Western Kentucky University Research Foundation

Kentucky Space Grant Consortium

Proposal for 2005-2009

Certification of Compliance with Applicable Executive Orders and U.S. Code

By signing and submitting the proposal identified in this Cover Sheet/Proposal Summary in response to the NASA request for a proposal under the National Space Grant College and Fellowship Program, the Authorizing Official of the proposing institution, as identified below:

1. *certifies that the statements made in this proposal are true and complete to the best of his/her knowledge;*
2. *agrees to accept the obligations to comply with NASA award terms and conditions if an award is made as a result of this proposal;*
3. *provides certification to the following that have been reviewed on the following NASA website (http://genesis.gsfc.nasa.gov/grants/grants.htm#GrantForms):*

(i) Certification for Debarment, Suspension, and other Responsibility Matters; (ii) Certification Regarding Lobbying, (iii) Assurance for Nondiscrimination Compliance.

Institution Authorization: Phillip E. Myers 11/29/04

Dr. Phillip E. Myers
Executive Director
Western Kentucky University Research Foundation

Date

NASA

National Space Grant College and Fellowship Program
Phase II -- Capability Enhancement Grant

Kentucky Space Grant Consortium Proposal for 2005-2009

Richard Hackney, KSGC Director
Karen Hackney, Assoc. Director
Dept. of Physics & Astronomy
Western Kentucky University
Bowling Green, KY 42101
Phone: (270) 745-4156
FAX: (270) 745-4255
Richard.Hackney@wku.edu

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Kentucky Space Grant Consortium

Proposal for 2005-2009

Purpose and Mission

The Kentucky Space Grant Consortium (KSGC) is a partnership between NASA and Kentucky, which brings benefits of NASA to Kentucky to inspire and guide research, education, and workforce development. Benefits to NASA from Kentucky include development of future workforce for NASA and its contractors and university researchers, and enhanced awareness and appreciation of NASA's benefits to the Nation among Kentucky's teachers, students, and public.

Specific Charter: Capability Enhancement

Established in 1992 in Phase II of the National Space Grant College and Fellowship Program, the KSGC is a Capability Enhancement Program, which is tasked by NASA to develop space-related research and education capability in a state that has not traditionally participated at high levels of competitiveness in federally-funded research and development.

Needs of Kentucky

The KSGC Program is designed to serve identified needs of the Commonwealth of Kentucky within the framework of national emphases for Space Grant Capability Enhancement programs. Relevance of KSGC to the needs of Kentucky is indicated by the following:

- Kentucky in 2001 ranked 44th in NASA funding and 40th in federal R&D funding
- Kentucky in 2002 ranked 47th in percentage of scientists/engineers in the workforce
- Kentucky in 2002 ranked 47th in educational attainment of the workforce
- Kentucky began in 1990 a process of systemic revision of public education
- Kentucky enacted in 1997 a systemic revision of its higher education programs
- Kentucky developed in 2000 a statewide strategic plan for a technology-centered economy

Kentucky has a population of 4.0 million (2000 U.S. census), of which 7.7% are African American, 0.9% are Asian, 0.6% are Native American, and 0.9% are other races (totaling 10.1% minority population). The Hispanic and Latino population of all races is 1.5%. The population distribution is nearly equally divided between rural and urban. Kentucky's economy was traditionally based largely on agriculture and mining; however, manufacturing and service industries now lead the economy. Kentucky's major industries include Ford, Toyota, and GM/Corvette manufacturing plants, Lexmark, GTE, GE, and a major UPS air hub. Kentucky has neither a NASA Center nor a significant aerospace industry presence. For the development of a technology-based state economy, Kentucky can benefit from involving more of its faculty and students in space-related R&D, working toward future opportunities for Kentucky's students for technology-based employment in Kentucky, with NASA, or in the aerospace industry.

Relation to the NASA's Mission

The KSGC relates most directly to NASA's needs in its mission as expressed by NASA Administrator Sean O'Keefe:

"To inspire the next generation of explorers...as only NASA can."

KSGC is a two-way interface that **applies** the accomplishments and capabilities of NASA:

- to **convey and generate that inspiration** for Kentucky's students, teachers, and public...
- to **prepare for participation with NASA** as members of the next generation of explorers.

Relation to NASA's Needs

The future course of NASA exploration, as prescribed by President Bush in **"A Renewed Spirit of Discovery: The President's Vision for Space Exploration"**, involves a revitalized program of solar system exploration, including return to the Moon in preparation for the eventual exploration of Mars.

The President's goals were supported thorough a study conducted by a Presidential Commission and reported in **"A Journey to Inspire, Innovate, and Discover"**, known as the **Aldridge Report** (AR). As the Commission addressed the means to support a sustained program of space exploration, it stated:

> *"Space exploration captures the imaginations of America's children and adults. The challenge before us is to leverage the journey to the space frontier to engage learners of all ages and interests. In addition, we must focus on training the workforce needed for the success of the long-term exploration program. The education community, working with NASA, must aggressively educate and train a new generation of explorers – there is perhaps no greater imperative for ensuring successful and sustainable space exploration by this nation."* (AR, p.41)

The President's Commission (**Aldridge Report**) further elaborated some specific needs, which form the core of the KSGC mission:

- "The Commission believes the greatest impact will come from expanding programs to train teachers of science, mathematics, and technology." (AR, p. 42)
- "The Commission suggests that NASA use strategic investments to engage universities in training the workforce capable of taking us on the exploration journey." (AR, 42)
- "At present there are insufficient methods for students to acquire hands-on experience in the scientific and technical disciplines necessary for space commerce and exploration." (AR, 43)
- "In fact, public participation is critical to sustaining the space exploration vision. The American people – the taxpayers who pay the bill – must assert ownership of the space program that transcends politics and the political environment." (AR, 44)

The **NASA Education Strategy** further recognizes that *"the shrinking S&E education pipeline has great significance to NASA. Nearly 60 percent of the total NASA workforce is in the S&E fields, and half of those employees have masters or doctorate degrees."* It sets as a major objective the enhancement of higher education STEM capability.

The **NASA Human Capital Management Plan** notes that NASA faces the imminent retirement of much of its technical workforce, with the prospect of having to recruit from a currently diminishing pool of S&E graduates in competition with an increasing external demand for these graduates by universities, industries, and even businesses in fields that were not historically technologically based.

The national Space Grant goals and objectives (**Space Grant Strategic Plan**) priorities include:

- Provide undergraduate training through fellowship and scholarship awards.
- Emphasize awards with effective student research and mentoring components, for example with NASA Field Centers and industry.
- Enhance precollege teacher education (preservice) programs through collaboration among education, science, and engineering disciplines.
- Stimulate public interest in aerospace sciences and lifelong learning…

These needs of NASA, as outlined by the President's Vision, the President's Commission, the Education Strategy, and the Space Grant Strategic Plan, are directly addressed below in the KSGC's Goals and Objectives (1-3).

KSGC Goals and Objectives

Goals: The KSGC has as its overall goal the development of expertise in space-related research and education needed by NASA and by Kentucky. We seek to enhance the quantity and quality of space-related research and education in Kentucky, and to contribute to the development of the technological workforce that is needed for the future in NASA, NASA's contractors, university research endeavors, and the Commonwealth of Kentucky.

Objectives: To facilitate the goals, the primary objectives of the Kentucky program are:

1. **Enhancement of research and education capabilities in space-related fields**
2. **Increased numbers of people training for the workforce in space-related fields**
3. **Greater public exposure to NASA and space-related research and applications**

KSGC Strategic Plan – How We Achieve the Objectives

Strategic objectives for the Kentucky Space Grant Consortium are established in the areas of research, education, and public service. A common focus in all of these areas is to involve women, underrepresented groups, and persons with disabilities.

Research

- Fund competitive proposals for undergraduate scholarships and graduate fellowships for students to perform space-related, mentored research projects.
- Fund competitive proposals for faculty to perform space-related research projects in which undergraduate and graduate students may participate.
- Leverage with NASA funds to acquire additional state funding for support of research.
- Promote research collaborations between universities and NASA researchers.
- Maintain a database of space-related projects and principal investigators in Kentucky.
- Coordinate with other agency programs in the state with similar objectives.
- Conduct an annual KSGC Aerospace Forum to showcase research projects, to exchange ideas, and to develop further collaborations among state researchers.

