NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 2004 ANNUAL PERFORMANCE REPORT TO THE WHITE HOUSE INITIATIVE OFFICE ON HISTORICALLY BLACK COLLEGES AND UNIVERSITIES

Office of the Chief Education Officer

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)
FISCAL YEAR 2004 ANNUAL PERFORMANCE REPORT
TO THE WHITE HOUSE INITIATIVE OFFICE ON
HISTORICALLY BLACK COLLEGES AND UNIVERSITIES (HBCU)

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EXECUTIVE SUMMARY

The National Aeronautics and Space Administration (NASA) is highly committed to ensuring the broadest participation by Historically Black Colleges and Universities (HBCU) in the Agency's research and education programs and its overall mission. The Agency's goals for HBCUs, as stated in its FY 2004 Annual Plan to Assist HBCUs, undergird and guide NASA's planned spending and technical assistance to HBCUs. Executive Order 13256, *President's Board of Advisors on Historically Black Colleges and Universities*, requires all Federal agencies to plan and report annually on how they increased the capacity of HBCUs to compete effectively for Federal funding. The NASA programs highlighted in this report are examples of the Agency's strategy for strengthening and expanding research and academic infrastructure development in science, technology, engineering, and mathematics (STEM) at HBCUs.

NASA's commitment is evidenced by the significant progress made toward the Agency's FY 2004 Annual Plan to Assist HBCUs. NASA's investment in HBCUs grew from its planned investment of $57.2 million for FY 2004 to an actual investment of $69.2 million, a 17-percent increase over our projected investment.

In FY 2004, NASA initiated a college corporate recruitment program for STEM and business management majors at 26 HBCUs. Over 1,600 students participated in individual consultations with NASA Center personnel and informational workshops on career, coop, and summer employment opportunities, as well as current and future NASA research programs, for both faculty and students. As a result of the corporate recruitment initiative in FY 2004, NASA hired a total of 96 students, of which 20 or 21 percent were African Americans from HBCUs. The recruitment program represented NASA's proactive effort to attract underrepresented and underserved students as potential scientific and technical personnel to replenish and increase the diversity of its workforce. Another goal achieved through the recruitment initiative was to increase NASA's outreach to the HBCUs receiving grant and research funding.

HBCU students and faculty were recognized locally and nationally for their outstanding accomplishments and increased participation in NASA's Mission Directorates and space exploration research. For example, the principal investigator (PI) of the Partnership Award to Integrate Research into the Undergraduate Curriculum (PAIR) program at North Carolina Central University (NCCU) received North Carolina's Max O. Gardner award. This award is given to the faculty member who makes the greatest contribution to the academic community within the State. Additionally, a May 2004 summa cum laude graduate of NCCU's Physics Department and PAIR student researcher was a finalist for the American Physics Society's national award to an outstanding undergraduate student researcher. The NCCU Physics Department is further distinguished by the fact that it graduates over 50 percent of the State's African American physics majors, 30 percent of whom are female.

Evidence of the Agency's funding commitment is seen in the research that was conducted through URCs, Faculty Awards for Research, Model Institutions of Excellence, and research-oriented Partnership Awards programs. As a result of sustained NASA funding in FY 2004, HBCUs reported 396 refereed publications, 8 patents, 2 copyrights, and 13 African Americans who received doctoral degrees in NASA-related scientific and technical areas.

HBCU faculty and student researchers supported by NASA funding continue to make significant contributions to NASA 's mission and its Vision for Space Exploration.

SUMMARY OF AGENCY AWARDS TO HBCUs BY CATEGORY: FY 2004

1. Agency: National Aeronautics and Space Administration

2. Agency Representative: Adena Williams Loston _____
Chief Education Officer (Signature)

3. Total Funds for Institutions of Higher Education (IHE): $1,166,521,110

DISCRETIONARY AWARDS

CATEGORY	*AWARDS TO IHEs+*	*AWARDS TO HBCUs**	*AWARDS TO HBCUs AS % OF TOTAL AWARDS TO IHEs*
1. Research & Development	$1,014,873,366	$41,571,374	4.09%
2. Program Evaluation			
3. Training	$23,330,422	$12,474,867	52.18%
4. Facilities and Equipment			
5. Fellowships, Traineeships, Internships, Recruitment, and Arrangements under the Intergovernmental Personnel Act (IPA)		$1,690,650	
6. Student Tuition Assistance, Scholarships, and Other Aid		$3,275,000	
7. Direct Institutional Subsidies			
8. Third-Party Awards		$7,668,654	
9. Private-Sector Involvement		$2,500,000	
10. Administrative Infrastructure			
11. Other Activities	$128,317,322		
TOTAL	**$1,166,521,110**	**$69,180,545**	**5.9%**

Michael D. Griffin _____
Administrator (Signature)

+ IHE=Institutions of Higher Education
* HBCUs=Historically Black Colleges and Universities

TOTAL FY 2004 AWARDS TO HISTORICALLY BLACK COLLEGES AND UNIVERSITIES

	Institutions of Higher Education	*Historically Black Colleges and Universities*
DISCRETIONARY AWARDS:	$1,166,521,110	$69,180,545
LEGISLATED AWARDS:	$0	$0
TOTAL AWARDS:	$1,166,521,110	$69,180,545

FY 2004 SUMMARY OF AGENCY AWARDS TO HBCUs BY INSTITUTION

STATE/INSTITUTION	R&D	PE	TRAINING	F&E	FELLOWS	STA	DIS	TPA	PSI	AI	OTHER	TOTAL
ALABAMA												
Alabama A&M University	$1,457,000		$270,000			$75,000						$1,802,000
Alabama State University			$100,000									$100,000
Lawson State Community College			$100,000									$100,000
Oakwood College	$50,000		$475,000									$525,000
Stillman College			$100,000									$100,000
Tuskegee University	$1,611,000		$116,508		$410,000							$2,137,508
DISTRICT OF COLUMBIA												
Howard University	$617,517				$53,600							$671,117
Southeastern University			$98,611									$98,611
University of the District of Columbia			$365,000									$365,000
FLORIDA												
Florida A&M University	$950,000				$350,000	$900,000						$2,200,000
GEORGIA												
Albany State University			$100,000									$100,000
Clark Atlanta University	$1,611,197		$200,000									$1,661,197
Morehouse College						$1,150,000						$1,150,000
Morehouse School of Medicine	$1,450,000											$1,450,000
Spelman College	$70,399		$1,000,000			$1,150,000						$2,220,399
LOUISIANA												
Southern University and A&M College-Baton Rouge	$1,305,000											$1,305,000
Xavier University			$75,000									$75,000
MARYLAND												
Bowie State University	$100,000		$1,150,000		$328,050							$1,578,050
Morgan State University	$1,187,536		$475,000									$1,662,536
University of Maryland-Eastern Shore			$319,848		$50,000							$369,848
MISSISSIPPI												
Jackson State University	$95,000		$300,000									$395,000
Mississippi Valley State University			$200,000									$200,000
NORTH CAROLINA												
Elizabeth City State University	$52,000		$350,000									$402,000
Fayetteville State University			$100,000									$100,000
Livingstone College			$125,000									$125,000
North Carolina A&T State University	$1,946,000		$295,000		$425,000							$2,666,000
North Carolina Central University			$900,000									$900,000
Winston-Salem State University			$125,000									$125,000
OHIO												
Central State University	$100,445											$100,445
PENNSYLVANIA												
Lincoln University			$200,000									$200,000

STATE/INSTITUTION	R&D	PE	TRAINING	F&E	FELLOWS	STA	DIS	TPA	PSI	AI	OTHER	TOTAL
SOUTH CAROLINA												
Claflin College			$100,000									$100,000
South Carolina State University			$850,000									$850,000
TENNESSEE												
Fisk University	$302,000		$270,000									$572,000
Meharry Medical College			$100,000									$100,000
Tennessee State University	$1,445,187		$1,144,900									$2,590,087
TEXAS												
Prairie View A&M University	$1,370,000		$375,000									$1,745,000
Texas College			$200,000									$200,000
Texas Southern University	$1,200,000		$100,000									$1,300,000
Wiley College			$125,000									$125,000
VIRGINIA												
Hampton University	$22,370,000		$570,000		$74,000							$23,014,000
Norfolk State University	$2,162,000		$950,000									$3,112,000
WEST VIRGINIA												
West Virginia State College			$100,000									$100,000
U.S. VIRGIN ISLANDS												
University of the Virgin Islands			$150,000									$150,000
OTHER HBCU AWARDS												
American Society for Engineering Education								$50,000				$50,000
Global Science & Technology, Inc./NASA Peer Review Services									$2,500,000			$2,500,000
University Space Research Association								$105,000				$105,000
National Action Council for Minorities in Engineering (NACME)								$600,000				$600,000
National Association for the Advancement of Colored People (NAACP)								$150,000				$150,000
National Association for Equal Opportunity in Higher Education (NAFEO)								$772,000				$772,000
National Council of Negro Women								$200,000				$200,000
National Society of Black Physicists								$60,000				$60,000
National Society of Black Physics Students								$25,000				$25,000
Space Grant College Fellowship Program								$306,654				$306,654
Summer High School Apprentice Research Program (SHARP) PLUS								$50,000				$50,000
Tennessee State University – Diversified Career and Educational Services (DCES)								$700,000				$700,000
United Negro College Fund Special Programs, Inc.								$4,650,000				$4,650,000
GRAND TOTAL	**$41,571,374**		**$12,474,867**		**$1,690,650**	**$3,275,000**		**$7,668,654**	**$2,500,000**			**$69,180,545**

ABBREVIATIONS KEY	
R&D	Research & Development
PE	Program Evaluation
TRAINING	Training
F&E	Facilities and Equipment
FELLOWS	Fellowships, Traineeships, Internships, Recruitment, and Arrangements under the Intergovernmental Personnel Act (IPA)
STA	Student Tuition Assistance, Scholarships, and Other Aid
DIS	Direct Institutional Subsidies
TPA	Third-Party Awards
PSI	Private-Sector Involvement
AI	Administrative Infrastructure
OTHER	Other Activities


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ON HISTORICALLY BLACK COLLEGES & UNIVERSITIES
Awards By
Object Category

