

**NATIONAL SCIENCE FOUNDATION
INDUSTRY/UNIVERSITY
COOPERATIVE RESEARCH CENTERS**

**FINAL
1996-1997 STRUCTURAL INFORMATION^{1,2}**

- **TABLE 1:** GENERAL INFORMATION
- **TABLE 2:** OPERATING BUDGET: TOTAL FUNDING
- **TABLE 3:** BUDGET FIGURES & CAPITAL FUNDING
- **TABLE 4:** INDUSTRY MEMBERSHIP DESCRIPTORS
- **TABLE 5:** HUMAN RESOURCES
- **TABLE 6:** CENTER DIRECTOR DESCRIPTORS
- **TABLE 7:** CENTER OUTCOMES
- **TABLE 8:** INTELLECTUAL PROPERTY EVENTS
- **APPENDIX: FOOTNOTES: SPECIAL CONSIDERATIONS**

(Footnotes appear on top of columns and/or at end of rows for each Table and are described in the Appendix on the last page).

**D.O. Gray & M.A. Pieterman
DEPARTMENT OF PSYCHOLOGY
NORTH CAROLINA STATE UNIVERSITY**

March 1998

NOTE: 1996-1997 data collected from 49/50 Center Director Surveys (98% response rate).

PLEASE DIRECT QUESTIONS AND COMMENTS TO THE AUTHORS³

TABLE 1
1996 - 1997 GENERAL INFORMATION

STATUS	YEAR FUNDED	UNIVERSITY (CENTER)	DIRECTORS	#OF DEPT.
	1981	1. Case Western Reserve Univ. (Center for Applied Polymer Research)	Hiltner, A.	1
	1982	2. Rutgers Univ. (Center for Ceramic Research)	Niesz, D.	1
	1983	3. The Pennsylvania State Univ. (Center for Dielectric Studies)	Randall, C.	4
	1984	4. Univ. of Arizona (Center for Microcontamination Control)	O'Hanlon, J.	5
		5. Colorado School of Mines (Center for Advanced Steel Processing and Products Research)	Matlock, D.	2
		6. Lehigh Univ. (Center for Innovation Management Studies)	Bean, A.	7
	1985	7. Carnegie-Mellon Univ. (Center for Iron and Steelmaking Research)	Fruchan, RJ.	1
		8. Univ. of Tennessee (Center for Measurement and Control Engineering)	Garrison, A.	4
		9. Iowa State Univ. (Center for Nondestructive Evaluation)	Thompson, R.	6
	1986	10. Oklahoma State Univ. (Web Handling Research Center)	Reid, K.	0
		11. Northeastern Univ. (Center for Electromagnetics Research)	Silevitch, M., DiMarzio, C., Rappaport, C., & McKnight, S.	4
		12. New Mexico Institute of Mining & Technology (Center for Energetic Materials)	Persson, P. & Olson, D.	2
		13. Univ. of California-Berkeley (Center for Sensors and Actuators)	Muller, R.	6
	1988	14. Univ. of New Mexico (Center for Micro-Engineered Materials)	Datye, A. & Hampden-Smith, M.	6
		15. Carnegie-Mellon Univ. (Center for Building Performance and Diagnostics)	Hartkopf, V. & Lee, S.	1
	1989	16. Univ. of Illinois-Urbana-Champaign (Center for Advanced Air Conditioning and Refrigeration)	Bullard, C.	2
		17. Univ. of California-San Diego (Center for Ultra High-Speed Integrated Circuits & Systems)	Ko, W., Milstein, L.B., Asbeck, P.M., & Chan, P.	4
	1990	18. Univ. of Michigan (Center for Dimensional Measurement and Control in Manufacturing)	Ni, J. & Hu, J.	2
		19. Univ. of Colorado-Boulder (Center for Separations Using Thin Films)	Krantz, W. & Noble, R.	5
	1991	20. Rutgers Univ./State Univ. of New Jersey (Center for Wireless Information Networks)	Goodman, D.	4
		21. Lehigh Univ. (Center for Polymer Interfaces)	Chaudhury, M. & Mercurio, A.	5
		22. North Carolina State Univ. (Center for Integrated Pest Management)	Stinner, R.	5
		23. Villanova University (Center for Advanced Communications)	Di Giacomo, J.	3
		24. Georgia Tech/Univ. of Arkansas (Center for Material Handling/Logistics Institute)	Nemhauser, G. & Landers, T.	6
	1993	25. NJ Institute of Technology/The Pennsylvania State Univ./Ohio State Univ./MIT (Center for Emission Reduction Research)	Watts, D. & Moritz, K.	4
		26. Ohio Univ. (Center for Corrosion in Multiphase Systems)	Jepson, P. & Gopal, M.	1
		27. Univ. of Illinois (Center for Machine-Tool Systems)	Kapoor, S.	6