Education

- Fund competitive proposals for undergraduate scholarships and graduate fellowships for students to perform space-related, mentored research projects.
- Fund competitive proposals for teacher workshops to enhance the capabilities of college or precollege teachers in the teaching of space-related subjects.
- Continue to review teacher education programs for the Kentucky Dept. of Education.
- Participate in the activities of the OSS SouthEast Regional ClearingHouse.
- Conduct an annual KSGC Aerospace Forum to showcase education projects, to exchange ideas, and to develop further collaborations among state educators.

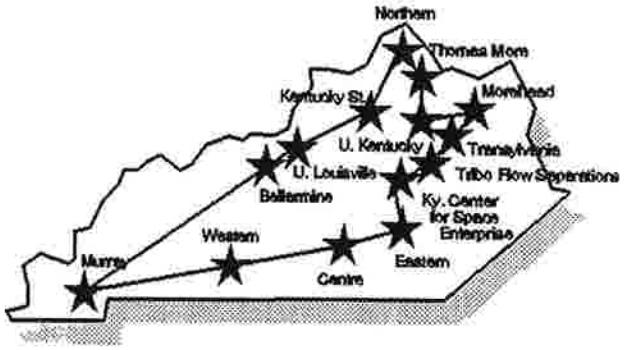
Public Service

- Conduct public information and public participation opportunities to expose the public to NASA-related science and technology.
- Support planetarium and science center projects, and provide materials for use by planetaria and science centers.
- Conduct tours of space-related facilities at the Consortium universities.
- Provide financial management assistance to subgrantee institutions.
- Partnership with the Science@NASA Science Communication Roundtable for communicating science to the public.
- Conduct an annual KSGC Aerospace Forum to showcase space- and NASA-related projects and activities in Kentucky.

Our strategic objectives provide the framework of principal activities and emphases by which the KSGC achieves its goals and objectives in support of the identified needs of Kentucky and its citizens, of NASA and the national Space Grant program, and of the Nation.

KSGC Membership, Structure, and Program

The KSGC consists of fourteen members, including twelve academic institutions, the Kentucky Center for Space Enterprise, and industrial affiliate Tribo Flow Separations, LLC. The affiliates are located geographically as shown in the figure. The Consortium is governed by the KSGC Committee, which is chaired by the KSGC Director and has membership consisting of the KSGC Institutional Directors (also known as Campus Directors) from all member institutions, the KSGC Associate Director, and ex-officio members representing the Kentucky EPSCoR Program. Only the Institutional Directors are voting members, and each member institution has equal voting representation in planning Consortium activities and deciding on awards. Management of the KSGC is vested in the Center Office at Western Kentucky University, which is staffed by the KSGC Director, Associate Director, and Administrative Secretary. The KSGC staff maintains a mutually supportive relationship with NASA staff.



The program of the KSGC is based primarily upon competitive proposals from faculty and students at the member institutions. In addition, Campus Directors may request Campus Objectives Grants to facilitate objectives specific to their institutional programs. Members also seek funding from other sources to support KSGC activities connected with other state and federal agencies. The basic principles of operation of the Consortium, as well as its major goals and purposes, were developed in the original KSGC proposal in response to the NASA RFP. However, with the passage of time, there is continuing need to maintain careful alignment with subsequent strategic imperatives, including the NASA Strategic Plan, the National Space Grant College and Fellowship Program Strategic Plan, and the NASA Education Strategy. Coordination is facilitated through participation in the meetings of the National Council of Space Grant Directors.

Performance Metrics -- Tangible Evidence of Achieving Goals

Achievement of program objectives is measured using the following quantifiable metrics:

- ❑ Talks, presentations, abstracts, and published papers
- ❑ Follow-on grant proposal submissions and awards
- ❑ Students training for careers in space-related science, engineering, and mathematics
- ❑ Teachers and pre-service teachers developing expertise for space-related education
- ❑ General public reached in space-awareness activities
- ❑ Participants in forums/meetings to enhance awareness of NASA and KSGC

Short-Term Goals – 2005

The overall short-term and long-term goals of the Kentucky Space Grant Consortium are the development of expertise in space-related research and education needed by NASA and by Kentucky. The goals are supported by the major objectives:

- **Enhancement of research and education capabilities in space-related fields**
- **Increased numbers of people training for the workforce in space-related fields**
- **Greater public exposure to NASA and space-related research and applications**

The goals and objectives are to be accomplished through proposed program activities that are elaborated in the KSGC Strategic Plan and in the remainder of this proposal. Quantifiable metrics are defined to provide tangible evidence of performance relative to the goals and objectives. The detailed relationship of the output metrics to the proposed suite of activities is as follows. Each fellowship, scholarship, research, and workshop project is expected to result in a paper or presentation of results. All research capability enhancement projects are expected to result in a

proposal for follow-on funding to make the project self-sustaining. Fellowship and scholarship students train for careers in space-related STEM fields. Workshops help teachers develop expertise for space-related education to motivate and inspire early consideration and preparation for college studies in STEM fields. Outreach activities provide public exposure to space- and NASA-related science and activities that benefit mankind. Participants in our various programs, as well as potential future participants, interact in forums/meetings designed for presenting results and enhancing awareness of NASA and KSGC opportunities. These activities result in corresponding, quantifiable results that relate directly to the overall goals and objectives of the Consortium.

Our targets for 2005, based on activities that can be supported by the available budget, are:

- ❑ Talks, presentations, abstracts, and published papers 15
- ❑ Follow-on grant proposal submissions and awards..... 6
- ❑ Students training for careers in space-related science, engineering, and mathematics..... 5
- ❑ Teachers and pre-service teachers developing expertise for space-related education 30
- ❑ General public reached in space-awareness activities..... 15,000
- ❑ Participants in forums/meetings to enhance awareness of NASA and KSGC 50

Long-Term Goals – 2005-2009

The overall long-term goals of the Kentucky Space Grant Consortium are the development of expertise in space-related research and education needed by NASA and by Kentucky. The goals are supported by the major objectives:

- **Enhancement of research and education capabilities in space-related fields**
- **Increased numbers of people training for the workforce in space-related fields**
- **Greater public exposure to NASA and space-related research and applications**

The goals and objectives are to be accomplished through proposed program activities that are elaborated in the KSGC Strategic Plan and in the remainder of this proposal. Quantifiable metrics are defined to provide tangible evidence of performance relative to the goals and objectives. The detailed relationship of the output metrics to the proposed suite of activities is described in the preceding section on short-term goals.

The program is planned and assessed in annual increments. In the next five years, we would like to increase our emphasis on workforce development, as expressed by our goal to contribute to the development of the technological workforce that is needed for the future in NASA, NASA's contractors, university research endeavors, and the Commonwealth of Kentucky. The degree of accomplishment in this area in 2005-2009 is currently budgetarily limited primarily to the available fellowship and scholarship funds. If program augmentations become available to support substantial workforce development project experiences for larger numbers of students, we will include the output measures in our metrics. In a later section of this proposal, we report the results from activities supported by a 2003 funding augmentation for Aerospace Workforce Development.

Targets for the next five years are tabulated below, based on the five-year budgeted funding levels. Some of the areas and results are affected by declining resources within a level budget with unavoidable cost inflation in some areas reducing resources available in others.

- ❑ Talks, presentations, abstracts, and published papers 65
- ❑ Follow-on grant proposal submissions and awards..... 25
- ❑ Students training for careers in space-related science, engineering, and mathematics..... 25
- ❑ Teachers and pre-service teachers developing expertise for space-related education 120
- ❑ General public reached in space-awareness activities..... 75,000
- ❑ Participants in forums/meetings to enhance awareness of NASA and KSGC 250

KSGC Program Components for 2005-2009

Proposed activities for 2005-2009 are organized under the following identified components of the KSGC program:

- Research Capability Enhancement "Seed" Funding
- Fellowships and Scholarships
- Higher Education
- Teacher Workshops
- Precollege Education
- Public Awareness
- Research Infrastructure
- Communications
- Relation to NASA Centers
- Relation to Kentucky NASA EPSCoR
- Kentucky Aerospace Forum
- Industry and Economic Development

Principal activities in program areas are detailed in the following sections.

Research Capability Enhancement Grants

Based upon this proposal's requested funding, we anticipate that we will be able to provide direct awards of "seed" funding for space-related research in amounts up to about $10,000 per project. Throughout the program, special emphasis is given to fostering participation by women and members of other underrepresented populations, and to involving students in the research. Faculty researchers are encouraged to develop projects that are related to NASA and have connections with investigators at NASA Centers, and to apply for KSGC support to work at NASA Centers.