AWARDS BY OBJECT CATEGORY

Research and Development

STATE	INSTITUTION	DESCRIPTION	AWARD
AL	Alabama A&M University	Center for Hydrology, Soil Climatology, and Remote Sensing (HSCaRS)	$1,200,000
AL	Alabama A&M University	Characterizing Electro-Optical Properties	$100,000
AL	Alabama A&M University	Optical Studies in Polymer Optical Fibers: Dye-Dropped Polymer Optical Fibers and Fabrication and Characterization of Bragg Grating	$99,901
AL	Alabama A&M University	Research and Development to Establish an Independent Verification and Validation Facility Simulation Testbed/Tools	$57,000
AL	Oakwood College	Evaluation of Numerical Techniques for MGD Propulsion Simulation	$50,000
AL	Tuskegee University	Center for Food and Environmental Systems for Human Exploration of Space (CFESH)	$1,200,000
AL	Tuskegee University	Development and Assessment of a Novel Training Package for Basic Maneuvering Tasks on a Flight Simulator	$99,289
AL	Tuskegee University	Electrical Issues in Nuclear Electric Propulsion Systems	$100,000
AL	Tuskegee University	Turbulence Modeling Using Maximum Entropy Concept	$100,000
AL	Tuskegee University	A Nonlinear Model for Fuel Atomization in Spray Combustion	$60,000
AL	Tuskegee University	Survivability of Affordable High Temperature Polymer Matrix Composites for Propulsion Engine Components	$51,000
DC	Howard University	Center for the Study of Terrestrial and Extraterrestrial Atmospheres	$424,000
DC	Howard University	Evaluating Effects of Multiple Scattering and Cloud Inhomogeneity on IR Radiative Transfer	$100,000
DC	Howard University	Detection, Diagnosis, Location and Recommendation of Remedial Actions for Corona/Soft Faults	$93,517
FL	Florida A&M University	Center for Nonlinear and Nonequilibrium Aerosciences (CENNAS)	$450,000
FL	Florida A&M University	University Research Engineering Institute	$300,000
FL	Florida A&M University	Design and Control of a Robot Master Manipulator for a Telerobotic System	$100,000
FL	Florida A&M University	Control of Dynamic Stall Process on Helicopter ROT or Blades Using Distribute Multiple Microjets	$100,000
GA	Clark Atlanta University	Computational Models in Vision: Bridges Between Biological Vision and Computer Vision	$100,000
GA	Clark Atlanta University	High Performance Polymers and Composites Center	$1,200,000
GA	Clark Atlanta University	Multiscale Modeling of Metallic Alloys	$100,000
GA	Clark Atlanta University	Simulation of Cavitating Flows Using Mixed Discontinuous Galerkin and Stabilized Galerkin Finite Element Methods	$75,000
GA	Clark Atlanta University	Development and Implementation of Implicit FVM and FEM for Simulations of Compressible and Two-Phase Experiments	$75,000
GA	Clark Atlanta University	Liquid Fuels: Pyrolytic Degradation and Fire Spread Behavior as Influenced by Buoyancy	$60,000
GA	Clark Atlanta University	Developing Novel Fluorescent Materials with Near Infrared Mission by Using M-Pheylene	$51,197
GA	Clark Atlanta University	Resin Transfer Molding and Vacuum Assisted Resin Transfer Molding Program	$50,000

STATE	INSTITUTION	DESCRIPTION	AWARD
GA	Morehouse School of Medicine	Space Medicine and Life Sciences Research Center	$1,200,000
GA	Morehouse School of Medicine	Telemedicine Application of Autogenic Feedback Training Exercise as a Treatment for Specific Patients	$150,000
GA	Morehouse School of Medicine	Gravitational Effects on Nutrient Diffusion Through Cartilage Matrix	$100,000
GA	Spelman College	Raman-Based Oxygen and Nitrogen Sensor for Monitoring Empty Airplane Fuel Tanks	$70,399
LA	Southern University and A&M College-Baton Rouge	Predictive Calculation and Simulation for Nanosemiconductors and Related Heterostructures	$50,000
LA	Southern University and A&M College-Baton Rouge	The Advanced Thin Ionization Calorimeter Balloon Experiment	$55,000
LA	Southern University and A&M College-Baton Rouge	The Center for Coastal Zone Assessment and Remote Sensing	$1,200,000
MD	Bowie State University	Biomolecular Recognition of Fullness and Carbon Nanotubes	$100,000
MD	Morgan State University	Advanced Computational Fluid Dynamics (CFD) Analysis/Experimental Validation and Transient Model Development for the Flow in SSME Exhaust Duct	$80,000
MD	Morgan State University	Manufacturing Cost Reduction for Multiple Production Runs of Nanosats and Related Aerospace Products through Integrating Robustness Concepts	$70,000
MD	Morgan State University	Center for Advanced Microwave Research and Applications	$1,037,536
MS	Jackson State University	Non-Contact Precision Actuation and Structural Control Using Opto-Mechanical Actuators	$95,000
NC	Elizabeth City State University	Applications of Chaos Theory in NASA's Advanced Communications Systems	$25,000
NC	Elizabeth City State University	The Use of Proteomics to Analyze Antioxidant and Phosphoinositol Signal Transduction Pathways	$27,000
NC	North Carolina A&T State University	Low-Power SOI CMOS Transceiver	$455,000
NC	North Carolina A&T State University	Third Generation Reusable Launch Vehicle Technology Institute	$175,000
NC	North Carolina A&T State University	Analytic Solution Algorithms & Simulation for Compressible Flow Models: Computational Benchmarks	$100,000
NC	North Carolina A&T State University	A Wireless Radio Location System for Use in an Indoor Environment	$100,000
NC	North Carolina A&T State University	Continuous Sensor System for Health Monitoring of Aerospace Fuel Tanks	$100,000
NC	North Carolina A&T State University	North Carolina A&T State University Center for Aerospace Research	$520,000
NC	North Carolina A&T State University	Optimal Trajectory Planning for Interplanetary Mission using Hybrid Evolutionary Algorithms	$100,000
NC	North Carolina A&T State University	Performance Evaluation & Modeling of Affordable Composites Manufactured Using Stitching & Z-Pinning Processes	$100,000
NC	North Carolina A&T State University	Study of GaAsSbN Alloys for Solar Cell Applications	$100,000
NC	North Carolina A&T State University	Investigation of the Next-Generation Design Tool for Aerospace	$85,000
NC	North Carolina A&T State University	Developing Ultra-Efficient Engine Technology Through Education and Research	$60,000

STATE	INSTITUTION	DESCRIPTION	AWARD
NC	North Carolina A&T State University	Meyer Institute for Future Space Transportation	$50,000
OH	Central State University	Analysis and Development of a SiC Piezoresistive Probe for Measuring Turbulent Intensity	$100,445
TN	Fisk University	Center for Photonic Materials and Devices	$302,000
TN	Tennessee State University	Center for Automated Space Science (CASS)	$1,200,000
TN	Tennessee State University	Free Flight Testing and Simulation at Ames Research Center	$155,187
TN	Tennessee State University	Visual Tele-Robotic Task Planning of Cooperative Robots based on Soft Computing Techniques	$90,000
TX	Prairie View A&M University	Center for Applied Radiation Research	$1,200,000
TX	Prairie View A&M University	Effects of Service Conditions on the Morphology and Properties of Advanced Composites for Cryogenic Tank Applications	$100,000
TX	Prairie View A&M University	Meyer Institute for Future Space Transportation	$70,000
TX	Texas Southern University	NASA Research Center for Biotechnology and Environmental Health	$1,200,000
VA	Hampton University	Hampton University Testing Facilities	$83,000
VA	Hampton University	Aeronomy of Ice in the Mesosphere (AIM) Mission	$21,100,000
VA	Hampton University	Hampton University Aeropropulsion Center	$1,092,000
VA	Hampton University	Advanced Air Transportation Technologies (ATT) Project at Langley Research Center	$20,903
VA	Hampton University	Meteorological Event Classes for Moderate Resolution Imaging Spectroradiometer (MODIS) Data Analysis	$95,000
VA	Norfolk State University	Novel Spin Polarization Transport Phenomena for Applications in Space Microelectronics Technology	$90,000
VA	Norfolk State University	Development of Novel Composite and Random Materials for Nonlinear Optics and Lasers	$500,000
VA	Norfolk State University	Development of a High Efficiency and Lightweight Photovoltaic Device	$150,000
VA	Norfolk State University	Application of Variational Method in the Analysis of Fluid-Structure High Speed Thermal Fluid Design Densitivity Analysis	$100,000
VA	Norfolk State University	Center for Research and Education in Advanced Materials	$1,200,000
VA	Norfolk State University	Power Allocation and Distribution (PAD) Logic Circuit for Smart Membrane Actuators Controlled by a Microwave	$100,000
VA	Norfolk State University	The Use of Proteomics to Analyze Antioxidant and Phosphoinositol Signal Transduction Pathways	$22,000
TOTAL			**$41,571,374**

AWARDS BY OBJECT CATEGORY

Program Evaluation

In FY 2003, NASA adopted six Operating Principles (i.e., Customer Focus, Content, Pipeline, Diversity, Evaluation, and Partnership/Sustainability) by which all grant awards are evaluated. The Office of Education developed and implemented a review process using the six Operating Principles in which all NASA education and research programs over $100,000 were evaluated. In FY 2004, NASA conducted a pilot test program review of 12 programs using the six Operating Principles plus two additional criteria (Relevance to NASA and Cost). All programs will now be evaluated annually against the Operating Principles plus the Relevance to NASA and Cost criteria. The results will be used to determine which programs are effective, are cost-efficient, or need improvement.

The evaluation of all grant awards will continue through a combination of oversight by NASA technical monitors, collection of data on key metrics, site visits, and reverse-site visits. For institutional research programs, technical review committees comprised of NASA experts in relevant research areas conduct site visits at least annually. These evaluations and assessments are critical tools that provide valuable information to HBCUs that can be utilized to strengthen their research and program outcomes.

Performance Outcomes

In order to monitor the progress of NASA HBCU programs, all grant recipients were required to submit a Performance Outcomes Report as part of their annual performance report. The Performance Outcomes Report consists of both numerical outcomes data and a narrative summary of project accomplishments covering Academic Year (AY) 2003-2004 and the summer of 2004. The data were collected electronically via the World Wide Web. This single annual collection of data is used to provide the information necessary for the annual performance goals reports, required White House reports, budget submissions and justifications, and responses to congressional inquiries and comparative assessments of programs and projects.

The numerical data measure program performance against metrics that apply to all NASA Minority University Research and Education Programs (MUREP). These metrics reduce the collection of data to the minimal amounts possible, emphasize outcomes over process, and are applicable to any project. They are aggregable both horizontally and longitudinally, and they allow adjustable benchmarking standards to be applied. For research projects, including URCs, Institutional Research Awards (IRA), and Faculty Awards for Research (FAR), the metrics track two basic areas--student outcomes (degrees awarded and post-degree plans) and research outcomes (refereed publications, leveraged funding, patents, and commercial products). Vital process information, such as numbers of faculty and students supported and the gross categories in which funds are spent, is also collected. For education projects, the Performance Outcomes Report not only continues to collect data on numbers and demographics of students supported, but also primarily focuses on measurable improvements in student performance. Both short- and long-term metrics are utilized in the collection of data that pertains to education projects.

The narratives on each project provide information on accomplishments that are relative to that project and, therefore, are not necessarily captured in the Performance Outcomes data. These narratives serve as input for the annual HBCU Performance Report and other similar reports, as required.

Site Visits

Independent peer reviewers conducted onsite reviews of grants at many HBCUs during FY 2004. The purposes of the visits were to ascertain the projects' accomplishments to date, identify any potential barriers to achieving project objectives, determine whether collaboration between the institution and NASA is sufficient to achieve maximum benefits for the university and for NASA, and to allow NASA personnel an opportunity to review the management of the grant.