		28. Univ. of Massachusetts-Lowell (Center for Biodegradable Polymer Research)	McCarthy, S.	4
		29. Univ. of Rhode Island (Center for Ocean Technology)	Callahan, J.	6
		30. North Carolina State Univ./Duke Univ. (Center for Advanced Computing and Communication)	Snyder, W. & Trivedi, K.	3
	1994	31. Univ. of Washington/Univ. of Minnesota/Univ. of California-Davis/Univ. of Delaware (Center for Process Analytical Chem.)	Christian, G. & Koch, M.	5
		32. Northwestern University/Georgia Institute of Tech./Univ. of Illinois-Urbana-Champaign (Center for Surface Engin. and Trib.)	Wilson, W. & Danyluk, S.	4
		33. Purdue Univ./Univ. of Florida/Univ. of Oregon (Center for Software Engineering)	Mather, A. & Thebaut, S.	4
		34. North Carolina State Univ./Univ. of California-Davis (Center for Aseptic Processing and Packaging Studies)	Swartzel, K. & Shoemaker, S.	4
		35. Washington State Univ./Univ. of Washington/Oregon State Univ./State Univ. of NY-SB (Center for Anal./Dig. Integrated Circuits)	Ringo, J., Lautitzen, P., Kisei, S., & Carlson, B.	2
	1995	36. Texas A&M Univ. (Center for Ergonomics)	Congleton, J., Kerk, C., & Amendola, A.	5
		37. The Pennsylvania State Univ./Rutgers Univ. (Center for Particulate Materials)	Messing, G. & Cornwall, R.	7
		38. Arizona State Univ./Colorado School of Mines/Wichita State Univ. (Center for Advanced Control of Energy and Power Systems)	Heydt, G.T. & Shoureshi, R.	9
		39. Univ. of Texas-Arlington (Center for Advanced Electronic Materials, Devices and Systems)	Fitzer, J. & Pandey, R.	2
		40. Univ. of Arizona/Univ. of Maryland (Center for Optoelectronic Devices, Interconnects and Packaging)	Dagenais, M. & Peyghambarian, N.	5
		41. Univ. of Colorado-Boulder (Center for Advanced Manufacturing and Packaging of Microwave, Optical and Digital Electronics)	Mahajan, R.	2
		42. Eastern Michigan Univ./North Dakota State Univ./Michigan Molecular Institute (Center for Coatings Research)	Jones, F. & Urban, M.	3
		43. Purdue Univ. (Center for Pharmaceutical Processing Research)	Nail, S. & Kildsig, D.	4
	1996	44. Cornell Univ./Univ. of California-Berkeley/Univ. of Illinois-Urbana/Univ. of Wisconsin-Madison (Center for Power Systems Engineering)	Thomas, R., Lasseter, M., Chen, S., & Sauer, P.	5
		45. NJ Institute of Technology/Rutgers Univ./Stevens Tech./UMDNJ/Princeton/Tufts (Center for Hazardous & Toxic Waste Mgmt)	Magee, R.	7
		46. Alfred Univ./Univ. of Missouri-Rolla (Center for Glass Research)	Seward, T. & Moore, J.	3
		47. Univ. of Connecticut (Center for Grinding Research)	Howes, T. & Webster, J.	7
		48. Univ. of Washington/Northwestern Univ. (Center for Health Management)	Zuckerman, H. & Shortell, S.	5
	1997	49. SUNY Buffalo/SUNY-Alfred/Univ. of Memphis/Univ. of Miami (Center for Biotechnology)	Baird, J., Auer, A., Clare, A., Turito, V., & Hwang, S.	14
		50. Univ. of Iowa/Univ. of Texas-Austin (Virtual Proving Ground Simulation)	Hahn, G., & Tongoria, R.	5
			GRAND MEAN:	
			GRAND SUM:	24
NEW CENTERS		51. Univ. of California-Berkeley (Center for Built Environments) - call forward	Arens, E.	5
		52. North Carolina State Univ. (Center for Silicon Wafer Engineering and Defect Science)	Rosgonyi, G.	5
		53. Univ. of Oklahoma (Center for Wireless Electromagnetic Compatibility)	Grant, F.	1
		54. Ohio State Univ. (Center for Advanced Polymer and Composite Engineering)	Lee, L. J.	1
		55. Rutgers Univ. (Center for Quality and Reliability Engineering) - CQRE-68	Elsayed, E.	1
		56. Arizona State Univ. (Center for Management of Information)	Nunamaker, J.	1