Fellowships and Scholarships

For 2005, the stipend for competitive undergraduate research scholarships will be in amounts up to $3,500. Competitive graduate research fellowships are in amounts up to $16,000. Tuition waivers are considered in competitive applications. We intend to award at least $50,000 in fellowship and scholarship support, with the possibility of added amounts drawn from the research/workshop pool depending on needs indicated in the proposal process. All university fellowships and scholarships are required to have a mentored research component. Awards may also be made for research-based studies at NASA Centers, including programs such as the NASA Academy at NASA Centers. Emphasis is placed on fostering participation by women and members of other underrepresented populations.

Longitudinal Tracking of Students Supported by Fellowships and Scholarships

All of our graduate fellowships and undergraduate scholarships are based on mentored research projects, in which the recipient works closely with a faculty mentor. The close relationship between the mentor and the student provides the primary basis for successful longitudinal tracking of the students following their involvement in their KSGC-sponsored project. The mentors personally maintain contact with the student and current awareness of their career progress beyond their KSGC experience.

Diversity and Population Statistics

We continuously seek women and underrepresented minorities for our awards. Our RFPs encourage their participation, and we additionally encourage our Campus Directors to personally encourage their faculty mentors to seek out and encourage women and underrepresented minority students to propose for mentored projects. The success of the endeavor is highly dependent on the available pool of potential participants enrolled in the mentors' departments. In most of the STEM disciplines, the enrollments of women and minority students are substantially lower than in the general university populations, and in some cases there are no minority student majors in some

departments at a given time. When there are, these students are frequently endowed with special minority scholarships that far exceed what KSGC can provide and that, moreover, restrict them from obtaining other funding in addition. Historically, KSGC has awarded every minority student who has submitted a project proposal, as all were well-qualified recipients. However, we have little control over the number of applicants and the combined impediments of low STEM enrollments and limitations imposed by existing minority scholarships.

Kentucky Population Statistics and Women and Minorities Eligible to Participate

Population Data from 2000 Census, Enrollments/Degrees 2001	Women	Minorities
Kentucky's General Population	51%	10.1%
Kentucky's University Population (All Disciplines)	58.6%	9.4%
National Space Grant Target Figure	40%	
*Eligible University of Kentucky STEM-Enrolled Pool (#Degrees)	30.5%	2.6%

*These are the most optimistic indicators, based on the largest and most attractive programs in the state.

We need to have more female and minority students at the high-school/college interface preparing for college majors leading to STEM careers. That is a pipeline issue. Students in the general university population are not generally prepared or inclined to convert at that point to STEM majors. The general university population is not indicative or relevant to the issue of participants in NASA-relevant STEM-oriented mentored-research activities. What is relevant is the sparseness of pre-college students thinking of and effectively preparing for entering STEM disciplines in college. This pandemic is nationwide and is not significantly correctable by a research-capability enhancement program that is funded at $208,843 per year with a minimal subset of these resources available for K-12 programs. Even so, it is so critically important to the future technological workforce and participant pool that we endeavor to support some teacher workshops to improve teacher capabilities for inspiring students to pursue STEM preparation and careers. Overall, our most significant capability lies in using mentored research and other activities to involve STEM students at the college level, in order (1) to aid retention in the field and (2) to provide motivation for aerospace or NASA-related career choices.

Unfortunately, in many STEM disciplines there are few female and minority role models and mentors in the state. Major accomplishments have been made through KSGC-supported efforts of female faculty members such as Dr. Suzanne Smith (Mechanical Engineering, University of Kentucky) and Dr. Lori Wilson (Chemistry, Eastern Kentucky University). These role models, who are very active in research and proactive in involving students, have mentored several KSGC graduate fellows, NASA Academy participants, and undergraduate research teams (including female and minority participants) with successful flight projects in NASA's KC-135A Reduced Gravity Student Flight Opportunities Program. Dr. Charles McGruder (African American, Physics and Astronomy, Western Kentucky University) has served as role model and mentor for several African American students. Moreover, the KSGC Committee and management include women and persons with disabilities, and we address gender equity/access in our workshops for teachers.

Higher Education

In 1997, the Governor of Kentucky worked with the Kentucky General Assembly to design and begin implementation of systemic reform of postsecondary education in the state, including technical schools, community colleges, and university undergraduate and graduate education. The KSGC will encourage the development of space-related undergraduate and graduate curricular components in Kentucky, including new courses, laboratories, majors and minors in disciplines, and interdisciplinary offerings. However, these endeavors are ultimately driven by needs appropriate to the individual colleges as recognized by their faculty in the context in which they work. Encouragement, or offering of seed funding for development, cannot instigate a lasting major curricular undertaking that has to be sustained by faculty and university resources – unless the university's faculty have already determined that they want to instigate, and can sustain, the new program, major, or minor. The major and most significant contributions that our Consortium *can* make in the arena of higher education in Kentucky are (1) student-involvement projects that provide preparation and experience for workforce development and (2) training for pre-service teachers (in higher education) to develop interactive and student-involvement teaching techniques that will help them inspire interest in science and technology among their future students.

Teacher Workshops

Awards to support teacher workshops will be made in amounts up to $8,000. Workshops may be designed to train teachers in teaching space-related subjects in support of state and national educational standards in science, mathematics, geography, and technology, to develop teaching materials and/or applications of instructional technologies, or to enhance the scientific investigative skills of teachers. The scope of eligible workshop support extends beyond K-12 to include support for the undergraduate curriculum. We may also identify specific educational needs and directly fund the development, acquisition, and distribution of materials to meet those needs.

Precollege Education

Kentucky is currently involved in a systemic reformation of its public K-12 education system, which began under the Kentucky Education Reform Act of 1990 (KERA). The changes at all levels, including postsecondary education, affect the education of those whom we seek to attract to studies in science, technology, engineering, and mathematics (STEM). At the present time, it is recognized that the universities need to provide a vital service in the development of materials and techniques, and in the training of teachers in content and in the new ways of teaching that are mandated for K-12 under KERA. These factors clearly impact the students at all levels in the "pipeline," and KSGC vigorously supports the reformation at all levels, beginning with workshops for teacher training and materials development. Other activities will include, for example, informing teachers of NASA program opportunities and educational materials/activities appropriate for their teaching mission, supporting the Governor's Scholars Program; providing materials to teachers and students who attend planetarium presentations; providing means for teachers to access educational software and materials; and maintaining NASA/KSGC in a leadership role in Kentucky through representation and interaction with the Kentucky Department of Education (KDE). In its precollege activities, the KSGC supports the NASA Education objectives of attaining an improved science and mathematics performance, a strong elementary and secondary teacher workforce, and an adequate pipeline for the science and technology workforce, including greater ethnic, gender, *etc.*, diversity in science and mathematics education. KSGC personnel will continue to serve on task forces implementing national science and mathematics education standards in the state's educational curriculum and teacher certification programs. We will continue to work with Ms. Sue Darnell Ellis (NASA AESP) to identify Kentucky Core Content in NASA educational products, and with Mr. Ron Koczor (MSFC) and the SCICOMM Roundtable in developing NASA-science-based educational materials for use in classrooms.

Public Awareness

Activities designed to increase public exposure of space-related activities in Kentucky and NASA research/missions, and their importance to education and economic development, will include news releases, advertisement of available video and cyber conferences, and advertisement of space-related programming on educational and public television. KSGC will continue to sponsor StarDate throughout much of the state on public radio, and NOVA on public television. Student activities based on space science and exploration inspire interest not only among the students but also among the parents of these students. KSGC will continue participating in the SCICOMM Roundtable to develop NASA-science-based web products, and will facilitate public access of these web products and participation in other web events.

Research Infrastructure Development

We need to continue to exert a major effort toward the development of infrastructure within Kentucky to effect significant and long-term changes in the amount of space-related research and the competitiveness of researchers in Kentucky universities and colleges. The challenge for capability enhancement in Kentucky is twofold: (1) to increase the *number* of researchers participating in space-related fields throughout the state, and (2) to increase the overall *level* of competitiveness of the pool of researchers in Kentucky. In addition to providing "seed" money for research, our plan is to further facilitate these objectives through a variety of avenues -- which are components of building the space-related research infrastructure in Kentucky. The keys to achieving these objectives are to increase communication, cooperation, collaboration, and support of infrastructure-building activities among present and potential members of the Kentucky space-related research community, *and* between this population and NASA's R&D programs.