AWARDS BY OBJECT CATEGORY

Training

STATE	INSTITUTION	DESCRIPTION	AWARD
AL	Alabama A&M University	Graduate Space Science Education and Research	$270,000
AL	Alabama State University	NASA High School Science Enrichment Program	$100,000
AL	Lawson State Community College	Infusing Technology, Engineering, Mathematics and Science in the Dual Enrollment/Accelerated Students Program	$100,000
AL	Oakwood College	Minority Student Development Program in Science and Engineering	$75,000
AL	Oakwood College	Enhancing Mathematics and Science Education Through Research (EMSER)	$400,000
AL	Stillman College	Project Mi Futuro	$100,000
AL	Tuskegee University	Student Participation in Multi Aircraft Simulator Program	$116,508
DC	Southeastern University	Project ESCAPE (Eager Student Community Activism for Planet Earth)	$98,611
DC	University of the District of Columbia	Partnership for a Sustainable Space Science Program	$240,000
DC	University of the District of Columbia	Science, Engineering, Mathematics, and Aerospace Academy (SEMAA)	$125,000
GA	Albany State University	Precollege Achievement of Excellence in Science, Technology, Engineering, and Mathematics	$100,000
GA	Clark Atlanta University	Clark Atlanta University and Partners Center for Preparing Mathematics and Science Teachers for Hard-to-Staff Schools	$200,000
GA	Spelman College	Model Institutions of Excellence (MIE)	$1,000,000
LA	Xavier University	Stress on Analytical Reasoning (SOAR) 2 Summer Bridge Program	$75,000
MD	Bowie State University	Bowie State's Satellite Operation Control Center	$50,000
MD	Bowie State University	Model Institutions of Excellence (MIE)	$1,100,000
MD	Morgan State University	Minority University-Space Interdisciplinary Network/NASA Research and Training Site (MU-SPIN/NRTS) Continuation	$350,000
MD	Morgan State University	Science, Engineering, Mathematics, and Aerospace Academy (SEMAA)	$125,000
MD	University of Maryland-Eastern Shore	Eastern Shore Mathematics Teachers Education Project	$194,848
MD	University of Maryland-Eastern Shore	Science, Engineering, Mathematics, and Aerospace Academy (SEMAA)	$125,000
MS	Jackson State University	Science and Mathematics Initiative for Learning Enhancement	$200,000
MS	Jackson State University	Science and Technology Enhancement Pre-College Program	$100,000
MS	Mississippi Valley State University	Developing and Improving Teacher Education in Mathematics, Science and Technology	$200,000
NC	Elizabeth City State University	Minority University-Space Interdisciplinary Network/NASA Research and Training Site (MU-SPIN/NRTS) Continuation	$350,000
NC	Livingstone College	Science, Engineering, Mathematics, and Aerospace Academy (SEMAA)	$125,000
NC	North Carolina A&T State University	Partnership for Research and Education in Space Science	$295,000
NC	North Carolina Central University	North Carolina Central University NASA Center of Excellence	$500,000

STATE	INSTITUTION	DESCRIPTION	AWARD
NC	North Carolina Central University	Integration of Nanotechnology and Computational Modeling NASA Research in the Undergraduate Curriculum at North Carolina Central and Fisk Universities	$400,000
NC	Winston-Salem State University	Science, Engineering, Mathematics, and Aerospace Academy (SEMAA)	$125,000
PA	Lincoln University	NASA/Lincoln University Teacher Education Partnership: Minority University Mathematics, Science and Technology Teacher Partnership Program	$200,000
SC	Claflin College	ASTROCHEM Project	$100,000
SC	South Carolina State University	Minority University-Space Interdisciplinary Network/NASA Research and Training Site (MU-SPIN NRTS) Continuation	$375,000
SC	South Carolina State University	New Directions in Astronomy and Astrobiology	$275,000
SC	South Carolina State University	Share with a Pair of Peers II	$200,000
TN	Fisk University	Fisk Astronomy, Space Science and Technology (FASST) Program	$270,000
TN	Meharry Medical College	NASA/Meharry Medical College/Vanderbilt Summer Research Apprenticeship Program	$100,000
TN	Tennessee State University	NASA Engineering and Science Collaborative	$520,000
TN	Tennessee State University	Minority University-Space Interdisciplinary Network/NASA Research and Training Site (MU-SPIN/NRTS) Continuation	$375,000
TN	Tennessee State University	Science, Engineering, Mathematics, and Aerospace Academy (SEMAA)	$125,000
TN	Tennessee State University	Research Projects for Increasing the Pool of Minority Engineers	$82,400
TN	Tennessee State University	TSU College Bound IV Program	$42,500
TX	Prairie View A&M University	Minority University-Space Interdisciplinary Network/NASA Research and Training Site (MU-SPIN/NRTS) Continuation	$375,000
TX	Texas College	Mathematics, Science, Engineering and Technology Place for Faculty: A Proposal to Integrate Technology	$100,000
TX	Texas College	Precollege Placement for Achievement of Excellence in Science, Technology, Engineering and Mathematics	$100,000
TX	Texas Southern University	NASA Center on Model-Based Simulation, Structural and Materials Systems	$100,000
TX	Wiley College	Science, Engineering, Mathematics, and Aerospace Academy (SEMAA)	$125,000
VI	University of the Virgin Islands	Saturday Science Academies and Summer Science Enrichment Academies	$150,000
VA	Hampton University	Space Science Minor at Hampton University	$270,000
VA	Norfolk State University	Space Science Education and Research at Norfolk State University	$250,000
VA	Norfolk State University	2004 Pre-Service Teacher Program (Institute and Conference)	$700,000
VA	Hampton University	Continuing Education Aeroscience Center	$300,000
WV	West Virginia State University	West Virginia State University (Independent Verification and Validation Facility)	$100,000
		TOTAL	**$12,474,867**

AWARDS BY OBJECT CATEGORY

Facilities and Equipment

There are no competitively awarded grants specifically for facilities and equipment. A small portion of funding is normally permitted under a research or education grant to fund equipment required to support research or education activities. In addition, to the degree that it is available from NASA Centers, HBCUs are able to acquire excess or loaned equipment to support research efforts or scientific teaching.

AWARDS BY OBJECT CATEGORY

Fellowships, Traineeships, Internships, Recruitment, and Arrangements under the Intergovernmental Personnel Act (IPA)

STATE	INSTITUTION	DESCRIPTION	AWARD
AL	Tuskegee University	NASA Space Flight and Life Sciences Training Program	$410,000
DC	Howard University	Public Service Intern Program	$53,600
DC	Howard University	Earth System Science Fellowship	$24,000
FL	Florida A&M University	A Graduate Fellowship Component to Augment Program IMAGE	$350,000
MD	Bowie State University	Summer Institute in Engineering and Computer Applications	$278,050
MD	Bowie State University	Faculty Summer Fellowship	$50,000
MD	University of Maryland-Eastern Shore	Student Internship at Wallops Flight Facility	$50,000
NC	North Carolina A&T State University	NASA Ronald E. McNair Graduate Research Fellowship Program	$425,000
VA	Hampton University	Langley Aerospace Research Summer Scholars Program (LARSS)	$50,000
		TOTAL	**$1,690,650**

AWARDS BY OBJECT CATEGORY

Student Tuition Assistance, Scholarships, and Other Aid

STATE	INSTITUTION	DESCRIPTION	AWARD
AL	Alabama A&M University	Future Assets Student Talent (FAST) Program	$75,000
FL	Florida A&M University	Increasing Minority Access to the Graduate Engineering Program (IMAGE)	$900,000
GA	Morehouse College	Strategic Preparedness Advancing Careers in Engineering/Sciences (Project SPACE)	$1,150,000
GA	Spelman College	Women in Science and Engineering (WISE) Scholars Program	$1,150,000
TOTAL			**$3,275,000**

AWARDS BY OBJECT CATEGORY

Direct Institutional Subsidies

NASA does not have any direct institutional subsidies.

AWARDS BY OBJECT CATEGORY

Third-Party Awards

American Society for Engineering Education (ASEE)	
Helen T. Carr Fellowship	$50,000
National Association for Equal Opportunity in Higher Education (NAFEO)	
Collaboration on Programs for the NASA/NAFEO Research Park	$727,000
NASA Summer Internship Program	$45,000
University Space Research Association	
Earth Systems Science Education (ESSE) for the 21st Century Program	$105,000
United Negro College Fund Special Programs, Inc.	
Harriett G. Jenkins Predoctoral Fellowship Program	$2,120,000
Curriculum Improvement Partnership Awards (CIPA)	$1,300,000
NASA Administrator's Fellowship Program (NAFP)	$1,230,000
National Action Council for Minorities in Engineering (NACME)	$600,000
National Association for the Advancement of Colored People (NAACP)	$150,000
National Council of Negro Women (NCNW)	$200,000
National Society of Black Physicists (NSBP)	$60,000
National Society of Black Physics Students	$25,000
Space Grant College Fellowship Program	$306,654
Summer High School Apprenticeship Research Program (SHARP) PLUS	$50,000
Tennessee State University – Diversified Career and Educational Services (DCES)	$700,000
THIRD-PARTY TOTAL	**$7,668,654**

AWARDS BY OBJECT CATEGORY

Private-Sector Involvement

ORGANIZATION	DESCRIPTION	AWARD
Global Science & Technology, Inc.	NASA Peer Review Services	$2,500,000
TOTAL		**$2,500,000**

NASA's Office of Education programs, including the MUREP, are supported by NASA Peer Review Services (NPRS), a consolidated contract, of which Global Science & Technology, Inc. is the prime contractor. NPRS' functions include the development and enhancement of an internet-based electronic management system to support solicitation development, peer review and selection, post-award evaluation, and grants/cooperative agreements management with HBCUs and Other Minority Universities (OMU). Additionally, NPRS provides technical assistance to HBCUs and ensures that they are familiar with and capable of accessing the NASA HBCU programs online, via the electronic management system, to receive announcements of opportunity and to submit proposals, evaluations, and post-award management activities.