call forward
call Cathy in Art Mills
or Art Mills?
TS?
need P10 codes / ACSU codes
contact evaluators and let them know P10 code

TABLE 2
1996 - 1997 OPERATING BUDGET: TOTAL FUNDING⁶

STATUS	YEAR FUNDED	ABBREVIATED NAME	TOTAL FUNDING	NSF		INDUSTRY		STATE TOTAL	UNIV. TOTAL	OTHER		
				IUCRC TOTAL	OTHER	MEMBERSHIP FEES	OTHER			FEDERAL AGENCY	NON-FEDERAL AGENCY	OTHER FUNDING
	1981	1. Case Western Reserve Univ. (Applied Polymer Research)										
	1982	2. Rutgers Univ. (Ceramic Research)	\$5,022,272	\$125,000	\$0	\$316,250	\$502,504	\$934,589	\$117,350	\$1,864,567	\$110,000	\$0
	1983	3. The Pennsylvania State Univ. (Dielectric Studies)	\$619,000	\$33,000	\$0	\$249,000	\$0	\$0	\$100,000	\$0	\$0	\$237,000
	1984	4. Univ. of Arizona (Microcontamination Control)	\$506,000	\$33,000	\$5,000	\$425,000	\$0	\$0	\$43,000	\$0	\$0	\$0
		5. Colorado School of Mines (Advanced Steel Processing and Products Research)	\$1,099,958	\$88,000	\$0	\$990,000	\$0	\$0	\$21,958	\$0	\$0	\$0
		6. Lehigh Univ. (Center for Innovation Management Studies)	\$423,248	\$73,848	\$169,400	\$180,000	\$0	\$0	\$0	\$0	\$0	\$0
	1985	7. Carnegie-Mellon Univ. (Iron and Steelmaking Research)	\$781,700	\$25,000	\$0	\$700,000	\$0	\$0	\$0	\$0	\$0	\$56,700
		8. Univ. of Tennessee (Measurement and Control Engineering)	\$731,985	\$85,242	\$20,000	\$370,000	\$144,000	\$0	\$67,743	\$45,000	\$0	\$0
		9. Iowa State Univ. (Nondestructive Evaluation)	\$4,950,456	\$33,000	\$5,000	\$630,000	\$0	\$0	\$382,894	\$3,603,987	\$0	\$295,575
	1986	10. Oklahoma State Univ. (Web Handling)	\$913,800	\$33,000	\$33,750	\$450,000	\$33,000	\$33,750	\$295,500	\$0	\$10,800	\$22,000
		11. Northeastern Univ. (Electromagnetics Research)	\$2,000,000	\$32,000	\$0	\$367,000	\$0	\$0	\$65,000	\$0	\$0	\$1,600,000
		12. New Mexico Inst. of Mining & Technology (Center for Energetic Mat.)	\$299,000	\$38,000	\$0	\$45,000	\$0	\$0	\$76,000	\$140,000	\$0	\$0
		13. Univ. of California-Berkeley (Sensors and Actuators)	\$5,685,354	\$124,874	\$319,261	\$1,024,902	\$725,311	\$73,836	\$7,993	\$3,391,418	\$40,000	\$0
	1988	14. Univ. of New Mexico (Micro-Engineered Materials)	\$3,108,618	\$58,000	\$52,254	\$229,233	\$10,000	\$75,000	\$238,477	\$0	\$37,307	\$1,408,347
		15. Carnegie-Mellon Univ. (Building Performance and Diagnostics)	\$1,196,582	\$80,000	\$215,000	\$354,982	\$254,000	\$0	\$0	\$292,600	\$0	\$0
	1989	16. Univ. of Illinois-Urbana-Champaign (Adv. Air Conditioning and Refrig.)	\$1,760,000	\$63,000	\$0	\$668,000	\$110,000	\$0	\$707,000	\$0	\$0	\$212,000
		17. Univ. of California-San Diego (Ultra High-Speed Integr. Circuits & Sys.)	\$192,000	\$57,000	\$0	\$125,000	\$10,000	\$0	\$0	\$0	\$0	\$0
	1990	18. Univ. of Michigan (Dimensional Measurement and Control in Manufac.)	\$644,938	\$88,000	\$0	\$300,000	\$83,938	\$0	\$168,000	\$0	\$0	\$0
		19. Univ. of Colorado-Boulder (Separations Using Thin Films)	\$656,151	\$83,000	\$112,392	\$443,640	\$0	\$54,511	\$40,000	\$0	\$0	\$0
	1991	20. Rutgers Univ. (Wireless Information Networks)	\$955,301	\$38,000	\$0	\$630,000	\$27,360	\$4,079	\$1,292	\$119,872	\$132,698	\$0
		21. Lehigh Univ. (Polymer Interfaces)	\$493,879	\$63,000	\$87,981	\$245,000	\$97,498	\$0	\$0	\$0	\$0	\$0
		22. North Carolina State Univ. (Integrated Pest Management)	\$436,359	\$104,478	\$0	\$219,680	\$101,845	\$0	\$0	\$18,356	\$12,000	\$0
		23. Villanova Univ. (Advanced Communications)	\$400,000	\$33,000	\$5,000	\$192,000	\$0	\$35,000	\$10,000	\$65,000	\$0	\$60,000
		24. Georgia Tech (Material Handling/Logistics Institute)	\$1,599,627	\$78,000	\$0	\$534,000	\$0	\$43,000	\$311,262	\$147,365	\$480,000	\$0
	1993	25. NJ Institute of Technology (Emission Reduction Research)	\$1,639,513	\$100,000	\$1,099,515	\$300,000	\$0	\$140,000	\$0	\$0	\$0	\$0