Campus Objectives Grants

A major component of the Consortium infrastructure development program involves direct grants to Institutional Directors to facilitate KSGC objectives identified at the individual institutions. These grants support activities such as taking students for visits to NASA Centers, sending faculty to consult with potential research collaborators at NASA Centers, developing interdisciplinary and special courses, bringing researchers to campus to speak on space-related research, and promoting awareness of KSGC activities and opportunities in the local area and among faculty, students, and the public.

Communications

In support of our membership and our outreach constituencies, we will continue to develop and expand our web presentations for informing others about space-related research, education, and funding opportunities and resources. Additional communication will occur by way of an annual Aerospace Forum, KSGC Committee meetings, and e-mailings to Institutional Directors. It is a KSGC goal that the Internet will lead to distance learning in support of space-related interest and to the widest possible universe of experience for Kentucky's teachers and students. The Kentucky Space Grant Consortium is a member of the Marshall Space Flight Center Science Communications Roundtable that produces the Science@NASA family of websites. One of the objectives of this multifaceted endeavor is to raise awareness about NASA for a wide constituency.

Connections with NASA Center Programs

An emphasis will be placed on providing information about research opportunities in connection with projects at NASA Centers. The KSGC Associate Director will continue to identify potential collaborations and will serve as a means of establishing communications between Kentucky researchers and NASA researchers. We will distribute information leading to opportunities such as those listed in the *NASA EPSCoR Research Compendium* provided by NASA. We will encourage the development of research connections between Consortium faculty and NASA Centers as an effective means for initiating research projects in Kentucky which will enhance researchers' capabilities and can lead quickly to relevant research and development activities that can compete

for regular NASA funding. The Kentucky Science and Technology Corporation, a KSGC affiliate, recently established a Kentucky office on the campus of the NASA Ames Research Center, and completed an agreement between Ames and Kentucky to develop future research partnerships.

Kentucky NASA EPSCoR Program

The KSGC Center Office and management personnel have responsibility, in conjunction with the Kentucky EPSCoR Program, for management and coordination of the Kentucky NASA EPSCoR Program. The Kentucky NASA EPSCoR Program complements and extends the KSGC enhancement program and serves as an avenue for development of capabilities well beyond the "seed" level, with emphasis on direct collaborations between Kentucky researchers and NASA Centers and missions. The *NASA EPSCoR Research Compendium* provides significant aid to Kentucky researchers in developing collaborations with NASA researchers. It represents a major step forward in the development of space-related infrastructure and an enhanced basis for developing increased competitiveness of researchers in Kentucky. KSGC participants are encouraged to develop research affiliations with the Kentucky NASA EPSCoR Program. Through this program and the organizational structure of the KSGC, we maintain communications and a working relationship with the statewide Kentucky EPSCoR Committee and governing structure. The KSGC will participate jointly in meetings and conferences with this organization, and in related economic development conferences.

Kentucky Aerospace Forum

The annual statewide Aerospace Forum is a major factor in realizing the KSGC program's goals. The next Forum will be held in May 2005. The Forum helps develop a sense of community among the state's faculty and students who are involved in space-related research and education. The Forum will be held in conjunction with the researchers in the Kentucky NASA EPSCoR Program to showcase research projects, to exchange ideas, and to develop further collaborations among state researchers. An External Advisory Panel will participate in the Forum to evaluate progress and to provide advice regarding Kentucky's space-related capability enhancement efforts.

Industry and Economic Development

The KSGC affiliate member Kentucky Center for Space Enterprise (KCSE) provides leadership and contacts for relating space activities and developments to industrial interests in the state. These may be based on direct interests in economic development or on concern for enhancement of educational opportunities in the state. We will endeavor to inform the public of space-related R&D in Kentucky which has potential for enhancing economic development in the state. Projects in the Kentucky NASA EPSCoR research clusters specifically address the issues of technology application and economic development in Kentucky and the nation. Our industry affiliate member, Tribo Flow Separations, developed from applications of Kentucky NASA EPSCoR research, and now advises the Consortium on relations and interactions with industries. The KSGC will continue to work with the Southern Technology Council and the Southern Growth Policies Board, and will work to support the goal of the Commission on the Future of the South to increase the universities' contributions to economic development.

Aerospace Workforce Development Augmentation -- 2003 Report

In 2003, KSGC successfully proposed and received funding from NASA for an Aerospace Workforce Development Program.

Goal: The goal and purpose of the Kentucky Space Grant Consortium's Aerospace Workforce Development Program is to enlarge and enhance the pool of well-prepared students and faculty who can contribute to NASA's workforce as employees, contractors, and principal investigators.

Objectives: The objectives of the program are to attract, motivate, and prepare students for technological careers in support of NASA, its missions, and its research efforts. We reach outstanding Kentucky students to provide experiential learning directed specifically toward personal preparation for entering the aerospace workforce. The program provides an effective ***interface*** between the education "pipeline" and the workforce consumers -- NASA, its contractors, and its principal investigators.

Based on the premise that "experience is the best teacher," this program provides highly-qualified students with a comprehensive, interdisciplinary aerospace mission development experience, from concept development through payload development, integration, launch, mission operations, and data analysis. This comprehensive student experience simulates a NASA mission, with students experiencing the range of roles, responsibilities, constraints, and interactions across the spectrum of project management, planning, preparation, and execution -- including interaction with advisors from NASA and aerospace industry.

Vision and Need: Responding to *Renewed Spirit of Discovery: The President's Vision for U.S. Space Exploration,* including the moon, Mars, and beyond, the President's Commission recommended that ***"this next generation of explorers should engage in significant hands-on and interdisciplinary experiences in the scientific, engineering, and technical disciplines."***

Exploration of Mars and the Moon, as proposed in the President's *Vision for Space Exploration* and the Aldridge Commission's *Report*, are current aerospace subjects with great potential to inspire the next generation of explorers, as is the recent centennial of the Wright brothers' first flight. The excitement of these subjects inspires our project, named **BIG BLUE** (***Baseline Inflatable-wing Glider, Balloon-Launched Unmanned Experiment***), in positively impacting the development of NASA's future workforce through **student development of inflatable-wing technology for an airplane that can be stored in compact form and is capable of flying on Mars. Participants learn to fly on earth, then "as on Mars."** Other participants were engaged in a **Moonbuggy** project inspired by past and future lunar exploration prospects, as well as an engineering research project on **NASA's KC-135**.

Workforce-experience participations included:

- A trip to **Kitty Hawk**, NC, to develop hardware and flying skills in preparation for the Mars glider balloon mission.
- Development of **BIG BLUE II (Phase II) flight hardware**, involving trips to **NASA Ames Research Center** as well as to partner, **NASA contractor ILC Dover**.
- Successful **BIG BLUE II mission** balloon flight in Colorado with deployment and rigidization of inflatable glider wings at the edge of space.
- **NASA MSFC Moonbuggy team** developed in 2003 at Murray State University placed 8th in the 2004 **NASA Great Moonbuggy Competition** at **Marshall Space Fight Center**. The faculty mentors for the team will provide workshops in 2004/05 to increase participation in the state.
- **NASA JSC KC-135** project at the University of Kentucky's Paducah facility tested structural dynamics related to a **NASA JPL** ultralightweight weather-mapping antenna.

- An Eastern Kentucky University chemistry major established a **NASA GSFC** research project through the Summer 2004 **NASA Academy** program.
- A Western Kentucky University physics major spent 5 days at **NASA GSFC** participating in tours and seminars about research opportunities in **NASA**.

Phase II Metrics (2003): Summary of the 2003 project's outcome metrics to date (some projects/degree programs are not yet completed):

- ❑ Number of students participating at all levels 107
- ❑ Number of students completing learn-about-NASA activities 75
- ❑ Number of student interactions with NASA Centers, installations, or contractors ...86
- ❑ Number of presentations made by participants 14
- ❑ Number of students expressing an intention to work for NASA or contractor 17
- ❑ Number of students applying for student opportunities at NASA or contractor.....12
- ❑ Number of students applying for employment with NASA, contractor, aerospace ..*13
- ❑ Number of students pursuing advanced degrees in aerospace-related fields 15

*This number is expected to increase, as an aerospace industry is about to locate in Lexington, KY.