AWARDS BY OBJECT CATEGORY

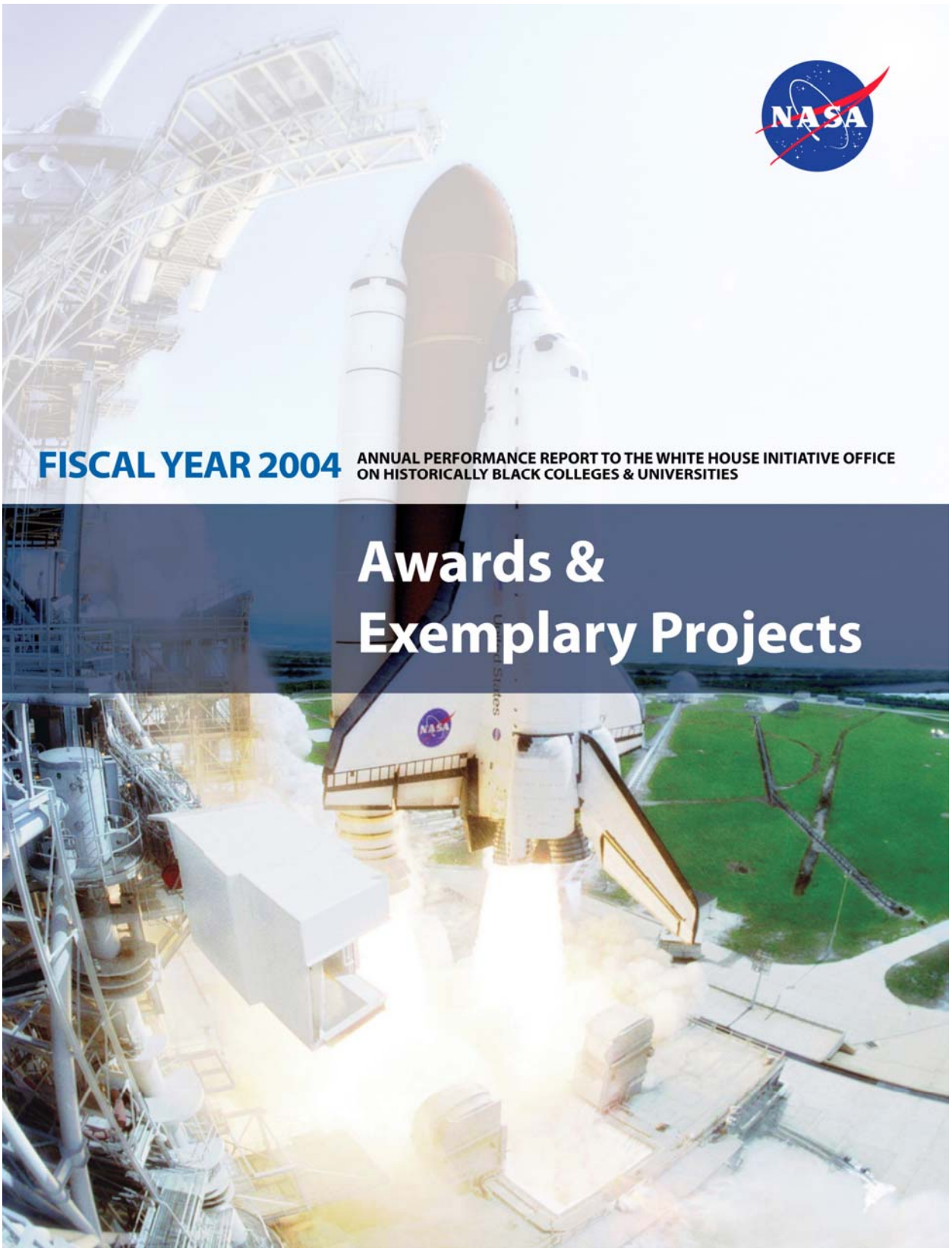
Administrative Infrastructure

There were no grants funded specifically for Administrative Infrastructure at HBCUs during FY 2004.

AWARDS BY OBJECT CATEGORY

Other Activities

There were no grants funded specifically for Other Activities at HBCUs during FY 2004.


NASA
FISCAL YEAR 2004
ANNUAL PERFORMANCE REPORT TO THE WHITE HOUSE INITIATIVE OFFICE
ON HISTORICALLY BLACK COLLEGES & UNIVERSITIES
Awards &
Exemplary Projects

AWARDS AND EXEMPLARY PROJECTS

NASA employs a comprehensive and complementary array of strategies to achieve its established goals for HBCUs. These programmatic initiatives are carried out in close collaboration with the Mission Directorates and NASA Centers. The Mission Directorates and Centers support minority university programs through direct funding, use of their facilities, and commitment of their personnel to serve on Technical Review Committees (TRC) and assist in other facets of program implementation. As a result of the involvement of the Mission Directorates and NASA Centers in the programs of the Office of Education, numerous students and principal investigators (PI) from HBCUs are knowledgeable about and make significant contributions to the aeronautics and space community.

Outreach to HBCUs will continue to be made in collaboration with the Mission Directorates and Centers to ensure that HBCUs are knowledgeable about and responsive to the Agency's Strategic Plan. The Office of Education will continue to set specific program goals that lead to measurable program outcomes that are consistent with the Agency's investment in HBCUs. Sample awards and exemplary projects are outlined below.

University Research Centers (URC)

The URC awards are collaborative programs conducted in cooperation with the Mission Directorates. These awards are designed to achieve a broad-based, competitive aerospace research capability among the Nation's HBCUs that will foster new aerospace science and technology concepts, expand the Nation's base for aerospace research and development, develop mechanisms for increased participation by faculty and students in mainstream research, and increase the number of underrepresented and underserved students (who are U.S. citizens) with advanced degrees in NASA-related fields.

The 15 HBCU URCs achieved the following outcomes in AY 2003-2004 and the summer of 2004:

- 476 students from underrepresented minority groups participated in URC research: 289 undergraduates, 113 masters students, and 74 doctoral students
- 83 faculty members, 56 research associates, 163 graduate assistants, and 19 postdoctoral researchers conducted NASA-related research at URCs
- 86 degrees in science, technology, engineering, or mathematics (STEM) disciplines were awarded to disadvantaged/underrepresented students as follows: 47 bachelors of science degrees, 29 masters of science degrees, and 10 doctoral degrees
- 243 refereed papers and/or book chapters were published or accepted for publication, including 107 with at least one student author
- 359 technical presentations, 176 which included at least one student presenter
- 3 patents are pending and 3 patents have been issued
- Students and faculty members participated in 82 panels, 5 sponsored by MUREP, 17 by other NASA programs, and 60 by other Federal agencies
- 72 research partnerships were developed

The statistics indicated above were reported by the following HBCU URC institutions: Alabama A&M University, Clark Atlanta University, Fisk University, Florida A&M University, Hampton University, Howard University, Morehouse School of Medicine, Morgan State University, Norfolk State University, North Carolina A&T State University, Prairie View A&M University, Southern University and A&M College, Tennessee State University, Texas Southern University, and Tuskegee University.

An Exemplary URC

Tuskegee University
Center for Food and Environmental Systems for Human Exploration of Space

PROGRAM DESCRIPTION

The Center for Food and Environmental Systems for Human Exploration of Space (CFESH) focuses on answering fundamental and applied research questions about NASA's Advanced Life Support (ALS) program to provide a reliable source of safe, palatable food to enable NASA's quest for successful human exploration of space. In cooperation with the Johnson Space Center, Kennedy Space Center, and Ames Research Center, CFESH is focusing on goals and objectives that integrate genomics and biotechnology, plant physiology and environmental systems, food technology and waste reduction, technology transfer, and K-12 through Ph.D. science, mathematics, and engineering education. This research is being conducted with both staple and salad crops and selected culinary herbs. The staple crops include the sweet potato and peanut, carrots for salads, and basil and dill as culinary herbs. In FY 2004, CFESH supported 33 students (14 graduates and 19 undergraduates) majoring in agricultural and environmental sciences, computer science, biology, electrical and mechanical engineering, and food and nutritional sciences, and 16 summer high school interns. The work is coordinated between two main teams and two subteams. The main teams are the Food Crop and Controlled Environmental Systems (FCE) and Food Processing and Product Development (FPD). The subteams are the Systems Integration (SI) and Education and Outreach (EO).

PROGRAM RELEVANCE TO NASA

Research findings on crop performance in controlled environments will help NASA's ALS program in providing a safe and reliable source of fresh, palatable food for humans on extended space exploration missions. In addition, students being trained in the program in the STEM subjects will provide a ready and qualified pool of underrepresented minorities that NASA can hire to replenish its retiring workforce.

PROGRAM BENEFITS TO SOCIETY

Program benefits will include, but are not limited to, providing peer-reviewed information, protocols, and technologies to help advance the Nation's space exploration activities; training and graduating underrepresented minority students in the life sciences, as well as potential technology transfer of useful products for consumers. For example, the ready-to-eat sweet potato breakfast cereal with a 5-percent moisture level has gained acceptability among consumers in an informal bench-top testing. Several other products being refined with potential

benefits to society include enhancers to improve bread baking and a sweetener made from the starch of the sweet potato.

PROGRAM GOALS

The goals are (1) to use fundamental and applied approaches to address the research and education objectives of NASA's ALS program; and (2) to train and graduate underrepresented minority students with bachelors of science, masters of science, and Ph.D. degrees in life sciences, physical sciences, and engineering, and the promotion of public understanding of the role and impact of NASA's ALS science and technology activities as they relate to space exploration and Earth applications.

PROGRAM ACCOMPLISHMENTS

The Food Crop and Controlled Environmental Systems team focused on cultivar selection of carrots, dill, and basil, the physiological role of t-Zeotin Riboside in storage root initiation and enlargement and identification and isolation of such genes, canopy gas exchange studies, and supraoptimal CO^2 studies with sweet potatoes and peanuts, models to predict growth and yield of sweet potato, and phytomodel usage for rapid selection techniques. In storage roots initiated 2 weeks after planting, only one breeding clone exhibited rapid development. Biomass production was enhanced for both crops with CO^2 enrichment. Storage root yield was enhanced with supraoptimal CO^2, while foliage production declined. Foliage dry mass, pod, and seed yield of peanuts were also enhanced.

The Food Processing and Product Development team also focused on optimizing a ready-to-eat sweet potato breakfast cereal, reformulating, improving and measuring selected properties of a sweet potato bread and enhancer, optimizing high glucose sweet potato syrup and improving its storage ability, improving the processing and production of a sweet potato beverage, and characterizing and managing food and biomass residuals. Three refined formulations of the cereal showed similar chemical and physical characteristics. Two bread enhancers improved loaf volume and storage stability. Chemical and physical analyses of the syrup indicated similarities with corn syrups. Characterization of potential waste from menu items using a simulated International Space Station Menu Plan was completed. As part of resource recovery, sweet potato vines are being used to prepare germination matrices.

The Systems Integration subteam concentrated on streamlining the production of syrup from sweet potatoes and developed a process configuration. Mass and energy input/output and intermediate flows were determined and alternative configurations synthesized the rationale for each configuration, operating principles, and potential advantages and disadvantages were documented.

The Education and Outreach subteam continued its summer high school apprenticeship and college internship programs. Faculty and staff assisted the local school system with the Leadership and Assistance for Science Education Reform (LASER) initiative, worked with the Spaceflight Life Sciences Training Program team, and hosted a teacher workshop in biotechnology. They also conducted classroom visits, offered a new initiative with the National Park Service to develop a display of Dr. George Washington Carver’s work, and added a presentation of CFESH’s current work with NASA.