		26. Ohio Univ. (Corrosion in Multiphase Systems)	\$1,178,000	\$55,000	\$0	\$500,000	\$23,000	\$0	\$150,000	\$0	\$0	\$450,000
		27. Univ. of Illinois (Machine-Tool Systems)	\$495,970	\$105,000	\$0	\$289,970	\$56,000	\$0	\$0	\$0	\$0	\$45,000
		28. Univ. of Massachusetts-Lowell (Biodegradable Polymer Research)	\$679,054	\$60,000	\$0	\$314,000	\$200,000	\$0	\$60,000	\$44,527	\$0	\$0
		29. Univ. of Rhode Island (Ocean Technology)	\$275,000	\$50,000	\$0	\$65,000	\$11,000	\$111,000	\$38,000	\$0	\$0	\$0
		30. North Carolina State Univ. (Advanced Computing and Communication)	\$1,241,672	\$174,000	\$50,000	\$370,000	\$278,972	\$0	\$146,900	\$0	\$0	\$221,800
	1994	31. Univ. of Washington (Process Analytical Chemistry)	\$1,323,000	\$100,000	\$0	\$945,000	\$33,000	\$135,000	\$0	\$110,000	\$0	\$0
		32. Northwestern University (Surface Engineering and Tribology)	\$665,000	\$151,000	\$17,000	\$275,000	\$0	\$0	\$0	\$0	\$0	\$0
		33. Purdue Univ. (Software Engineering)	\$1,930,514	\$125,000	\$168,218	\$280,000	\$0	\$100,000	\$67,296	\$30,111	\$0	\$1,260,000
		34. North Carolina State Univ. (Aseptic Processing and Packaging Studies)	\$655,489	\$106,000	\$0	\$249,440	\$0	\$50,000	\$123,049	\$0	\$0	\$127,000
		35. Washington State Univ. (Analog/Digital Integrated Circuits)	\$1,033,689	\$181,814	\$0	\$527,500	\$0	\$30,000	\$264,375	\$0	\$0	\$30,000
	1995	36. Texas A&M Univ. (Ergonomics)	\$380,676	\$45,000	\$5,000	\$195,000	\$32,846	\$0	\$12,000	\$67,830	\$0	\$3,000
		37. The Pennsylvania State Univ. (Particulate Materials)	\$1,220,879	\$50,000	\$0	\$447,500	\$29,000	\$0	\$162,181	\$0	\$0	\$532,198
		38. Arizona State Univ. (Advanced Control of Energy and Power Systems)	\$1,293,000	\$110,000	\$10,000	\$750,000	\$0	\$0	\$373,000	\$0	\$0	\$50,000
		39. Univ. of Texas-Arlington (Adv. Electronic Materials, Devices and Sys.)	\$313,000	\$35,000	\$0	\$240,000	\$3,000	\$0	\$5,000	\$0	\$0	\$30,000
		40. Univ. of Arizona (Optoelectronic Devices, Interconnects & Packaging)	\$984,204	\$98,000	\$150,000	\$372,600	\$0	\$263,604	\$0	\$100,000	\$0	\$0
		41. Univ. of Colorado-Boulder (Adv. Manuf. & Pkg. of Micro., Opt. and Dig. Elect.)	\$661,741	\$50,000	\$105,000	\$425,000	\$120,000	\$0	\$2,500	\$209,241	\$0	\$225,000
		42. Eastern Michigan Univ. (Coatings Research)	\$714,000	\$130,000	\$0	\$360,000	\$0	\$30,000	\$7,000	\$90,000	\$0	\$97,000
		43. Purdue Univ. (Pharmaceutical Processing Research)	\$401,313	\$50,000	\$0	\$300,000	\$0	\$0	\$51,315	\$0	\$0	\$0
	1996	44. Cornell Univ. (Power Systems Engineering)	\$655,000	\$150,000	\$50,000	\$240,000	\$100,000	\$0	\$25,000	\$20,000	\$0	\$0
		45. NJ Institute of Technology (Hazardous & Toxic Waste Management)	\$11,193,106	\$85,000	\$342,241	\$330,000	\$1,117,519	\$3,014,984	\$0	\$6,116,157	\$33,455	\$163,750
		46. Alfred Univ. (Glass Research)	\$1,110,000	\$45,000	\$0	\$720,000	\$5,000	\$0	\$90,000	\$30,000	\$0	\$220,000
		47. Univ. of Connecticut (Grinding Research)	\$1,956,390	\$75,000	\$7,761	\$307,000	\$5,650	\$367,296	\$126,081	\$1,073,601	\$0	\$0
		48. Univ. of Washington (Health Management)	\$640,000	\$110,000	\$0	\$530,000	\$0	\$0	\$0	\$0	\$0	\$0
	1997	49. SUNY Buffalo (Biosurfaces)	\$1,047,000	\$197,000	\$75,000	\$320,000	\$0	\$0	\$190,000	\$115,000	\$0	\$120,000
		50. Univ. of Iowa (Virtual Proving Ground Simulation)	\$7,017,000	\$93,000	\$0	\$760,000	\$0	\$0	\$0	\$4,788,000	\$1,376,000	\$0
		GRAND MEAN:	\$1,511,841	\$81,638	\$43,363	\$489,790	\$83,968	\$112,136	\$91,799	\$458,829	\$82,987	\$152,987
		GRAND SUM:	\$74,880,212	\$4,880,256	\$3,194,773	\$28,879,897	\$4,114,443	\$5,495,649	\$4,547,166	\$22,482,832	\$2,582,160	\$7,496,376

