							S		M									
20 Neutron and Light Sources Facilities	\$394.551	\$374.269	\$569.783	M	M	M	M			M	M						S	S	M	S								
N Waste Management	\$0.000	\$0.000	\$8.073																									
21 Structural Biology Research Facilities	\$15.471	\$16.000	\$20.500							M	M						S	S										
22 Understanding and Predicting Protein Structure	\$11.429	\$11.474	\$15.390							M	S						S		S					S				
23 High Throughput DNA Sequencing	\$46.000	\$54.167	\$54.052														S		S					S				
24 Resources and Tools for DNA Sequencing and Sequence Analysis	\$38.119	\$26.719	\$28.218														S		S	M								
25 Radiopharmaceutical Development	\$15.062	\$14.413	\$24.280							S								M										



					New Fuels	Clean and Affordable Power	Efficient Energy Use	Sources and Fate of Energy Byproducts	Impacts on People and the Environment	Prevention and Protection	Components of Matter	Origin and Fate of the Universe	Complex Systems	Instrumentation for the Frontiers of Science	Scientific Simulation	Institutional Capacity
54	Experimental Fusion Physics Support	\$16.118	\$16.666	\$15.472	S								M	S		M
55	Fusion Physics Research on NSTX	\$9.906	\$12.874	\$12.250	S								S			S
56	Experimental Plasma Research (Alternatives)	\$18.980	\$25.088	\$23.665	S								M	S		M
57	Inertial Fusion Energy Research	\$8.377	\$15.281	\$14.384	S								M			M
58	Plasma Theory and Computation	\$22.666	\$24.536	\$27.536	S							S	S		S	M
59	General Plasma Science	\$6.222	\$7.964	\$8.450	M							S	S			M
59a	TFTR Facility	\$3.949	\$13.422	\$19.600										S		
60	DIII-D Facilities Operations	\$29.065	\$31.098	\$29.255	S									S		M
61	Alcator C-Mod Facility Operations	\$10.223	\$10.657	\$10.042	S									S		M
62	NSTX Facility Operations	\$17.333	\$15.506	\$17.721	S									S		S
63	Plasma Technologies	\$19.475	\$12.085	\$11.664	S											M
64	Fusion Technologies	\$8.096	\$9.222	\$9.373	S			M								M
65	Advanced Fusion Design	\$9.127	\$5.271	\$4.906	S			M								M
66	Advanced Fusion Materials Research	\$6.840	\$7.167	\$6.804	S			M			M		M			M
67	CP Violation - B-Meson System	\$14.324	\$16.537	\$16.862							S	S		M	M	M
68	CP Violation - K-Meson System	\$7.519	\$6.779	\$6.912							S	S		M	M	M
69	Neutrino Mass and Missing Mass	\$27.211	\$31.848	\$33.042							S	S		M	M	M
70	Search for Higgs & Supersymmetry	\$65.000	\$70.000	\$70.000							S	M		M	M	M
71	Strong Interactions, Supersymmetry & Particles	\$37.288	\$41.322	\$42.135							S	M		M	M	M
72	Electroweak Interactions	\$38.718	\$39.476	\$40.252							S	M		M	M	M
73	Hadron Spectroscopy	\$6.516	\$8.188	\$8.349							S	M		M	M	M
74	Spin Structure of Nucleons	\$0.790	\$0.886	\$0.904							S	M		M	M	M
75	Particle Astrophysics & Cosmology	\$4.633	\$3.423	\$3.490							M	S		M	M	M
76	High Energy Physics Theory	\$29.194	\$36.745	\$37.467							S	M		M	S	
77	General Technology: Detector R&D	\$13.835	\$12.750	\$11.565							S			S	M	M
78	Facility Operations: Fermilab	\$219.711	\$219.333	\$219.447							S			S	S	M
79	Facility Operations: SLAC	\$109.240	\$118.271	\$124.196							S			S	S	M
80	Facility Operations: AGS	\$34.326	\$4.994	\$7.889							S			S	S	M
81	Adv. Particle Accelerator Concepts	\$12.515	\$13.140	\$13.575							S			S	M	M
82	General Technology: Accelerator R&D	\$42.706	\$44.932	\$49.191							S		M	S	S	M
83	Quark/Gluon Substructure of Nuclei - Medium Energy Nuclear Physics	\$36.777	\$36.962	\$37.744							S	M		M	M	M
84	Medium Energy Facility Ops. & Constr.	\$78.918	\$76.900	\$82.675							S	M		S	M	M