STUDENT ACCOMPLISHMENTS

Fourteen CFESH students presented findings from their research at various regional, national, and international scientific meetings, and three published findings in peer-reviewed journals. An undergraduate student won second place for her work evaluating physiochemical properties and consumer evaluation of wheat bread enhanced with peels from three cultivars of sweet potato at the 4th Annual Undergraduate Science and Engineering Conference held at Tuskegee University. Two graduate students won first and second place for their work involving pH, physiochemical and viscometric properties of a sweet potato syrup at the 13th Biennial Association of Research Directors Symposium. In addition, a graduate student won first place for her work evaluating impact of supraoptimal carbon dioxide on the sweet potato and the peanut at the annual meeting of the Tuskegee Chapter of Sigma Xi. An environmental science major and a food science major, both graduate students, interned at Johnson Space Center. Two recent graduates have enrolled in the Food Science Ph.D. program at North Carolina State University.

Faculty Awards for Research (FAR)

FAR awards provide new faculty, and those who have limited NASA experience, the opportunity to integrate the research and education components of their careers with the unique mission requirements of a specific NASA Center. The FAR program provides merit selection of proposals from outstanding and promising STEM-tenured and tenure-track faculty who are capable of contributing to the Agency's research and education objectives. This award provides faculty members with research support and exposure to the NASA peer-review process to enable them to demonstrate creativity, productivity, and future promise in the transition to achieving competitive awards in the Agency's mainstream research programs.

During this program year, the FAR program funded 31 research projects at 13 HBCUs. The data that follow were obtained from the projects that were funded and reported during FY 2004 and summarize the measurable outcomes of these FAR projects during AY 2003-04 and the summer of 2004 reporting period.

There were 208 participants in the FAR research programs of whom 159 were undergraduates, 41 were masters students, and 8 were doctoral students. Fifty-two students obtained degrees during the reporting period, including 37 bachelors degrees, 12 masters degrees, and 3 doctoral degrees.

During this same period, 149 professional-level investigators were involved in research projects including 37 faculty members, 57 research associates, 52 graduate assistants and 3 postdoctoral fellows. The research accomplishments of the FAR projects were documented in 68 refereed papers or book chapters that were published during this period, including 43 publications with students as authors or coauthors. Additionally, the HBCU participants made 46 presentations at peer-reviewed national and international conferences and NASA Centers with 32 of these presentations including at least one student presenter.

An Exemplary FAR

North Carolina Agricultural and Technical State University
A Wireless Radio Location System for Use in an Indoor Environment

PROGRAM DESCRIPTION

The purpose of this project is to develop a wireless radio location (WRL) system based on global positioning system (GPS) concepts that will be capable of tracking people and supplies in an indoor environment, i.e., an indoor positioning system (IPS). Indoor environments where the system would be useful include NASA Centers/buildings and/or spacecraft/space stations such as the Shuttle or the International Space Station (ISS). This system will use Radio Frequency Identification (RFID) technology in conjunction with GPS concepts to perform wireless radio location of the tagged objects. The proposed system will be able to give position information of a tagged object with a projected accuracy of a few centimeters, which would be an improvement over currently available technology. This project will develop both the RFID tags and the IPS system that will be used to locate the tagged objects. The wireless radio location system will be based on GPS and cellular communication system concepts while the RFID tags will be developed from first principles, i.e., basic circuit theory and design. The RFID-IPS system would be a hybrid of RF identification technology, cellular communication system theory, and GPS technology. The RFID-IPS system would be simple in design but incorporate most of the concepts from GPS.

Although some research has been done on using the orbiting GPS satellite system to perform indoor geolocation of material and personnel, this research has shown the somewhat impracticality of measuring satellite-based GPS signals inside buildings and structures. This is especially true if one wishes to have an RFID tag for a transceiver. Therefore, since GPS satellite signals, for the most part, are unavailable indoors, an IPS system would require its own indoor antenna/controller infrastructure. The IPS system would be organized as cells within a structure with each cell projected to cover 1,000 to 50,000 square feet in commercial applications. The modeling of this cellular structure of antennas will be based on the hexagonal modeling used in cellular communication systems.

Similar to GPS satellite signals, RFID-IPS controllers would emit direct-sequence spread-spectrum (DSSS) signals that would be received by the RFID tags. Unlike GPS, the passive portion of RFID tags would not include sophisticated circuitry and software to decode this signal. Instead, it is proposed that they simply change the signal's frequency and transmit it back to the cell controller.

PROGRAM RELEVANCE TO NASA

The primary goal of this research is to provide NASA with an RF system capable of tracking people and materials at NASA ground installations. In addition, the system developed through this project would allow NASA to track astronauts and supplies on the Space Shuttle and ISS. The system would also be useful in tracking personnel and supplies in future habitats that would be constructed on Mars or the Moon. This research would comply with the rule of the Federal Communications Commission (FCC) for geolocation of cellular phone calls to 911. The proposed research complements the current research or technology used by NASA such as:

- Real Time Kinematics (RTK) GPS which is a technology used by Langley Research Center for day-to-day surveying and utility location,

- Goddard Space Flight Center's efforts to develop navigation algorithms using GPS Standard Positioning Service (SPS) measurements to provide real-time spacecraft position and velocity accuracies adequate to meet onboard, high-precision instrument pointing,

- GPS radio occultation technique developed and verified by the Jet Propulsion Laboratory (JPL) during the GPS/MET experiments managed by the University Corporation of Atmospheric Research,

- Glenn Research Center work on a proposal drafted for allocating space-to-space frequencies in the GPS Spectrum Bands,

- JPL research on estimating altitude from GPS measurements on one antenna, and

- NASA, along with other Federal agencies, have formed the International Global Positioning System Outreach Committee of the U.S. Government to protect spectrum used by the GPS from encroachment by future mobile satellite services.

PROGRAM BENEFITS TO SOCIETY

The commercial applications for the proposed RFID-IPS system are incalculable. Some of the applications include using the system to track newborn infants while they are still in the hospital and once they arrive at home. Also, the need to locate people after such disasters as the Oklahoma City bombing or the U.S. Embassy bombings in Africa are examples of occurrences where this system would be useful.

PROGRAM GOALS
The primary goals of this research project are to:

- Develop an RFID tag component of the prototype RFID radio location system,
- Develop the antenna and controller component of the prototype RFID radio location system, and
- Combine the RFID tag and the antenna component into a prototype RFID radio location system.

STUDENT ACCOMPLISHMENTS
The principal investigator and several student researchers coauthored four papers about the project and presented them at two conferences.

Minority University and College Education and Research Partnership Initiative in Space Science (MUCERPI)
MUCERPI represents a critical step by NASA to broaden the participation of underrepresented groups and minority institutions in NASA research programs and missions and to encourage and foster the development of linkages among the NASA Science Mission Directorate, the space science research community, and minority institutions through the establishment of exchange programs and long-term partnerships. MUCERPI awards support programs in one of two broad categories: (1) Academic Program Development or (2) Faculty/Student Professional Enhancement and Development through Partnerships and Exchange Programs. The capabilities developed under this initiative may include research, undergraduate or graduate courses or degree programs, precollege or public outreach programs, and/or teacher training in space science.

Five HBCUs, first funded in FY 2001 under this initiative, were awarded 3-year renewals in FY 2004. These institutions were Alabama A&M University, Hampton University, Norfolk State University, South Carolina State University, and Southern University and A&M College. New FY 2004 HBCU awardees were Fisk University, North Carolina A&T State University, and the University of the District of Columbia.

Thirty faculty members, 9 graduate assistants, and 1 post doctorate were engaged in space science research at the above institutions during FY 2004. MUCERPI awardees authored 24 publications. Of 44 presentations made at conferences and workshops, students presented 25. Adhering to the intent of the MUCERPI initiative, grantees have entered into 10 education partnerships and 12 research partnerships. MUCERPI awards resulted in 7 enhanced and 2 new academic courses relevant to space science. Collectively, 72 students participated in the 8 programs: 64 undergraduates, 6 masters students, and 2 doctoral candidates.

An Exemplary MUCERPI Project

South Carolina State University (SCSU)
New Directions in Astronomy and Astrobiology

PROGRAM DESCRIPTION

This project will expand the existing program in astrophysics at South Carolina State University (SCSU) to include new areas of research and outreach in astronomy and astrobiology. Faculty at SCSU in the Department of Biological and Physical Sciences are collaborating with NASA scientists and educators, space scientists at other government laboratories and private research institutions, and faculty members and students at minority institutions, as well as educators in the K-14 community.

SCSU is concentrating on faculty and student research and outreach to the K-14 community. Student research was conducted at several levels including research by a high school student from the South Carolina Governor's School for Science and Mathematics, as well as undergraduate students in the STEM disciplines at SCSU. SCSU will institutionalize its involvement in space science through a variety of means including the creation of an astronomy minor in its curriculum. This minor will be designed to be attractive to biology majors and assist them in entering the field of astrobiology.

This project will enable SCSU to enter the field of astrobiology. SCSU will increase its involvement with NASA through its faculty members and students in the Department of Biological and Physical Sciences. This will be accomplished through faculty and student participation in the recently awarded NASA Astrobiology Institute Node at the Goddard Space Flight Center (GSFC), through the recruiting efforts of its Co-Investigator for astrobiology, through a partnership with Bennett College, and membership in the Minority Institute Astrobiology Collaborative.

New partnerships have been formed at sites around the Nation: (1) two new faculty research collaborations at GSFC; (2) a new faculty research partnership at the Lawrence Livermore National Laboratory; (3) two new K-12 collaborations with NASA Explorer Schools; (4) a new partnership with a local community college; (5) a new partnership in astrobiology with Bennett College; (6) a new research collaboration with Medgar Evers College; and (7) a new collaboration with the South Carolina Governor's School for Science and Mathematics.

Previous partnerships that will be enhanced under this proposal include: (1) an expanded faculty research collaboration with an astronomer at GSFC; (2) a significantly enhanced research collaboration with the Planetary Science Institute in Tucson; (3) increased involvement with the Pisgah Astronomical Research Institute in North Carolina; and (4) partnership with an Outreach Coordinator. The Outreach Coordinator is a Professor of Physics at SCSU and the Regional Coordinator of the Midlands Mathematics and Science Center serving a five-county area in South Carolina. The Center is one of eight such centers operated by the Mathematics and Science Unit of the South Carolina Department of Education.

PROGRAM RELEVANCE TO NASA

- Contributes to the scientific advancement of the field of astronomy through publications resulting from faculty research.

- Motivates and stimulates the next generation of explorers through student research projects, training, and internships.

- Improves diversity within NASA programs through inclusion of many students, teachers, and faculty members who are members of underrepresented minority groups or who serve such groups.

- Assists in the dissemination of NASA resources and new, cutting-edge science and technology results through teacher workshops, student internships, faculty and teacher training, and related outreach activities such as public observing sessions.

PROGRAM BENEFITS TO SOCIETY

- Assists in the education of students and teachers in rural and underrepresented minority communities through workshops, internships, and related outreach activities.

- Provides access of current scientific information and facilities to teachers and faculty members in communities that normally do not have such access.

- Advances scientific knowledge through faculty research.

- Assists to better inform the general public and enhance science literacy regarding current scientific and technological issues through public activities such as speakers, planetarium programs, and public observing sessions.

PROGRAM GOALS

- Enhance faculty and student participation at SCSU in astronomy and astrobiology through the creation of an astronomy minor and other activities that increase recruitment of students into these fields.