TABLE 4
1996 - 1997 INDUSTRY MEMBERSHIP DESCRIPTORS

23

STATUS	YEAR FUNDED	ABBREVIATED NAME	CURRENT MEMBERS	1996 - 1997 MEMBERS			LIFETIME MEMBERS			FEES		
				STARTING	NEW	LEFT	STARTING	NEW	LEFT	PRIMARY ANNUAL	SECONDARY FEE	TERTIARY FEE
	1981	1. Case Western Reserve Univ. (Applied Polymer Research)	*	*	*	*	*	*	*	*	*	*
	1982	2. Rutgers Univ. (Ceramic Research)	12	12	1	1	10	32	30	\$35,000	\$10,000	*
	1983	3. The Pennsylvania State Univ. (Dielectric Studies)	12	12	1	1	18	26	33	\$26,000	\$7,000	*
	1984	4. Univ. of Arizona (Microcontamination Control)	19	19	0	0	26	26	31	\$40,000	\$10,000	*
		5. Colorado School of Mines (Advanced Steel Processing and Products Research)	23	21	2	0	7	27	12	\$45,000	*	*
		6. Lehigh Univ. (Center for Innovation Management Studies)	8	9	0	1	12	8	7	\$20,000	*	*
	1985	7. Carnegie-Mellon Univ. (Iron and Steelmaking Research)	24	22	2	0	11	19	6	\$46,000	\$32,000	*
		8. Univ. of Tennessee (Measurement and Control Engineering)	13	14	2	3	14	7	8	\$35,000	\$15,000	*
		9. Iowa State Univ. (Nondestructive Evaluation)	21	20	4	3	14	18	12	\$35,000	*	*
	1986	10. Oklahoma State Univ. (Web Handling)	18	20	0	2	5	22	8	\$25,000	*	*
		11. Northeastern Univ. (Electromagnetics Research)	7	9	0	2	9	9	9	\$50,000	\$15,000	*
		12. New Mexico Inst. of Mining & Technology (Center for Energetic Mat.)	9	8	2	1	9	24	25	\$30,000	\$20,000	*
		13. Univ. of California-Berkeley (Sensors and Actuators)	21	20	2	1	6	24	12	\$50,000	\$7,500	*
	1988	14. Univ. of New Mexico (Micro-Engineered Materials)	12	15	0	3	8	15	8	\$30,000	\$10,000	*
		15. Carnegie-Mellon Univ. (Building Performance and Diagnostics)	16	7	10	1	4	10	5	\$50,000	\$30,000	\$25,000
	1989	16. Univ. of Illinois-Urbana-Champaign (Adv. Air Conditioning and Refrig.)	17	17	1	1	13	12	8	\$40,000	*	*
		17. Univ. of California-San Diego (Ultra High-Speed Integr. Circuits & Sys.)	6	5	1	0	6	*	*	\$50,000	\$25,000	*
	1990	18. Univ. of Michigan (Dimensional Measurement and Control in Manufac.)	8	6	2	0	8	5	5	\$50,000	*	*
		19. Univ. of Colorado-Boulder (Separations Using Thin Films)	11	10	3	2	8	7	4	\$40,000	*	*
	1991	20. Rutgers Univ. (Wireless Information Networks)	21	26	2	7	21	10	8	\$30,000	*	*
		21. Lehigh Univ. (Polymer Interfaces)	7	10	1	4	10	5	5	\$35,000	*	*
		22. North Carolina State Univ. (Integrated Pest Management)	14	13	1	0	7	8	3	\$25,000	\$5,000	*
		23. Villanova Univ. (Advanced Communications)	6	5	1	0	4	4	2	\$30,000	\$20,000	\$5,000
		24. Georgia Tech (Material Handling/Logistics Institute)	22	17	6	1	18	3	0	\$50,000	\$25,000	*
	1993	25. NJ Institute of Technology (Emission Reduction Research)	7	7	0	0	9	3	4	\$50,000	*	*
		26. Ohio Univ. (Corrosion in Multiphase Systems)	21	20	1	0	4	19	2	\$25,000	*	*
		27. Univ. of Illinois (Machine-Tool Systems)	7	*	*	*	6	2	1	\$50,000	\$20,000	\$10,000
		28. Univ. of Massachusetts-Lowell (Biodegradable Polymer Research)	10	10	0	0	6	8	4	\$30,000	*	*
		29. Univ. of Rhode Island (Ocean Technology)	8	8	0	0	6	4	2	\$25,000	\$10,000	*
		30. North Carolina State Univ. (Advanced Computing and Communication)	8	7	2	1	8	19	19	\$50,000	\$20,000	*
	1994	31. Univ. of Washington (Process Analytical Chemistry)	27	28	2	3	14	61	45	\$35,000	*	*
		32. Northwestern University (Surface Engineering and Tribology)	9	10	0	1	14	13	12	\$52,500	*	*
		33. Purdue Univ. (Software Engineering)	8	10	1	3	10	17	19	\$30,000	\$5,000	*
		34. North Carolina State Univ. (Aseptic Processing and Packaging Studies)	9	7	2	0	8	8	9	\$35,000	\$20,000	*
		35. Washington State Univ. (Analog/Digital Integrated Circuits)	17	12	8	3	11	17	11	\$35,000	*	*
	1995	36. Texas A&M Univ. (Ergonomics)	9	9	1	1	9	1	1	\$25,000	\$15,000	\$10,000
		37. The Pennsylvania State Univ. (Particulate Materials)	13	12	2	1	12	2	0	\$35,000	\$10,000	*
		38. Arizona State Univ. (Advanced Control of Energy and Power Systems)	13	12	1	0	5	11	3	\$50,000	*	*
		39. Univ. of Texas-Arlington (Adv. Electronic Materials, Devices and Sys.)	3	2	1	0	6	8	7	\$30,000	\$15,000	*
		40. Univ. of Arizona (Optoelectronic Devices, Interconnects & Packaging)	14	4	11	1	*	*	*	\$50,000	\$25,000	*
		41. Univ. of Colorado-Boulder (Adv. Manuf. & Pkg. of Micro., Opt. and Dig. Elect.)	12	10	2	0	10	4	4	\$40,000	\$25,000	\$12,500
		42. Eastern Michigan Univ. (Coatings Research)	16	17	0	1	11	10	4	\$30,000	*	*
		43. Purdue Univ. (Pharmaceutical Processing Research)	12	12	0	0	11	1	0	\$25,000	*	*
	1996	44. Cornell Univ. (Power Systems Engineering)	19	17	2	0	17	2	0	\$40,000	*	*
		45. NJ Institute of Technology (Hazardous & Toxic Waste Management)	17	17	1	1	8	32	23	\$30,000	\$15,000	*
		46. Alfred Univ. (Glass Research)	24	25	0	1	8	24	9	\$30,000	*	*
		47. Univ. of Connecticut (Grinding Research)	9	14	0	5	7	12	6	\$50,000	\$12,000	*
		48. Univ. of Washington (Health Management)	15	10	9	4	6	6	2	\$35,000	\$15,000	*
	1997	49. SUNY Buffalo (Biosurfaces)	11	9	5	3	6	9	6	\$40,000	*	*
		50. Univ. of Iowa (Virtual Proving Ground Simulation)	19	19	0	0	24	4	19	\$40,000	*	*
		GRAND MEAN:	15.25	15.02	1.98	1.31	10.08	15.12	9.64	\$37,439	\$16,241	\$12,500
		GRAND SUM:	664	625	95	63	484	618	483	\$1,834,500	\$438,500	\$42,500