Numbers of Workforce 2003 Participants by Level, Gender, and Race

		Male					Female					
Level	Total	Cauc.	Afr. Amer.	Hisp.	Asian	Nat. Amer.	Cauc.	Afr. Amer.	Hisp.	Asian	Nat. Amer.	Disability
Faculty	15	10				1	4					2
PhD	4	3					1					
Master	14	9			2		1			2		
Senior	54	45			1		8					1
Junior	15	15										
Soph.	3	1						1		1		
Fresh.	2	1					1					
H.Sch.	15	10					5					

Some highlights from the 2003 workforce development program include:

- 76 student participants in BIG BLUE Mars airplane project
- 23 student participants in NASA MSFC Moon Buggy Competition
- 6 student participants in NASA KC-135 project at JSC
- 20 female student participants
- Female African student involved in BIG BLUE
- Student with disability involved in BIG BLUE
- Female student participant in NASA Academy at GSFC
- Student summer intern at ILC Dover
- Student summer interns at NASA Glenn and NASA Langley Research Centers
- Student in 5-day visit to NASA GSFC laboratories and seminars
- One student going into Aerospace Engineering at Georgia Tech
- Two students taking space or defense related jobs in Huntsville, AL
- One student taking a defense-related job; a student going to graduate school in Illinois
- Student attending graduate school in flight control systems.
- Engineering Summer Program Learn-to-Fly project involved 14 high school students
- Visits to schools introduced BIG BLUE project to precollege students
- Wind-tunnel exhibit is being built for Kentucky Aviation Museum
- Asbury College Comm. Arts majors are making a BIG BLUE video documentary
- **Modeling of the program for other states** as a basis for a **Virtual Space Academy** (AR, p.43) has progressed through presentations to two Starting Student Space Hardware workshops and the American Association of Physics Teachers, and features in Space News, Space Daily, Science.NASA.gov (MSFC), and the NASA Education website.

Of the 38 respondents to one BIG BLUE II survey, 32 attended the internal CDR and test flight experiments, and 26 participated in Engineers-Day activities. There were 11 students who did not know about aerospace careers before BIG BLUE and are now interested. A large majority in another survey (19 of 22 responding) are considering careers in aerospace. Objectives to date on the Phase II schedule were met, with the exception of a postponed visit to the UT Space Institute and a Learn-to-Fly experience that was postponed pending technical developments.

A faculty mentor for the Moonbuggy team reported, regarding participation by a female engineering physics freshman:

> ***"Amanda was on the fence about remaining an engineering major and I believe the competition brought her back for this year."***

This statement illustrates the true role and capability of the Space Grant Aerospace Workforce Development program, and in fact all of the Space Grant research capability initiatives. It is important to recognize what they realistically can – and cannot— accomplish:

- **Project involvement** of struggling or uncommitted STEM students can lead to retention.
- STEM recruitment does not likely occur from the unprepared general college population.
- **Involvement** of STEM students in aerospace-related projects increases their awareness of, interest in, and preparation for – careers in aerospace and NASA-related areas.

Faculty capability is also being developed in the program in several research areas that can support future opportunities in aerospace project experiences for STEM students:

- BIG BLUE is a multidisciplinary project led by University of Kentucky (UK) faculty members Suzanne Weaver Smith (inflatable aerospace structures), Jamey Jacob (aerodynamics, airfoils), William Smith (communications, antennas), and James Lumpp (electronic control systems, avionics).
- **The compelling question "can inflatable wings fly in low-density atmospheres (as on Mars)?"** led to BIG BLUE, and from there to 3 DARPA-funded projects on wing design and performance, and to a homeland security project involving morphing wings, control networking, and conformal antenna designs to improve all-weather reliability of UAVs.
- The number of classes per academic year offered related to BIG BLUE has increased from 4 for Phase I to 7 for Phase II to 11 for planned Phase III.
- The UK/Paducah NASA/JSC KC-135 student research team is led by Jack Leifer (mechanical structures and dynamics).
- The Murray State University undergraduate Moon Buggy development and competition team is led by James Rogers (engineering physics), who is developing with KSGC support a workshop and regional competition to increase participation in NASA's Moon Buggy events.

Program presentations include:

- **"Space Grant Student Involvement -- Student Payload-to-Altitude Comprehensive Experience."** Richard Hackney, Suzanne Smith, Justin Kearns, and Karen Hackney, American Association of Physics Teachers, Miami, Florida, January 2004.
- **"To the Edge of Space x2."** Richard Hackney, Suzanne Smith, Justin Kearns, Will Wathen, and Karen Hackney, National Space Grant Student Space Hardware Program Workshop, Boulder, Colorado, June 17, 2004.
- **"Learning to Fly on Mars"** Suzanne Weaver Smith, NASA Education Website: http://www.nasa.gov/audience/forstudents/postsecondary/features/F_Learning_to_Fly_on_Mars.html

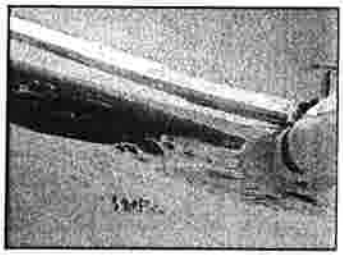
Research presentations to date, or planned for future meetings, include:

- **"Second Generation Inflatable/Rigidizable Wings for Low-Density Applications,"** Usui M., J.D. Jacob, S.W. Smith, S. Scarborough and D. Cadogan, to be presented at the 46th AIAA Gossamer Spacecraft Forum, Austin, TX, April 2005.
- **"BIG BLUE: A High-Altitude UAV Demonstrator of Mars Airplane Technology,"** Lumpp, J.E., et. al., IEEE Aerospace Conference, Big Sky, MT, March 2005.
- **"Design of a Low-cost Avionics, Mission Control and Ground Communication System for a High-Altitude UAV,"** Rawashdeh, O., Lumpp, J.E., et. al., IEEE Aerospace Conference, Big Sky, MT, March 2005.
- **"BIG BLUE II: Mars Aircraft Prototype with Inflatable-Rigidizable Wings ,"** Simpson, A.D., Rawashdeh, O., Smith, S.W., Jacob, J.D., Smith, W.T and Lumpp, J.E," accepted for presentation at the 43nd AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 2005.
- **"Flying on Air: UAV Flight Testing with Inflatable Wing Technologies,"** Simpson, et. al., AIAA-2004-6570, AIAA 3rd Unmanned Unlimited Technical Conference, Workshop and Exhibit, Chicago, IL, Sept 2004.
- **"Aeromechanics of Inflatable Wings,"** Simpson, A.D., Usui, M., Smith, S.W., Jacob, J.D., Presentation and paper written for the AIAA 34th Fluid Dynamics Conference, Portland, OR, June 2004
- **"Design of Inflatable-Rigidizable Wings for Low-Density Flight Applications."** Usui, M., Masters Thesis, Dept. of Mechanical Engineering, University of Kentucky, Lexington, KY, May 2004.
- **"BIG BLUE: Autonomous Flight Demonstration of Mars Airplane Technology,"** Wathen, W.F., S.W. Smith, J.D. Jacob, J.E. Lumpp, and W.T. Smith, 10th Annual Kentucky EPSCoR Conference and KSGC Aerospace Forum, Lexington, KY, May 2004.
- **"Development of UV-Curable Inflatable Wings for Low Density Flight Applications,"** Kearns, J., Usui, M., Smith, S., Scarborough, S., Smith, T., Cadogan, D AIAA-2004-1503, 45th AIAA Gossamer Spacecraft Forum, Palm Springs, CA, April 2004.
- **"Development of a UAV with Inflatable Wings,"** Simpson, A.D., Jacob, J.D., Presentation at the 29th Annual Dayton-Cincinnati Aerospace Sciences Symposium, March 9, 2004
- **"Aeromechanics of a Low Re Inflatable Wing,"** Usui, M., Smith, S.W., Jacob, J.D., Presentation at the 29th Annual Dayton-Cincinnati Aerospace Sciences Symposium, March 9, 2004
- **"Development and Flight Testing of a UAV with Inflatable-Rigidizable Wings,"** Simpson, A.D., Usui, M., Smith, S.W., Jacob, J.D. Presentation and paper written for the 42nd AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 2004.

BIG BLUE Phase II flight team at payload recovery in Colorado.