- Enhance faculty research in space science at SCSU and other minority institutions.

- Create and implement a multigrade-level program of space science activities and research aimed at the next generation of explorers in grades 6-16.

- Develop and implement workshops and mentorships in space science for in-service teachers in grades 6-14.

- Develop new or enhance existing partnerships with NASA missions, Centers, and laboratories, as well as other Federal laboratories and space science organizations.

PROGRAM ACCOMPLISHMENTS

SCSU has completed a highly successful first year under its NASA MUCERPI-2003 award. A wide range of space science activities has been supported in the areas of research, education, and outreach. New collaborations have been developed with astronomers at GSFC and the Lawrence Livermore National Laboratory. Under this grant, SCSU has partnered with all three NASA Explorer Schools in South Carolina and held a number of workshops for inservice teachers. SCSU has collaborated with faculty members at other minority institutions including Medgar Evers College, Talladega College, Bennett College, Elizabeth City State University, and Norfolk State University. SCSU has significantly increased its involvement in the field of astrobiology though partnerships with astronomers and chemists at the Goddard Center for Astrobiology at GSFC, as well as with partner school, Bennett College. Other partnerships with institutions in Arizona, Kentucky, and North Carolina have been highly productive, including collaboration with a junior college located near the campus of SCSU. High school and undergraduate students have completed research projects in radio astronomy, cosmology, and modeling of close binary star systems. One SCSU astronomer was awarded a NASA Faculty Fellowship for 10 weeks of research at GSFC and was a Co-Investigator on a successful Cycle-1 Spitzer Space Telescope archival proposal.

STUDENT ACCOMPLISHMENTS

- An SCSU student authored two posters presented at the 204th Meeting of the American Astronomical Society in May 2004, including first authorship on one of the posters.

- During the summer of 2004, a high school student funded under this project interned at SCSU under a physics faculty member in the field of radio astronomy. This student will present her work at the South Carolina Junior Academy of Science in the Spring of 2005 as partial fulfillment of her graduation requirements at the South Carolina Governor's School for Science and Mathematics.

- Seven undergraduates at SCSU participated in research or training under the mentorship of SCSU faculty funded by this project. Their projects ranged from analysis of data from the Sloan Digital Sky Survey to training in the use of a mass spectrometer for applications in astrobiological research.

NASA CENTER INVOLVEMENT

During FY 2004, NASA Centers implemented numerous projects that helped to strengthen the infrastructure of HBCUs. These projects better equipped students to pursue degrees and careers in NASA-related fields. The faculty at HBCUs enhanced their ability to conduct NASA-related research and compete for mainstream funds. The following summaries are synopses of the accomplishments of NASA Centers for FY 2004.

Ames Research Center (ARC)

ARC strives to foster and develop meaningful research collaborations in NASA-related research areas that are beneficial to NASA and that provide HBCUs the ability to enhance their research capabilities. ARC is unwavering in its commitment to strengthen its support of institutions of higher education to ensure that NASA can meet its future workforce needs in STEM fields.

Research and development grants, cooperative agreements, and third-party subcontracts were awarded from ARC discretionary funds in FY 2004. The Center's commitment of support to these institutions' faculty and students is evident in the increased amount of students and faculty participating in ARC-related research, internships, and fellowship opportunities. FY 2004 was the second year of the NASA/NAFEO Ames Research Academy located in the NASA Research Park (NRP). ARC hosted 6 faculty members representing 5 HBCUs, 9 undergraduates, and 1 graduate student from various HBCUs. In FY 2004, ARC's Office of Education assumed the responsibility of technical oversight of the cooperative agreement that supports the Academy's presence within the Research Park, allowing greater connectivity to ARC.

Dryden Flight Research Center (DFRC)

DFRC's exciting research and operations provided a unique asset for NASA to fulfill its mission to "*Inspire the next generation of explorers."* To accomplish this mission, DFRC established the Office of Academic Investments (OAI) as a unifying entity responsible for leading the implementation of all of DFRC's educational programs. OAI aspires to support NASA's Education Programs, Aeronautics, and Earth Science themes through its research and flight capabilities. Using DFRC's unique assets in FY 2004, students, educators, and researchers from HBCUs were able to conduct engineering and scientific investigations in support of its research and education mission.

Glenn Research Center (GRC)

GRC provided funding to Minority Access, Inc., and the National Action Council for Minorities in Engineering (NACME) for their collaborations with HBCUs in support of the development of students in NASA-related disciplines.

In FY 2004, GRC hosted its annual HBCU Research Forum. This event afforded an opportunity for researchers at HBCUs across the Nation to present summaries of their research interests and capabilities to GRC technical managers. The HBCU researchers were given briefings on the GRC R&D agenda. Additionally, time was scheduled for informal discussions on future collaborations. This annual forum is an exemplary vehicle for building partnerships that are sustainable and critical for GRC's achievement of its R&D goals.

GRC proactively recruits students from HBCUs for summer work experiences. The GRC internship program provides students with introductory professional experiences to complement their academic programs. Interns are given assignments in R&D, technical, and administrative projects under the personal guidance of NASA professional staff members. During the summer of FY 2004, GRC hosted students from HBCUs in the program.

GRC supported precollege students in a 2-week on-campus program, College Bound; a pre-engineering enrichment program for high school students; and undergraduates in pursuit of technical degrees in the College of Engineering and Technology through a grant to Tennessee State University. These programs were designed to increase the number of underrepresented minorities graduating with engineering degrees.

GRC continued a robust K-12 education initiative, the Science, Engineering, Mathematics, and Aerospace Academy (SEMAA) program, which prepares and motivates the next generation of students to enter the NASA pipeline and pursue STEM careers. The SEMAA sites at the University of Maryland-Eastern Shore, Morgan State University, the University of the District of Columbia, and Winston-Salem State University are supported by GRC funds to Paragon Tech, Inc., the National SEMAA Office. These HBCU SEMAA sites served over 4,700 students and parents during FY 2004.

Goddard Space Flight Center (GSFC)

During FY 2004, GSFC continued to enhance interaction with HBCUs by pursuing the following goals:

- To increase the level of interaction with HBCUs by increasing travel and physical presence on the HBCU campuses to effect a greater GSFC involvement in HBCU education.

- To promote technical excellence in NASA-related disciplines at HBCUs through collaborative research and educational activities, with emphasis on promoting research faculty development, student involvement, increased collaborative research, and increased student participation in research.

- To facilitate use of NASA data by the HBCU community.

HBCU programs aided in the achievement of GSFC goals and objectives as follows:

The GSFC Office of Human Resources

- For FY 2004, GSFC actively recruited at 6 HBCUs: Bowie State University, Howard University, Morgan State University, North Carolina A&T State University, Tuskegee University, and the University of Maryland - Eastern Shore.
- The Cooperative Education Program has a total of 10 students enrolled in HBCUs including Bowie State University.
- Two HBCU students have received tuition assistance through the Co-op Program.

The GSFC Higher Education Office

The Higher Education Office at GSFC has supported the development of collaborative efforts for HBCUs through travel to both Tuskegee University and Florida A&M University. The Chief of the Higher Education Office is serving as the Co-Principal Investigator for an award to the University of the District of Columbia.

The GSFC Equal Opportunity Programs Office

GSFC sponsored a series of exhibits for the Bowie State University Science, Engineering and Mathematics Showcase. Staff from the NASA Headquarters Office of Education attended and addressed the audience.

GSFC sponsored a series of internship programs with HBCUs. Students enrolled in these institutions came to GSFC for a period of 8-12 weeks over the summer to conduct research and/or administrative activities under the supervision of GSFC personnel:

- Bowie State University cosponsored 22 college undergraduates and graduates
- Florida A&M University hosted one intern for the Increase Minority Access Graduate Engineering (IMAGE) program
- Morehouse College hosted 6 interns in the Strategic Preparedness for Advancing Careers in Engineering (SPACE) program
- Spelman College hosted 7 interns in the Women in Science and Engineering (WISE) program
- Howard University hosted 4 interns in the Public Service Intern (PSI) program.

The Applied Engineering and Technology Directorate

Morgan State University (MSU) was awarded a URC grant for funding startup in 2003. This URC is the Center for Advanced Microwave Research and Applications (CAMRA) and is providing support to NASA's Applied Engineering and Technology Directorate (AETD) at GSFC. The Center is operated through MSU's School of Engineering.

CAMRA's mission is to provide NASA's future Earth and Space Science Missions with a technology base for the production of microwave components and systems such as Radio Frequency Integrated Circuits (amplifiers, mixers, local oscillators). Such components are crucial in the design, construction, and operations of space-qualified communication systems and microwave instruments for NASA's science and exploration missions.

CAMRA provided learning and training opportunities with cutting-edge research projects and hands-on laboratory experiences for 62 undergraduate and graduate students

during the 2003-2004 academic year. There were 35 males and 27 females, 61 African Americans, and one Asian/Pacific Islander, 59 U.S. citizens, and two permanent residents. CAMRA's objective is to produce a significant STEM pool of professionals with advanced degrees in Engineering. During FY 2004, two CAMRA students received bachelors degrees. One is a candidate for a masters degree, and the other is applying to graduate school. The remaining two FY 2004 graduates received doctoral degrees and have post-degree plans with NASA.

University of Maryland-Eastern Shore (UMES) Capstone Project

With a component of the Applied Engineering and Technology Directorate at Wallops Flight Facility (WFF), UMES is strategically located to provide hiring of prospective engineers because graduates are more inclined to work on the Eastern Shore. Therefore, AETD management is proactively establishing relationships and activities with faculty members and students. In one case, the AETD Guidance, Navigation and Control and Mission Systems Engineering Branch at WFF completed its second year activity during school year 2004 and continued an informal agreement with UMES that allows mutual benefit to NASA and to the University. The fundamental intent of what UMES calls its Capstone Project for seniors is to provide "real world" engineering design and implementation experiences to a limited number of students per year as part of their senior design requirement. AETD is cooperating by integrating student development efforts with current technology interests of AETD. This allows the students to participate in actual technology applications while fulfilling academic requirements. The partnership also enables NASA to benefit from the student resources of UMES and provides a means of developing relationships with potential prospective employees. The students worked at UMES in Princess Anne, Maryland, and at WFF to accomplish their efforts to give them ownership and experience in engineering activities.

One 2004 student joined three 2003 students in completing their senior assignments on projects beneficial to NASA. All four graduates are employed as engineers: one at WFF, two on the Eastern Shore in industry, and one at Lockheed Martin in Texas.

The Graduate Student Information Technology Initiative (GSITI)

This program is an effort to grow real-time processing skills at WFF. The intent of the GSITI program is to capture local real-time processing student talent for employment. Students use NASA research opportunities as their masters thesis and gain work experience while NASA benefits from seeding local students' skills for employment after graduation. Discretionary funds were utilized to support the program in FY 2004, which employed one graduate computer science student from UMES. A second UMES student was hired during spring 2004. This student completed her masters degree with her thesis in support of the WFF Balloon Program's Trajectory Simulation Program under industry employment at WFF, where AETD personnel provided the project management support. The student re-enrolled in the graduate program and is seeking employment. A third graduate student was hired via an industry arrangement and worked under AETD Project Management and completed his masters thesis in December 2004 on Ocean Atmospheric Sensor Integration System (OASIS) Guidance Navigation Control (GNC) Mapping Overview and is being considered for hire at Pacifica Gyre.