TABLE 5
1996 - 1997 HUMAN RESOURCES

STATUS	YEAR FUNDED	ABBREVIATED NAME	RESEARCHERS BREAKDOWN			STUDENTS		ADMINISTRATIVE		CLERICAL	
			TOTAL # RESEARCHERS	# FACULTY SCIENTISTS FT & PT	# NON-FACULTY FT	# OF GRADES	# OF UNDERGRADES	PROFESSIONALS FT	PROFESSIONALS PT	CLERICAL FT	CLERICAL PT
1983		1. Case Western Reserve Univ. (Applied Polymer Research)	12	12	0	16	55	1	0	1	0
1982		2. Rutgers Univ. (Ceramic Research)	6	4	2	5	2	0	1	1	0
1983		3. The Pennsylvania State Univ. (Dielectric Studies)	9	8	1	6	2	2	0	0	0
1984		4. Univ. of Arizona (Microcommunication Control)	6	6	0	20	4	1	0	1	0
		5. Colorado School of Mines (Advanced Steel Processing and Products Research)	11	9	2	1	3	0	2	1	0
1985		6. Lehigh Univ. (Center for Innovation Management Studies)	12	7	5	12	9	1	0	1	0
		7. Carnegie-Mellon Univ. (Iron and Steelmaking Research)	12	10	2	13	7	3	0	0	0
		8. Univ. of Tennessee (Measurement and Control Engineering)	13	8	5	9	1	0	2	0	3
		9. Iowa State Univ. (Nondestructive Evaluation)	13	8	5	9	1	0	2	0	3
1986		10. Oklahoma State Univ. (Web Handling)	20	13	7	12	13	1	4	2	0
		11. Northeastern Univ. (Electromagnetic Research)	12	8	4	5	9	0	3	0	1
		12. New Mexico Inst. of Mining & Technology (Center for Emergent Mat.)	5	1	4	12	1	1	0	2	0
		13. Univ. of California-Berkeley (Sensor and Actuators)	12	7	5	5	9	0	1	3	2
1988		14. Univ. of New Mexico (Micro-Engineered Materials)	14	7	7	27	3	2	1	2	0
		15. Carnegie-Mellon Univ. (Building Performance and Diagnostics)	4	3	1	9	5	3	0	2	0
1989		16. Univ. of Illinois-Urbana-Champaign (Adv. Air Conditioning and Refrig.)	14	13	1	41	23	0	1	1	0
		17. Univ. of California-San Diego (Ultra High-Speed Integr. Circuits & Sys.)	1	1	0	6	2	1	2	1	0
1990		18. Univ. of Michigan (Dimensional Measurement and Control in Manufac.)	13	6	7	8	2	3	0	1	1
		19. Univ. of Colorado-Boulder (Operations Using Thin Films)	14	12	2	9	4	1	2	0	0
1991		20. Rutgers Univ. (Wireless Information Networks)	7	7	0	10	10	4	0	3	0
		21. Lehigh Univ. (Polymer Interfaces)	22	16	6	9	2	4	0	1	1
		22. North Carolina State Univ. (Integrated Pest Management)	15	0	15	7	6	0	1	0	1
		23. Villanova Univ. (Advanced Communications)	8	8	0	8	7	1	1	0	0
		24. Georgia Tech (Material Handling/Logistics Institute)	18	18	0	25	4	1	1	3	3
1993		25. NI Institute of Technology (Emission Reduction Research)	6	4	2	18	4	2	0	1	0
		26. Ohio Univ. (Concussion in Multiphase Systems)	4	2	2	25	2	2	0	1	1
		27. Univ. of Illinois (Machine-Tool Systems)	16	15	1	15	2	1	1	0	1
		28. Univ. of Massachusetts-Lowell (Biodegradable Polymer Research)	11	5	6	3	0	2	1	0	1
		29. Univ. of Rhode Island (Ocean Technology)	4	3	1	3	0	1	1	0	1
		30. North Carolina State Univ. (Advanced Computing and Communication)	16	16	0	32	2	3	2	2	1
1994		31. Univ. of Washington (Process Analytical Chemistry)	2	1	1	21	2	0	1	1	0
		32. Northwestern University (Surface Engineering and Tribology)	13	7	6	12	2	0	2	0	2
		33. Purdue Univ. (Software Engineering)	10	9	1	2	1	1	0	1	1
		34. North Carolina State Univ. (Aspheric Processing and Packaging Studies)	12	9	3	4	1	0	2	0	1
		35. Washington State Univ. (Analog/Digital Integrated Circuit)	14	14	0	29	4	6	0	4	0
1995		36. Texas A&M Univ. (Ergonomics)	9	4	5	8	4	4	0	0	0
		37. The Pennsylvania State Univ. (Particulate Materials)	6	6	0	10	10	1	0	2	0
		38. Arizona State Univ. (Advanced Control of Energy and Power Systems)	11	11	0	20	6	4	0	2	0
		39. Univ. of Texas-Arlington (Adv. Electronic Materials, Devices and Sys.)	3	2	1	3	3	0	0	0	3
		40. Univ. of Arizona (Optoelectronic Devices, Interconnects & Packaging)	14	14	0	4	1	2	2	0	2
		41. Univ. of Colorado-Boulder (Adv. Manuf. & Pkg. of Micro. Opt. and Dig. Elect.)	8	8	0	18	1	2	0	0	0
		42. Eastern Michigan Univ. (Coatings Research)	14	7	7	17	7	2	4	0	3
		43. Purdue Univ. (Pharmaceutical Processing Research)	7	7	0	8	0	0	4	1	0
1996		44. Cornell Univ. (Power Systems Engineering)	13	11	2	10	0	0	0	0	0
		45. NI Institute of Technology (Hazardous & Toxic Waste Management)	43	40	3	42	12	2	3	2	0
		46. Alfred Univ. (Glass Research)	11	9	2	8	5	3	0	1	0
		47. Univ. of Connecticut (Grinding Research)	25	13	12	13	4	0	5	0	3
		48. SUNY Buffalo (Health Management)	35	33	2	6	0	0	3	0	2
1997		49. SUNY Buffalo (Biosurfaces)	30	24	6	6	4	0	10	0	2
		50. Univ. of Iowa (Virtual Proving Ground Simulation)	15	6	9	14	0	0	3	0	2
GRAND TOTAL:			1239	848	232	1422	821	148	145	85	84
GRAND AVERAGE:			687	464	125	697	488	69	71	43	41