					New Fuels	Clean and Affordable Power	Efficient Energy Use	Sources and Fate of Energy Byproducts	Impacts on People and the Environment	Prevention and Protection	Components of Matter	Origin and Fate of the Universe	Complex Systems	Instrumentation for the Frontiers of Science	Scientific Simulation	Institutional Capacity
85	Nuclear Structure/Dynamics ... Phase Trans. - Heavy Ion Nuclear Physics	\$54.028	\$51.051	\$51.333							S	S		M	M	M
86	Heavy Ion Facility Ops. & Constr.	\$103.547	\$116.203	\$126.757							S	S		S	M	M
87	Nuclear Structure & Astrophysics - Low Energy Nuclear Physics	\$22.998	\$23.998	\$24.193							S	S		M	M	M
88	Low Energy Facility Ops. & Constr.	\$9.310	\$8.941	\$9.120							S	S		S	M	M
89	Theoretical Nuclear Physics	\$15.640	\$15.675	\$18.155							S	S			S	M
90	Science Education Support (X)	\$4.500	\$4.500	\$6.500	M	M	M	M	M	S	M	M	M	S	S	S
91	General Purpose Plant & Equipment (GPP/GPE)	\$46.590	\$47.178	\$53.847	M	M	M	M	M	M	M	M	M	M	M	S
92	Multiprogram Energy Lab Facilities Support (MELFS)	\$21.260	\$21.255	\$23.219	M	M	M	M	M	M	M	M	M	M	M	S
93	Small Business Innovation Research (SBIR) Program	\$76.850	\$55.744	\$58.849	M	M	M	M	M	M					M	S
94	Small Business Technology Transfer (STTR) Program	\$4.611	\$3.344	\$3.525	M	M	M	M	M	M	M				M	S
95	Oak Ridge Landlord	\$0.000	\$11.800	\$10.711	M	M	M	M	M	M	M	M	M	M	M	M

X — \$4.5m of Science Education activities are being funded out of the SC Program Direction account in FY 1999 and FY 2000 and \$6.5m in FY 2001.