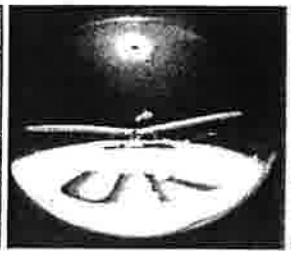
UK/Paducah students in NASA KC-135 JSC/ JPL research project.

Murray State Univ. MSFC Moonbuggy team.



Flight-camera aerial view of the students at Kitty Hawk.

The "Wright stuff."



BIG BLUE II looking up at the edge of space.

Michiko smiles, holding the wing she designed.

Budgets

In this section, we outline the proposed KSGC budget for FY 2005, the fourteenth year of the KSGC program, and budget projections for FY 2006-2009.

The included forms and supporting documentation are itemized below:

Fourteenth-Year Budget Plan, Kentucky Space Grant Consortium (KSGC)
For the Period: March 1, 2005 - June 30, 2006*

***Budget Period**: This is a multi-year NASA award. The budget will cover expenses incurred beginning March 1, 2005, including awards with terms running through June 30, 2006. The budget will need to be arranged to cover awards that will extend through June 30, 2006.

****Affiliate Funding:** The Consortium awards funding for fellowships, scholarships, and enhancement projects on the basis of competitive proposals from faculty and students at member institutions. The awards have not been determined, and the amounts are not known by institution. We therefore provide data as a summary of the pooled funds by program area.

	----- From NASA -----		--Consortium Cost Share--	
	NASA to WKU	**NASA to Consortium**	**WKU Cost Sharing**	**Affiliate Cost Share**
Director (50% for AY 05/06)	20,979		20,979	
Director (10 days summer 04/05 rate)	4,440			
Director (10 days summer 05/06 rate)	4,660			
Associate Director (25% for AY 04-05)	8,804		8,804	
Associate Director (10 days summer 05)	3,730			
Associate Director (10 days summer 05)	3,910			
Adm. Secretary (50% 3/1/05-6/30/05)			3,848	revised -
Adm. Secretary (50% 7/1/05-2/28/06)			8,081	
Fringe (faculty @ 31.36% AY)	9,340		9,340	see internal
Fringe (faculty @ 22.47% summer)	3,762			budget
Fringe (support staff in 2005 @ 33.78%)			1,300	
Fringe (support staff in 2006 @ 33.78%)			2,730	1/21/05
Office Operation	5,983			
Travel	8,000			
Aerospace Forum		4,000		
Research/Workshop Grants		**60,000		58,584
Fellowships		**50,000		
Campus Grants		**11,000		11,000
Indirect (22% of salaries)	10,235		9,177	
TOTALS	**83,843**	**125,000**	**64,259**	**69,584**

	----- From NASA -----	--Consortium Cost Share--
GRAND TOTALS	**$208,843**	**$133,843**

Richard Hackney Date 11/29/04
Richard Hackney
KSGC Director
Western Kentucky University

Phillip E. Myers Date 11/29/04
Phillip E. Myers
Executive Director
WKU Research Foundation

Direct Labor -- KSGC Fourteenth Year 2005/2006

	NASA	Other	Total
Director			
50% effort, academic year 05/06 (750 hours)	20,979	20,979	41,958
Fringe at 31.36%	6,579	6,579	13,158
33% effort, summer 05 (167 hours)	9,100		9,100
Fringe at 22.47%	2,045		2,045
Associate Director			
25% effort, academic year 05/06 (375 hours)	8,804	8,804	17,608
Fringe at 31.36%	2,761	2,761	5,522
33% effort, summer 05 (167 hours)	7,640		7,640
Fringe at 22.47%	1,717		1,717
Admin. Secretary			
50% effort, 3/1/05-6/30/05 and 7/01/05-2/28/06 (1000 hrs)		11,929	11,929
Fringe at 33.78%		4,030	4,030
TOTALS	$59,625	$55,082	$114,707
	NASA	**Other**	**Total**

Detail of Director Salary Components

	NASA Funding **TOTAL Dollars** for a 12-month period (academic year + summer time)	Matching Funds **TOTAL Dollars** for a 12-month period (academic year + summer time)	NASA Funding **Percentage of TOTAL time** for a 12-month period (academic year + summer time)	Matching Funds **Percentage of TOTAL time** for a 12-month period (academic year + summer time)
Director	Salary $30,079 Fringe $ 8,624 Total $38,703	Salary $20,979 Fringe $ 6,579 Total $27,558	27%	19%

Estimated Travel -- KSGC Fourteenth Year 2005/2006

Location	#People Total	Airfare/ Mileage	Car Rental	#Days	Per Deim	Registration	Total
Washington, DC	2	$546	$320	4	$916*	$400	$2182
Louisville, KY	3	-	$73	1	-	-	$73
Ithaca, NY	2	$1100	-	3	$594	$600	$2294
Space Telescope/ Goddard Space Flight Center	1	$231	$108	2	$163	-	$502
Marshall Space Flight Center	15	-	$193[H]	1	$930	-	$1123
Conference at Louisville, KY	14[I]	-	$200	2	$784	$280	$1264
Frankfort, KY	2	-	$76	1	$164	-	$240
Lexington, KY	2	-	$76	1	$246	-	$322
TOTAL		$1877	$1046		$3797	$1280	$8000

*Based on double occupancy
[H]15-passenger van
[I]From different institutions

NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM

CONSORTIUM BUDGET SUMMARY FOR March 1, 2005 to February 28, 2006

Name of Consortium **Kentucky Space Grant Consortium**

BUDGETED FUNDING SOURCES

	CASH	OTHER	TOTAL
NASA SPACE GRANT FUNDS			$ 208,843
OTHER FEDERAL FUNDS		$	$
NONFEDERAL MATCHING FUNDS			
Lead Institution	$	$ 64,259	$ 64,259
Academic Affiliates	$	$ 69,584	$ 69,584
State/Local Gov't	$	$	$ 0
Industry	$	$	$ 0
Nonprofit Org's	$	$	$ 0
Other(identify)	$	$	$ 0
TOTAL NONFEDERAL FUNDS	$	$ 133,843	$ 133,843
TOTAL BUDGETED FUNDING	$	$ 133,843	$ 342,686

PROPOSED EXPENDITURES	NASA S.G.	OTHER FEDERAL	NON-FEDERAL	TOTAL
Direct Labor	$ 59,625	$	$ 55,082	$ 114,707
Estimated Travel	$ 8,000	$	$	$ 8,000
Supplies/Services	$ 5,983	$	$	$ 5,983
Other Direct Costs	$ 75,000	$	$ 69,584	$ 144,584
Indirect Costs	$ 10,235	$	$ 9,177	$ 19,412
Fellowships	$ 50,000	$	$	$ 50,000
TOTAL ESTIMATED COSTS	$ 208,843	$ 0	$ 133,843	$ 342,686

NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM

CONSORTIUM SUMMARY OF PROPOSED EXPENDITURE BY PROGRAM

FOR PERIOD March 1, 2005 to February 28, 2006

Name of Consortium **Kentucky Space Grant Consortium**

	NASA	OTHER FEDERAL	NON-FEDERAL	TOTAL
Research Infrastructure	$ 37,500	$	$ 39,584	$ 77,084
Higher Education:	$ 11,000	$	$ 6,000	$ 17,000
K-12:	$ 24,500	$	$ 20,000	$ 44,500
General Public:	$ 1,500	$	$ 2,000	$ 3,500
External Relations:	$ 1,500	$	$ 2,000	$ 3,500
Consortium Admin. Costs:	$ 72,608	$	$ 55,082	$ 127,690
Indirect Costs:	$ 10,235	$	$ 9,177	$ 19,412
Fellowships	$ 50,000	$		$ 50,000
TOTAL:	$ 208,843	$ 0	$ 133,843	$ 342,686

NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM

PROPOSED EXPENDITURE BY INSTITUTION BY PROGRAM

FOR PERIOD March 1, 2005 to February 28, 2006

Name of Consortium **Kentucky Space Grant Consortium**

Name of Institution Western Kentucky University (as Lead Institution*)

	NASA	OTHER FEDERAL	NON-FEDERAL	TOTAL
Research Infrastructure	$ 1,500	$	$	$ 1,500
Higher Education:	$ 1,000	$	$	$ 1,000
K-12:	$ 500	$	$	$ 500
General Public:	$ 1,000	$	$	$ 1,000
External Relations:	$ 1,000	$	$	$ 1,000
Consortium Admin. Costs:	$ 72,608	$	$ 55,082	$ 127,690
Indirect Costs:	$ 10,235	$	$ 9,177	$ 19,412
Fellowships	$	$	$	$
TOTAL:	$ 87,843	$ 0	$ 64,259	$ 152,102

* These figures are for the role as Lead Institution, maintaining the Center Office, conducting programs, arranging meetings, and promoting Space Grant throughout the state. As a member of the Consortium, the Lead Institution's faculty and students are also eligible to compete for funding for fellowships, scholarships, and enhancement projects from the funds described on the page that summarizes the affiliate funding pool.

NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM

PROPOSED EXPENDITURE BY INSTITUTION BY PROGRAM

FOR PERIOD March 1, 2005 to February 28, 2006

Name of Consortium **Kentucky Space Grant Consortium**

Name of Institution Competitive Pool for All Affiliates*

	NASA	OTHER FEDERAL	NON-FEDERAL	TOTAL
Research Infrastructure	$ 36,000	$	$ 39,584	$ 75,584
Higher Education:	$ 10,000	$	$ 8,000	$ 18,000
K-12:	$ 24,000	$	$ 20,000	$ 44,000
General Public:	$ 500	$	$ 1,000	$ 1,500
External Relations:	$ 500	$	$ 1,000	$ 1,500
Consortium Admin. Costs:	$	$	$	$
Indirect Costs:	$	$	$	$
Fellowships	$ 50,000	$	$	$ 50,000
TOTAL:	$ 121,000	$ 0	$ 69,584	$ 190,584

* The Consortium awards funding for fellowships, scholarships, and enhancement projects on the basis of competitive proposals from faculty and students at member institutions. The awards have not been determined, and the amounts are not known by institution. We therefore provide data as a summary of the pooled funds by program area, as estimated at the beginning of the budget year.

Fifteenth-Year Budget Plan, Kentucky Space Grant Consortium (KSGC)
For the Period: March 1, 2006 - June 30, 2007*

***Budget Period**: This is a multi-year NASA award. The budget will cover expenses incurred beginning March 1, 2006, including awards with terms running through June 30, 2007. The budget will need to be arranged to cover awards that will extend through June 30, 2007.

****Affiliate Funding:** The Consortium awards funding for fellowships, scholarships, and enhancement projects on the basis of competitive proposals from faculty and students at member institutions. The awards have not been determined, and the amounts are not known by institution. We therefore provide data as a summary of the pooled funds by program area.

	----- From NASA -----		--Consortium Cost Share--	
	NASA to WKU	**NASA to Consortium**	**WKU Cost Sharing**	**Affiliate Cost Share**
Director (50% for AY 06/07)	22,028		22,028	
Director (10 days summer 05/06 rate)	4,660			
Director (10 days summer 06/07 rate)	4,900			
Associate Director (25% for AY 05/06)	9,245		9,245	
Associate Director (10 days summer 06)	3,910			
Associate Director (10 days summer 06)	4,110			
Adm. Secretary (50% 3/1/06-6/30/06)			4,040	
Adm. Secretary (50% 7/1/06-2/28/07)			8,485	
Fringe (faculty @ 31.36% AY)	9,807		9,807	
Fringe (faculty @ 22.47% summer)	3,951			
Fringe (support staff in 2006 @ 33.78%)			1,365	
Fringe (support staff in 2007 @ 33.78%)			2,866	
Office Operation	5,485			
Travel	8,000			
Aerospace Forum		4,000		
Research/Workshop Grants		**57,000		55,371
Fellowships		**50,000		
Campus Grants		**11,000		11,000
Indirect (22% of salaries)	10,747		9,636	
TOTALS	**86,843**	**122,000**	**67,472**	**66,371**
	----- From NASA -----		**--Consortium Cost Share--**	
GRAND TOTALS	**$208,843**		**$133,843**	

Richard Hackney Date 11/29/04

Richard Hackney
KSGC Director
Western Kentucky University

Phillip E. Myers Date 11/29/04

Phillip E. Myers
Executive Director
WKU Research Foundation

Sixteenth-Year Budget Plan, Kentucky Space Grant Consortium (KSGC)
For the Period: March 1, 2007 - June 30, 2008*

***Budget Period**: This is a multi-year NASA award. The budget will cover expenses incurred beginning March 1, 2007, including awards with terms running through June 30, 2008. The budget will need to be arranged to cover awards that will extend through June 30, 2008.

****Affiliate Funding:** The Consortium awards funding for fellowships, scholarships, and enhancement projects on the basis of competitive proposals from faculty and students at member institutions. The awards have not been determined, and the amounts are not known by institution. We therefore provide data as a summary of the pooled funds by program area.

	----- From NASA -----		--Consortium Cost Share--	
	NASA to WKU	**NASA to Consortium**	**WKU Cost Sharing**	**Affiliate Cost Share**
Director (50% for AY 07/08)	23,130		23,130	
Director (10 days summer 06/07 rate)	4,900			
Director (10 days summer 07/08 rate)	5,140			
Associate Director (25% for AY 06/07)	9,707		9,707	
Associate Director (10 days summer 07)	4,110			
Associate Director (10 days summer 07)	4,310			
Adm. Secretary (50% 3/1/07-6/30/07)			4,242	
Adm. Secretary (50% 7/1/07-2/29/08)			8,909	
Fringe (faculty @ 31.36% AY)	10,298		10,298	
Fringe (faculty @ 22.47% summer)	4,148			
Fringe (support staff in 2007 @ 33.78%)			1,433	
Fringe (support staff in 2008 @ 33.78%)			3,009	
Office Operation	4,815			
Travel	8,000			
Aerospace Forum		4,000		
Research/Workshop Grants		**54,000		51,998
Fellowships		**50,000		
Campus Grants		**11,000		11,000
Indirect (22% of salaries)	11,285		10,117	
TOTALS	**89,843**	**119,000**	**70,845**	**62,998**
	----- From NASA -----		**--Consortium Cost Share--**	
GRAND TOTALS	**$208,843**		**$133,843**	

Richard Hackney Date 11/29/04
Richard Hackney
KSGC Director
Western Kentucky University

Phillip E. Myers Date 11/29/04
Phillip E. Myers
Executive Director
WKU Research Foundation

Seventeenth-Year Budget Plan, Kentucky Space Grant Consortium (KSGC)
For the Period: March 1, 2008 - June 30, 2009*

***Budget Period**: This is a multi-year NASA award. The budget will cover expenses incurred beginning March 1, 2008, including awards with terms running through June 30, 2009. The budget will need to be arranged to cover awards that will extend through June 30, 2009.

****Affiliate Funding:** The Consortium awards funding for fellowships, scholarships, and enhancement projects on the basis of competitive proposals from faculty and students at member institutions. The awards have not been determined, and the amounts are not known by institution. We therefore provide data as a summary of the pooled funds by program area.

	----- From NASA -----		--Consortium Cost Share--	
	NASA to WKU	**NASA to Consortium**	**WKU Cost Sharing**	**Affiliate Cost Share**
Director (50% for AY 08/09)	24,286		24,286	
Director (10 days summer 07/08 rate)	5,140			
Director (10 days summer 08/09 rate)	5,400			
Associate Director (25% for AY 07/08)	10,192		10,192	
Associate Director (10 days summer 08)	4,310			
Associate Director (10 days summer 08)	4,530			
Adm. Secretary (50% 3/1/08-6/30/08)			4,455	
Adm. Secretary (50% 7/1/08-2/28/09)			9,354	
Fringe (faculty @ 31.36% AY)	10,812		10,812	
Fringe (faculty @ 22.47% summer)	4,354			
Fringe (support staff in 2008 @ 33.78%)			1,505	
Fringe (support staff in 2009 @ 33.78%)			3,160	
Office Operation	4,970			
Travel	8,000			
Aerospace Forum		4,000		
Research/Workshop Grants		**50,000		48,456
Fellowships		**50,000		
Campus Grants		**11,000		11,000
Indirect (22% of salaries)	11,849		10,623	
TOTALS	**93,843**	**115,000**	**74,387**	**59,456**
	----- From NASA -----		**--Consortium Cost Share--**	
GRAND TOTALS	**$208,843**		**$133,843**	

Richard Hackney Date 11/29/04
Richard Hackney
KSGC Director
Western Kentucky University

Phillip E. Myers Date 11/29/04
Phillip E. Myers
Executive Director
WKU Research Foundation

Eighteenth-Year Budget Plan, Kentucky Space Grant Consortium (KSGC)
For the Period: March 1, 2009 - June 30, 2010*

***Budget Period**: This is a multi-year NASA award. The budget will cover expenses incurred beginning March 1, 2009, including awards with terms running through June 30, 2010. The budget will need to be arranged to cover awards that will extend through June 30, 2010.