Goddard Space Flight Center/University of Maryland-Eastern Shore Education Outreach for Remote Sensing Operations
This program is a joint venture at WFF with NASA, UMES, and middle and high schools. WFF Engineering provides project management in conjunction with a UMES professor who provides instructions, coaching, and mentoring to develop an infrastructure in robotics in this Eastern Shore venture. FY 2004 accomplishments included participation of two UMES undergraduate students and area middle and high school students in the refurbishment and development of the Surface Operated Vehicle (SOV) and the Flexinol/Nitinol Stiquito "simple" robot experiment.

Bowie State University (BSU) maintains a Satellite Operations and Control Center (BSOCC)
Since its inception in 1996, the BSOCC has issued 67 certificates to 35 students who have been qualified to provide mission planning, spacecraft analysis, and/or command controller support for NASA Small Explorers (SMEX) such as SAMPEX and WIRE. On November 6, 2003, the BSOCC was relocated within the campus to the new Computer Science Building at BSU. Maryland State and Prince George's County officials, Honeywell Corporation personnel, BSU students and faculty, and NASA personnel including staff from the NASA Headquarters Office of Education, participated in the ceremony when the corresponding certificates were issued. BSOCC is a joint venture for the University, NASA, and Honeywell Corporation. GSFC/NASA Engineering continues to provide a SMEX Mission Manager for the joint venture. Honeywell currently employs several BSU graduates with SMEX operations certifications in support of NASA satellite operations.

Science Mission Directorate
Science Mission Directorate scientists continued developing partnerships and collaborations with HBCUs as listed below:

A Co-Investigator on an awarded proposal to Howard University titled: "Development of a Comprehensive Earth System Science–Focused Education Curriculum at Howard University."

The Swift BAT team has a partnership with the staff of Langston University who works with 2 students at GSFC each summer for 2 months.

Collaboration between GSFC and staff from Florida A&M University and a Summer Faculty Fellow at GSFC last summer.

GSFC scientists have a Ph.D. graduate student from Morgan State University working toward becoming a radio astronomy hardware scientist.

A staff member from Morgan State University visited the Astrochemistry Branch of the Laboratory for Extraterrestrial Physics to discuss a potential research project using his Mossbauer Spectrometer to monitor the chemical changes in iron silicate grains as a function of thermal annealing and as a function of catalytic activity in the production of hydrocarbons and ammonia from gases analogous to those found in the Primitive Solar Nebula. He submitted a request for internal funding from Morgan State University to explore this possibility and was awarded $10,000. Two initial samples were provided, two more are under production, and results of analyses are pending to determine the potential information that might be extracted from these studies.

Jet Propulsion Laboratory (JPL)

JPL performs research, development, and related activities for NASA. The primary mission of the Laboratory is to explore the solar system with automated spacecraft. In addition, JPL undertakes other scientific, technological, and educational projects to meet national needs. JPL is fully committed to NASA's goals in support of HBCUs.

During FY 2004, JPL continued to implement programs to achieve the goals of strengthening the capability of HBCUs to provide quality education and to conduct first-rate research activities for faculty and students. Moreover, JPL perceives the need to continue to support a more proactive policy in its role as technical monitor, seeking opportunities to more closely link funded programs to the technical divisions, and to broad education and public outreach efforts. The following is a summary of JPL's goal and objectives in fulfilling its commitment to supporting excellence in education at HBCUs:

Goal and Objectives

JPL's overall goal is to continue to enhance the educational and research competitiveness of a selected number of minority-serving institutions. JPL seeks to accomplish this through various programs to assist these institutions to align their research programs with JPL's long-term vision by providing access to and support for enabling technologies to conduct space science research in support of the Nation's Vision for Space Exploration by continuing to:

- Extend JPL's ability to reach underrepresented and underserved audiences by collaborating with the inhouse organizations and communities offering opportunities specific to all universities to ensure access to and for all minority-serving institutions.

- Expand the scope of outreach and recruitment by collaborating with other NASA Centers and the aerospace industry at large.

- Support the full participation of the universities and the programs directly associated with the NASA education pipeline in accordance with the goals of the NASA Offices of Education, Diversity and Equal Opportunity, and Human Resources by:

    - Providing more in-depth K-12 pipeline programs, more rigorous undergraduate internship programs, and closer ties with education and public outreach programs that reach underserved/underutilized communities both nationally and locally,
    - Focusing efforts to nurture existing relationships with HBCUs, HSIs, and TCUs, as well as efforts to seek newer relationships in support of NASA and JPL research and development competencies,
    - Providing collaborative training opportunities at JPL for interns, fellows, and visiting students and professionals from minority-serving institutions, and
    - Increasing the number of new graduate hires from HBCUs.

JPL supported HBCUs during FY 2004 as follows:

- JPL is the lead Center in robotic exploration of the solar system and participates in activities for international space exploration, Earth observation missions, astrophysical research, and technology development. JPL supported the North Carolina A&T State University's research goals under subcontract agreements.

- Transferred a customized Varian spectrometer to Morehouse College. This equipment is being used to support research of the Chemistry Department. JPL intends for the equipment to ultimately remain at the college.

- The JPL Education Office produced a guide to internships and educational opportunities specifically focused on students attending minority-serving institutions entitled, "Your Place in the Universe." The entire Laboratory uses the guide**.** JPL also offered summer employment opportunities to students from HBCUs. These students spent 10 weeks conducting research on JPL-related work associated with their academic goals.
- Continued its college recruitment program to identify and select the best candidates available to fill its new graduate-hiring requirements. During FY 2004, JPL representatives visited several HBCUs for recruiting purposes.

- Provided additional support to HBCUs by participating in a variety of student-focused activities such as attendance at award functions for science and engineering majors and recruitment at national conferences.

Johnson Space Center (JSC)

In FY 2004, JSC continued to develop a successful link with HBCUs. JSC sought new relationships with HBCUs and worked to strengthen existing ones in aiding in the development of competitive aerospace research capabilities, educational outreach, and student support at these institutions.

Accomplishments

JSC continued to emphasize the goal of inclusion of HBCUs in research, education, and outreach in FY 2004. JSC accomplished the following in support of NASA's objectives to support higher education and underrepresented and underserved communities:

- Provided technical and administrative support to 4 HBCU URCs. Annual technical and management reviews are held at each of the following URCs with travel costs provided by JSC:

    - Morehouse School of Medicine (MSM), Space Medicine and Life Sciences Research Center
    - Tuskegee University (TU), Center for Food and Environmental Systems for Human Exploration of Space
    - Prairie View A&M University (PVAMU), Center for Applied Radiation and Research, and

- Texas Southern University (TSU), Research Center for Biotechnology and Environmental Health.

- Fifteen college students from HBCUs interned at JSC during the summer of 2004. The undergraduate- and graduate-level interns were selected based on achievement in programs funded by NASA. Employees in Procurement, Mission Operations, Engineering, Information Systems, Center Operations, Chief Financial Officer, Space and Life Sciences, and Education mentored the students. Interns represented the following HBCUs:

  - Florida A&M University (2)
  - Spelman College (4)
  - Morehouse College (3)
  - Prairie View A&M University (3)
  - Texas Southern University (2)
  - Tuskegee University (1)

- JSC continued to support the NASA Harriett G. Jenkins Predoctoral Fellowship Program in FY 2004. Scientists in the Space and Life Sciences Directorate mentored two fellows while one fellow was mentored in the Engineering Directorate. The MUREP Manager served on the Application Review Panel. Each fellow spent 6 weeks at JSC conducting research in the lab.

- JSC hosted the Pre-Service Teacher Institute (PSTI) which is a collaborative effort with the Prairie View A&M Research Foundation and Langley Research Center designed to increase the students' skills in teaching mathematics and science while incorporating technology into the curriculum. There were 25 participants, of which 17 were from the following HBCUs: Prairie View A&M University (5), Texas Southern University (1), Huston-Tillotson College (2), Texas College (1), Langston University (7), and Wiley College (1).

- In FY 2004, JSC and MSFC coordinated the NASA Corporate Recruitment event at Texas Southern University. The cluster institutions that participated included Jackson State University, Prairie View A&M University, Southern University and A&M College at Baton Rouge, Southern University at New Orleans, and Xavier University at New Orleans. The event consisted of presentations of student and faculty research and educational opportunities, federal employment, panel and roundtable discussions, and employment consultations. Two undergraduates from Jackson State University were offered and accepted co-op positions, and one doctoral student from Texas Southern University was hired as a full-time employee.

- Also in FY 2004, JSC hosted the Texas Southern University URC Student Research Symposium and Recognition Ceremony. The students gave impressive poster presentations describing the research projects they worked on during the summer. A former astronaut addressed the students and encouraged them to follow their dreams.

- The JSC Director of Education served on the NASA SEMAA Advisory Board as the NASA local point-of-contact. Wiley College hosts a SEMAA site.

- JSC staff provided education outreach and tours for students participating in activities sponsored by minority professional organizations and in support of JSC's outreach programs for underrepresented and underserved communities. These include:

    - An annual presentation on NASA education programs was made at TSU to students from the Ronald E. McNair Post-Baccalaureate Achievement Program. The McNair Program is funded by the U.S. Department of Education, and participants are enrolled at TSU, Jarvis Christian College, Texas College, and Wiley College. All students are first-generation/low-income juniors and seniors. The objective of the program is to encourage students to pursue STEM graduate studies. Approximately 20 students and 10 faculty attended the event. As a result, one student applied and was accepted for the Pre-Service Teacher Institute.

    - The JSC Center Director hosted the President of PVAMU and his staff: the Executive Vice President and Chief Financial Officer; the Provost and Vice President for Academic Affairs; the Vice President for Research and Development; the Vice President for University Operations; the Dean of the College of Engineering; and the Director of Special Events. The group visited with the Director and key staff members, toured JSC facilities and had lunch with over 60 PVAMU alumni and friends.

    - The JSC PVAMU Alumni Chapter hosted an annual visit of the Engineering and Science Concepts Institute (ESCI) students. ESCI is a program designed for recent high school graduates entering their freshman year in college in the fall. One of the objectives of the program is to encourage students to pursue STEM careers. The 66 students spent the morning at Space Center Houston and concluded with lunch at JSC. A recent graduate of PVAMU and former co-op student provided the students with an inspirational talk on pursuing a college education and a successful career in engineering. The students were also briefed on educational and employment opportunities available within the Agency.

    - In FY 2004, the President of TSU accompanied by the Provost, an Environmental Toxicology Ph.D. candidate, and a NASA Harriett G. Jenkins Predoctoral Fellow, visited JSC. The JSC Director hosted the visit and briefed the group on JSC's core competencies. It was mutually agreed upon that there were several areas in which the two institutions could strengthen their partnerships.