**Table A-2. Research Summary Funding by Research Performer**

	B&R	RSP Title	FY 1999	FY 2000	FY 2001 Pres. Req.	Percent of Funding by Research Performer				
						Lab	Univ	Ind	Gov	For
1	KC020101	Structure of Materials	\$24.111	\$23.841	\$26.778	68	32	0	0	0
2	KC020105	Engineering Behavior	\$15.226	\$15.521	\$18.218	91	9	0	0	0
3	KC020102 KC020104	Mechanical Behavior and Radiation Effects	\$16.267	\$16.570	\$16.410	78	21	1	0	0
4	KC020103	Physical Behavior of Materials	\$13.496	\$14.065	\$13.790	76	24	0	0	0
5	KC020201	Neutron and X-Ray Scattering	\$24.891	\$23.907	\$23.441	77	23	0	0	0
6	KC020202	Experimental Condensed Matter Physics	\$32.420	\$33.313	\$35.649	77	23	0	0	0
7	KC020203 KC020204 KC020205	Theory & Simulations of Matter, Engineering Physics	\$15.124	\$15.767	\$18.876	85	15	0	0	0
8	KC0203	Materials Chemistry	\$25.938	\$25.796	\$27.645	72	26	1	1	0
9	KC0205	Experimental Program to Stimulate Competitive Research (EPSCoR)	\$6.815	\$6.815	\$9.815	5	95	0	0	0
10	KC030101	Photochemistry and Radiation Research	\$23.871	\$23.351	\$25.842	50	49	0	1	0
11	KC030102	Chemical Physics Research	\$36.384	\$31.191	\$38.515	80	19	0	1	0
12	KC030103	Atomic, Molecular, and Optical Science	\$11.018	\$11.092	\$12.123	42	58	0	0	0
13	KC030201	Catalysis and Chemical Transformations	\$22.304	\$21.857	\$24.952	55	41	0	4	0
14	KC030202	Separations and Analysis	\$13.950	\$12.617	\$14.617	68	32	0	0	0
15	KC030203	Heavy Element Chemistry	\$6.642	\$6.720	\$7.376	95	5	0	0	0
16	KC030204	Chemical Energy and Chemical Engineering	\$9.207	\$9.009	\$9.975	55	45	0	0	0
17	KC0401	Mechanical Systems, Systems Science, and Engineering Analysis	\$17.476	\$14.352	\$17.767	41	53	1	5	0
18	KC0403	Geosciences	\$22.792	\$14.997	\$15.205	48	50	2	0	0
19	KC06	Energy Biosciences	\$26.643	\$25.041	\$27.966	9	88	1	2	0
20	KC020401	Neutron and Light Sources Facilities	\$394.551	\$374.269	\$569.783	100	0	0	0	0
N		Waste Management	\$0.000	\$0.000	\$8.073					
		<b>TOTAL BES</b>	<b>\$759.126</b>	<b>\$720.091</b>	<b>\$962.816</b>					
21	KP110101	Structural Biology Research Facilities	\$15.471	\$16.000	\$20.500	90	10	0	0	0
22	KP110101 KP110401	Understanding and Predicting Protein Structure	\$11.429	\$11.474	\$15.390	76	24	0	0	0
23	KP110301	High Throughput DNA Sequencing	\$46.000	\$54.167	\$54.052	90	10	0	0	0
24	KP110301	Resources and Tools for DNA Sequencing and Sequence Analysis	\$38.119	\$26.719	\$28.218	21	79	0	0	0
25	KP140101 KP140102 KP140104	Radiopharmaceutical Development	\$15.062	\$14.413	\$24.280	40	60	0	0	0
26	KP110301	Production DNA Sequencing Facility	\$4.000	\$4.000	\$4.000	100	0	0	0	0
27	KP110201	Microbial Genomics	\$10.633	\$9.594	\$18.362	40	60	0	0	0
28	KP140201	Analytical Chemistry Instrumentation	\$5.844	\$4.619	\$5.849	90	10	0	0	0
29	KP110202 KP110401	Health Risks from Low Dose Exposures	\$12.316	\$18.262	\$11.682	51	44	0	0	5

						Percent of Funding by Research Performer				
30	KP140102 KP140103 KP140104 KP140106 KP140107	Advanced Medical Imaging	\$26.490	\$23.410	\$16.390	50	50	0	0	0
31	KP110201 KP110301 KP110401	Understanding Gene Function	\$22.788	\$20.007	\$24.221	80	20	0	0	0
32	KP140105	Boron Neutron Capture Therapy	\$10.769	\$11.290	\$10.795	46	54	0	0	0
33	KP130101	Natural and Accelerated Bioremediation Research Program	\$25.299	\$25.173	\$21.113	50	50	0	0	0
34	KP12040	Economics of Global Climate	\$7.384	\$6.844	\$6.699	35	65	0	0	0
35	KP130103	Environmental and Molecular Sciences Laboratory (EMSL)	\$29.909	\$28.823	\$32.415	100	0	0	0	0
36	KP120301 KP120302	Ecological Processes	\$13.691	\$11.924	\$12.010	40	60	0	0	0
37	KP120101 KP120102	Climate Change Prediction Program	\$22.092	\$23.845	\$27.962	49	45	0	5	1
38	KP130102 KP130105	Cleanup Research	\$3.632	\$3.383	\$2.667	56	36	8	0	0
39	KC02 KC03 KC0403 KC06 KP120202 KP120203 KP110201	Climate Change Technology Initiative (CCTI)	\$13.135	\$32.160	\$35.761	(W)	(W)	(W)	(W)	(W)
40	KP120202 KP120203	Carbon Cycle Research	\$9.416	\$15.483	\$16.035	30	65	0	0	0
41	KP120201	Atmospheric Sciences	\$14.307	\$12.641	\$12.318	63	37	0	0	0
42	KP120103 KP120104	Atmospheric Radiation Measurement (ARM) Program Research	\$15.293	\$15.997	\$16.976	44	33	2	19	1
43	KP120103	Atmospheric Radiation Measurement (ARM) Program Infrastructure	\$28.454	\$27.371	\$27.371	99	0	1	0	0
44	KP110201 KP120203 KP120402 KP140107	Focused Health Research	\$26.201	\$17.797	\$0.000	(W)	(W)	(W)	(W)	(W)
		<b>TOTAL BER</b>	<b>\$427.734</b>	<b>\$435.396</b>	<b>\$445.066</b>					
45	KJ0101	Applied Mathematics	\$22.564	\$23.354	\$33.054	65	35	0	0	0
46	KJ0101	Computer Science to Enable Scientific Computing	\$14.000	\$14.000	\$21.476	75	25	0	0	0
47	KJ0102	High Performance Computer Networks	\$7.420	\$6.000	\$7.500	75	25	0	0	0
48	KJ0101 KJ0102	Advanced Computing Software and Collaboratory Tools	\$13.841	\$8.000	\$14.600	65	35	0	0	0
49	KJ0101 KJ0102	Scientific Computing Application Testbeds	\$16.173	\$8.732	\$20.500	60	40	0	0	0
50	KJ0102	Advanced Computing and Communications Facility Operations	\$61.296	\$55.996	\$66.341	100	0	0	0	0
51	KJ02 KJ03	Laboratory Technology Research and Advanced Energy Projects	\$18.148	\$8.578	\$11.963	100	0	0	0	0
		<b>TOTAL ASCR</b>	<b>\$153.442</b>	<b>\$124.660</b>	<b>\$175.434</b>					