****Affiliate Funding:** The Consortium awards funding for fellowships, scholarships, and enhancement projects on the basis of competitive proposals from faculty and students at member institutions. The awards have not been determined, and the amounts are not known by institution. We therefore provide data as a summary of the pooled funds by program area.

	----- From NASA -----		--Consortium Cost Share--	
	NASA to WKU	**NASA to Consortium**	**WKU Cost Sharing**	**Affiliate Cost Share**
Director (50% for AY 09/10)	25,500		25,500	
Director (10 days summer 08/09 rate)	5,400			
Director (10 days summer 09/10 rate)	5,670			
Associate Director (25% for AY 08/09)	10,702		10,702	
Associate Director (10 days summer 09)	4,530			
Associate Director (10 days summer 09)	4,760			
Adm. Secretary (50% 3/1/09-6/30/09)			4,677	
Adm. Secretary (50% 7/1/09-2/28/10)			9,822	
Fringe (faculty @ 31.36% AY)	11,353		11,353	
Fringe (faculty @ 22.47% summer)	4,575			
Fringe (support staff in 2009 @ 33.78%)			1,580	
Fringe (support staff in 2010 @ 33.78%)			3,318	
Office Operation	3,909			
Travel	8,000			
Aerospace Forum		4,000		
Research/Workshop Grants		**47,000		44,737
Fellowships		**50,000		
Campus Grants		**11,000		11,000
Indirect (22% of salaries)	12,444		11,154	
TOTALS	**96,843**	**112,000**	**78,106**	**55,737**

	----- From NASA -----	--Consortium Cost Share--
GRAND TOTALS	**$208,843**	**$133,843**

Richard Hackney Date 11/29/04
Richard Hackney
KSGC Director
Western Kentucky University

Phillip E. Myers Date 11/29/04
Phillip E. Myers
Executive Director
WKU Research Foundation

Kentucky Space Grant Consortium
BUDGET SUMMARY
Year 14

From March 1, 2005 To June 30, 2006

	RECIPIENT'S COSTS	NASA USE ONLY	
	A	B	C
1. Direct Labor (salaries, wages, and fringe benefits)	59,625		
2. Other Direct Costs:			
a. Affiliate Awards	121,000		
b. Consultants			
c. Equipment			
d. Supplies	5,983		
e. Travel	8,000		
f. Other (Meetings/Forums)	4,000		
3. Indirect Costs	10,235		
4. Other Applicable Costs (Match)	133,843		
5. SUBTOTAL -- Estimated Costs	342,686		
6. Less Proposed Cost Sharing (if any)	133,843		
7. Carryover Funds (if any) a. Anticipated amount_____ b. Amount used to reduce budget			
8. TOTAL ESTIMATED COST	208,843		xxxxxxxxx
APPROVED BUDGET	xxxxxxxxxx	xxxxxxxxxx	

Kentucky Space Grant Consortium
BUDGET SUMMARY
Year 15

From March 1, 2006 To June 30, 2007

	RECIPIENT'S COSTS	NASA USE ONLY	
	A	**B**	**C**
1. Direct Labor (salaries, wages, and fringe benefits)	62,611		
2. Other Direct Costs:			
a. Affiliate Awards	118,000		
b. Consultants			
c. Equipment			
d. Supplies	5,485		
e. Travel	8,000		
f. Other (Meetings/Forums)	4,000		
3. Indirect Costs	10,747		
4. Other Applicable Costs (Match)	133,843		
5. SUBTOTAL -- Estimated Costs	342,686		
6. Less Proposed Cost Sharing (if any)	133,843		
7. Carryover Funds (if any) a. Anticipated amount b. Amount used to reduce budget			
8. TOTAL ESTIMATED COST	208,843		xxxxxxxxx
APPROVED BUDGET	xxxxxxxxxxx	xxxxxxxxxx	

Kentucky Space Grant Consortium
BUDGET SUMMARY
Year 16

From March 1, 2007 To June 30, 2008

	RECIPIENT'S COSTS	NASA USE ONLY	
	A	**B**	**C**
1. Direct Labor (salaries, wages, and fringe benefits)	65,743		
2. Other Direct Costs:			
a. Affiliate Awards	115,000		
b. Consultants			
c. Equipment			
d. Supplies	4,815		
e. Travel	8,000		
f. Other (Meetings/Forums)	4,000		
3. Indirect Costs	11,285		
4. Other Applicable Costs (Match)	133,843		
5. SUBTOTAL -- Estimated Costs	342,686		
6. Less Proposed Cost Sharing (if any)	133,843		
7. Carryover Funds (if any) a. Anticipated amount_____ b. Amount used to reduce budget			
8. TOTAL ESTIMATED COST	208,843		xxxxxxxxx
APPROVED BUDGET	xxxxxxxxxxx	xxxxxxxxxx	

Kentucky Space Grant Consortium
BUDGET SUMMARY
Year 17

From March 1, 2008 To June 30, 2009

	RECIPIENT'S COSTS	NASA USE ONLY	
	A	**B**	**C**
1. Direct Labor (salaries, wages, and fringe benefits)	69,024		
2. Other Direct Costs:			
a. Affiliate Awards	111,000		
b. Consultants			
c. Equipment			
d. Supplies	4,970		
e. Travel	8,000		
f. Other (Meetings/Forums)	4,000		
3. Indirect Costs	11,849		
4. Other Applicable Costs (Match)	133,843		
5. SUBTOTAL -- Estimated Costs	342,686		
6. Less Proposed Cost Sharing (if any)	133,843		
7. Carryover Funds (if any) a. Anticipated amount_____ b. Amount used to reduce budget			
8. TOTAL ESTIMATED COST	208,843		xxxxxxxxx
APPROVED BUDGET	xxxxxxxxxxx	xxxxxxxxxx	

Kentucky Space Grant Consortium
BUDGET SUMMARY
Year 18

From March 1, 2009 To June 30, 2010

		RECIPIENT'S COSTS	NASA USE ONLY	
		A	B	C
1.	Direct Labor (salaries, wages, and fringe benefits)	72,490		
2.	Other Direct Costs:			
	a. Affiliate Awards	108,000		
	b. Consultants			
	c. Equipment			
	d. Supplies	3,909		
	e. Travel	8,000		
	f. Other (Meetings/Forums)	4,000		
3.	Indirect Costs	12,444		
4.	Other Applicable Costs (Match)	133,843		
5.	SUBTOTAL -- Estimated Costs	342,686		
6.	Less Proposed Cost Sharing (if any)	133,843		
7.	Carryover Funds (if any) a. Anticipated amount_____ b. Amount used to reduce budget			
8.	TOTAL ESTIMATED COST	208,843		xxxxxxxxx
APPROVED BUDGET		xxxxxxxxxxx	xxxxxxxxxx	

Kentucky Space Grant Consortium
FIVE-YEAR BUDGET SUMMARY
Years 14-18

From March 1, 2005 To June 30, 2010

		RECIPIENT'S COSTS	NASA USE ONLY	
		A	B	C
1.	Direct Labor (salaries, wages, and fringe benefits)	329,493		
2.	Other Direct Costs:			
	a. Affiliate Awards	573,000		
	b. Consultants			
	c. Equipment			
	d. Supplies	25,162		
	e. Travel	40,000		
	f. Other (Meetings/Forums)	20,000		
3.	Indirect Costs	56,560		
4.	Other Applicable Costs (Match)	669,215		
5.	SUBTOTAL -- Estimated Costs	1,713,430		
6.	Less Proposed Cost Sharing (if any)	669,215		
7.	Carryover Funds (if any) a. Anticipated amount_____ b. Amount used to reduce budget			
8.	TOTAL ESTIMATED COST	1,044,215		xxxxxxxxx
	APPROVED BUDGET	xxxxxxxxxxx	xxxxxxxxxx	