24

25

TABLE 7
1996 - 1997 CENTER OUTCOMES

STATUS	YEAR FUNDED	ABBREVIATED NAME	28 STUDENTS RECEIVING DEGREE			29 STUDENTS HIRED BY INDUSTRY			30 PUBLICATIONS		
			# of P.H.D.'s	# of M.S.'s	# of B.S./B.A.'s	# of P.H.D.'s	# of M.S.'s	# of B.S./B.A.'s	# W/ CENTER RESEARCHERS	# W/ CENTER MEMBERS	# OF PRESENTATIONS
	1981	1. Case Western Reserve Univ. (Applied Polymer Research)	0	0	0	0	0	0	0	0	0
	1982	2. Rutgers Univ. (Ceramic Research)	0	2	0	0	7	0	75	0	60
	1983	3. The Pennsylvania State Univ. (Dielectric Studies)	1	2	2	0	2	1	18	3	10
	1984	4. Univ. of Arizona (Microcontamination Control)	1	1	1	1	1	1	*	*	*
		5. Colorado School of Mines (Advanced Steel Processing and Products Research)	2	4	0	2	0	0	10	2	25
		6. Lehigh Univ. (Center for Innovation Management Studies)	5	0	0	3	0	0	16	1	50
	1985	7. Carnegie-Mellon Univ. (Iron and Steelmaking Research)	3	2	3	3	1	1	*	*	*
		8. Univ. of Tennessee (Measurement and Control Engineering)	2	4	3	1	1	0	15	3	25
		9. Iowa State Univ. (Nondestructive Evaluation)	1	0	0	1	0	0	15	0	65
	1986	10. Oklahoma State Univ. (Web Handling)	0	13	6	3	0	0	6	1	6
		11. Northeastern Univ. (Electromagnetics Research)	5	15	5	0	1	2	40	6	60
		12. New Mexico Inst. of Mining & Technology (Center for Energetic Mat.)	1	0	3	1	0	0	4	0	4
		13. Univ. of California-Berkeley (Sensors and Actuators)	7	3	0	1	0	0	20	2	35
	1988	14. Univ. of New Mexico (Micro-Engineered Materials)	2	5	0	0	3	0	6	0	6
		15. Carnegie-Mellon Univ. (Building Performance and Diagnostics)	1	3	0	0	0	0	29	1	58
	1989	16. Univ. of Illinois-Urbana-Champaign (Adv. Air Conditioning and Refrig.)	2	10	10	1	2	0	36	8	22
		17. Univ. of California-San Diego (Ultra High-Speed Integr. Circuits & Sys.)	1	1	0	1	0	0	18	2	12
	1990	18. Univ. of Michigan (Dimensional Measurement and Control in Manufac.)	6	1	0	1	0	0	16	0	10
		19. Univ. of Colorado-Boulder (Separations Using Thin Films)	3	6	0	0	1	1	17	17	22
	1991	20. Rutgers Univ. (Wireless Information Networks)	1	3	0	1	1	0	28	28	12
		21. Lehigh Univ. (Polymer Interfaces)	2	2	1	1	0	0	11	3	8
		22. North Carolina State Univ. (Integrated Pest Management)	1	2	2	0	0	0	5	0	16
		23. Villanova Univ. (Advanced Communications)	0	4	0	0	4	0	7	2	3
		24. Georgia Tech (Material Handling/Logistics Institute)	1	6	0	1	2	0	25	25	32
	1993	25. NJ Institute of Technology (Emission Reduction Research)	0	2	0	0	0	0	6	0	5
		26. Ohio Univ. (Corrosion in Multiphase Systems)	0	1	2	0	1	0	12	1	7
		27. Univ. of Illinois (Machine-Tool Systems)	2	6	0	2	2	0	6	0	0
		28. Univ. of Massachusetts-Lowell (Biodegradable Polymer Research)	4	4	0	3	3	0	*	*	*
		29. Univ. of Rhode Island (Ocean Technology)	0	1	0	0	1	0	2	0	2
		30. North Carolina State Univ. (Advanced Computing and Communication)	11	9	2	6	0	0	27	1	70
	1994	31. Univ. of Washington (Process Analytical Chemistry)	2	0	0	2	0	0	26	0	*
		32. Northwestern University (Surface Engineering and Tribology)	4	3	0	1	0	0	13	14	15
		33. Purdue Univ. (Software Engineering)	0	0	0	0	0	0	23	5	11
		34. North Carolina State Univ. (Aseptic Processing and Packaging Studies)	3	7	4	0	0	0	10	0	6
		35. Washington State Univ. (Analog/Digital Integrated Circuits)	5	8	2	2	6	1	12	12	14
	1995	36. Texas A&M Univ. (Ergonomics)	0	9	1	0	4	0	0	0	5
		37. The Pennsylvania State Univ. (Particulate Materials)	0	0	0	0	0	0	0	0	0
		38. Arizona State Univ. (Advanced Control of Energy and Power Systems)	2	5	6	0	1	5	17	35	15
		39. Univ. of Texas-Arlington (Adv. Electronic Materials, Devices and Sys.)	2	0	5	1	0	2	2	0	2
		40. Univ. of Arizona (Optoelectronic Devices, Interconnects & Packaging)	4	0	0	1	0	0	2	19	17
		41. Univ. of Colorado-Boulder (Adv. Manuf. & Pkg. of Micro., Opt. and Dig. Elect.)	0	0	0	0	0	0	25	4	15
		42. Eastern Michigan Univ. (Coatings Research)	1	0	0	0	0	0	7	1	14
		43. Purdue Univ. (Pharmaceutical Processing Research)	0	0	0	0	0	0	3	0	6
	1996	44. Cornell Univ. (Power Systems Engineering)	3	2	0	3	2	0	42	42	23
		45. NJ Institute of Technology (Hazardous & Toxic Waste Management)	11	20	0	0	2	0	0	0	0
		46. Alfred Univ. (Glass Research)	2	2	8	2	1	3	40	2	20
		47. Univ. of Connecticut (Grinding Research)	5	4	0	0	0	0	31	0	12
		48. Univ. of Washington (Health Management)	0	0	0	0	0	0	9	0	18
	1997	49. SUNY Buffalo (Biosurfaces)	0	1	1	0	0	0	5	2	4
		50. Univ. of Iowa (Virtual Proving Ground Simulation)	0	0	0	0	0	0	12	0	21
		GRAND MEAN:	1.22	1.53	1.37	0.92	1.00	0.36	16.28	5.26	18.73
		GRAND SUM:	189	173	67	46	49	17	749	242	843