						Percent of Funding by Research Performer				
52	AT501020	Fusion Physics Research on DIII-D	\$21.931	\$23.025	\$21.617	35	6	59	0	0
53	AT501030	Fusion Physics Research on Alcator C-Mod	\$7.775	\$7.870	\$7.367	25	75	0	0	0
54	AT5010101 AT501080 AT501070 ATGI	Experimental Fusion Physics Support	\$16.118	\$16.666	\$15.472	40	47	4	9	0
55	AT501501	Fusion Physics Research on NSTX	\$9.906	\$12.874	\$12.250	80	14	5	0	1
56	AT501502	Experimental Plasma Research (Alternatives)	\$18.980	\$25.088	\$23.665	45	54	0	1	0
57	AT501503	Inertial Fusion Energy Research	\$8.377	\$15.281	\$14.384	94	2	2	2	0
58	AT5020	Plasma Theory and Computation	\$22.666	\$24.536	\$27.536	47	38	15	0	0
59	AT5030	General Plasma Science	\$6.222	\$7.964	\$8.450	15	69	0	16	0
59 a	AT5501	TFTR Facility	\$3.949	\$13.422	\$19.600	100	0	0	0	0
60	AT5502	DIII-D Facilities Operations	\$29.065	\$31.098	\$29.255	9	0	91	0	0
61	AT5503	Alcator C-Mod Facility Operations	\$10.223	\$10.657	\$10.042	5	95	0	0	0
62	AT5505 AT5508	NSTX Facility Operations	\$17.333	\$15.506	\$17.721	100	0	0	0	0
63	AT601030	Plasma Technologies	\$19.475	\$12.085	\$11.664	44	53	3	0	0
64	AT601040	Fusion Technologies	\$8.096	\$9.222	\$9.373	68	31	1	0	0
65	AT601050	Advanced Fusion Design	\$9.127	\$5.271	\$4.906	49	40	9	0	2
66	AT6020	Advanced Fusion Materials Research	\$6.840	\$7.167	\$6.804	86	13	1	0	0
		<b>TOTAL FES</b>	<b>\$216.083</b>	<b>\$237.732</b>	<b>\$240.106</b>					
67	KA04	CP Violation - B-Meson System	\$14.324	\$16.537	\$16.862	25	75	0	0	0
68	KA04	CP Violation - K-Meson System	\$7.519	\$6.779	\$6.912	25	75	0	0	0
69	KA04	Neutrino Mass and Missing Mass	\$27.211	\$31.848	\$33.042	25	75	0	0	0
70	KA04	Search for Higgs & Supersymmetry	\$65.000	\$70.000	\$70.000	25	75	0	0	0
71	KA04	Strong Interactions, Supersymmetry & Particles	\$37.288	\$41.322	\$42.135	25	75	0	0	0
72	KA04	Electroweak Interactions	\$38.718	\$39.476	\$40.252	25	75	0	0	0
73	KA04	Hadron Spectroscopy	\$6.516	\$8.188	\$8.349	25	75	0	0	0
74	KA04	Spin Structure of Nucleons	\$0.790	\$0.886	\$0.904	25	75	0	0	0
75	KA04	Particle Astrophysics & Cosmology	\$4.633	\$3.423	\$3.490	25	75	0	0	0
76	KA04	High Energy Physics Theory	\$29.194	\$36.745	\$37.467	25	75	0	0	0
77	KA04	General Technology: Detector R&D	\$13.835	\$12.750	\$11.565	50	50	0	0	0
78	KA02	Facility Operations: Fermilab	\$219.711	\$219.333	\$219.447	100	0	0	0	0
79	KA02	Facility Operations: SLAC	\$109.240	\$118.271	\$124.196	100	0	0	0	0
80	KA02	Facility Operations: AGS	\$34.326	\$4.994	\$7.889	100	0	0	0	0
81	KA04	Adv. Particle Accelerator Concepts	\$12.515	\$16.140	\$13.575	35	22	40	3	0
82	KA04	General Technology: Accelerator R&D	\$42.706	\$44.932	\$49.191	100	0	0	0	0
		<b>TOTAL HEP</b>	<b>\$663.526</b>	<b>\$668.624</b>	<b>\$685.276</b>					
83	KB0101	Quark/Gluon Substructure of Nuclei - Medium Energy Nuclear Physics	\$36.777	\$36.962	\$37.744	55	45	0	0	0
84	KB0102	Medium Energy Facility Ops. & Constr.	\$78.918	\$76.900	\$82.675	84	16	0	0	0
85	KB0201	Nuclear Structure/Dynamics ... Phase Trans. - Heavy Ion Nuclear Physics	\$54.028	\$51.051	\$51.333	65	35	0	0	0
86	KB0202	Heavy Ion Facility Ops. & Constr.	\$103.547	\$116.203	\$126.757	100	0	0	0	0
87	KB0401	Nuclear Structure & Astrophysics - Low Energy Nuclear Physics	\$22.998	\$23.998	\$24.193	54	46	0	0	0