    - In FY 2004, a group of 23 summer interns from TSU visited JSC. The students toured the facility and were briefed by staffers from the Office of Education with a wealth of information on educational and employment opportunities available. NASA, the National Science Foundation, the National Academy of Science, the University of Houston, and the Houston Museum of Natural Science fund the TSU intern program. The purpose of the program is to encourage and mentor students as they pursue degrees in mathematics and science. In the summer of 2004, one student interned at JSC.

Kennedy Space Center (KSC)

KSC hosted representatives from 19 NASA URCs, of which 14 were HBCUs, at a conference held onsite at KSC on February 22-24, 2004. Although none of the current URCs are aligned with KSC, the Center reached out to build a relationship with these research institutions. The main goal of the conference was to enhance the understanding of KSC technical personnel of the URCs' research activities and capabilities, as well as explain to the URCs KSC's research areas and technical focus. This conference provided each URC with the opportunity to present its current cutting-edge research and associated technical capabilities. KSC senior managers and key lab personnel presented its research needs and the capabilities of key onsite labs. Local NASA contractors including Boeing, Lockheed, and ASRC also presented their space program-related activities. Education opportunities for faculty and students to work with KSC were also discussed. The result of this conference was an enhanced mutual understanding of each organization's research interests and capabilities. To date, one KSC person has been selected as an advisory council member for one of the URCs.

KSC supported SEMAA groups in its region with hands-on educational student experiences and looks forward to more collaborative opportunities in the future. KSC hosted 19 preservice teachers who were selected to participate in its first PSTI.

Langley Research Center (LaRC)

LaRC continues to support and implement the NASA Education Enterprise Strategy to help revitalize STEM education in America through minority and majority institutions. This effort will contribute to the increased workforce of trained scientists, technologists, engineers, and educators to meet the Nation's needs in shaping and sharing the experience of exploration and discovery.

LaRC Pre-Service Teacher Program

The NASA Langley Pre-Service Teacher Program (PSTP) is a partnership between the Langley Office of Education and Norfolk State University's School of Science and Technology. The goal of the program is to provide preservice teachers and faculty members the opportunity to enhance their knowledge and skills in teaching mathematics and science using technology at the elementary and middle school levels. The PSTP reaches out to HBCUs, HSIs, and TCUs to enhance the skills and abilities of future teachers.

Approximately 850 students and faculty representing 71 universities attended the 9th Annual Pre-Service Teachers Conference held in Alexandria, Virginia. The theme was, "Inspiring the Next Generation of Explorers – as only NASA can." The 3-day conference was designed for elementary and middle school preservice teachers from HBCUs, HSIs, and TCUs who were nominated to attend by their faculty advisors. Of the 71 universities represented, there were 44 HBCUs, 13 HSIs, 10 TCUs, and 4 majority institutions. Of the 850 student participants, 68 percent were African American.

The PSTI is an intensive 2-week residential program. This Institute is comprised of a core faculty in mathematics, science, and technology coupled with an adjunct faculty of NASA scientists and engineers. The PSTI has been successfully conducted for 7 years

with LaRC, along with Norfolk State University, serving as hosts. Two Institutes were held at LaRC in FY 2004 with 47 participants in both sessions. The minority participation percentages were: African American, 62 percent; Hispanic, 15 percent; and Native American, 12 percent. The 2-week Institute concluded with a classroom activity involving students from the National Summer Youth Program at Hampton University.

LaRC Summer Internship Programs

The Langley Aerospace Research Summer Scholars (LARSS) program represents a diverse group of competitively selected undergraduate juniors, seniors, and first-year graduate students pursuing degrees in aeronautical engineering, mechanical engineering, electrical engineering, materials science, computer science, atmospheric science, astrophysics, physics, chemistry, or selected space disciplines of interest to LaRC. The LARSS program actively sought interns from HBCUs. In FY 2004, 10 HBCUs were represented: Clark Atlanta University, Elizabeth City State University, Hampton University, Lane College, Norfolk State University, North Carolina A&T State University, North Carolina Central University, Tennessee State University, University of Maryland-Eastern Shore, and Virginia State University.

NASA Summer Scholars (NSS)

The NSS is a unique undergraduate summer internship program. The students are recruited from three HBCUs: Spelman College, Morehouse College, and Florida A&M University. In FY 2004, there were 17 students represented at LaRC: Spelman College (8), Morehouse College (7), and Florida A&M University (2). The students are part of a NASA-funded program at their university. Spelman College's program is the Women in Science and Engineering (WISE) program, Florida A&M University's program is Increasing Minority Access to Graduate Engineering (IMAGE), and Morehouse College's program is Strategic Preparedness in Advancing Careers in Engineering Sciences (SPACE).

NASA Awareness Days/Corporate Recruitment Initiative

LaRC's faculty and university programs were presented at two NASA Awareness Days. One event was hosted by North Carolina A&T State University that also included students and faculty from Norfolk State University, Hampton University, North Carolina Central University, and South Carolina State University. LaRC also participated in the NASA Awareness Days at Clark Atlanta University that included students and faculty from Morehouse College and Spelman College. LaRC personnel served on the "NASA Career Paths and Pipeline Building" panel and provided information on LaRC's faculty and university programs. The NASA Awareness Days were part of NASA's Corporate Recruitment Initiative.

LaRC University Programs Presentation to Langston University

The NASA Faculty Fellowship Program (NFFP), the Graduate Student Researchers Program (GSRP), and the LARSS Program were presented via videoconference to faculty and students at Langston University. Approximately 40 faculty and students participated.

Three LaRC employees attended the Seventh Annual Virginia High-Tech Partnership (VHTP) Career Fair on March 12, 2004, at the Richmond Virginia Convention Center. The Governor of Virginia is one of the primary sponsors of the VHTP, which helps to place students from Virginia's five HBCUs into high-tech careers. Over 600 undergraduate and graduate students were briefed on NASA research and training opportunities, including internships and fellowships.

LaRC maintained a Career Exhibit at the Annual Career Awareness Day at Saint Paul's College. NASA career opportunities and summer internships were promoted to approximately 200 students.

Marshall Space Flight Center (MSFC)

MSFC continues to foster strong relationships with local and national HBCUs. In FY 2004, MSFC provided support to a student from Tuskegee University to conduct research in the area of propulsion technology. This research proved to be beneficial in his ability to compete and win an Agency FAR award in electrical and nuclear propulsion. Propulsion technology is an area of significant interest to the Agency and MSFC. It also gives the faculty member an opportunity to train and motivate students in this research field.

The Minorities in Science and Engineering (MISE) program at Oakwood College continues to be one of MSFC's local premier intern programs. This program was designed to bring in minority students with an interest in STEM careers from the three local universities: Alabama A&M University, the University of Alabama, and Oakwood College. This program increased the number of scholastically well suited, highly qualified, diverse students pursuing STEM degrees or related undergraduate degrees. Through a support system from each participating university, students are allowed to maximize their ability to achieve and maintain a record of academic excellence during their undergraduate years. MSFC contractors have hired several of these students. Four students continue to work part-time with NASA researchers and contractors.

In FY 2004, MSFC continued its informal education outreach efforts. The NASA High School Senior Day hosted by Alabama A&M University continues to be one of MSFC's main outreach events with HBCUs. This effort exposed approximately 6,000 high school seniors from across the Nation to NASA-unique programs. It is also used to influence students' career choices in STEM. MSFC employees and contractors served as volunteers to talk with students about career choices and distributed brochures and pamphlets regarding NASA's programs. Senior management officials from NASA Headquarters and MSFC participated in the program.

Stennis Space Center (SSC)

No research and development funds were granted directly to HBCUs except for those funds granted through MUREP such as the FAR project at Tuskegee University and the URC project at Southern University at Baton Rouge.

Efforts have been made to encourage and recruit HBCUs to apply to announcements. A 3-day workshop was held in June 2004 inviting all regional (Louisiana and Mississippi) minority institutions, visiting NFFP, and others who have expressed an interest in working with SSC) to learn more about NASA programs in general and SSC

opportunities in particular. Two days were focused on MUREP types of opportunities, other Office of Education opportunities, and opportunities for local funding. Additionally, tours of SSC facilities and time for individual meetings between university personnel and researchers and managers were arranged.

Additionally, the SSC Office of Education is involved in attending local conferences involving minority institutions to share about NASA/SSC opportunities at the annual State of Louisiana Minority University Workshop sponsored by Southern University at New Orleans. The SSC Office of Education also forwards announcements that come through NASA email to a mailing list of minority universities to help keep them informed of opportunities as they arise.

SSC awarded Xavier University of Louisiana funds for preservice teacher training. Xavier University of Louisiana acts as the coordinating university for the PSTI at SSC. During FYs 2002-2004, SSC has reached over 65 preservice teachers in these 2-week sessions and engaged more than a dozen professors in the program in some capacity of instruction. In FY 2004, SSC conducted two Institutes.

SSC continues to offer training and materials to Southern University at Baton Rouge (SUBR) in the Earth Science/Geospatial field. The training provided by SSC to SUBR over the past years was significant in encouraging SUBR to successfully compete for the Group 3 HBCU NASA URC Award in FY 2002. Similar training activities that SSC has sponsored over the past 5 years or at HBCU and OMU campuses have also been beneficial to other universities and their faculty in writing successful proposals involving geospatial technologies.

Jackson State University also conducts a NASA Educator Resource Center (ERC) offering NASA-related training in the form of on-campus and off-campus workshops and seminars to preservice and inservice teachers in the region. It also supports other professors with materials for their courses and related training and project activities. NASA provides educational materials to the ERC but no direct funds.

SSC awarded funds to Southern University at Baton Rouge to serve as University Co-Director of the NFFP with SSC for FY 2004. SSC has had excellent participation from HBCU faculty as NFFP faculty fellows over the years. In FY 2004, more than two-thirds of the SSC NFFP faculty fellows were from HBCUs.

Of 13 SSC co-op students during FY 2004, one was African American. SSC also hosted three Spelman College students in the WISE program, three Florida A&M University students in the IMAGE program, two students from Morehouse College in the SPACE program, two students through the MARC program, and four students from HBCUs in various other programs. MUREP PACE program funds awarded to Jackson State University were administered by SSC.

HBCU faculty who participated in the NFFP at SSC have been quite successful in going on to be successful in obtaining NASA grants based on the training and experiences they had during their tenures in the NFFP at SSC. A recent faculty fellow from JSU, who participated in FY 2001 and FY 2002, was awarded a MUREP MASTAP project in FY 2002 (which will continue into FY 2005), and has received over $800,000 of other NASA competitive and unsolicited awards as well since FY 2001. Another of the identified JSU NFFP faculty fellows has written several grants since the summer of FY 2002 and participated as the science

instructor in two PSTIs hosted at SSC since FY 2002. The mathematics faculty fellow from Morehouse College conducted modeling for propulsion test programs associated with the testing of the Space Shuttle Main Engine.