TABLE 8
1996 - 1997 INTELLECTUAL PROPERTY EVENTS

TABLE 8a Centers Reporting One or More Intellectual Property Events		
INTELLECTUAL PROPERTY EVENT	NUMBER of CENTERS	PERCENTAGE of CENTERS
INVENTION DISCLOSURES	18	37%
PATENT APPLICATIONS	18	37%
SOFTWARE COPYRIGHTS	5	10%
PATENTS GRANTED	13	27%
LICENSING AGREEMENTS	5	10%
ROYALTIES REALIZED	6	12%

TABLE 8b Total Number and Means of Intellectual Property Events		
INTELLECTUAL PROPERTY EVENT	TOTAL for ALL CENTERS	MEAN for ALL CENTERS
INVENTION DISCLOSURES	62	1.32
PATENT APPLICATIONS	58	1.21
SOFTWARE COPYRIGHTS	6	0.13
PATENTS GRANTED	19	0.40
LICENSING AGREEMENTS	16	0.35
ROYALTIES REALIZED	6	0.13

APPENDIX

FOOTNOTES: SPECIAL CONSIDERATIONS

Footnotes appear on top of columns and/or at end of rows for each Table and are described in this Appendix.

- 1) All averages and sums exclude missing data. With the exception of percentages, data from multi-university centers has been aggregated across universities; percentages represent averages for the reporting universities.
- 2) This report includes only data on Centers which were considered active participants in the NSF IUCRC Program during the 1996-97 fiscal year. Some Centers are reporting data from two different fiscal years (1995-1996 & 1996-1997), depending on when the Center had completed their fiscal year at the time NSF requested the Center Director data. **Please note that the reporting categories have been changed from previous years and thus, the financial data is not directly comparable to previous reports.**
- 3) Authors' address: IUCRC Evaluation Project, Psychology Department, NCSU Box 7801, Raleigh, NC 27695.
By telephone: Voice (919) 515-3237; FAX (919) 515-1716 or e-mail: iucrc@poe.coe.ncsu.edu.
- 4) On Tables 1 through 7, the "YEAR FUNDED" indicates the year NSF gave the center the operating grant it is currently operating under.
- 5) On Tables 1 through 7, a bullet (*) indicates missing data due to non-response.
- 6) On Table 2, "TOTAL FUNDING" is being reported as a combination of direct and indirect dollars.
- 7) On Table 2, "TOTAL FUNDING" refers to the total cash income coming into the Center.
- 8) On Table 2, "NSF FUNDING" refers to two kinds of support, "IUCRC FUNDING" which refers to the total support provided by the IUCRC program, including operating grant, self-sustaining Center funding, evaluator support, TIE awards, RUI/PUI awards, etc. "NSF OTHER" refers to cash support for Center operations provided by other NSF groups or divisions. Neither of these categories include money transferred through NSF from other Federal Agencies (MIPRs).
- 9) On Table 2, "INDUSTRY MEMBERSHIP FEES" refers to the total cash membership fees from Center members.
- 10) On Table 2, "INDUSTRY OTHER" refers to additional industry cash funding for operations provided by industrial members (e.g., enhancements, donations, etc.) which is applied to the Center as a whole (e.g., income that results in outcomes shared equally by all Center members).
- 11) On Table 2, "STATE TOTAL" refers to the support provided by state government and/or an agency or program funded by state government.
- 12) On Table 2, "UNIV. TOTAL" refers to the support for the Center operating costs including salary, travel, and overhead returned to the Center. It does NOT include items such as utilities and space.
- 13) On Table 2, "OTHER FEDERAL AGENCY" refers to cash support for Center operations provided by other Federal funding sources, but does NOT include funding from NSF.
- 14) On Table 2, "OTHER NON-FEDERAL AGENCY" refers to cash support for Center operations provided by other non-Federal funding sources, foundations, etc.
- 15) On Table 2, "OTHER FUNDING" refers to any other cash support, such as contracts, received by Center researchers that would not have been received if the Center did not exist. The funding would not result in outcomes shared equally by Center members.
- 16) On Table 3, "TOTAL DIRECT" refers to the cash funding available to cover center operating expenses - net cash income to center by subtracting the overhead from the funding listed and recording only the cash income available to the center.
- 17) On Table 3, "TOTAL OVERHEAD" refers to overhead assessed by the university and was calculated as the difference between total cash income to the Center and net cash income to the Center.
- 18) On Table 3, "TOTAL BUDGET" refers to the total cash income to the Center.
- 19) On Table 3, "CAPITAL SUPPORT" refers to capital support for items of value over \$25,000 and includes equipment, and facilities.
- 20) On Table 3, "IN-KIND CONTRIBUTIONS" refers to non-cash donations of equipment, facilities (occupied buildings), personnel, and software.
- 21) On Table 3, "TYP. OVERHEAD" refers to the typical overhead rate charged to funding sources.
- 22) On Table 3, "IND. OVERHEAD" refers to the overhead rate charged to membership fees.
- 23) On Table 4, "FEES" are broken down into primary, secondary, and tertiary (the latter two represent variable membership fees).
- 24) On Table 5, "FT" means "Full-time" and "PT" means "Part-time."
- 25) On Table 5, "PROFESSIONAL ADMINISTRATIVE" includes the Center Director and Co- or Site Director.
- 26) On Table 6, "TIME ALLOCATION" refers to allocation of director's full-time equivalent for budgetary purposes.
- 27) On Table 6, "ADMIN. BUDGET (%)" refers to the estimated percentage of the Center's direct operating budget allocated to administration (e.g., administrative salaries, travel, telephone).
- 28) On Table 7, "STUDENTS RECEIVING DEGREE" refers to the number of Ph.D.'s, M.S.'s, and B.A./B.S.'s that received a degree during the reporting period.
- 29) On Table 7, "STUDENTS HIRED BY INDUSTRY" refers to the number of Ph.D.'s, M.S.'s, and B.A./B.S.'s that were hired by member companies during the reporting period.
- 30) On Table 7, "PUBLICATIONS" refers to the publications in the open literature the Center researchers produced based on Center research and publications reported that have a Center member as an author.