						Percent of Funding by Research Performer				
88	KB0402	Low Energy Facility Ops. & Constr.	\$9.310	\$8.941	\$9.120	100	0	0	0	0
89	KB0301	Theoretical Nuclear Physics	\$15.640	\$15.675	\$18.155	42	58	0	0	0
		<b>TOTAL NP</b>	<b>\$321.218</b>	<b>\$329.730</b>	<b>\$349.977</b>					
90	Program Dir.	Science Education Support (X)	\$4.500	\$4.500	\$6.500	70	30	0	0	0
91	Cross Cut	General Purpose Plant & Equipment (GPP/GPE)	\$46.590	\$47.178	\$53.847	100	0	0	0	0
92	KG	Multiprogram Energy Lab Facilities Support (MELFS)	\$21.260	\$21.255	\$23.219	100	0	0	0	0
93	KM0000	Small Business Innovation Research (SBIR) Program	\$76.850	\$55.744	\$58.849	5	10	85	0	0
94	KN0000	Small Business Technology Transfer (STTR) Program	\$4.611	\$3.344	\$3.525	25	15	60	0	0
95	AH99	Oak Ridge Landlord	\$0.000	\$11.800	\$10.711					
		<b>Total All Other</b>	<b>\$153.811</b>	<b>\$143.821</b>	<b>\$156.651</b>					
		<b>GRAND TOTAL</b>	<b>\$2,694.940</b>	<b>\$2,660.054</b>	<b>\$3,015.326</b>					

W — This Research Summary includes new program elements and as such the distribution of these research funds has yet to be decided.

X — \$4.5m of Science Education activities are being funded out of the SC Program Direction account in FY 1999 and FY 2000 and \$6.5m in FY2001.